Conceptions of Curricular Integration in an Undergraduate Degree Program:

A Case Study in Pharmaceutical Sciences

by

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Abstract

This study examined conceptions of curricular integration held by actors in an undergraduate pharmacy program, and the relationship of those conceptions to observed integration in a curriculum espoused in program documents, enacted by instructors, and experienced by students. Points of convergence and divergence between the espoused, enacted, and experienced dimensions of the curriculum were also examined. The conceptual framework used was Hubball and Burt's curriculum design model, with data collection and analysis further informed by Chinowsky's practice implementation matrix.

Qualitative case study methodology was employed, using the baccalaureate program of the Faculty of Pharmaceutical Sciences at the University of British Columbia as an instrumental case. Data sources included documents, such as curriculum planning records and course syllabi; classroom observations; interviews with curriculum planning leaders, course coordinators, and external stakeholders with supervisory roles as preceptors and employers; and focus group interviews with students.

Findings suggested that individuals' conceptions of curriculum integration related to their experiences and were uninformed by scholarship or theoretical models. Curriculum planning leaders' and course coordinators' understandings emphasized horizontal integration across disciplines, reflecting their experiences as disciplinary experts and teachers in a discipline-based curriculum with some multidisciplinary components. External stakeholders had little understanding of curricular integration, reflecting their minimal connection to the curriculum. Students co-constructed broader notions of curricular integration that included horizontal and vertical dimensions, reflecting their holistic experiences of the curriculum.

Structural, content, and pedagogical strategies supported integration within the curriculum. Comparison of the espoused and enacted curriculum showed that intended structural and content aspects were implemented, while the pedagogical promise of the espoused curriculum was not fully realized in the enacted curriculum, with integrative pedagogies often missing. Although most curriculum planning leaders and course coordinators appeared satisfied with their efforts, students described missed opportunities for integration and expressed strong interest in integrative learning through arrangement of content by disease states rather than disciplines and by case-based teaching and assessment. Implications for curricular redesign in higher education include the need for effective curriculum leadership and scholarship, and attention to perspectives of key stakeholders, especially students, to ensure congruence between the espoused, enacted, and experienced curriculum.

Preface

The selection, design, and conduct of the research project reported in this dissertation are entirely my own work.

A portion of Chapter 2 was published as a review paper [Pearson, M. L., & Hubball, H. T. (2012). Curricular integration in pharmacy education. *American Journal of Pharmaceutical Education 76*(10), Article 204. doi:10.5688/ajpe7610204]. This publication was based on one of my comprehensive papers, written in its entirety by me. My research supervisor, Dr. Harry Hubball, provided advice on preparing a condensed version suitable for publication and on selecting a publication venue. A slightly modified version of Figure 8 in Chapter 3 appeared as an appendix in this manuscript. Also, a portion of Chapter 3 was submitted for publication in February 2014 [Pearson, M. L., Albon, S. P., & Hubball, H. T. *Case study methodology: Flexibility, rigour, and ethical considerations for the scholarship of teaching and learning*. Manuscript submitted for publication.]. This manuscript was based on one of my comprehensive papers and a draft of Chapter 3 that was submitted for an assignment in EDCP 513 – Case Study, supplemented by the methodology chapter in Dr. Albon's PhD dissertation. It was primarily written by me, with input from Drs. Albon and Hubball.

The portion of this study that involved data collection through classroom observations, interviews, focus groups, and access to course materials received ethics approval from the University of British Columbia's Behavioural Research Ethics Board (Certificate #H11-02966).

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Glossary

Curricular integration: The intentional connections made between different elements of a planned program of study (Case, 1991).

Curriculum: A planned program of study that has been designed to provide a coherent set of learning experiences aimed at developing particular outcomes (Hubball & Gold, 2007).

Curriculum structure: Temporal organization of the curriculum, including the arrangement of content in units, modules, and/or courses, and the timetabling and sequencing of this coursework.

Enacted curriculum: The implemented curriculum that is taught to students by instructors.

Espoused curriculum: The intended curriculum that exists in curriculum planning documents.

Experienced curriculum: The curriculum that is received by students.

Horizontal integration: Integration across disciplines within a curriculum, which may be multidisciplinary, interdisciplinary, or transdisciplinary in nature.

Interdisciplinary: A cross-disciplinary approach to teaching and learning where two or more disciplines conjoin to develop a shared understanding of a theme (Drake, 1993).

Integrative learning: Learning where students make connections between different bodies of knowledge and experiences (Association of American Colleges and Universities, 2014a).

Multidisciplinary: A cross-disciplinary approach to teaching and learning where different disciplines remain intact but focus simultaneously on a common theme (Drake, 1993).

Program: A program of study leading to a degree, e.g., a baccalaureate degree program.

Transdisciplinary: A cross-disciplinary approach to teaching and learning where disciplinary distinctions are not evident (Drake, 1993).

Vertical Integration: Integration between theory and practice in a curriculum (referred to here as *vertical-practice* integration) or between elements of the curriculum over time, e.g., between sequential courses (referred to here as *vertical-spiral* integration).

Acknowledgements

I am indebted to the many people who made this work possible. Most of all, I would like to thank my supervisory committee who provided support and critique in appropriate doses at appropriate moments: Dr. Harry Hubball, at whose invitation I embarked on this journey and who has been so generous with his time and expertise and with opportunities to share in his scholarly work; Dr. Tony Clarke, who provided much appreciated practical advice and navigational support; and Dr. David Fielding, who once again helped me bridge between the worlds of pharmacy and education. I especially appreciate the dedication of time and the critical feedback all three provided during the final stages of completing this work, which I found challenging.

I thank the students and my colleagues in the Faculty of Pharmaceutical Sciences who so graciously provided expressions of support and access to their thoughts, experiences, and classrooms. I extend particular thanks to Simon Albon, Sharon Brown, Jim Orr, John Lee, and Kathleen MacLeod for their assistance. I'm especially grateful to Simon, my colleague, friend, and fellow student, whose company on this journey and recent graduation has been a source of affirmation and motivation. I look forward to our future collaborations.

Thanks also to my mother, Betty Pearson, who among other things was a meticulous proofreader, and to my father, John Pearson, for being a proud Dad.

A Faculty of Education Graduate Student Research Grant provided welcome financial assistance for this study.

Dedication

This work is dedicated to my husband, Dr. James Orr, for his unwavering support despite the many hours of loneliness he endured while I was in class or sequestered in my office reading, writing, and pondering. He is my partner in all things, and has been my most willing helper and first reader. He is the wind beneath my wings.

Chapter 1: Introduction

Background

Educational programs at all levels have traditionally been structured along disciplinary lines. In higher education, this is evident in faculty and departmental divisions, research activities, and curricula. However, as has repeatedly been observed by curriculum scholars, the problems and situations that arise in real life rarely fall neatly into the disciplinary categories typically used to structure curricula (e.g., Beane, 1992; Dressel, 1958a; Husband, Todd, & Fulton, 2014; Jacobs, 1989). Furthermore, undergraduate programs usually have the goal of providing a liberal or vocational education to students, not creating disciplinary specialists. By using disciplines as the defining structure, and using disciplinary experts (i.e., PhD-trained researchers) as instructors, there is a risk that students will acquire specific sets of knowledge but have limited ability to draw the connections between them that might be relevant to real life problems.

This disconnect between the siloed, disciplinary approach to teaching and the expectation for integrative learning on the part of students such that they will be able to apply their knowledge in multi-, inter-, or transdisciplinary ways is one of the drivers for contemporary calls for undergraduate degree program reform. Institutional responses include the current emphasis on acquisition of generic skills, inclusion of experiential or service learning, and assessment of program-level outcomes (e.g., University of British Columbia, 2012). As part of these types of efforts to reform undergraduate education, attention is increasingly being paid to curricular integration. This is seen as a useful strategy for making students' experiences in the classroom more relevant and engaging, for helping students form connections between learning in diverse

disciplines, and for providing students with the knowledge and skills for effective participation in the workforce and civil society (Beane, 1992; Huber, Hutchings, & Gale, 2005; Loepp, 1999).

Curricular integration and integrative learning are not new concepts. However, the burden of responsibility for integration is shifting from students, expected to make connections on their own between coursework in different disciplines and between what they learn in classrooms and their life experiences, to the institutions and instructors responsible for designing and teaching curricula (Alsharif, 2014; Huber & Hutchings, 2004; Miller, 2005; O'Brien & Irby, 2013). The increasing institutional concern with curricular integration is driven in part by recognition that integrative learning needs to be explicitly fostered for it to occur for most students (Huber & Hutchings, 2004). Also, integrative learning is hampered by institutional factors such as the proliferation of courses, the emergence of increasingly specialized disciplines, and the rapid expansion of human knowledge and associated diversity of epistemological traditions (Arcario, Eynon, & Clark, 2005; Klein, 2005; Vanasupa, McCormick, Stefanco, Herter, & McDonald, 2012). One consequence for students is the fragmentation of educational experiences resulting in lack of preparedness for the complexities of the world, which institutions are seeking to mitigate (Huber et al., 2005).

Nowhere is curricular integration to support integrative learning more essential than in health professions programs, where students must acquire a large body of specialized knowledge in a short period of time and rapidly develop broad competencies to function in a complex health care system and to manage patients' myriad medical conditions and therapies (Irby, Cooke, & O'Brien, 2010; Kulasegaram, Martimianakis, Mylopoulos, Whitehead, & Woods, 2013; Ratka, 2012). Even here, however, curricular integration is not a panacea. There is a danger of integration for integration's sake rather than for sound educational purposes (Bloom, 1958;

Brophy & Alleman, 1991; Jardine, LaGrange, & Everest, 1998; Pring, 1973). For example, it should not be "take[n] for granted that 'interdisciplinarity' is a good thing and needs to be encouraged and promoted wherever possible" (Krishnan, 2009, p. 4). Thought must be given to what is gained and what is lost and to the barriers that interfere with the planning and teaching of integrated curricula. Integration is also just one aspect of the complex nature of the curriculum for a program of study, so should not be the sole focus of attention in curriculum design (Hubball & Pearson, 2010). Nevertheless, if the—or a—purpose of education is to enable students to respond effectively to real-life issues, then curricula that draw connections between different discipline-specific bodies of knowledge and between theory and practice would be beneficial.

Purpose of the Study

Curricular integration is a frequently used but often ill-defined term. Curriculum leaders, planners, and faculty members responsible for designing, implementing, and supporting curricula, students, and other stakeholders may not have a deep or mutual understanding of integration. Lack of understanding and/or differences in understanding, including varying perceptions of the barriers to curricular integration, may lead to inadequate curriculum support, suboptimal curriculum design, and discontinuities between the curriculum as intended by curriculum planners (the *espoused* curriculum), taught by instructors (the *enacted* curriculum), and learned by students (the *experienced* curriculum).[1] Thus, one purpose of this research project is to determine how curricular integration is understood by different individuals associated with the curriculum for a program of study, including leaders, planners, instructors, students, and other stakeholders.

[1] This terminology has been adopted from Bath, Smith, Stein, & Swann (2004). Harden (2013) refers to these as the *declared*, the *taught*, and the *learned* curriculum, and others refer to these as the *intended*, *implemented*, and *attained* or *achieved* curriculum (e.g., Van den Akker, 2003.)

Areas of convergence and divergence between the espoused, enacted, and experienced dimensions of the curriculum are expected, and might be illustrated by a Venn diagram as shown in Figure 1.

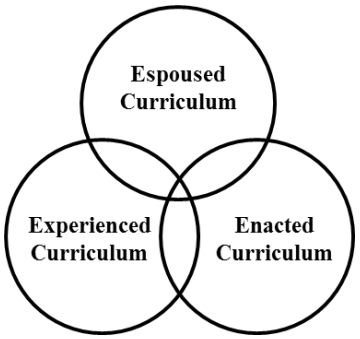


Figure 1. Venn diagram of three dimensions of the curriculum.

This diagram is meant as a pictorial device to illustrate the intersecting dimensions of the curriculum and no specific meaning is intended by the limited overlap shown between them. For example, the curriculum taught in the classroom ought to closely resemble the curriculum designed by an academic community in what is usually a labour-intensive, meticulous, inclusive, and scholarly manner. However, some gap between intentions and actions are inevitable in as complex a social endeavor as the curriculum for an undergraduate degree program. Also, the way students take up their learning experiences in the classroom can differ from the instructors' intentions and, in any case, not all learning is attributable to the formal curriculum. Thus, a second purpose of this study is to examine areas of convergence and divergence between (a) the espoused and enacted dimensions of the curriculum, to identify successes and failures in implementing curricular integration as planned and areas of curricular drift over time; (b) the enacted and experienced dimensions of the curriculum, to identify the degree to which the curriculum is supporting integrative learning; and (c) the espoused and experienced dimensions of the curriculum, to identify integrative learning that is occurring even though it is not explicitly

supported by the curriculum or that is not occurring despite being explicitly supported. This leads to the third purpose of this study, which is to examine the connection between these points of convergence and divergence and individuals' understandings of curricular integration, including their perceptions of the barriers to and necessary supports for curricular integration.

An ultimate purpose of this study is to use the findings to make evidence-based recommendations for policy, best practices, and further research in curricular integration.

Research questions.

The purposes outlined lead to two primary research questions, namely

1. What conceptions of curricular integration are held by those leading, planning, teaching, and learning in an undergraduate degree program?
2. What is the relationship of these conceptions to the observed espoused, enacted, and experienced dimensions of the curriculum and the areas of convergence and divergence between these dimensions?

These overarching questions encompass a variety of more specific questions, including:

a. With regard to the espoused dimension of the curriculum: What are the leaders' and planners' understandings of and intentions for integration within the curriculum? How do those understandings and intentions influence the design of the curriculum?
b. With regard to the enacted dimension of the curriculum: What are the understandings and attitudes of faculty members regarding curricular integration and integrative learning? What models or principles are being used by instructors in designing integrated teaching and assessment activities? What supports have been provided or would be required for improved curricular integration?

c. With regard to the experienced dimension of the curriculum: What are students' understandings and perceptions of curricular integration and their own integrative learning? What are external stakeholders' perceptions of curricular integration and students' integrative learning?

Scope of the Study

As the research questions suggest, the focus of this study is the existing curriculum for a program of study and the individuals associated with this curriculum. This is an interpretive study with no intervention, although potential exists for Hawthorne effects (e.g., instructors may alter their teaching practices when being observed) and maturation effects (e.g., there may be changes in individuals' understandings of integration) due to natural and ongoing processes of curriculum revision, participation in educational development activities, and similar occurrences during the time of the study. Case study methodology is employed in this research project, as an appropriate approach to the in-depth examination of a contemporary phenomenon (Yin, 2014), with data sources that include documents, field observations, and interviews for a single case.

The case selected for this research project is the Bachelor of Science in Pharmacy (B.Sc.(Pharm.)) program offered by the Faculty of Pharmaceutical Sciences at the University of British Columbia (UBC). This is the only pharmacy degree program in the Province of British Columbia. The identities of individual participants are protected but no effort is made to disguise the study location, as there is little chance this would be either effective or beneficial (Nespor, 2000; Walford, 2005). This program has a five-year curriculum, with one pre-pharmacy year completed outside the Faculty and four years of professional studies in the Faculty. It consists primarily of discipline-specific courses, supplemented by series of pharmacy skills laboratory courses, case-based tutorial courses, and experiential clerkship courses. The program is expected

to align with UBC's strategic plan, with the educational outcomes for Canadian pharmacy programs established by the Association of Faculties of Pharmacy of Canada (AFPC), and with provincial and national competency standards for the practice of pharmacy set by regulatory bodies, including the College of Pharmacists of British Columbia, the National Association of Pharmacy Regulatory Authorities (NAPRA), and the Pharmacy Examining Board of Canada (PEBC). The program must also meet the accreditation standards of the Canadian Council for Accreditation of Pharmacy Programs (CCAPP). Collectively, these standards require that the curriculum prepare practice-ready graduates with the knowledge, skills, and abilities to provide competent pharmaceutical care to patients in diverse pharmacy practice settings.

The current curriculum for this program was developed over a five-year period from 1997 to 2001 and phased in one year at a time starting in 2003. The first graduates completed the program in 2007. This curriculum was designed in an outcomes-based and scholarly manner (Hubball & Burt, 2004, 2007) and has been highlighted in various scholarship of teaching and curriculum design forums at UBC (e.g., University of British Columbia, 2011). As with any program, there are differences between the curriculum as planned and the curriculum as taught, which may be due to failure to implement certain elements of the curriculum as intended or to changes over time as the curriculum evolved. It is also very likely that the curriculum as experienced by students is somewhat different from the curriculum intended or taught by the Faculty.

The program has the goal of educating pharmacists, not disciplinary specialists such as pharmaceutical chemists or pharmacologists, so the use of disciplines as the defining structure for the program and disciplinary experts as instructors for most of the coursework has the potential to produce graduates with extensive knowledge of, for example, the physicochemical

properties and the pharmacology of drugs, but limited ability to manage a patient's drug therapy. Thus, curricular integration is a concern in this program.

Other issues suggesting the UBC B.Sc.(Pharm.) program is a fruitful case for examining curricular integration include the following:

a. It is not clear that curriculum leaders, planners, instructors, students, and other stakeholders associated with this program have a shared understanding of curriculum integration.
b. There was some deliberate attention to integration (although it was not named as such) during the planning of the curriculum. This is manifested as streams of discipline-specific courses; clusters of pathophysiology, pharmacology, therapeutics, and self-medication courses in Year 2 and Year 3 of the program; a series of experiential courses; and a series of case-based courses running through all four years of the program.
c. Curricular integration is of obvious concern to the Faculty, as evidenced by recent significant changes in Faculty governance, including the replacement of discipline-based Divisions with a Program Director and Year Coordinators charged with ensuring integration in the program (Faculty of Pharmaceutical Sciences, 2009).
d. The Program Director and Year Coordinators have facilitated several initiatives to enhance integration in the program, such as the development of a team-taught multidisciplinary lecture on osteoporosis (Albon, Seet, & Pearson, 2011; Pearson, Fielding, Albon, Brady, Wasan, & Verma, 2011).
e. National accreditation standards for the program include an expectation that the curriculum is horizontally and vertically integrated (Canadian Council for Accreditation of Pharmacy Programs, 2013).

f. There is no reason to think that integrative learning on the part of students in this program will "just happen." Rather, it is assumed that the curriculum must be designed to support this form of learning (Dressel, 1958b; Huber, Hutchings, Gale, Miller, & Breen, 2007).
g. Curricular integration has not previously been examined in this program.
h. Understandings of the areas of convergence and divergence between the espoused, enacted, and experienced curricular integration might shed light on other elements of the curriculum unfolding in ways that are congruent with or differ from program goals.

Potential Contributions

One hoped-for goal of this study is to provide a fuller description and examination of curricular integration than currently exists in the literature and to demonstrate how individuals' understandings of curricular integration are linked to their roles within the curriculum. Findings regarding areas of divergence between integration in the espoused, enacted, and experienced B.Sc.(Pharm.) curriculum also have immediate potential to inform the design of the next undergraduate curriculum of the UBC Faculty of Pharmaceutical Sciences, work on which has recently begun. Beyond the Faculty, this study may contribute to curriculum renewal initiatives currently underway in the medical program at UBC, and, in particular, the efforts of the working group on integration (University of British Columbia MD Undergraduate Program, 2011). Beyond UBC and beyond health professions, this study may have an impact in higher education more generally, as curricular integration is the focus of a large joint initiative of the Carnegie Foundation for the Advancement of Teaching and the Association of American Colleges and Universities (Huber, Brown, et al., 2007) and integrative learning is an important aspect of the AAC&U's Liberal Education and America's Promise (LEAP) initiative (Association of American Colleges and Universities, 2014b).

With respect to informing scholarly understandings of curricular integration, the 2012 Pearson and Hubball review paper cited in the preface has already had an impact through its inclusion in a set of resources assembled by a task force of the American Association of Colleges of Pharmacy to assist new faculty, mentors, and department chairs (Beck et al., 2013). This paper has also been cited in the pharmacy and medical education literature (e.g., Husband et. al, 2014; O'Brien & Irby, 2013). It is hoped that this and future dissemination efforts will continue to assist curriculum leaders, planners, and faculty members in schools of pharmacy, other health professions, and other programs in designing and teaching integrated curricula.

Two other contributions intended through this study are insights into the implementation of curriculum change and into student perspectives on curriculum. An examination of fidelity of implementation is important because failure to implement a program as intended is a common cause of lack of achievement of desired outcomes (Dusenbury, Brannigan, Falco, & Hansen, 2003; Love, 2004; O'Donnell, 2008; Protheroe, 2009). However, reports of such inquiry are virtually absent in the higher education literature, so study findings from the examination of the gap between the espoused and enacted curriculum may be of use in and beyond the Faculty. Meaningful representation of the student voice is also lacking in the literature, although integrative learning is something the student, not the instructor, does. This failing is unfortunate but not surprising, as working within the teaching rather than the learning paradigm (Barr & Tagg, 1995) is typical of much of the scholarship of teaching and learning (SoTL) literature. This study attempts to correct this oversight by including students in all years of the program as participants to inquire into the experienced curriculum. Findings related to the gap between the enacted and experienced curriculum may again be of use in and beyond the Faculty.

This study also has the potential to make a contribution to the SoTL field, and more specifically the scholarship of curriculum practice, in which it is situated (Boyer, 1990; Hubball & Gold, 2007). Much of the scholarship of teaching and learning relates to "regular faculty…producing pedagogical knowledge and using it to improve learning in their classrooms" (Hutchings, Huber, & Ciccone, 2011, p. x). However, there are cases where the object of interest is the entire curriculum for a program rather than an individual's teaching responsibilities (Cambridge, 2004; Hubball & Gold, 2007; Hubball & Pearson, 2009; Wolf, 2007). In fact, a shift from a course-level to a program-level focus is necessary for the scholarship of teaching and learning to have a significant impact on student learning in undergraduate programs (Hubball, Pearson, & Clarke, 2013). The Greater Expectations project's National Panel report on quality of college education in the US, for example, suggests that, among the changes that need to occur to improve programs, faculty must "individually and collectively assume responsibility for the entire curriculum" (Association of American Colleges and Universities, 2002, "The Greater Expectations New Academy Includes…," para. 4). This study provides a practical demonstration of this broader application of the scholarship of teaching and learning in the curriculum for an undergraduate degree program that others might choose to emulate.

Conceptual Framework

The model for curriculum development advanced by Hubball and Burt (2004) and shown in Figure 2 is the basis for the conceptual framework guiding data collection and analysis for this study.

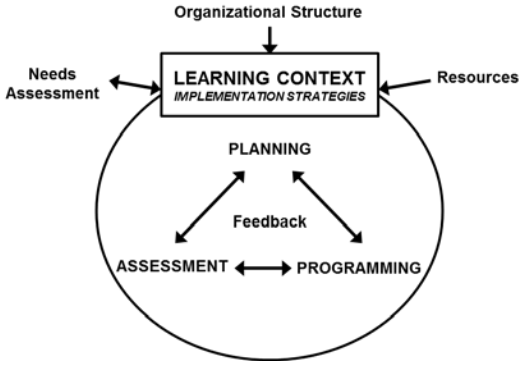


Figure 2. Framework for curriculum design. From "An integrated approach to developing and implementing learning-centred curricula," by H. Hubball and H. Burt, 2004, *International Journal for Academic Development, 9*(1), p. 54. Copyright 2004 by Taylor & Francis. Reprinted with permission.

This heuristic framework has been applied in diverse program settings (e.g., Boschma et al., 2010; Hubball, Gold, Mighty, & Britnell, 2007; Nesbit, Sianchuk, Aleksejuniene, & Kindiak, 2012). It takes into account the complex contextual factors that shape curriculum communities of practice and depicts the iterative process of designing curricula with constructive alignment of program-level learning outcomes, learning-centred pedagogies, and authentic assessment of student learning. However, this model does not explicitly address the design of horizontally and vertically integrated curricula intended to foster students' integrative learning or the specific needs of individual learners. It also does not distinguish between the espoused, enacted, and experienced dimensions of curricula nor does it delineate the crucial step of implementation. Accordingly, supplementary models were required for this study.

The intersecting dimensions of the curriculum of interest in this study are analogous to the central elements of this model. That is, the espoused curriculum is the curriculum that is developed during the planning phase, the enacted curriculum is the curriculum that is taught during the programming phase, and an examination of the curriculum as experienced by students

is an essential element of the assessment phase of determining whether the curriculum is achieving its intended outcomes. Accordingly, a modified version of this diagram was developed for this study that makes explicit reference to these three curricular dimensions and the focus on integration within them, as shown in Figure 3.

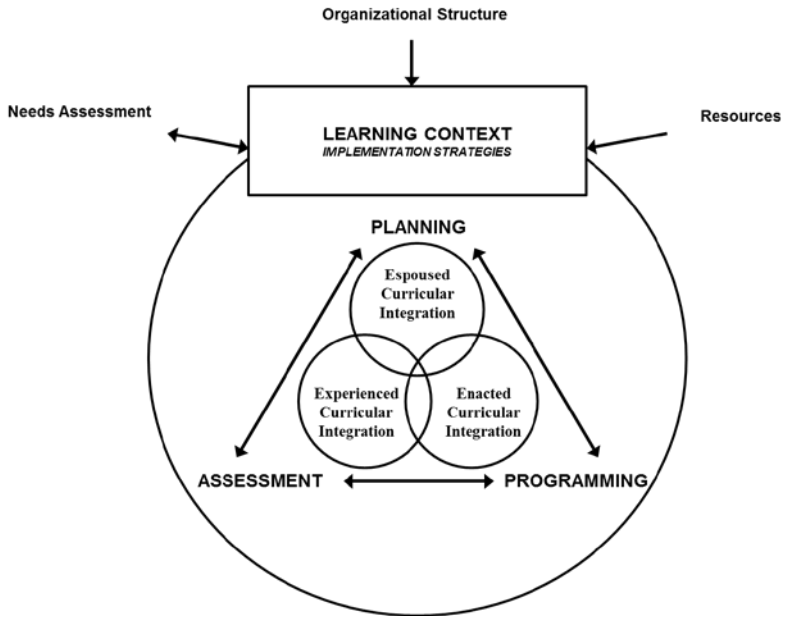


Figure 3. Conceptual framework for the study. Adapted from Hubball & Burt (2004).

This model suggests that context must always be considered when inquiring into a curriculum. Accordingly, the context within which the B.Sc.(Pharm.) program was developed is investigated first, and discussion of the findings includes consideration of the influence of key contextual features on characteristics of the curriculum. This model also suggests that there are questions to ask about the design process and about how the curriculum is taught by instructors and received by students.

Enough time has elapsed since this iteration of the curriculum was planned for the curricular change process to reach completion and the curriculum to be fully implemented. Given that fidelity of implementation is an important aspect of curriculum change, the practice

implementation matrix associated with Chinowksy's staircase implementation model (Chinowsky, 2008) has been used for a more detailed investigation of the intersection of the espoused and enacted dimensions of the curriculum. This matrix, shown in Figure 4, suggests analytic codes related to curricular change and provides guidance for formulating recommendations for policy and practice.

	Steps			
	Preparing	Initiating	Growing	Establishing
Elements				
Focus	Evaluation of change preparation areas	Introduction of practice in a limited context	Expansion of practice beyond test group or project	Marketing new process to broad organization
Tasks	Change audit, Change preparation	Communication, Success story	Communication, Buy-in, Resources	Standardization, Repetition, New areas
Barriers	Necessity, Buy-in	Culture, Outside influence, Risk aversion	Resources, Leadership, Culture	Resources, History, Executive approval
Strategy	Necessity, Assign champion	Communication plan, Support champion, Provide education	Communication plan, Increase champions, Provide education, Market successes	Leadership, Communication plan, Provide education, Establish experts, Reward compliance
Success	Audit completion	Success story	Cross-divisional and/or geographic implementation	Accepted practice

Figure 4. The practice implementation matrix. Adapted from "Staircase model for new practice implementation," by P. S. Chinowsky, 2008, *Journal of Management in Engineering, 24*(3), p. 192. Copyright 2008 by American Society of Civil Engineers. Reprinted with permission.

Organization of the Dissertation

The foregoing lays the groundwork for this study by outlining its purpose, delineating the research questions, and introducing the case and the conceptual framework that guided data collection and analysis. The chapters that follow include a summary of the relevant literature, a

description of the methodology, details of the findings, and discussion and conclusions. The literature review in Chapter 2 provides a brief overview of the scholarship of teaching and learning and the emergence within this field of the scholarship of curriculum practice to justify the selection of the curriculum for an undergraduate program as a worthy object of study. Definitions of curriculum and curricular integration are provided, as is a thorough examination of the historical and contemporary literature on curricular integration and integrative learning. A final section of this chapter attends to some of the literature on effective curriculum leadership and change management in higher education.

The methodology employed for this research project, described in Chapter 3, is a single, instrumental case study in the style of Robert Yin (2014), a preeminent scholar of case study research. The attraction to Yin, rather than, say, Stake (1995) or Merriam (2009), may be evident from the brief epistemological reflection that opens this chapter. The remainder of the chapter describes the data collection and analytical procedures, limitations of the study design and data sources, and the steps taken to strengthen validity and reliability of the findings. Details of the findings are provided in Chapter 4. To answer the research questions, and to be consistent with the conceptual framework for the study, it was first necessary to describe the context of the case and to develop rich descriptions of the espoused, enacted, and experienced dimensions of the curriculum for the UBC B.Sc.(Pharm.) program. Integration in the curriculum is characterized in terms of curricular structure, content, and pedagogical approaches. These findings are presented first, followed by the findings specific to the two research questions. Chapter 5 completes the report of this study by discussing the findings and drawing defensible conclusions that reflect the limitations of the study. Finally, implications for curriculum practice and policy that arise from the findings are provided, as are suggestions for avenues of further research.

Chapter 2: Literature Review

Introduction

Real challenges exist in designing and implementing integrated curricula for undergraduate degree programs. This is particularly so in the health professions, where curricula must support integrative learning on the part of students so that they can acquire the large, diverse body of knowledge and specialized skills they need to be practice-ready on graduation. It is not helpful to have accreditation standards that expect curricula to be horizontally and vertically integrated but provide little guidance on what is meant by these terms and how they might be manifested in a curriculum and how such a curriculum might be evaluated, as is the case for pharmacy programs in Canada (Canadian Council for Accreditation of Pharmacy Programs, 2013). Rather, a shared and scholarly understanding of what is meant by integration, and the goals and characteristics of integrated curricula, is needed. Thus, a significant part of this literature review is devoted to providing an in-depth examination of the definition of curricular integration; models of integration that address the horizontal and vertical dimensions of integration; integrative learning; the design of integrated curricula, with the specific example of the design of integrated pharmacy programs; and some of the obstacles to curricular integration, including the discipline-based structure of academia, the time and effort involved in designing integrated curricula, and the lack of compelling evidence of the learning benefits of integrated curricula.

This is prefaced by a brief summary of the development of the field of the scholarship of teaching and learning, in which this research project is situated. The history of the field, including the turn towards the scholarship of curriculum practice, is addressed, as is the meaning of the term “curriculum” in the context of this study. A concluding section of this chapter

provides a brief review of the literature on curriculum leadership and change management in higher education, as the design and implementation of integrated curricula often represents a significant change for a program that requires strong leadership and ongoing support.

Why Curriculum?

This research project is situated in the field of the scholarship of teaching and learning, which Ernest Boyer is widely credited with launching through publication of his seminal work, *Scholarship Reconsidered* (Boyer, 1990). Impetus for the development of this field has been variously traced to the student movement of the late 1960s (e.g., Boehnert & Moore, 1985; Huber & Hutchings, 2005) and to growing concerns in the 1980s regarding the quality of undergraduate education as competition escalated between teaching and research priorities in academia (Boyer, 1987).

The main contribution of *Scholarship Reconsidered* is its expansive vision of the nature of scholarship. Boyer (1990) lamented the fact that basic research had become the only scholarly endeavor valued in the university, and sought a "broader, more capacious meaning [of scholarship], one that brings legitimacy to the full scope of academic work" (p. 16). He proposed a new taxonomy of scholarship that encompassed the traditional triad of faculty labour, namely teaching, research, and service, within four types of scholarship: the scholarship of discovery, the scholarship of integration, the scholarship of application, and the scholarship of teaching. Boyer (1990) was short on detail regarding the scholarship of teaching, but his concept that good teaching involved "hard work and serious study" (p. 23) that should be valued and rewarded in ways similar to other forms of scholarship resonated with many. The scholarship of teaching was thus taken up enthusiastically by numerous individuals and institutions, and the field has experienced significant growth and evolution since 1990.

One avenue of development has been a move to rigour. Early work in the field, including Boyer's, failed to differentiate between excellent teaching and the scholarship of teaching (e.g., Boyer, 1990; Glassick, Huber, & Maeroff, 1997). More recently, the distinctions between excellent teaching, scholarly teaching, and the scholarship of teaching described by Hutchings and Shulman (1999) have become well accepted, with the scholarship of teaching requiring that the work be made public, be open to peer review, and have the potential to be built upon by others. A broad view still exists, where the scholarship of teaching is understood to encompass everything from faculty members' reflections on their own teaching, to classroom inquiry, to formal educational research efforts (e.g., Huber & Hutchings, 2005). However, a harder line has also emerged, with demands for standards of scholarship similar to other forms of research. For example, there have been specific calls for enhanced attention to the relevant scholarly literature, use of theoretical frameworks, competence in educational research methods, and criteria for peer review similar to those applied to grant applications and journal submissions in traditional avenues of research (Kanuka, 2011; Richlin, 2001; Svinicki, 2012). This push is squarely aimed at transforming educational practice in a scholarly, evidence-based manner that has applicability beyond an individual's own classroom.

Another area of change has been a move from individuals' teaching practices to whole curricula as the object of inquiry (Alsharif, 2014; Cambridge, 2004; Hubball & Gold, 2007; Hubball & Pearson, 2009; Wolf, 2007). This shift from a course-level to a program-level focus is considered necessary for the scholarship of teaching to have a significant impact on the quality of undergraduate degree programs. It has, in fact, been suggested that the "real power" of the scholarship of teaching "comes from understanding how its values and practices—seeing teaching as intellectual work, treating classrooms as sites for inquiry, and using what is learned

to improve student learning—can be applied more broadly: in course design [and] curricular development" (Hutchings et al., 2011, p. 116). Thus, the emergence of the scholarship of curriculum practice as an area of specialization within the scholarship of teaching is a key development in the field (Hubball & Gold, 2007; Hubball et al., 2013). Accordingly, this research project focuses on the curriculum for an undergraduate degree program.

What is Curriculum?

There are differing conceptions of curriculum, ranging from curriculum as content to be taught to curriculum as experiences that students have to curriculum as a plan for learning, with many definitional variants in the scholarly literature (Marsh, 2004; Portelli, 1987). Early modern North American curriculum scholars viewed curriculum as a plan for learning. For example, Bobbitt saw education as having the goal of providing students with the "abilities, attitudes, habits, appreciations, and forms of knowledge" needed to perform daily activities in the world they encountered, and curriculum design as a "scientific" process of planning "a series of things which [students] must do and experience" (Bobbitt, 1918, p. 42). Similarly, Tyler's approach to curriculum design included steps of (a) identifying the purposes of education; (b) determining the educational experiences likely to attain these purposes; (c) organizing these experiences effectively; and (d) determining whether these purposes have been attained (Tyler, 1949, p. 1).

By contrast, contemporary post-modern curriculum scholars have reconceptualized curriculum as "complicated conversation" (Pinar, 2012) or as "cosmological enterprise" (Slattery, 2013). Here, education is seen as a process of knowledge creation that emphasizes goals of emancipation and social justice. Curriculum in this context is less a planned collection of educational activities, and more an exploration and provocation of ideas, open to "the possibilities of unpredicted and novel events" (Pinar, 2012, p. 217).

There is obvious merit in the post-modern democratic aims for education, and truth in acknowledging the limits to which students' educational experiences can be planned and controlled. It is also reasonable to criticize modern views of "curriculum as plan" for failing to capture the complexity of the social phenomena of program planning, teaching, and learning. However, it should be noted that both modern and post-modern conceptions of curriculum have been developed mainly in the context of mandatory elementary education. In contemporary higher education settings, where students have far more opportunity to voluntarily pursue their own educational goals and to choose from a vast array of liberal and vocational options, the Tylerian "curriculum as plan" perspective predominates. This seems especially appropriate in professional programs, which typically have well-defined, societally-mandated expectations for graduate competencies.

The "curriculum as plan" for an undergraduate degree program should not be mistaken for a simple, stable, self-contained entity, however. In reality, such curricula are complex, with vast and growing bodies of knowledge to call upon, hundreds and sometimes thousands of hours of teaching and learning to organize into a coherent structure, and hour-by-hour or even minute-by-minute decisions to make on what and how to teach and learn in varied environments, such classrooms, laboratories, and field locations. Curricula, in fact, have all the features of complex systems, including self-organization, emergence, and structural determination (Davis & Sumara, 2006). These are social processes, influenced by the knowledge, skills, and attitudes of and the interactions between the changing individuals involved, including new groups of diverse students at regular intervals (Hubball & Pearson, 2010; Kreber, 2009; Lattuca & Stark, 2009). Thus, the curricular context matters (Hubball & Burt, 2004; Hubball & Gold, 2007). Politics and economics are always involved, and may arise at departmental, institutional, provincial, national,

and international levels (Altbach & Knight, 2007; Bridges, 2000; Lattuca & Stark, 2009; Schneider & Shoenberg, 1999). In professional programs such as pharmacy, these influences include the profession itself, represented by practice leaders, professional organizations, and regulatory authorities with their differing mandates.

Accordingly, the "curriculum as plan" definition of Hubball and Gold (2007), which is situated in higher education and acknowledges curricular complexity and the influence of context, has been adopted for this research project. That is, the term *curriculum* here refers to "a coherent program of study (such as a four-year B.Sc.) that is responsive to the needs and circumstances of the pedagogical context and is carefully designed to develop students' knowledge, abilities, and skills through multiple integrated and progressively challenging course learning experiences" (Hubball & Gold, 2007, p. 7).

What is Curricular Integration?

Just as there is no agreed upon definition of curriculum in the literature, there is no agreed upon definition of curricular integration. Many consider the terms integration and interdisciplinarity synonymous and do not distinguish between multidisciplinary, interdisciplinary, and transdisciplinary approaches to curriculum design, nor between integrated and integrative curricula (e.g., Fogarty, 2009; Jacobs, 1989). A vocal critic of this limited view of curriculum integration and lack of nuance in use of terminology is Beane (1997), who insists that curricular integration is "the organization of curriculum around significant problems and issues, collaboratively identified by educators and young people, without regard for subject-area lines…[for the purpose of] personal and social integration" (p. 19). This definition is reminiscent of Dewey's worthy ideals of democratic education; however, it seems somewhat ill-suited to the undergraduate pharmacy curriculum that must prepare competent practitioners with specific and

complex knowledge and skills. In this context, the simpler definition suggested by Case (1991), namely that curriculum integration is the "intentional uniting or meshing of discrete elements or features [of a planned educational experience]" (p. 215) seems more applicable.

Beane (1992) does usefully emphasize the subtle distinction between *integrated* and *integrative* curricula. In an integrated curriculum, the instructor is responsible for creating educational experiences that demonstrate to students pre-defined patterns and applications of different knowledge domains within unifying themes, whereas in an integrative curriculum, students are encouraged to create their own patterns (Beane, 1992; Dressel, 1958a; Huber & Hutchings, 2004; Mathison & Freeman, 1997). That is, in an integrative curriculum, "the task is not that of communicating to the individual an integrated view of all knowledge; it is rather that of developing individuals who will seek to do this for themselves" (Dressel, 1958b, p. 5). Part of this semantic confusion may relate to the differing conceptions of curriculum described earlier, and particularly whether curriculum is viewed as the "organized intentions, plans, and programs for what students are expected to learn…[or as] the experiences [students] have…[and] what they make of those experiences" (Beane, 1995, p. 170). Ultimately, in order for a curriculum to be integrative for students, it should be designed in an integrated manner, so the terms *integrated* and *integrative* are used here in the context of curriculum design and student learning respectively, with the former considered a necessary condition for the latter.

A distinction should also be made between the horizontal and vertical dimensions of curricular integration. These are temporal dimensions, contrasting the integration that occurs at a moment in time with the integration that occurs over time (Case, 1991; Tyler, 1958). As with other terms, there is some inconsistency in usage. In the health professions education literature, horizontal integration typically refers to integration across basic science disciplines such as

anatomy, biochemistry, and physiology, while the term vertical integration most often refers to integration of the basic and clinical sciences (e.g., Bandiera, Boucher, Neville, Kuper, & Hodges, 2013; Brueckner & Gould, 2006; Dahle, Brynhildsen, Behrbohm Fallsberg, Rundquist, & Hammar, 2002; Leinster, 2013; Schmidt et al., 1996). However, the combination of basic and clinical sciences within a unit or year of study has also been referred to as horizontal integration and the term vertical integration has also been applied to spiral curricula, with topics revisited in increasingly complex ways as the program proceeds (e.g., Oliver et al., 2008; Prideaux & Ash, 2013). To minimize confusion in this project regarding terminology in the context of the UBC B.Sc.(Pharm.) program, horizontal integration has been taken to mean connections across disciplines within a term or year and vertical integration has been taken to include vertical-spiral connections both across terms and years within disciplines and vertical-practice connections between the theoretical (i.e., classroom-based) and experiential (i.e., practice site-based) elements of the curriculum.

Horizontal integration: Crossing disciplinary boundaries.

Educational programs are usually structured along disciplinary lines, beginning with classes in mathematics, social studies, and other subjects for children in school, and persisting in higher education, where courses are typically discipline-specific and students often engage in a single discipline through majors and honours programs in areas such as physics, history, economics, etc. In pharmacy, the traditional disciplines are medicinal chemistry, pharmaceutics, pharmacology, pharmacy practice (or clinical pharmacy), and social and administrative pharmacy (Holmes & Desselle, 2004). In the Faculty of Pharmaceutical Sciences at UBC, these disciplines are prominent in the curriculum, and until recently were also the basis for Faculty governance through a system of discipline-based divisions.

Integration across disciplines can take various forms, from multidisciplinary approaches, where the disciplines remain intact but focus simultaneously on a common theme, to interdisciplinary approaches where there is conjoining of the disciplines to develop a shared understanding of a theme or solution to a problem, to transdisciplinary approaches where disciplinary distinctions are not evident (Drake, 1993; Knight, Lattuca, Kimball, & Reason, 2012). Each approach has its place, as may disciplinary isolation. As Harden (2000) suggests, no single integration strategy is ideal in a complex curriculum. Accordingly, and with reference especially to the work of Fogarty, Harden has developed an "integration ladder" for health professions education, shown in Figure 5, which provides a more finely gradated scale of cross-disciplinary approaches.

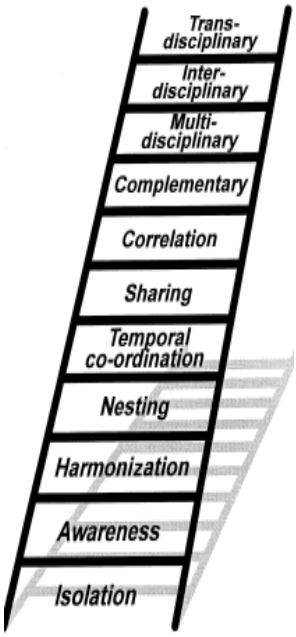


Figure 5. Harden's Integration Ladder: A model of horizontal integration. From "The integration ladder: A tool for curriculum planning and evaluation," by R. M. Harden, 2000, *Medical Education, 34*(7), p. 552. Copyright John Wiley and Sons 2001. Reprinted with permission.

Although Harden has placed multidisciplinary integration near the top of the ladder, the steps from awareness upwards involve some degree of connection between disciplines, as indicated in the descriptions provided in Table 1. Beane (1995) argues that taxonomies such as Harden's ladder introduce unnecessary complexity to discussions of curricular integration, and focus primarily on simplistic multidisciplinary approaches that are very distant from the ideal of the democratic integrated curriculum. However, he also suggests that any step in the direction of multidisciplinarity has value, given that isolation is the norm in the majority of educational settings. Having an array of options may minimize resistance and allow gradual transition to more integrated curricula in programs with strong disciplinary structures (Harden, 2000).

Table 1

Steps of Harden's Integration Ladder

Step	Description
Isolation	Curriculum is organized in discipline-specific units, taught by specialists, with no connections between disciplines
Awareness	Curriculum remains discipline-based, but instructors are aware of the content of coursework in other disciplines
Harmonization	Curriculum remains discipline-based, but instructors consult each other and may make explicit references to each other's content
Nesting	Curriculum remains discipline-based, but instructors incorporate content from other disciplines
Temporal coordination	Curriculum remains discipline-based, but the timetable is adjusted so that similar topics are addressed at the same time
Sharing	Curriculum remains discipline-based, but instructors from two or more disciplines plan and deliver content jointly
Correlation	Curriculum is primarily discipline-based, but an integrated element (e.g., a tutorial, problem session, or project) is added
Complementary program	Curriculum still includes discipline-based content, but a significant portion consists of integrated sessions
Multidisciplinary	Curriculum revolves around themes or problems that bring together a number of disciplines
Interdisciplinary	Curriculum revolves around themes or problems where the focus is on commonalities between disciplines
Transdisciplinary	Curriculum revolves around real-world experiences, without regard for discipline-specific understandings

Adapted from "The integration ladder: A tool for curriculum planning and evaluation," by R. M. Harden, 2000, *Medical Education, 34*(7), p. 551-557.

Vertical integration: Connecting across time and between theory and practice.

The isolation that occurs every day in discipline-based programs can also occur over time, so that content does not unfold in a logical order, prior learning is unaccounted for and not used to advantage, and connections are not made to the real-world context where learning is to be applied. Questions thus arise about the need for pre-requisite courses when knowledge and skills gained are neither referred to nor applied in subsequent courses and about the relevance of theory to practice. This latter concern is especially acute in professional programs, where learning from the classroom is expected to be put to safe and effective use in the workplace.

In health professions programs, curricula have traditionally been structured with the basic sciences elements occurring in the early years and clinical practice elements in the later years, as shown on the left in Figure 6, thanks to widespread adoption of the recommendations of the Flexner Report (Flexner, 1910). The more contemporary "inverted triangles" curriculum on the right, structured with clinical elements beginning early in the curriculum and basic sciences elements persisting into the later years, is intended to enhance integration of theory and practice.

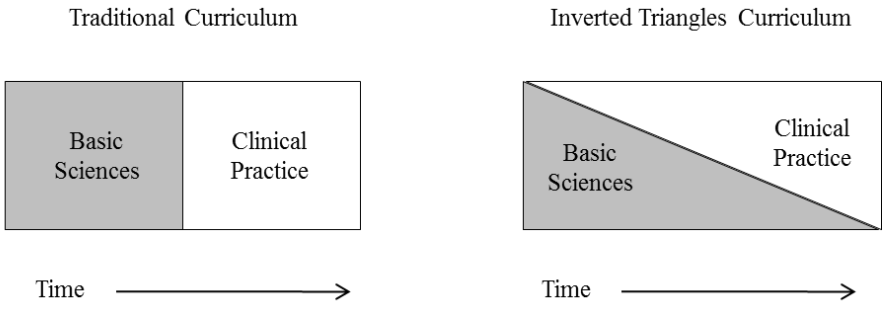


Figure 6. Basic sciences and clinical practice elements in traditional and vertically integrated inverted triangles models of health professions curricula. Adapted from "The undergraduate curriculum" (p. 20), by S. Leinster, in J. A. Dent and R. M. Harden (Eds.), *A practical guide for medical teachers* (4th ed.), 2013, London, UK: Elsevier. Copyright Elsevier 2013. Reprinted with permission.

Integrative Learning

Integrative learning has been defined as "an understanding and a disposition that a student builds across the curriculum and co-curriculum, from making simple connections among ideas and experiences to synthesizing and transferring learning to new, complex situations within and beyond campus" (Association of American Colleges and Universities, 2014a, Definition section). Interest in this type of learning has been long standing. Beane (1997) traces the history of curricular integration in schools back to late 19th century followers of Herbart's philosophy of education for productive citizenship, through the progressive education movement of the early 20th century,[2] and into the late 1950s, culminating in the work of Dressel, Tyler, Bloom, and others for the National Society for the Study of Education. A renaissance occurred in the 1980s and 1990s with the works of Jacobs, Fogarty, Beane, and others. More recently, curricular integration in higher education, specifically in liberal arts programs, has been the focus of a large joint project of the Carnegie Foundation for the Advancement of Teaching and the Association of American Colleges and Universities (Huber, Brown, et al., 2007; Huber et al., 2005). Work is ongoing in this area, notably through the AAC&U's Liberal Education and America's Promise (LEAP) initiative, which has identified integrative learning as an essential learning outcome for students (M. Huber, personal communication, July 28, 2011).

Integrative learning is understood as an active process that does not occur spontaneously for most students. Dressel (1958b) states that integrative learning is "a process actively engaged in by individuals alert to new ideas and new values and consciously trying to incorporate these into new and more meaningful organizations of knowledge and experience" (p. 21). Huber et al. (2005) similarly indicate that integrative learning requires work on the students' part and "does not just happen – though it may come more easily for some than for others" (p. 6). Krathwohl

[2] The term "correlation" rather than "integration" was commonly used at this time.

(1958), informed by findings from behavioural psychology, suggests that for integrative learning to occur students must have the ability to perceive relationships (with perceptions affected by past experiences, needs, values, and stressors); have, or gain in the process, the knowledge to perceive these relationships; have the ability to generalize through identifying similarities and suppressing dissimilarities; and have the desire for this type of learning.

Krathwohl's ideas are echoed in more recent research on learning, particularly work on deep learning, expert learning, and understanding (e.g., Bransford, Brown, & Cocking, 2000; Entwistle, 2009; Marton & Booth, 1997; Svensson, 2005). For example, Svensson (2005) indicates that "in learning for understanding within a deep approach, the student forms wholes corresponding to complex phenomena of the world, including facts and their interrelations" (p. 60), an approach he calls holistic but could easily call integrative. This type of learning is affected by characteristics such as previous knowledge and experience, itself affected by factors such as age, culture, and socioeconomic status; abilities such as language skills and logical thinking; learning styles such as serialism or holism; conceptions of knowledge and learning; personality traits such as introversion or extroversion; and motivation (Entwistle, 2009). Given differences in these characteristics between individuals—and at different times and in different circumstances for an individual—the integrative learning achieved through integrated curricula will vary between students and contexts, and may well differ from instructors' intentions.

Designing the Integrated Curriculum

As integrative learning does not "just happen" for most students, careful curriculum planning is required to foster this outcome. Even the simplest multidisciplinary efforts require thought and effort. Ultimately, the intention is to "replace the mystifying mosaic of many separated courses and unrelated extracurriculum experiences by an educational program that has

unity in the eyes of most students" (Dressel, 1958b, p. 23). The integrated curriculum should provide students with opportunities to observe and evaluate others' integrative efforts; to deal with problems that draw on and require new connections between prior experiences; and to relate classroom learning to the external world (Dressel, 1958b).

Integration in pharmacy curricula.

The literature on curricular integration, as with a great deal of the educational literature, is largely situated in elementary and secondary education rather than in higher education. Further, of the literature on integration in health professions programs, most is related to medical education, although there is a growing body of literature on integration in pharmacy education. As a crude measure, a search on the word "integration" in the archive of the American Journal of Pharmaceutical Education yielded 862 articles published in the last 10 years. However, the term integration was often used to describe the simple incorporation of new content or pedagogies within existing curricula. When sorted by relevancy, the top 40 articles included ones on adding content on complementary medicine into clinical coursework (Tiralongo & Wallis, 2008); adding medical humanities content into a seminar on dementia (Zimmermann, 2013); adding community service learning activities into the program (Schumann, Moxley, & Vanderwill, 2004); adding an internet-based medical chart into a pharmacotherapy course (Brown, Kotlyar, Conway, Seifert, & St. Peter, 2007); and adding virtual patient simulations into a self-care course (Orr, 2007).

Articles related to curricular integration as understood in this study were typically related to modest initiatives to improve horizontal or vertical integration in traditional discipline-based curricula. Examples included the introduction of a joint assignment to integrate a pharmaceutics course with a pharmacy practice course (Stewart, Buckner, & Wildfong, 2011); and the embedding of content from pre-requisite courses into a medicinal chemistry course (Alsharif &

Henriksen, 2009). That said, there were also articles on larger efforts to integrate basic and clinical sciences (e.g., Kullgren, Radhakrishnan, Unni, & Hanson, 2013; Witt-Enderby & McFalls-Stringert, 2004). There was also a special article on excellence in curriculum design that noted the trend to integration in medical programs and recommended consideration by pharmacy programs (Abate, Stamatakis, & Haggett, 2003), and two recent opinion pieces that made strong pleas for integrated pharmacy curricula to support integrative learning (Ratka, 2012) and for individual faculty members to take responsibility for curricular integration (Alsharif, 2014).

A common strategy for improving integration in medical programs, at least in the horizontal dimension, is to use body systems and/or disease states, rather than disciplines, to structure the curriculum (e.g., Davis & Harden, 2003; Ryan, Hanrahan, Krass, Sainsbury, & Smith, 2009). Pharmacy curricula are beginning to follow suit, with curricula that include modules on the cardiovascular system, the respiratory system, and similar major systems rather than courses in pharmaceutics, medicinal chemistry, pharmacology, etc. Three examples of this are found in the pharmacy programs at Butler University (in the curriculum as intended) and at Regis and Dalhousie Universities (in the curriculum as implemented). All three programs still contain some discipline-based courses, but the bulk of each curriculum is designed as a series of integrated modules (Hrubey, 1996; Nelson et al., 2013; Whelan, Mansour, & Farmer, 2002). For the programs at Butler and Dalhousie, details of the module topics were provided and are shown in Table 2. A comparison of the two programs shows that they are fairly similar, but there are also notable differences in both the modules offered and the order in which they occur, with no explanation given for the choices made. Also, it is not clear what, if any, strategies for vertical integration are used in these programs, either with regard to the progression from one module to the next or with regard to linkages between classroom-based and experiential elements.

Table 2

Systems Modules in Two Pharmacy Programs

Butler University – Planned Modules	Dalhousie University – Existing Modules
Concepts of drug therapy	Topical products (dermatologicals)
Toxicology and substance abuse	Topical products (eye and ear)
Parenterals and nutrition	Respiratory system
Autonomic nervous system	Infectious diseases I
Central nervous system	Gastrointestinal disorders
Cardiovascular disease	Nutrition
Infectious disease	Women's health issues
Respiratory disease	Infectious diseases II
Renal disease	Cardiovascular diseases
Endocrine disease	Pain and rheumatology
Neoplastic disease	CNS and behavioural disorders
Gastrointestinal and hepatic disease	Endocrine disorders
Inflammation and dermatological disease	Neoplasms
Geriatric and pediatric pharmacotherapy	Liver disease
Special therapeutic concerns	Blood and immune mechanism disorders
Cases on pharmacy law	Genitourinary disorders

Adapted from "An integrated, case-based curricular model for the entry-level Doctor of Pharmacy degree," by T. W. Hrubey, 1996, *American Journal of Pharmaceutical Education, 60*, p. 265-273 and "Outcomes-based integrated hybrid PBL curriculum," by A. M. Whelan, S. Mansour, and P. Farmer, 2002, *American Journal of Pharmaceutical Education, 66*, p. 302-311.

Integrative pedagogies.

In addition to themed arrangements of content, specific pedagogical strategies have the potential to facilitate integrative learning. These include the use of general ability-based outcomes to define learning expectations, case-based and problem-based learning, capstone courses, experiential learning, and comprehensive authentic assessment. These strategies speak to the logical necessity of making clear to students what they are expected to know and be able to do, and aligning planned educational experiences and assessment tasks with those expectations. These are all familiar learning-centred practices, already in use to varying degrees in health professions programs. In fact, Huber, Hutchings, et al. (2007) suggest that virtually any classroom activity "can prompt integrative learning, if the topic is of sufficient scope and interest to be elucidated by insights from different disciplines and perspectives" (p. 2).

The articulation of general ability-based outcomes is helpful in integrative learning because such outcomes transcend disciplinary boundaries and signal to instructors and students alike that the intention of the curriculum is not simply mastery of particular content knowledge, but also the ability to synthesize, apply, and communicate knowledge in complex, real-world situations. Well-designed case-based and problem-based learning activities, and often capstone courses, simulate those complex, real-world situations and provide opportunities for students to observe the importance of and to practice the skill of integrating knowledge across disciplines. Experiential learning, which can take the form of community service learning, co-op work, fieldwork, etc., all provide opportunities to apply theory to practice. They are also a source of complex, real-world situations that can be drawn upon to support the learning of theory.

It is no surprise, therefore, that the pharmacy programs described above that claim to have integrated curricula all emphasized the use of pedagogical approaches other than the

standard lecture. At Butler, the primary instructional method was the small group discussion, supplemented by pharmacy skills labs and "modified" lectures or large group discussions (Hrubey, 1996). The pedagogy employed at Dalhousie was described as "hybrid" problem-based learning, which included some traditional lectures and basic science and pharmacy skills labs in addition to problem-based learning tutorials, while at Regis University, the emphasis was on team-based learning (Nelson et al., 2013; Whelan et al., 2002).

Assessment of integrative learning, in common with assessment of most general ability-based outcomes, is a particular challenge (Boix-Mansilla, 2005; Huber, Hutchings, et al., 2007). As with instructional strategies, however, many familiar forms of assessment may be useful if designed to give students the opportunity to demonstrate integrative learning. Comprehensive assessments, such as progress exams that simultaneously evaluate basic and clinical sciences in health professions programs, may be particularly valuable as they transcend the structural elements of the curriculum. For example, the fact that pharmacy students at Dalhousie University scored higher on the basic sciences component of a comprehensive exam in their fourth year than in their first year when the material was taught has been attributed to their integration of this content with their clinical knowledge during their fourth year clerkships (Whelan et al., 2002).

Guidance on assessing integrative learning is also now available in the form of a "VALUE" (Valid Assessment of Learning in Undergraduate Education) rubric for integrative learning, which is a product of the aforementioned LEAP initiative. This rubric suggests that students' work should provide evidence of both horizontal and vertical integration through (a) connecting content across disciplines; (b) transferring skills, abilities, theories, or methods gained in one context to new contexts; (c) connecting academic knowledge to life experiences; (d) communicating in ways that enhance meaning; and (e) reflecting on learning and self-

assessing (Association of American Colleges and Universities, 2014a). Even with the rubric, however, assessing integrative learning is still very challenging, and highlights the importance of faculty leadership and educational development initiatives in the successful use of this and all integrative pedagogies (Huber, Hutchings, et al., 2007).

Obstacles to Curricular Integration

The nature of academic disciplines.

Given that much of the focus on curricular integration is on the crossing of disciplinary boundaries, one of the major obstacles to curricular integration is the need to overcome centuries of history in institutional structure in higher education. The earliest European universities offered liberal arts education organized into seven distinct subjects (the *trivium* of grammar, logic, and rhetoric and the *quadrivium* of arithmetic, geometry, astronomy, and music, a structure traceable to the time of Plato) and specialized programs of study in theology, law, and medicine (Cobban, 1975; Kreber, 2009). Disciplinary communities coalesced when scholarly inquiry became an important part of academic work. This occurred first in German universities during the 18th century, and resulted in the adoption of particular research methods by different groups of faculty and the proliferation of specialized journals (Turner, 1974). By the turn of the 20th century, North American universities were being structured along disciplinary lines in response to growing demand for graduate education as knowledge expanded and increasingly specialized workers were required by industry (Holley, 2009). As the disciplines evolved, they developed distinct views of knowledge and norms of research, publication, and education. The result has been the formation of what Becher and Trowler (2001) refer to as “academic tribes,” within which individual faculty members locate their professional aspirations and academic identity, and develop strong ties.

With disciplinary differences in the nature of knowledge come differences in approach to teaching and learning. Becher and Trowler (2001) and Neumann, Parry, and Becher (2002) have characterized these differences using a framework inspired by Biglan's (1973) work on disciplinary knowledge and Kolb's (1981) work on disciplinary learning styles. This framework, shown in Figure 7, employs two axes (hard to soft and pure to applied) to create four disciplinary categories: hard-pure (e.g., physics and mathematics), soft-pure (e.g., history and anthropology), hard-applied (e.g., engineering and pharmacy), and soft-applied (e.g., education and law).

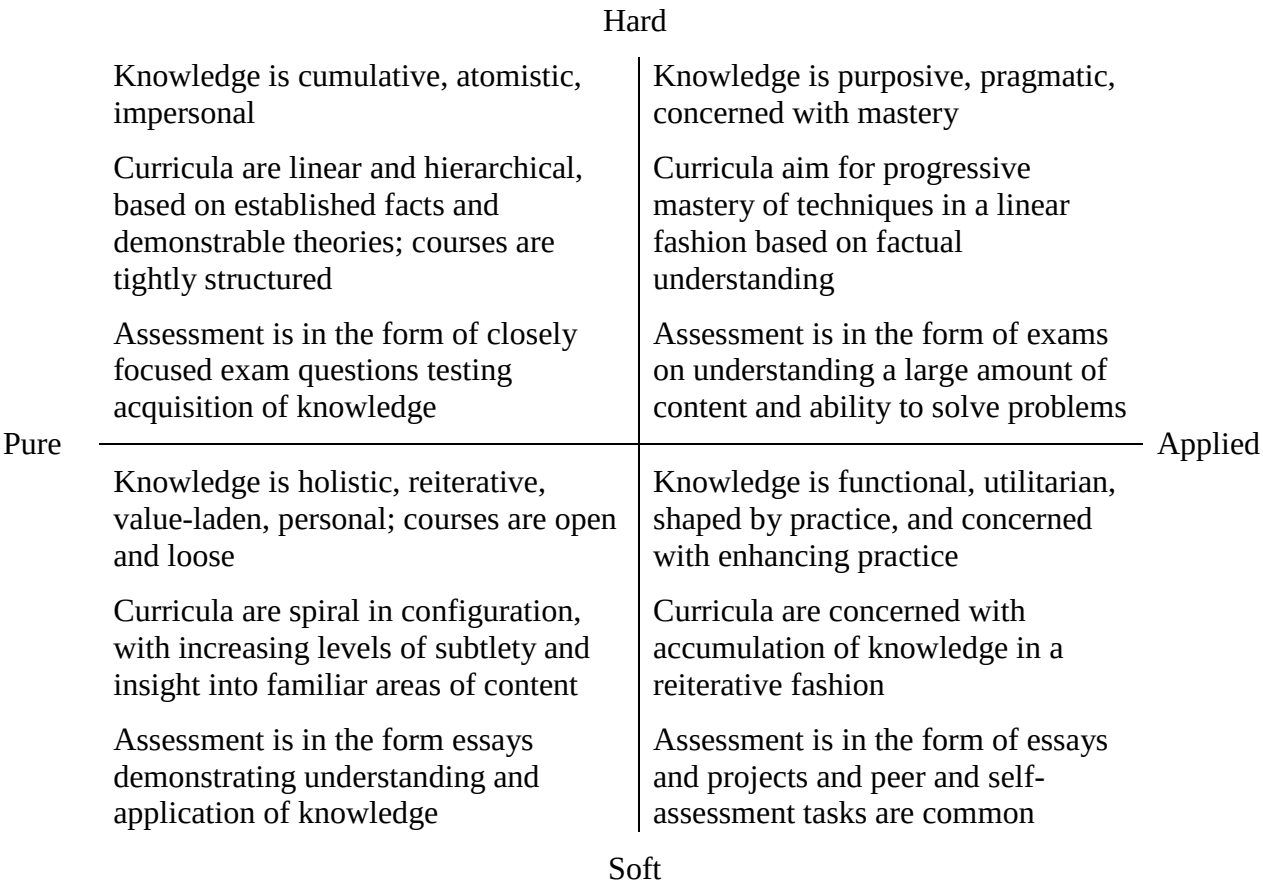


Figure 7. Disciplinary differences in forms of knowledge, curriculum design, and assessment of learning. Adapted from *Academic tribes and territories* (2nd ed.), by T. Becher and P. R. Trowler, 2001, p. 36 and "Teaching and learning in their disciplinary contexts: A conceptual analysis," by R. Neumann et al., 2002, *Studies in Higher Education, 27*(4), p. 405-417.

The difference between a soft-pure and a hard-pure discipline can be seen by comparing Roth's (2005) description of historical thinking (involving suspension of personal beliefs, working within the perspective of a different time and place, being skeptical about universal concepts of human behaviour, and assessing the credibility of multiple sources) with Pustejovsky's (2005) description of mathematical thinking (involving identifying quantities in a problem and identifying which ones are changing, determining the quantities that are related to each other, and describing relationships using tables, graphs, and equations). As a consequence of this substantial difference in approach to thinking, approaches to teaching history are very different to those in math. Entwistle (2009), in fact, suggests that

> There is an inner logic of the subject and its pedagogy. There is a logic that holds together the various strands of a discipline or topic area, and there is a logical connection between the intellectual demands of the subject and how best to teach it (p. 3).

This "logical connection" between disciplinary learning and teaching can give rise to unique pedagogical strategies, or so-called *signature pedagogies*, within disciplines (Shulman, 2005).

Such differences in concepts of knowledge, expectations for thinking, and pedagogical practices all complicate the process of crossing disciplinary boundaries in integrated curricula. However, a good grasp of disciplinary knowledge and skills appears to be necessary for effective integrative learning, and takes time to develop, so there is still a need for disciplinary elements in integrated curricula (Gardner & Boix-Mansilla, 1994; Kline, 1995; Spelt, Biemans, Tobi, Luning, & Mulder, 2009). Significant time is also needed, though, for integrative learning. Within the confines of typical undergraduate programs, this time will come at the expense of disciplinary learning, so it is no surprise that integrated curricula are criticized for loss of depth of disciplinary content knowledge (Case, 1991; Smith, 2005). One might ask, for example, what

integrative learning is gained and what disciplinary depth is lost in an integrated English and math course with essay assignments on topics such as gender equity in the context of running times for men and women in the 100 m race at the Olympics or management of the wolf population reintroduced to Yellowstone Park with reference to data on reproductive success (Association of American Colleges and Universities, 2005).

Effort in planning and implementing integrated curricula.

Considerable planning effort is required to design horizontally and vertically integrated curricula. Agreement between faculty members on issues such as content and timing is required on a level far beyond that in traditional discipline-based programs. Obstacles to integration in health professions curricula include lack of faculty time, limited incentive, competition for time for content, non-standardized base knowledge of students, limited opportunity for interaction between basic scientists and clinicians, differences in level of interest in integration on the part of basic scientists and clinicians, and student resistance to unfamiliar pedagogies (Albon, 2014; Brueckner & Gould, 2006; Stull & Carter, 2002). The uniqueness of each context also limits the efficiencies that might be realized through copying successful models. For example, Davis and Harden (2003) describe a systems-based medical curriculum where different models of integration were used for different body systems and where planning was sometimes the task of a team and sometimes an individual, implying that the work had to be done afresh for each body system.

Implementing and sustaining integrated curricula also requires time and resources. Even simple horizontal integration efforts such as have occurred in the UBC B.Sc.(Pharm.) program take work. For example, the temporal coordination of clusters of courses depends on faculty members and guest lecturers being available at particular times, which requires annual

negotiation. There is very limited ability to accommodate for illness, other work commitments, or conference travel. More elaborate integration efforts that require multiple instructors to be present at the same time are particularly challenging to schedule and may be deemed inefficient or too costly. One successful solution to this problem has been the creation of designated integrated learning areas, where groups of students are able to meet and access materials that teams of instructors have prepared, but where the instructors do not have to be jointly present (Davis & Harden, 2003). However, even creating dedicated space and preparing instructional materials requires the commitment of scarce resources, so may not be feasible or sustainable.

Lack of evidence of effectiveness.

For all the apparent value of curricular integration, there is little evidence of substantive improvement in learning outcomes or other important parameters in integrated vs. traditional curricula. This is particularly troublesome in health professions programs, where the expectation for evidence-based practice in the professional realm might reasonably be expected to apply in the educational realm. Reports such as Hammer and Paulsen's (2001) that "students enjoyed [an interdisciplinary] professional skills development course" and that the course instructors "commented that students…demonstrated a greater understanding of the importance of basic sciences to pharmacy practice" (p. 81) and Brynhildsen, Dahle, Behrbohm Fallsberg, Rundquist, and Hammar's (2002) that "students as well as teachers appreciated both [horizontal and vertical] forms of integration highly" (p. 287) are encouraging but hardly compelling justification for major curriculum change.

More rigorous studies of learning outcomes of integrated curricula have demonstrated improvements that are modest at best. Mixed findings have also been reported, such as a shift to deeper learning approaches by 5 students and a shift to more surface learning approaches by 6

students out of 18 participating in a study of the impact of an integrated medical curriculum (Balasooriya, Hughes, & Toohey, 2009). More typical, though, is a study comparing the diagnostic ability of final-year medical students in a traditional curriculum, a problem-based learning curriculum, and a systems-based integrated curriculum. Those in the problem-based and the integrated curriculum had equivalent scores (mean = 40/67) that were higher than those in the traditional curriculum (mean = 36/67), with the difference being statistically significant (Schmidt et al., 1996). However, the difference is not large, so its practical significance is questionable. Also questionable, and not addressed, is the fact that the mean scores seem low for all students.

Similarly, Ogur, Hirsh, Krupat, and Bor (2007) compared exam results for medical students participating in a year-long clerkship at a single clinic site that was integrated with their course work and that of their classmates receiving the more typical experience of rotating through a variety of separate hospital wards without integration with their course work. The students in the integrated clerkship had higher mean scores on each of four subject exams and an objective structured clinical examination (OSCE); however, in each case the difference was not statistically significant. That said, students in the integrated clerkship gave statistically significantly higher ratings for the effectiveness of their clerkship experience in preparing them to be truly caring in dealing with patients, to deal with ethical dilemmas, to see the effect of social context on patients and their problems, to involve patients in decision making, to relate to diverse patient populations, and to be a self-reflective practitioner (Ogur et al., 2007). Such outcomes are desirable, of course, but a higher self-rating is not a demonstration of actual improvement in caring attitude, dealing with ethical dilemmas, etc. Nor were these results achieved without costs, which included using faculty members selected for their teaching ability rather than residents or interns as preceptors, strategically selecting a diverse patient case load

rather than making do with the patients who happened to be present, and developing a system to notify students when one of their patients sought care anywhere in the clinic (Ogur et al., 2007).

Lack of *evidence* for effectiveness should not be mistaken for lack of *effectiveness*, however. Much of the available literature is descriptive rather than evaluative. For example, a review of the literature from 1992 to 2009 on interdisciplinary teaching and learning in higher education located only 10 reports of empirical studies (Spelt et al., 2009). This may be because the task of conducting large-scale studies that would convincingly demonstrate the value of integrated curricula and, in particular, the achievement of integrative learning by students is filled with challenges. There may be large gaps between the curriculum as planned, the curriculum as taught by instructors, and the curriculum as experienced by students. For example, the integrated curriculum planned for the pharmacy program at Butler University was not fully implemented; rather compromises were made which resulted in a partial reversion to a more traditional disciplinary structure (Hrubey, 1996). This sort of failure to implement a program as intended is a frequent cause of lack of positive outcome (Fullan, 1993; Love, 2004; O'Donnell, 2008). Also, investigations involving students as participants have many ethical pitfalls, and require careful attention to procedures to ensure that participation is voluntary, identities are protected, and negative consequences associated with participating, withdrawing, or refusing to participate are avoided. Thus, studies investigating student learning in a large-scale, meaningful way are rare.

A further difficulty is the fact that assessment of student learning is frequently poorly done. For example, the content knowledge tests in the study by Ogur et al. (2007) are not described, but they might very well be multiple-choice tests with performance dependent on recognition and recall of fragments of knowledge rather than integration of the knowledge and

skills required for safe and effective patient care. That was precisely the case in another study, where “integrated” exams consisted of a mix of discipline-specific questions (Thompson, Braun, & O’Loughlin, 2013). Perhaps not surprisingly due to the misalignment of teaching and assessment methods, the medical students in this study who had been taught in integrated modules performed more poorly on most of these exams than students who had been taught in disciplinary courses.

Even when more robust research is done, the degree to which findings can be generalized may be questioned, because institutional contexts, curricular structures, and student populations are complex and vary considerably. Consequently, findings from, say, the liberal arts may have limited applicability to health professions programs. Regardless, traditional curricula have been developed and implemented in the absence of this type of supportive evidence. Lack of evidence for the value or effectiveness of integrated curricula should thus be seen as a call to enhanced efforts in the scholarship of teaching and learning, not as justification for avoiding curricular change.

Curriculum Leadership

The magnitude of the change that may be involved and the obstacles to be overcome in designing and implementing—and sustaining—integrated curricula demand effective curriculum leadership. As Chinowsky’s (2008) practice implementation matrix suggests, effective communication, achievement of buy-in, commitment of resources, identification and support of champions, and provision of educational development opportunities and performance rewards are important aspects of successful implementation of change, and these functions are all within the purview of leaders. Unique challenges exist, however, for leaders in higher education. There is a history in education of “change without difference” (Woodbury & Gess-Newsome, 2002, p.

764) and “defensiveness, superficiality, or at best short-lived pockets of success” in response to demands for change (Fullan, 1993, p. 3). Fullan and Scott (2009), in fact, assert that universities are particularly resistant to change.

Possible reasons for this include the conservative nature of educational institutions, the high value attached to individual autonomy and academic freedom, the academic culture of questioning and critique, and the loyalty to a discipline superseding institutional loyalty (Beaudoin, 2003; Bryman & Lilley, 2005; Fullan, 1993). Also, leaders in higher education typically come out of the faculty ranks, sometimes reluctantly and often with little leadership experience or familiarity with theories and scholarship related to leadership, and they may be expected to maintain research productivity as their appointments are frequently time-limited (Bryman, 2007; Bryman & Lilley, 2009). Leadership in universities is also diffuse. It does not reside only in presidents and deans, but also in department heads, committee chairs, and even in influential individuals without formal administrative roles (Amey, 2006; Beaudoin, 2003; Kezar, Carducci, & Contreras-McGavin, 2006). Thus, leadership strategies proven in other contexts are not necessarily transferrable to universities (Bryman & Lilley, 2009).

Some principles of effective leadership in higher education have nevertheless been elucidated. In a review of the literature conducted by Bryman (2007), behaviours of department heads associated with effective leadership included having and communicating a strategic vision, being credible and trustworthy, acting as a role model, treating others considerately and fairly, and providing opportunities for shared decision-making. Specific to curriculum change, Fullan (2002) suggests that leaders must understand the process of change and, above all else, place student learning at the centre of reform efforts.

Summary

Integrative learning is a desirable outcome for higher education programs in general and pharmacy programs in particular, where graduates are expected to apply knowledge and skills from multiple disciplines to the management of patients' complex medical conditions and drug therapy problems. Integrative learning does not occur spontaneously for most students, but may be fostered by curricula that provide appropriate educational experiences. Thus, it is no surprise that accreditation standards and other institutional guidelines are calling for integrated curricula. However, these calls rarely define what is meant by curricular integration or suggest the means by which integration might be achieved. Furthermore, there is confusion about the definition of curricular integration, integrative learning, interdisciplinarity, and related concepts. The view taken here is that the crucial elements of integrated curricula are the connections between disciplines and between theory and practice, which are encompassed in Harden's ladder of horizontal integration and the inverted triangles model of vertical integration.

There is a long history of discipline-based structure in higher education that may hamper cross-disciplinary collaboration. There is also a continuing need for disciplinary depth in curricula, and it is not obvious what an appropriate balance might be between disciplinary and cross-disciplinary educational experiences. Also, despite the fact that pedagogical strategies to encourage integrative learning may be familiar, significant curricular reform requires a great deal of time and effort. Change will not occur without resources, educational development, and effective leadership. There is also a need for additional scholarship to shed more light on the nature of integrated curricula and integrative learning and to provide evidence in support of investments in curricular change.

Chapter 3: Methodology

Paradigmatic Ponderings

Educational research is characterized by the plurality of methods employed and by differing points of view regarding such matters as the nature of knowledge, the construction of meaning, and the role of the researcher and the researched (Arthur, Waring, Coe, & Hedges, 2012; Cousin, 2009; Hubball & Clarke, 2010; Rist, 1977). This makes it necessary to reflect on and be clear about one's own stance in a research project, and how this influences the questions one is inclined to ask, the theoretical frameworks and methodologies one prefers to use, and how one is likely to interpret the findings. This is, however, in sharp contrast to research practices in the health sciences, where it is hoped this work will resonate. Research in this realm is almost exclusively rooted in an objectivist paradigm where the randomized, double-blind, placebo-controlled trial is considered the "gold standard" of research methodology and the researcher is seen as an external, disinterested party. As a consequence, educational research in health professions tends to be of a sort that seeks quantitative evidence of effectiveness, asking the question "Does it work?" ("it" being, say, a pedagogical innovation) rather than attempting to answer questions such as "How does it work?" or "Why does it work?" or, more generally, "What is going on in this social world?" (Cousin, 2009; Regehr, 2010).

This research project asked the latter, interpretive types of questions. Nevertheless, it is undeniably rooted in a post-positivist perspective. As such, it aimed to make what Dewey (1938) referred to as "warranted assertions" based on evidence obtained through "competent and controlled inquiry," (p. 8) and is consistent with the post-positivist approach to educational research delineated by Phillips and Burbules (2000). This includes the understandings that:

- The universe is not necessarily totally knowable and controllable.

- Evidence is imperfect and fallible.
- Evidence places limits on the interpretations that are warrantable.
- Researchers are imperfect and are situated in social and historical contexts in which multiple motivations operate, the pursuit of the truth being but one.
- Attention to subjectivity and avoidance of bias are worthy goals for the researcher.
- Researchers should hold epistemically important values, such as dedication to pursuit of the truth, openness to counterevidence, receptiveness to criticism, accuracy of measurements and observations, and honesty and openness in reporting results.
- These values do not just apply to the natural sciences; they are equally important for interpretivist research in the social sciences.
- No particular research methodology is favoured; the methodology chosen should be the one that best fits the issue that is under investigation.

Why a Case Study?

With respect to the final point above regarding choice of methodology, and the associated selection of methods, the research questions must be used as guides. For this study, those questions were

1. What conceptions of curricular integration are held by those leading, planning, teaching in, and learning in an undergraduate degree program?
2. What is the relationship of these conceptions to the observed integration in the espoused, enacted, and experienced dimensions of the curriculum and the areas of convergence and divergence between these three dimensions?

There is no intervention or measurement implied in these questions, so experimental methodology and other strictly quantitative approaches, such as survey methodology, were not

deemed appropriate. Rather, a qualitative approach was called for, with possibilities including but not limited to narrative research, phenomenology, grounded theory, and ethnography (Cresswell, 2012).

The design of a curriculum,[3] which is at the heart of this study, is a social endeavor. In higher education settings, this process is primarily undertaken by the same faculty members responsible for teaching the students in the program, with the guidance and support of curriculum leaders. As such, the form a program takes depends on a complex set of context-specific factors internal and external to the academic unit, including the resources available, such as time and money; institutional priorities; accreditation requirements; the collegiality, engagement, expertise, and autonomy of the faculty members involved; and the effectiveness of the leadership provided (Lattuca & Stark, 2009). Various qualitative methods could be used to gain an understanding of how a particular curriculum has been arrived at. Given the purpose here of in-depth description and analysis of a defined contemporary program, case study methodology was selected as the best fit for this research project (Cresswell, 2012; Hammersley & Gomm, 2000; Pearson, Albon, & Hubball, submitted; Yin, 2014).

Conceptions of what a case study is vary. Some consider case study to be a qualitative research approach, and contrast it with methodologies such as ethnography and phenomenology (e.g., Merriam, 2009; Cresswell, 2012). Others acknowledge that case studies can include quantitative data or can even be purely quantitative in nature (Stake, 1995; Yin, 2014). There is also debate as to whether case study is a methodology (e.g., Cresswell, 2012), a method of inquiry (e.g., Crotty, 1998), or, perhaps, a "transparadigmatic and transdisciplinary heuristic"

[3] As previously indicated, the term "curriculum" here is taken to mean "a coherent program of study…[that] is carefully designed to develop students' knowledge, abilities, and skills through multiple integrated and progressively challenging course learning experiences" (Hubball & Gold, 2007, p. 7).

(VanWynsberghe & Khan, 2007, p. 2). Resolution of this debate remains elusive (Hyett, Kenny, & Dickson-Swift, 2014).

In relation to this research project, Yin's definition of a case study was particularly resonant. Yin (2014) considers case study to be "an empirical inquiry that investigates a contemporary phenomenon (the "case") in depth and within its real-life context" (p. 16) that is particularly well-suited to investigating "how" and "why" questions about events that the investigator is not in a position to control, where there are many more variables of interest than data points, and where multiple sources of evidence are sought. Yin also provides clear methodological guidance to the researcher. Accordingly, this case study was approached using the principles of research design outlined by Yin (2014). These include the steps of defining the research questions and conceptual framework, selecting and defining the boundaries of the case, linking the data to the conceptual framework, and providing explanations for the findings (Yin, 2014).

With the methodology chosen, data collection methods had to be selected, and again the research questions provided guidance. With respect to the first question, developing an understanding of individuals' conceptions of a complex construct such as curricular integration called for semi-structured interviews, with their opportunity to ask in-depth questions and to probe responses. With respect to the second question, a necessary first step was to characterize integration in the intersecting dimensions of the curriculum, which required a combination of methods. For example, the espoused curriculum resides mostly in planning documents and the memories of those involved in the planning process, so document analysis and, again, interviews were called for. The enacted curriculum resides mainly in teaching documents and instructor practices in classrooms, so field observations were added to the data collection methods. The

experienced curriculum resides mainly in the thoughts and impressions students have, so interviews were once more required.

Case Selection

For this research project, a single case design was used due to time and resource constraints and the desire for depth rather than breadth of inquiry. The case selected was the Bachelor of Science in Pharmacy (B.Sc.(Pharm.)) program offered at The University of British Columbia (UBC) and its associated curriculum dimensions. This was an instrumental rather than an intrinsic case because this program was not unique in its ability to serve as a site of inquiry for the proposed research questions, and the option existed to select other health professions programs at UBC or other pharmacy programs, or indeed any professional or liberal program at any higher education institution (Stake, 1995).

This program was chosen because the curriculum design process, which occurred between 1997 and 2002, was well-documented (Hubball & Burt, 2004) and was the most significant curriculum project undertaken in recent years by the Faculty of Pharmaceutical Sciences. At the time of the study, the curriculum was mature and stable, with no recent major changes. Furthermore, it was geographically convenient, required manageable resources, and allowed easy access to the documents and individuals needed to conduct a comprehensive study.

The selection of the UBC B.Sc.(Pharm.) program as the case to be studied did present potential risks in terms of coercion and loss of privacy for participants and for excessive intrusion of subjectivity, given the multiple roles of the individuals involved (e.g., researcher/curriculum planner/program director/ colleague/friend and observed instructor/interviewee/course coordinator/colleague/friend). Some participants may have been overly eager to please or wary of being seen as critical of the curriculum or their colleagues or

not knowledgeable about integrative learning and assessment; thus, they may have adjusted their classroom practices while being observed or may have given responses to interview questions that did not represent their true feelings. Further reflection on these risks is found in Appendix A. These issues are not trivial, but they were not considered so severe as to preclude the selection of the case or the individual participants.

The UBC B.Sc.(Pharm.) program is arguably a typical case of a Canadian pharmacy program, and, more broadly, typical of a university program leading to the practice of a recognized profession. Although every Canadian pharmacy program has unique characteristics, similarities include horizontal and vertical curricular integration strategies (see Appendix B), accreditation requirements, desired educational outcomes, and licensure and practice standards for graduates (Austin & Ensom, 2008). This program seemed a fruitful location for this study with its focus on curricular integration for reasons previously stated, including that

1. A desire for curricular integration was a contributing factor in recent changes in Faculty governance (Faculty of Pharmaceutical Sciences, 2009).
2. Several recent curricular integration initiatives in the program had been reported (Albon et al., 2011; Pearson et al., 2011).
3. The accreditation standards for the program expected horizontal and vertical integration of the curriculum (Canadian Council for Accreditation of Pharmacy Programs, 2013).

Finally, this program was selected because the findings might be particularly valuable to the Faculty, which was at the beginning stages of designing the next iteration of its undergraduate curriculum.

Case boundaries.

There were curricular, temporal, and role boundaries applied to this case. The curricular boundary was the required coursework of the B.Sc.(Pharm.) program provided by the Faculty of Pharmaceutical Sciences. Courses outside the Faculty's control and where students' learning experiences might vary considerably were excluded, as they do not factor strongly in the integration strategies for the program. These included the pre-pharmacy courses and the required courses within the program (e.g., in anatomy and physiology) provided by other Faculties, which students could take at any institution offering equivalent courses and at any time prior to entering the program; and the elective courses, which students selected from the many options available to them, both inside and outside the Faculty. PHAR 403 – Administration of Injections was also excluded, as it was only added to the program in 2012 and its content was externally determined and separately accredited from the rest of the program.

The temporal boundaries were related to the design and implementation of the curriculum. The temporal boundaries for the espoused curriculum were from 1997, the year the design process was initiated, to differing endpoints up to 2012 depending on the data source. Curriculum documents predating this were excluded and the historical roots of the Faculty and prior iterations of its undergraduate curriculum were not examined in any detail. The temporal boundaries for the enacted and experienced dimensions of the curriculum were just over one calendar year, from January 2012 to March 2013. This timeframe spanned two academic years, with classroom observations and associated interviews with course coordinators occurring for Term 2 courses during the 2011 Winter Session and for Term 1 courses during the 2012 Winter Session. Confining the study to one academic year would have meant waiting for the start of a

new academic year in September after receiving ethics approval in January 2012, which was not considered necessary in this mature curriculum where few changes occurred from year to year.

Role boundaries for the enacted curriculum were also applied, in that only course coordinators, and not guest instructors, were invited to participate in interviews. This is because it was the course coordinators who had primary responsibility for determining the objectives and learning and assessment strategies for their courses, for preparing course syllabi, and for collaborating with each other to enhance curricular integration. However, classes taught by guest instructors were included in the classroom observations conducted during this study as some courses relied heavily on guests and these classes were still part of the enacted curriculum. Also, external stakeholders were limited to pharmacy practitioners who had some awareness of the curriculum by virtue of being alumni of the program and through their involvement in the supervision of students during the experiential component of the coursework and of recent graduates of the program employed at their practice site.

Selection of an embedded case.

Given the complexity of the curriculum for a professional degree program and the breadth and depth of data that might be collected, an embedded case design was employed (Yin, 2014). This involved the purposeful selection of a single term of the program to serve as a consistent exemplar, for which the data collected were analysed in greater depth for characteristics such as curricular structure, content, pedagogy, and integration. The main criteria considered in this selection were the number and variety of required courses in the term and the completeness of the data available. Thus, the decision on which term to select was not made until after all data collection had been completed. However, based on number and variety of courses, the candidates for the embedded case were Term 1 and Term 2 of Year 2 and Term 1 and Term 2

of Year 3. It is during these four terms that the majority of the required pharmacy coursework occurs. There are sequences of courses in all the major disciplines, including pharmaceutics, medicinal chemistry, pharmacology, clinical pharmacy, and pharmacy practice, running through these terms. There are also clusters of pathophysiology, pharmacology, therapeutics, and self-medication courses, within which some integrative efforts occur, in each of these terms. However, no term includes courses across the full range of disciplines taught in the program.

Ultimately, Term 2 of Year 2 was selected as the embedded case, because

1. This is one of two terms with the largest number of credits of required pharmacy coursework (16.5 credits) in the original curriculum design.
2. This is the only term that includes both pharmaceutics and medicinal chemistry courses, along with courses in all other disciplinary course streams except pathophysiology.
3. This is one of two terms that has not had courses added or deleted since the curriculum was originally designed.
4. This is the only term in the program where classroom observations were conducted in every course during the same term.
5. This term has as complete a set of interviews with course coordinators as any other term in the program.

Limitations of this term as the embedded case include the fact that it does not include a pathophysiology course, which would be a typical part of an integrated cluster of courses, and the interview data are incomplete, although no more so than in any other term, as two of eight course coordinators did not participate. Also, any single term of the program may be useful for examining horizontal integration but is limited in its usefulness for examining vertical integration. To at least address the vertical-practice dimension of integration, the experiential

course that occurs in the summer immediately following completion of Term 2 of Year 2 was included in the embedded case.

Data Collection

This study used the triad of qualitative methods most common in case study research, namely document analysis, observation, and interviews (Merriam, 2009; Yin, 2014). The use of these methods in combination allowed for thorough characterization and comparison of the espoused, enacted, and experienced dimensions of the curriculum, and for inquiry into the conceptions of curricular integration held by curriculum planners, course coordinators, students, and external stakeholders, according to the data collection and analytic plan shown in Figure 8.

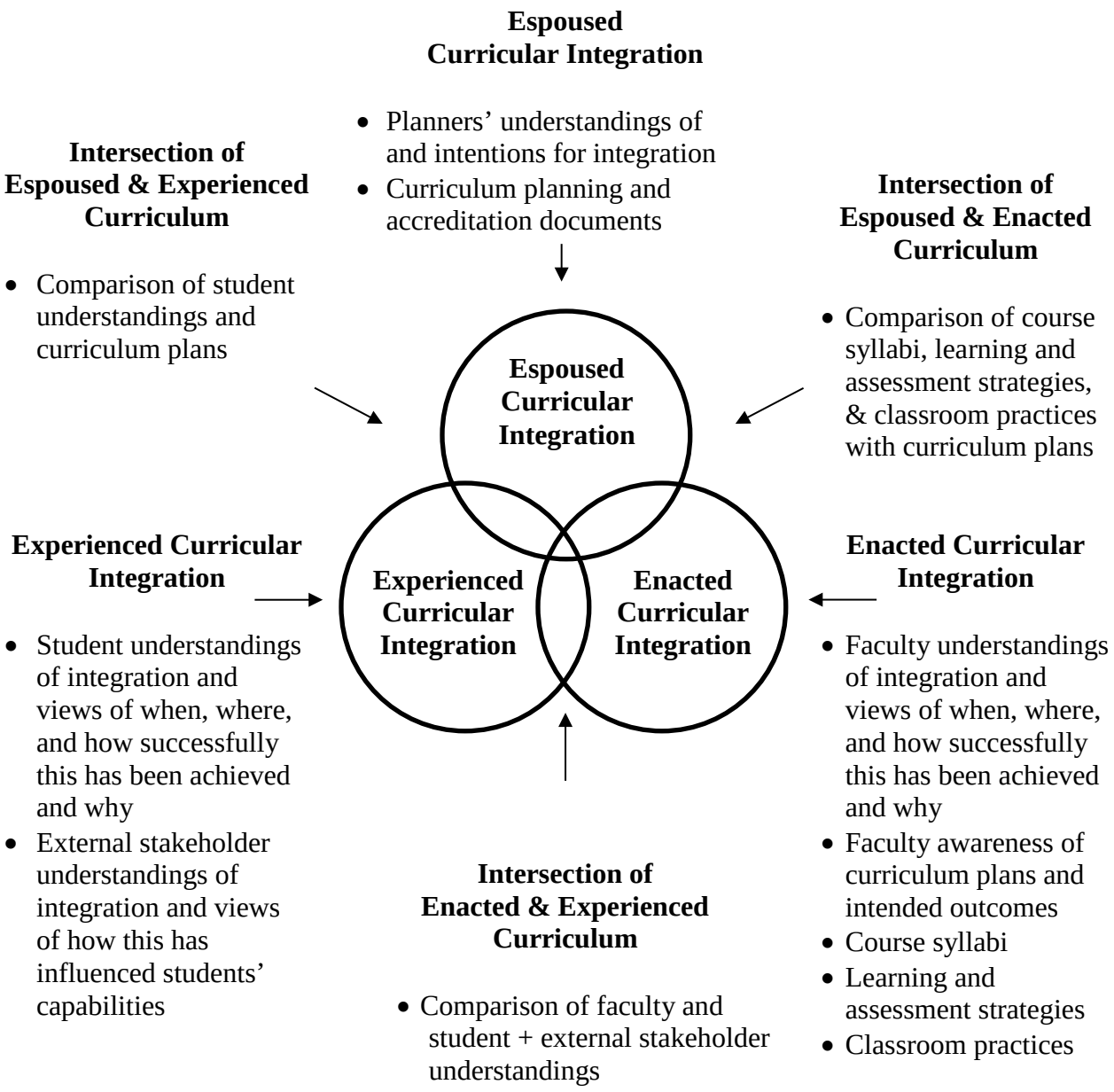


Figure 8. Data collection and analytic plan for characterization and comparison of the intersecting dimensions of the curriculum. From "Curricular integration in pharmacy education," by M. L. Pearson and H. T. Hubball, 2012, *American Journal of Pharmaceutical Education, 76*(10), Article 204, p. 7. Copyright 2012 by the American Association of Colleges of Pharmacy. Reprinted with permission.

All data sources were recorded and tracked in an Excel® spreadsheet that served as a database for the research project. Documents other than contemporary course syllabi and class handouts were classified as to type (e.g., report, meeting Minutes) and assigned a catalogue number, and notations were made indicating their format (e.g., hard copy, zip disk) and the date of preliminary review. Classroom observations were organized by course number, and notations were made regarding the date(s) of the observations, the name of and code number assigned to the instructor, the location(s) of the field notes (e.g., the notebook page numbers), whether a course syllabus had been obtained, and whether a handout had been obtained for the particular class observed. For the interviews, participants were classified as curriculum planning leaders, course coordinators, students, or external stakeholders and were assigned a code number. The date of the interview was recorded, as was a notation for the course coordinators to indicate whether they had been involved in the curriculum planning process.

Documents.

With respect to characterizing the espoused curriculum, documents collected included those related to the curriculum planning, approval, and accreditation processes, namely

1. Faculty and institutional strategic plans from circa 1997 and 2012.
2. Minutes of meetings and reports of the Faculty's Curriculum Review Committee, curriculum planning working groups, Faculty Advisory Council, and Curriculum Committee from 1997 to 2003, the time period during which the curriculum was being planned and moving through the institutional approval process. The completeness of this set of records was determined by cross-checking references within these documents to other meetings (e.g., items mentioning the next scheduled meeting or indicating approval of Minutes of a previous meeting).

3. Curriculum change proposals for the program submitted by the Faculty between 2001 and 2004 to the Senate Curriculum Committee. Included among these documents are course outcomes templates and draft syllabi for each required PHAR course, which summarize the topics, learning outcomes, and proposed instructional and assessment strategies.

With respect to characterizing the enacted curriculum, documents collected included

1. Accreditation reports from 1997 to 2012, including Faculty self-studies and site team evaluations.
2. Contemporary course syllabi, from either the 2011 or 2012 Winter Session; handouts for the class sessions observed; and copies of exams and assignments.

Classroom observations.

Prior to doing any classroom observations, approval was obtained from UBC's Behavioural Research Ethics Board. Permission was sought from the coordinators of all required pharmacy courses, excluding experiential courses and the 1-credit injection training course, in Term 1 and Term 2 of the Winter Session in each of the four years in the program to observe their classes for a two-week period in the middle of the term. The majority of the observations were scheduled as follows:

1. Jan. 30 to Feb. 10, 2012: Year 1 and Year 3 Term 2 courses
2. Feb. 27 to Mar. 9, 2012: Year 2 Term 2 courses[4]
3. Oct. 22 to Nov. 2, 2012: Year 1 and Year 3 Term 1 courses
4. Nov. 5 to Nov. 16, 2012: Year 2 and Year 4 Term 1 courses

These timeframes were chosen on the assumption that classroom practices observed in the middle of the term would be more representative of instructional norms than those very early

[4] No Year 4 classes were observed in Term 2, because these same courses were offered in Term 1, and were observed at that time. This duplication of course offerings is due to the split of the Year 4 students into two cohorts that complete their classroom-based and experiential courses in alternating terms.

or very late in the term. The schedule for each course was reviewed to determine the specific dates and times to request to observe and to identify who would be teaching at those times. Classes where midterm exams were being held were omitted from the observation schedule. For courses with nontraditional scheduling (e.g., compressed courses that did not span the full term) or where there was a direct conflict between two classes to be observed, dates outside the timeframes indicated above that would best fulfill the intentions of the study were requested. Term 2 courses were observed prior to Term 1 courses as a matter of convenience, to facilitate earlier completion of this phase of data collection.

Each request to observe was sent via an e-mail message to which was attached a letter of initial contact providing details of the study and a consent form (see samples in Appendix C). Descriptions of the purpose of the study were deliberately kept as brief and non-specific as possible in these documents to minimize potential influence on classroom behaviour and interview responses of participants. Where a guest lecturer was scheduled to teach during the observation period, permission to observe was first obtained from the course coordinator, then from the guest lecturer. One follow-up message was sent to course coordinators who did not respond to the initial request. Students were informed via an e-mail message sent through the Student Information System that their classes would be observed for the purposes of gathering information on what was being taught and how it was being taught, and not for purposes of observing individual students (see sample in Appendix C). Classes were observed as unobtrusively as possible[5] and field notes were taken by hand for the first three sets of observations and on a laptop computer for the fourth set. Class handouts were obtained either

[5] I was an observer rather than a participant-observer in the class sessions. In lecture theatres, I typically sat near the back of the classroom, and in a middle rather than aisle seat, out of the direct line of sight of the instructor. In tutorial and lab sessions, I sat outside the circle of the group of students having a discussion or performing a task. I was primarily an observer of the instructor, not the students.

from the instructor or, with permission, from the course materials posted in the university's online learning management system, *Connect*.

Observations were documented through field notes that included the date, time, course number, and initials of the instructor as cataloguing features, and included content such as

1. Verbatim remarks of the instructor, to the extent that these were possible to capture as the instructor was speaking and deemed relevant (e.g., when the instructor was not simply verbalizing the content of slides or handouts). A particular point was made to capture remarks potentially indicative of efforts at curricular integration, such as references to other courses or to the practice of pharmacy.
2. Questions and comments from students.
3. Cross references to slides and handouts, such as page or slide numbers that coincided with a particular remark.
4. Preliminary identification of types of integrative efforts (e.g., horizontal integration with courses in other disciplines) and the certainty with which these were made.
5. Marginalia with personal reflections and preliminary thoughts about analytic strategies.

These notes were reviewed after each set of observations, and the notes pertaining to a particular course were reviewed prior to interviewing the course coordinator.

Interviews.

Interviews of curriculum planning leaders, course coordinators, students, and external stakeholders were conducted following the classroom observations. Curriculum planning leaders included faculty members holding senior administrative roles and those who chaired the committees and working groups responsible for designing the curriculum during the period 1997 to 2003. These individuals included

1. The Dean of the Faculty at the time, now retired but still active in the Faculty.
2. The Assistant Dean of Undergraduate Programs, now retired and not active in the Faculty.
3. The Chair of the Curriculum Review Committee.
4. The Chairs of the Pharmaceutics, Medicinal Chemistry, Pharmacology, Pharmacy Practice, and Clinical Working Groups.

Of these, two individuals were excluded, one because of illness and one because of conflict of interest due to being part of the supervisory team for this research project, leaving six potential participants, all of whom were invited to take part in an interview.

Course coordinators included faculty members identified in the Student Information System as responsible for each of the required courses in the program, including the experiential courses. There were instances where one person coordinated multiple courses and other instances where two or more individuals shared coordination responsibilities for one course. Where there were multiple coordinators for a course, the person presumed to be the better informant was purposively selected as a potential interview participant, e.g., the full-time rather than the part-time faculty member, the longer serving faculty member, or the faculty member whose teaching had been observed. The coordinators of six courses were excluded, including four who had been categorized as curriculum planning leaders, one who was on sabbatical leave, and the coordinator of the injection training course that was excluded from the study. In all, 32 coordinators of 36 courses were invited to participate in an interview.

External stakeholders to the Faculty include leaders in pharmacy organizations, regulatory bodies, the pharmaceutical industry, retail pharmacy, and provincial health authorities. Those likely to have the greatest interest in the curriculum are the community and institutional employers of the graduates of the program, especially those who act as clinical instructors,

providing placements for students doing their experiential courses. Thus, for purposes of this study, the external stakeholder participants were limited to pharmacy practitioners in supervisory or managerial roles in their place of employment who were also experienced preceptors and alumni of the program. A short list of long-serving, respected preceptors was obtained from the Faculty's Office of Experiential Education, from which four individuals were selected as potential interview participants. Criteria used in the selection process included seniority in the workplace, years of experience as a preceptor, diversity, and convenience of location for conducting a face-to-face interview. Of the four individuals selected, two (one male, one female) worked in community practice, one in a supervisory position in a large pharmacy chain and one who managed an independent pharmacy, and two (one male, one female) worked in institutional settings, one in a large urban teaching hospital and one in a smaller suburban hospital.

Purposive sampling was also used to select student participants who would potentially be well-informed about the curriculum and student opinion of the curriculum, and who would likely be willing to freely and thoughtfully engage in a group discussion. Thus, the student participants were either members of the Faculty's Student Pipeline[6] or students recruited with the assistance of Pipeline members.

Interviews took the form of semi-structured individual interviews of the curriculum planning leaders, course coordinators, and pharmacy practitioners, and focus group interviews with students in each year in the program. The primary questions for each of these four groups are provided in Appendix C. These were developed with both the research questions and the analytical frameworks adopted for the study in mind. There were some commonalities in the

[6] The Student Pipeline is a group of approximately 40 students, 10 from each year of the program, who are elected or who volunteer to assist in communicating the students' point of view to the Faculty. When issues of mutual interested are identified, each Pipeline member is expected to seek input from up to 10 of their classmates.

questions asked. For example, all participants were asked about their understandings of curricular integration, and what they saw as barriers to and necessary supports for curricular integration. However, the set of questions was customized to the type of interviewee, and, as is typical of semi-structured interviews, the direction each conversation took varied somewhat during the course of asking follow-up and probing questions. During the interviews with course coordinators, the one-page course outcomes template created during the curriculum design process for their course was presented to assist with probing their awareness of the espoused curriculum. A sample is provided in Appendix C.

Written consent was obtained prior to each interview. The interviews were conducted at mutually agreeable times and places, mostly in private meeting rooms and participants' offices. All interviews were digitally audio-recorded, and written notes were also taken during the interviews. Each recording was transferred from the recorder to a laptop computer, and then erased from the recorder. Each recording was then transcribed into a Word® document. Backup copies of both the recordings and the transcripts were saved to a memory stick. Access to the files on the laptop required a password and the memory stick was securely stored when not in use. The transcripts were verbatim records of the words spoken, but did not include details of the tone of voice, body language, "ums" and "ahs," silences, laughter, and similar aspects of the conversational interactions that occurred. Also, to protect privacy, names of individuals, hospitals, and pharmacies mentioned during the interviews were denoted in the transcripts by an initial only (e.g., M_____). The transcripts were verified by reviewing them while listening to the recordings and by cross-checking with the handwritten notes. Time notations were added to the transcripts to facilitate rapid relocation of particular sections of the recordings as needed for data analysis purposes.

Data Analysis

The data obtained during this study were analysed using a manual thematic analysis process (Boyatzis, 1998; Flick, 2009; Guest, MacQueen, & Namey, 2012). A stepwise approach of (a) "making the text manageable," (b) "hearing what was said," and (c) "developing theory" was used (Auerbach & Silverstein, 2003, p. 43). This was an intentional but also a flexible, iterative process, as appropriate for a qualitative study with explanatory purposes in mind (Guest et al., 2012; Yin, 2014). That is, a skeletal analytic plan was developed prior to starting analysis, but the analytic process was open to findings that emerged from the data and to reanalysis in light of such findings in a manner similar to the constant comparative method (Glaser, 1965; Glaser & Straus, 1967). A codebook was prepared, with an initial set of codes derived from the research questions, conceptual frameworks, and literature, and was refined as analysis proceeded. For example, Chinowsky's (2008) practice implementation matrix suggested that "communication" and "buy-in" were concepts that should be reflected in codes associated with barriers and supports in curriculum design and implementation. Analysis of interview transcripts resulted in the addition of items such as workload, personal initiative, history, and evidence to the barrier and support concepts in the codebook. The final version of the codebook thus contained a combination of structural and theory-driven (deductive) and data-driven (inductive) codes (DeCuir-Gunby, Marshall, & McCulloch, 2011; Miles, Huberman, & Saldaña, 2014).

All coding was done by making coding notations and writing memos on documents, field notes, and interview transcripts. Accuracy of the coding was checked early, at the mid-point, and late in the analytic process through independent analysis of several data samples by a colleague experienced in qualitative case study methodology and familiar with the case. In each of these instances, there was a high level of agreement on the interpretations.

To facilitate answering the research questions, data analysis began with an examination of contextual factors, followed by a sequential examination of the intersecting dimensions of the curriculum, starting with the espoused curriculum and proceeding to the enacted curriculum and then the experienced curriculum, as shown in Figure 9.

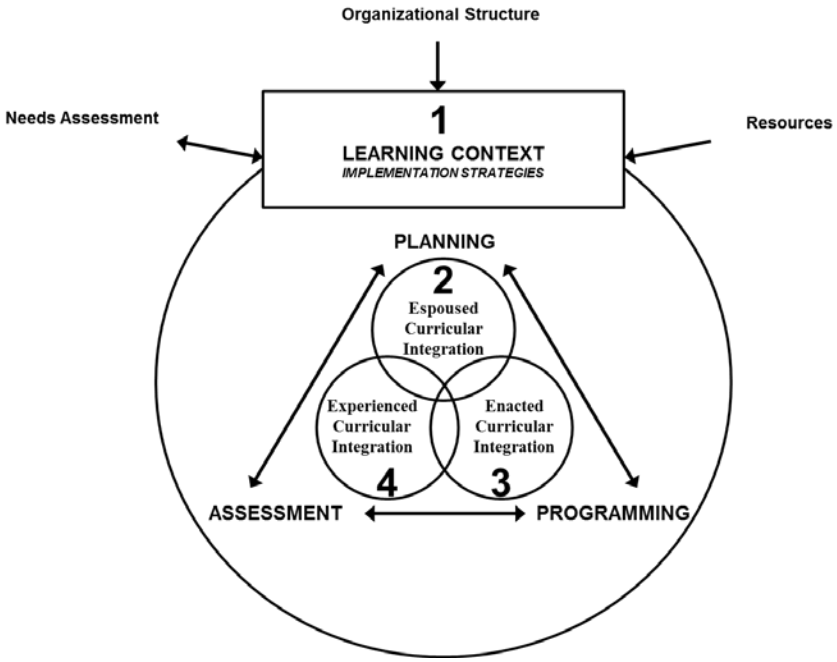


Figure 9. Data analysis sequence for descriptive findings on curriculum design.

Documents.

"Making the text manageable" for analysis of curriculum planning documents consisted of organizing these documents by type and in chronological order, and assigning catalogue numbers, as already described. This step was followed by a first reading with the preliminary set of codes in mind for triage purposes. Documents considered to have little or no relevance were identified as such and set aside. "Hearing what was said" involved a careful reading and initial coding of the retained documents. Coding notations were reviewed and adjusted in light of the final version of the codebook during a subsequent rereading of the documents.

Classroom observations.

"Making the text manageable" for the classroom observations involved an initial step of organizing and cataloguing the field notes and class handouts as previously described. The process of identifying instructors' integrative strategies documented in the field notes evolved as these strategies emerged over time during the classroom observations. "Hearing what was said" involved developing a coding scheme for characterizing these integrative efforts. This set of codes, shown in Table 3, was primarily created inductively, during careful reading of the instances of integrative statements or actions in the notes of the final set of observations (i.e., Year 2 and 4 Term 1 courses in the fall of 2012).

Table 3

Coding Scheme for Integrative Efforts Observed

Criterion	Scale
Integration Type	Horizontal-Multidisciplinary (disciplines intact but complementary)
	Horizontal-Interdisciplinary (disciplines intact but acting collectively)
	Horizontal-Transdisciplinary (disciplinary boundaries not evident)
	Vertical-Spiral (link to past or future curricular elements)
	Vertical-Practice (link to pharmacy practice)
Breadth	Within a course
	Within an integrated course cluster
	Within the program but outside the course cluster
	Within the program but outside the Faculty
	Outside the program
	Related to practice-theoretical
	Related to practice-actual
Depth	Micro (fleeting mention with no detail provided)
	Meso (small amount of detail provided)
	Macro (substantial detail provided)
Sureness	Sure (appears knowledgeable about curriculum or pharmacy practice)
	Unsure (guessing, speculating, or asking students)
Locus	Self
	Other (reference to other faculty member or practitioner)
Time scale	Micro (within same class session or last/next class)
	Meso (within unit or term)
	Macro (across terms or years)
Direction	Forward (to the future)
	Backward (to the past)

As an example, an instructor's statement "I hope these clinical guys come talk to you because they are starting to revisit the use of low-dose ASA[7] for primary prevention of MI[8]" was coded as (a) horizontal-multidisciplinary integration, (b) within an integrated course cluster, (c) meso depth, (d) unsure, (e) other locus, (f) meso time, and (g) forward direction.

Interviews.

"Making the text manageable" for the interviews involved creating written transcripts of the audio recordings and verifying the accuracy of the transcription. This was followed by a triage step of reading each transcript in its entirety and identifying the portion(s) most relevant to each research question. Passages related to particular questions for each category of participant were copied and collated in separate document files to facilitate analysis. "Hearing what was said" involved repeated readings of the selected passages and returning to the original audio recordings when deemed necessary. Similar to the approach used with other types of data, coding notations were made during the first reading of the transcripts and refinements were made to the codebook for use during subsequent readings.

As with the coding scheme for integrative efforts in the classroom, outlined in Table 3, the coding scheme for concepts of integration was developed during the early stages of analysis and refined as analysis progressed. Individual's conceptions of curricular integration were coded on three primary characteristics: sophistication, locus, and type of integration. Sophistication refers to the fullness and specificity of the description of integration. Aspects such as length, clarity, inclusion of examples and, if so, whether those examples were rooted in current curriculum practices or reflected more speculative possibilities, were used to assess whether the description was of high or low sophistication. Locus here refers to the central person(s) involved

[7] Acetylsalicylic acid (Aspirin®)
[8] Myocardial infarction (heart attack)

in or responsible for integrative actions in a participant's description of curricular integration, i.e., teachers or students. For example, the statement "you would get different people in the one room to teach" was considered to have a teacher locus, while the statement "students should not see those courses as separate, mutually exclusive courses" was considered to have a student locus. Descriptions of integration were also assessed for the type(s) of integration envisioned, including horizontal (e.g., through mention of different disciplines, such as medicinal chemistry and pharmacology), vertical-spiral (e.g., through mention of the flow of topics or the increase in complexity within a disciplinary course stream), and vertical-practice (e.g., through mention of links between classroom-based activities and experiential coursework or pharmacy practice). As with the integrative efforts observed in the classroom, horizontal integration was further classified as being multidisciplinary, interdisciplinary, or transdisciplinary.

Limitations of the Methodology and Methods

The ability to ascribe particular meanings to the findings arising from this analytic process is subject to a number of limitations in the study design and the data sources. First and foremost, the use of a single-case design means that there is no opportunity to make between-case comparisons with either a similar or a contrasting case (Palys, 2003; Yin, 2014). A multiple-case design would permit stronger claims to be made and facilitate readers' judgements on transferability to other settings. In this research project, a decision was made to favour depth over breadth and, therefore, to use a single-case design.

A number of limitations accrue to the case itself. The most important of these may be the insider status of the researcher, which is typical of endeavours in the scholarship of teaching and learning but does present risks that have already been outlined and reflected upon. The maintenance of a project database open for auditing, the independent analysis of several data

samples, and the review of findings by key informants were all efforts undertaken to mitigate the risk of researcher subjectivity. Secondarily, the claim that the curriculum for the UBC B.Sc.(Pharm.) program is a typical case is not easily verifiable, considering the complexities of the context and the curriculum for this, or any, higher education program. Also, for reasons outlined earlier, boundaries have been applied to the case such that certain parts of the curriculum and certain people have been excluded from the case. In particular, there was limited emphasis in this study on curriculum leaders and supporters, although these individuals can be very influential in the design and implementation of curricula. Finally, a limiting aspect of the case is the passage of time since the curriculum planning process occurred. In the intervening years, documents may have been lost, memories of interviewees may have faded, some curricular change is likely to have occurred, and individuals may have developed new understandings of curricular integration.

There are also limitations to each of the data sources used for this study. With respect to documentary sources, different documents have different limitations. For example, the set of curriculum planning documents may be incomplete, as already mentioned. Formal archival procedures were not used and these documents were mostly stored in individuals' offices so were at risk for being misplaced or discarded. Completeness of the set of documents was assessed, as previously described, and no significant deficiencies were noted; however, it is ultimately not possible to verify that all relevant records were located. Also, the accuracy of some documents is not verifiable. As an example, Minutes of meetings may be the only record available, but they are brief summaries, often prepared by individuals with a vested interest in the business conducted, and should not be taken for verbatim records that document the nuances of the discussion and debate that occurs in meetings. Also, accreditation self-studies are purpose-

written, and those purposes include the political so these documents should not be taken as completely objective accounts.

In the case of course syllabi, it was possible to verify the completeness of the set of these documents but not the accuracy or completeness with which they represented the courses. For example, as the syllabus is normally published before a course starts, the stated content may not be entirely accurate due to adjustments that occur while the course is underway where listed topics are not taught or topics not listed are taught. The typical course syllabus a few pages long provided little detail regarding content or pedagogical approach. Even a detailed handout for a class session only went so far in communicating the content and pedagogical approach for the class. Thus, there was no substitute for attending a class as an observer. However, the classroom observations also had their limitations. The most obvious of these is that the two-week period of observation in this research project was a sample of less than 20% of the total class time for each course. Syllabi were perused in an effort to check that the two-week periods chosen were reasonably representative of the curriculum, but it was not possible to verify this with certainty. Also, instructors were aware they were going to be observed, so may have altered what they taught or how they taught it during these class sessions. As previously mentioned, every effort was made to be inconspicuous during these observations to minimize this possibility and there is no evidence to suggest this did occur. However, consideration will be given to incorporating a verification step, such as obtaining students' perceptions of the typicality of the class, in future research of this type.

The final data source, the interviews, also had their limitations. The first of these might be the limited skill of the interviewer in determining the questions to ask and when and how to probe to obtain rich data on individual's conceptions of curricular integration. As Palys (2003),

puts it with respect to interviews and questionnaires, “Gathering data is easy; gathering meaningful data is a whole other challenge” (p. 150). Reconsideration of the interview protocol would be useful if similar research were to be pursued in the future. Another limitation, always present in interviewing, is the fact that it relies on participants’ self-report (Palys, 2003). In this case, there were risks that interviewees would have poor recall or modulate their responses in an effort to please or appear knowledgeable or to avoid appearing critical of others (Yin, 2104). Also, the students and pharmacy practitioners invited to participate were selected purposively for their potential ability to provide rich data and not for their representativeness. This is not to say that they might not be representative of their respective communities, but this was not assessed in any way so findings related to these two groups should be generalized with caution. Similar caution would also be appropriate with regard to the curriculum planning leaders and course coordinators. Although almost the entire community was invited to participate in these two cases, a few individuals were excluded for reasons given earlier and a small number declined or did not respond to the invitation. The non-participants were reviewed to determine if there was over-representation of individuals from a particular discipline. This was not the case, but they might have had some other characteristic in common that has skewed the findings.

Validity and Reliability

In addition to the limitations of the methodology and the methods, various threats exist to validity and reliability of the findings. Validity and reliability are contested concepts in qualitative research, as they derive from quantitative research, and are rooted in the objectivist notion that there is a single, fixed truth that is attainable through the use of appropriate methods of data collection and analysis. As such, these terms are an uneasy fit with any study in an interpretive paradigm, and perhaps especially a case study with its naturalistic form of inquiry

into a singularity. There is a confusing array of stances regarding validity and reliability, ranging from the view that these terms are devoid of meaning in interpretive research to the suggestion that the use of such positivistic terminology helps qualitative research gain acceptance in a world that is quantitatively oriented (Cresswell, 2012). Similar to other matters of methodology for this research project, guidance was taken from Yin (2014) and a number of steps were taken to strengthen validity and reliability of the findings as these terms were understood within the context of this study.

Tactics adopted to strengthen construct validity (i.e., the collection of appropriate data) included identifying the sources of data necessary to respond to the research questions, using multiple sources of data, and having key informants review the report of the findings (Yin, 2014). With regard to the use of multiple sources of data, this is often suggested for purposes of triangulation to achieve greater accuracy. This was done where possible, such as by comparing findings from the interview and the observation(s) of a course coordinator; however, data sources in this study rarely overlapped in a way that one could be used to confirm another. Thus, the main purpose of triangulation in this study was that suggested by Mathison (1988), namely to obtain "more and better evidence from which…to construct meaningful propositions" (p.15). With regard to participant review, as Yin (2014) recommends, key informants were sent a draft of the findings chapter (Chapter 4) of this dissertation and invited to comment on the accuracy with which it reported "what was said." Two informants were selected: one senior faculty member who served as a curriculum planning leader, who was also a course coordinator and had some familiarity with the field of the scholarship of teaching and learning; and one student who had participated in a focus group interview and who was well-read about principles of learning and familiar with qualitative research methodology. Both reported that the findings rang true for

them. Some minor editing of the presentation of the findings was done to clarify aspects they identified as confusing. The only adjustment made to the findings as a result of these reviews was the removal of a minor aspect of the student experience that had been deemed problematic, which the student reviewer indicated was not a problem from the students' perspective.

Procedures to strengthen internal validity (i.e., the drawing of appropriate inferences) included using pattern matching and explanation building during data analysis and considering other explanations for the phenomena observed (Yin, 2014). In particular, although this case study had explanatory purposes, i.e., determining how individuals' conceptions of curricular integration influenced the observed integration of the curriculum, care was taken not to confuse correlation with causation. Procedures to strengthen external validity (i.e., generalizability to other cases) were also employed.[9] These included providing an assessment of the typicality of the case selected, thorough description of the case, and samples of raw data.

With regard to reliability (i.e., the likelihood of obtaining the same results if the study were to be repeated), a systematic process of data collection and analysis was developed (see Figure 8) and followed. Also, a project database was created and kept up to date. Both these steps were essential to keeping track of the large amount and diverse types of data collected and the thematic codes used for analysis.

"Developing Theory"

The "developing theory" stage of data analysis might more accurately be described as seeking meaningful patterns in the data, relative to the research questions and conceptual framework for the study, in order to make warranted assertions (Dewey, 1938; Yin, 2014). This

[9] Generalizability is another contested notion in interpretive research, where some prefer the term "transferability" (Lincoln & Guba, 1979/2000). Regardless of the term used, concerns exist about generalizing from a single case study. However, even a single case, be it typical or atypical, is a case "of something" and findings may be applicable to other cases (Gerring, 2007; Yin, 2014).

involved processes of pattern matching and explanation building (Yin, 2014). To this end, data related to the espoused, enacted, and experienced dimensions of the curriculum were analysed according to the same set of design characteristics, namely structure, content, and pedagogy and horizontal, vertical-spiral, and vertical-practice integration, to facilitate comparisons. Similarly, data sources documenting the words and the actions of course coordinators regarding curricular integration were analysed through use of a common set of codes. Further, following the initial coding step, juxtaposing a more sophisticated and a less sophisticated description of curricular integration provided by two course coordinators proved a useful approach to analysing the conceptions of integration in this participant group (Yin, 2014).

The findings that emerged from these processes were then examined for relationships between the observed integration in the curriculum and various actors' conceptions of integration. Finally, possible explanations were sought for the points of convergence and, more importantly, the points of divergence between the curriculum as designed, the curriculum as taught, and the curriculum as learned.

Chapter 4: Findings

Introduction

The findings for this study are presented in two sections. The first of these provides descriptive details for the UBC B.Sc.(Pharm.) program. This section is organized according to the major elements of the conceptual framework for this study, beginning with the curricular context and proceeding to integration in the espoused, enacted, and experienced dimensions of the curriculum. A significant amount of detail is provided in this section in order to set the stage for the findings specific to the research questions for this study, which are provided in the second section.

Findings related to the curricular context are mainly derived from documentary sources and emphasize the period during which the curriculum was being designed (circa 1997) and being taught at the time of the study (circa 2012). The factors available within the data sources considered most influential on the curriculum include (a) the administrative structure, processes, and priorities of the Faculty; (b) the administrative structure, processes, and priorities of the University; (c) the social environment in the Faculty; (d) the Faculty's perspective on the nature of the profession; and (e) the educational environment of the Faculty and the University.

Findings related to the espoused curriculum are mainly derived from documentary sources and interviews with 4 of 6 eligible curriculum planning leaders, including the Dean of the Faculty at the time, the Chair of the Curriculum Review Committee, and the Chairs of two of the discipline-specific working groups.

Findings related to the enacted curriculum come from documentary sources, interviews with 24 of 32 eligible course coordinators, and 126 hours of classroom observations in 30 of 34

eligible courses. Among the course coordinators, 9 had been involved in the curriculum planning process and 15 had joined the Faculty after the planning had been completed.

Findings for the experienced curriculum mainly come from six focus group interviews with students, including groups from Year 1 and 3 interviewed in April 2012 and groups from each of the four years of the program interviewed in March 2013, and from interviews with four practicing pharmacists who were all alumni of the program and in positions where they supervised students during their experiential coursework and newly-graduated pharmacist employees. With regard to the students, eight focus group interviews had been planned, two each for the students in each of the four years in the program. However, in two instances none of the invited students agreed to participate due to the timing being close to the exam period. Also, although it was intended that one set of focus group interviews would occur in Term 1 and the other in Term 2, scheduling difficulties led to them all being conducted in Term 2.

Through these data sources, the espoused, enacted, and experienced dimensions of the curriculum have each been characterized in terms of content, structure, and pedagogy, with particular attention to curricular integration and integrative learning. Further, integration has been examined in three dimensions: horizontal integration across disciplines, vertical integration within disciplines (deemed "vertical-spiral), and vertical integration between theory or basic sciences and practice or clinical sciences (deemed "vertical-practice"). Where appropriate, Term 2 of Year 2 of the curriculum has been used as a consistent exemplar of these various aspects of the curriculum.

The second section of the findings directly addresses the two research questions. Interview data are the source of the findings regarding the conceptions of curricular integration held by the four participant groups, namely curriculum planning leaders, course coordinators,

students, and pharmacy practitioners. These findings include participants' thoughts on the barriers to and the supports needed for integration in the B.Sc.(Pharm.) program.

Context and Characteristics of the B.Sc.(Pharm.) Curriculum

Curriculum context.

The Faculty's 1997 strategic plan, 1999 accreditation self-study, and 2001 Interim Report to the Canadian Council for Accreditation of Pharmacy Programs (CCAPP), and UBC's 1998 "Trek 2000" strategic plan served as the main data sources for developing a picture of the context at the time the curriculum was being designed. Similar documents, i.e., the Faculty's 2012 strategic plan and 2012 accreditation self-study, and UBC's 2012 "Place and Promise" strategic plan, were used to update that picture to the time of the study. Secondary sources to confirm some details included pertinent editions of the UBC Calendar, UBC annual reports, accreditation site visit evaluation reports, and interviews with curriculum planning leaders.

Administrative context.

When the curriculum design process began in 1997, the Faculty leadership included a Dean and Associate Deans of Graduate Studies and Research, Undergraduate Programs, and Professional Programs.[10] The Dean, the Associate Dean of Graduate Studies and Research, and the Associate Dean of Undergraduate Programs were long-serving faculty members but newcomers to their leadership roles. The governance structure of the Faculty included five discipline-based divisions, namely the Divisions of Pharmaceutical Chemistry, Pharmaceutics and Biopharmaceutics, Pharmacology and Toxicology, Pharmacy Practice, and Clinical Pharmacy. A Faculty Advisory Council, consisting of all faculty members and key staff, provided a mechanism for facilitating communications and decision-making in the Faculty.

[10] The Associate Dean of Professional Programs position was eliminated in 2004.

A five-year strategic plan completed in 1997 set out goals in four areas: Faculty structure, communication, and development; curriculum and teaching and learning strategies; research and graduate education; and acquisition of resources. The mission of the Faculty expressed in the strategic plan was "to educate students to provide pharmaceutical care, to promote research and scholarly activity in the pharmaceutical sciences, and to serve as a pharmacy resource for Canada and others around the world." The development of an outcomes-based curriculum was the singular goal related to teaching and learning. By 1997, a senior faculty member had been appointed to lead the development process and a Curriculum Review Committee was struck, which operated separately from the Faculty's Curriculum Committee. The Faculty enjoyed a strong national reputation for its research and educational programs. However, it was also facing significant resource challenges, including aging and insufficient physical facilities and a budget shortfall due to successive cutbacks to its operating funds. Budgetary problems had resulted in loss of positions through attrition and a growing reliance on soft funding for essential positions.

In 2012, a different and more seasoned leadership team was in place, with the Dean and the Associate Dean Academic having served for nearly a decade. The Faculty's governance structure had been revised in 2010, with new leadership positions created, including an Associate Dean of Practice Innovation. The Divisions were replaced by a Program Director and four Year Coordinators to support the undergraduate program and discipline-based research streams to support graduate programs and research activities. A Program Advisory Committee was created to complement the Curriculum Committee. The Faculty Advisory Council remained in place, and an Educators Committee, consisting of all faculty members and selected staff, was established to parallel the existing Research Committee, consisting of all faculty members in the professorial ranks, some instructors with an interest in educational research, and selected staff.

In 2012, the Faculty moved to a newly-constructed building providing significantly more and higher quality space than its previous home. A new strategic plan identified the Faculty's mission as the "advance[ment of] knowledge, health outcomes and the profession of pharmacy leading to enhanced societal benefit and optimal patient care." The development of an entry-to-practice Doctor of Pharmacy program to replace the B.Sc.(Pharm.) program was a high priority, and a Director of PharmD Programs had just been appointed to lead this curricular change.

This picture of the administrative context of the Faculty is mirrored at the institutional level. In 1997, a new president had recently been appointed and a new strategic plan was being developed. Government funding was in decline and a provincially-legislated freeze on tuition fees was in place; however, a successful capital campaign launched by the previous president was bearing fruit in the form of new infrastructure and programs. In 2012, there was a different leadership team in place with a president who was into his second five-year term. Funding remained a challenge, and another large capital campaign was underway.

Summaries of the priorities of the Faculty and the University in 1997 and 2012, derived from their strategic plans, are provided in Tables 4 and 5. For comparative purposes, these are organized according to the themes in the earliest of these documents, i.e. the Faculty's 1997 plan. These summaries demonstrate reasonable alignment between the Faculty's and the University's priorities. They also show consistency over time in a desire for excellence in education and research. Two evident changes are (a) an increase in attention to the world beyond the University, with new priorities emerging in globalization, sustainability, and social responsibility at both the Faculty and University level, and (b) a new emphasis on scholarly approaches to and scholarship of teaching in undergraduate education.

Table 4

Faculty Priorities in 1997 and 2012

Priority Area	1997 Priorities	2012 Priorities
Relationships	Enhance communication and collaboration within the Faculty Recognize faculty, staff, and student contributions to the Faculty Enhance Faculty relationships with the public, the profession, the government, the university, and pharmaceutical industry	Engage stakeholders and lead innovation in pharmacy practice Expand international collaborations Increase alumni and community engagement Promote intercultural understanding
Undergraduate Education	Develop an outcomes-based curriculum	Be recognized as a leader in pharmacy education Increase SoTL productivity Develop an entry-to-practice PharmD program
Research and Graduate Education	Conduct outstanding research Provide outstanding graduate education	Increase the number of graduate students Increase funding and research productivity Be recognized internationally
Resources	Identify and acquire new resources	Provide a healthy workplace Promote sustainable practices

Table 5

University Priorities in 1997[11] *and 2012*

Priority Area	1997 Priorities	2012 Priorities
Relationships	Recruit and retain outstanding faculty, staff, and students Develop a downtown presence Enhance connections with alumni Increase international collaborations	Foster positive societal change Increase capacity for international engagement Increase alumni commitment through lifelong engagement
Undergraduate Education	Develop an academic plan Provide learner-centred curricula Enhance use of technology Improve faculty teaching skills Increase enrolment of Aboriginal students	Enhance quality of teaching through research-informed curriculum and pedagogy Expand educational enrichment opportunities Enhance intercultural learning Expand opportunities for Aboriginal people and for learning about Aboriginal issues
Research and Graduate Education	Enhance funding and mentorship Expand liaison with industry	Increase quality and impact of research Be a world leader in knowledge exchange and mobilization
Resources	Upgrade infrastructure Strengthen library collections and services	Provide a healthy, inspiring workplace Be a living laboratory of social and environmental sustainability

[11] The "Trek 2000" strategic plan was drafted in 1997 and approved in 1998 (University of British Columbia, 2005).

Faculty social context.

The Faculty of Pharmaceutical Sciences is small compared to other UBC Faculties. In 1997, there were 35 faculty members, fairly evenly divided across ranks and across the five Divisions. However, the makeup of the Divisions by rank, gender, and pharmacy training, detailed in Appendix D, varied considerably. The most extreme difference in makeup by rank was between the Pharmacy Practice Division, with 1 full professor, 1 associate professor, and 6 instructors or lecturers, and the Pharmacology Division, with 5 full professors, 2 associate professors, and 1 assistant professor. The Pharmacy Practice Division was predominantly female, while the Pharmaceutical Chemistry was all male. Also, the 8 members of the Clinical Division were all practicing pharmacists with cross-appointments to local hospitals or other practice sites. Most other faculty members had pharmacy training, but few were actively engaged in practice.

Differences in rank, gender, and pharmacy background may have affected personal interactions and power relationships, and therefore decisions regarding the B.Sc.(Pharm.) curriculum. However, there were no indications of this in the data sources. Rather, accreditation reports describe the Faculty as socially cohesive and faculty members as talented, committed, and open to change. Evidence of this includes the engagement of the great majority of the faculty and staff in the strategic planning process and the large membership of the Curriculum Review Committee, which all interested faculty members were invited to join.

By 2012, the Faculty had grown to 48 faculty members and was recruiting additional personnel. The student body had also grown significantly, from 544 undergraduate and 56 graduate students in 1997 to 735 and 76 respectively in 2012. The Faculty continued to be seen as socially cohesive, with committed and hardworking faculty members and staff. However, there was some tension observed between the educational and research missions of the Faculty.

Professional context.

Little information is provided in the available documents about the profession that graduates of the program were entering. However, in 1997 the Faculty perceived the profession as undergoing rapid change. The Faculty also appreciated its responsibility to ensure students would be well prepared to enter practice. Factors cited as stimuli for practice change included the aging population, development of new medications, a shift from independent to corporate pharmacy ownership, and pressure to control health care spending. The pharmaceutical care model of practice, as described in Hepler and Strand's seminal 1990 article, was being adopted, as is evident from the Faculty's 1997 mission statement. However, the degree of uptake of this model by pharmacists appears to have been limited, perhaps more so in community than hospital practice settings. Evidence of this is the Faculty's 1999 intention to develop training and practice enhancement programs for the community pharmacists who served as preceptors for students' experiential learning. In 2012, patient-centred and outcome-focused models of pharmacy practice were still being anticipated rather than considered commonplace by the Faculty.

Links between the Faculty and the pharmacy profession included the Faculty's reliance on practitioners as preceptors for the experiential coursework and as guest instructors, and on part-time faculty members with cross appointments to clinical practice sites. These individuals were all valued for their ability to provide "real world" experience to students. Also, prior to the 2010 change in governance, practitioners and representatives of the provincial regulatory body and pharmacy advocacy organizations were included on various Faculty committees, particularly those related to the undergraduate program. After 2010, membership on these committees was limited to faculty members, although practitioners were included on the task force and working groups responsible for redesigning the program. By 2012, the Faculty saw that it had an active

role to play in leading, rather than just responding to, practice change. Accordingly, the position of Associate Dean Practice Innovation was created with this mandate, and a model practice site was under development in purpose-built clinic facilities in the new Faculty building.

Educational environment.

The B.Sc.(Pharm.) program, consisting of one year of pre-pharmacy coursework in the Faculty of Science followed by four years of study in the Faculty of Pharmaceutical Sciences, had been in place since 1971. Periodic revisions were undertaken, the most recent of which had occurred in 1991, with the first graduates completing this iteration of the program in 1995. This curriculum consisted of a combination of discipline-based coursework in the basic sciences, biomedical sciences, and pharmacy practice; an interdisciplinary sequence of "Drugs" courses that combined content in medicinal chemistry, pharmacology, and therapeutics; pharmacy and non-pharmacy electives; and 200 hours of experiential learning in the final year of the program.

The program was similar in content to other pharmacy programs in Canada and was expected to meet the accreditation standards of the Canadian Council for Accreditation of Pharmacy Programs (CCAPP). This organization was established in 1992 and conducted its first review of the Faculty in 1994, when full accreditation for a 5-year period was granted. Another relevant new set of national standards was the Association of Faculties of Pharmacy of Canada (AFPC) 1998 statement of educational outcomes for pharmacy programs. A similar set of educational outcomes for pharmacy programs had been introduced in 1994 in the United States.

Although the existing curriculum was still relatively new and fully accredited, curricular revision was a high priority of the Faculty in 1997. Driving forces included a desire to ensure the program was meeting educational outcomes that were being clearly articulated for the first time; to respond to deficiencies of the program identified by faculty members and students, including

insufficient experiential learning and lack of emphasis on practice-based problem solving; and to keep up with the rapid pace of change occurring in higher education. Locally, this included substantive curricular revision in the Faculties of Medicine and Dentistry, which initiated a joint problem-based learning curriculum in 1997, and the creation of UBC's first online learning management system, WebCT®. Internationally, there was a revolution occurring in pharmacy programs in the United States, where recent changes in accreditation standards demanded that all baccalaureate degree programs be replaced with Doctor of Pharmacy programs by 2000. More generally, there were moves occurring in higher education to use learning-centred pedagogical approaches; to foster development of generic skills such as critical thinking and communication skills in students; and for faculty members to engage in the scholarship of teaching and learning.

Curriculum planning process.

The Faculty's Curriculum Review Committee documents, Faculty Advisory Committee Minutes, Curriculum Committee Minutes, and interviews with curriculum planning leaders served as the main data sources for developing a picture of the process that was undertaken to design the curriculum. The result of that process, the espoused curriculum, was characterized using these same documents plus curriculum proposals and accreditation self-studies. Secondary sources to confirm some details included editions of the UBC Calendar and interviews with those course coordinators and pharmacy practitioners who had been involved in the planning process.

The stages in the curriculum planning process were

1. 1997: Faculty engagement. A senior faculty member, appointed to lead the curriculum revision, conducted interviews with all faculty members to identify concerns regarding the existing curriculum. Subsequently, a Curriculum Review Committee was established that was open to all interested faculty members.

2. 1998 to 1999: Student engagement. Student representatives from each year of the program were recruited to join the Curriculum Review Committee, and a survey of the entire student body was conducted to identify concerns regarding the existing curriculum.
3. 1998: Articulation of outcomes. The Curriculum Review Committee developed a Faculty-specific set of ability-based outcomes, guided by a draft version of the AFPC outcomes, the outcomes articulated by the American Association of Colleges of Pharmacy (AACP), competency statements for pharmacy practitioners, and similar resources.
4. 1998: External stakeholder engagement. Representatives of the profession were invited to review the outcomes and to join the Curriculum Review Committee.
5. 1998 to 1999: Articulation of idealized content. Working Groups, which mirrored the Faculty's Divisions, were established and identified discipline-specific content and learning and assessment activities to achieve the outcomes that had been identified.
6. 2000 to 2001. Curriculum design. The Working Groups organized their content and activities into courses. Other program elements considered at this stage included admission requirements, selection of non-pharmacy courses (e.g., anatomy and physiology), and identification of elective course offerings.
7. 2001: Achieving consensus. The Curriculum Review Committee was subsumed into the Faculty Advisory Council. Through a series of Faculty meetings and retreats, the idealized content was reduced to that which was considered realistically deliverable and the course structure of the curriculum was agreed to.
8. 2001 to 2004: Institutional approval. The Curriculum Committee prepared the documentation to obtain approval for the program itself and the set of courses for each year of the program from the University's Senate Curriculum Committee and, subsequently, the Senate.

9. 2003 to 2005: Implementation. The curriculum was phased in over a four-year period, during which the prior curriculum was phased out.
10. 2004 to 2012: Stabilization. The curriculum was fine-tuned through additions, deletions, and credit value changes.

Curricular structure.

The espoused curriculum that came out of the planning process consists of a combination of discipline-specific required and elective courses; courses that are internal and external to the Faculty; classroom-based lecture, lab, and tutorial courses; and experiential clerkship courses in community and institutional practice sites. A term-by-term chart of the required courses in the curriculum as originally structured is shown in Table 6. Elective requirements, totaling 18 credits, are not included as these courses can be taken at any time, including prior to entry to the program in many cases. All courses denoted "PHAR" are provided by the Faculty. Courses with other designations, e.g., ANAT (for anatomy), PHYL[12] (for physiology), etc., are provided by other Faculties to students in a variety of programs, with little or no input from the Faculty of Pharmaceutical Sciences. With the exception of biochemistry, these external courses are completed in Year 1 of the program, while the bulk of the internal required coursework is scheduled in Years 2 and 3. The experiential coursework is not scheduled concurrently with the classroom-based courses. Rather, students complete their clerkships during the summer months following Year 2 and 3 and during one full term of Year 4.

[12] In 2013, the course codes ANAT and PHYL were both replaced with the course code, CAPS, which stands for Cellular, Anatomical, and Physiological Sciences.

Table 6 *Required Courses by Term in the Espoused Curriculum*

	1st Year Pharmacy	cr	2nd Year Pharmacy	cr	3rd Year Pharmacy	cr	4th Year Pharmacy	cr
Winter Session Term 1	ANAT 390 Microscopic Anatomy	3	BIOC 300 Biochemistry	3	PHAR 401 – Term 1 Pharmacy Skills Lab III	1	**Cohort 1:**	
	CHEM 233 Organic Chemistry	3	PHAR 302 Pharmaceutical Care	3	PHAR 430 Pharmaceutical Chemistry II	4	PHAR 400 Pharmacy Management	3
	CHEM 235 Organic Chemistry Lab	1	PHAR 303 – Term 1 Pharmacy Skills Lab II	1	PHAR 441 Pharmacology III	3	PHAR 499 Cases in Pharmaceutical Sciences IV	3
	PHYL 301 Human Physiology	3	PHAR 321 Biophysical Pharmacy I	3	PHAR 451 Therapeutics III	2		
	PHYL 302 Human Physiology Lab	1.5	PHAR 322 Biophysical Pharmacy Lab	1	PHAR 461 Non-Prescription & Natural Products III	1		
	STAT 203 Statistical Methods	3	PHAR 341 Pharmacology I	3	PHAR 471 Pathophysiology II	1	**Cohort 2:**	
	PHAR 201 Pharmacist, Patient and Society	3	PHAR 351 Therapeutics I	2	PHAR 498 – Term 1 Cases in Pharmaceutical Sciences III	1.5	PHAR 479 Practice Experience III-Community	12
	PHAR 202 – Term 1 Pharmacy Skills Lab I	1	PHAR 361 Non-Prescription & Natural Products I	1			PHAR 489 Practice Experience IV-Institutional	6
	PHAR 299 – Term 1 Cases in Pharmaceutical Sciences I	1.5	PHAR 371 Pathophysiology I	1				
			PHAR 399 – Term 1 Cases in Pharmaceutical Sciences II	1.5				
Winter Session Term 2	ANAT 391 Gross Human Anatomy	3	BIOC 300 Biochemistry	3	PHAR 401 – Term 2 Pharmacy Skills Lab III	1	**Cohort 1:**	
	MICB 202 Microbiology & Immunology	3	PHAR 303 – Term 2 Pharmacy Skills Lab II	1	PHAR 435 Pharmaceutical Chemistry III	3	PHAR 479 Practice Experience III-Community	12
	PHYL 301 Human Physiology	3	PHAR 315 Pharmacokinetics	4	PHAR 442 Pharmacology IV	3	PHAR 489 Practice Experience IV-Institutional	6
	PHYL 302 Human Physiology Lab	1.5	PHAR 323 Biophysical Pharmacy II	3	PHAR 452 Therapeutics IV	2		
	PHAR 202 – Term 2 Pharmacy Skills Lab I	1	PHAR 330 Pharmaceutical Chemistry I	2	PHAR 454 Pediatric & Geriatric Drug Therapy	3		
	PHAR 220 Physicochemical Properties of Drugs	3	PHAR 342 Pharmacology II	2	PHAR 462 Non-Prescription & Natural Products IV	1	**Cohort 2:**	
	PHAR 241 Foundations of Pharmacology	2	PHAR 352 Therapeutics II	2	PHAR 472 Pathophysiology III	1	PHAR 400 Pharmacy Management	3
	PHAR 299 – Term 2 Cases in Pharmaceutical Sciences I	1.5	PHAR 362 Non-Prescription & Natural Products II	1	PHAR 498 – Term 2 Cases in Pharmaceutical Sciences III	1.5	PHAR 499 Cases in Pharmaceutical Sciences IV	3
			PHAR 399 – Term 2 Cases in Pharmaceutical Sciences II	1.5				
	Summer Session:		PHAR 369 Practice Experience I	3	PHAR 469 Practice Experience II	3		

As Table 6 illustrates, the curricular structure is not constrained by the institutional norm of the 3-credit, 1-term course. For example, up until late in the planning process, the self-medication coursework was envisioned as a single 3-credit course to include topics previously taught in separate courses on traditional non-prescription medications and alternative natural health products. However, this content was ultimately subdivided into four 1-credit courses spread across Years 2 and 3 of the program (PHAR 361, 362, 461, and 462 in Table 6). Planning documents and planners' recollections suggest that decisions regarding course credit values took into account institutional standards for assigning credits based on classroom contact hours; the number of credits associated with similar coursework offered in the prior iteration of the curriculum; availability of existing faculty members to teach in particular areas, as no new resources were anticipated; and a desire to limit the curriculum to a total of approximately 36 to 38 credits per year.

This curricular structure provides little flexibility. Most of the curriculum consists of single-section courses that must be taken in a particular order and in particular combinations with other courses. Consequently, options for part-time studies are limited. Typical of a professional program, course loads are heavy, with the credit requirements in each year being roughly 25% greater than the norm for a non-professional degree program at UBC.

Since being implemented, the curriculum has undergone some adjustments to the coursework. These include deletion of PHAR 302 – Pharmaceutical Care and PHAR 322 – Biophysical Pharmacy Lab in 2006 and of PHYL 302 – Human Physiology Lab in 2009, and addition of PHAR 460 – Natural Health Products[13] in 2008 and PHAR 403 – Administration of

[13] This course reflects a separation of the natural health products content from the self-medication content in PHAR 361, 362, 461, and 462, which retained their credit value.

Injections in 2012. Reasons for most of these changes are not provided in the documentary sources available, other than budgetary constraints in the case of the deletion of PHYL 302.

Curricular content.

With respect to content of the espoused curriculum, information is sparse in the planning documents. Content details seem to have been left up to the discipline-based working groups and course coordinators. However, brief descriptions are provided in course outcomes templates and topic lists in the draft course syllabi. From these sources, it is clear that the curriculum includes content in the traditional basic sciences (organic chemistry, microbiology, and statistics), biomedical sciences (biochemistry, anatomy, physiology, and pathophysiology), basic pharmaceutical sciences (pharmaceutics, medicinal chemistry, and pharmacology), and pharmacy practice (compounding and dispensing, clinical pharmacy, pharmaceutical care, and pharmacy management). There is no required content in the areas of social science, arts, or humanities, although there are some limited options for coursework in these areas among the approved electives for the program. There is also no required research or critical inquiry component to the curriculum, although this was considered during the planning process.

To provide a fuller sense of the curricular content, the intended content for the courses in Term 2 of Year 2 is shown in Table 7, summarized from the documents submitted to obtain institutional approval for each of the courses in the program, including proposed Calendar entries, course outcomes templates, and draft course syllabi. Typical of the curriculum as a whole, with the exception of the term of Year 4 devoted to experiential education, there is a large amount of content across a range of disciplines in this one term of the program.

Table 7

Intended Content of Required Pharmacy Courses in Term 2 of Year 2

Course	Discipline	Description
PHAR 303 – Pharmacy Skills II	Pharmacy practice	A lab and tutorial course providing simulations of community pharmacy practice, with a focus on legal, technical, and professional aspect of drug distribution and provision of pharmaceutical care. Topics include compounding and dispensing of topical medications; counselling on the use of different dosage forms; and home health care products, such as blood pressure monitors, mobility aids, and ostomy and wound care supplies.
PHAR 315 – Pharmacokinetics	Pharmaceutics	A lecture course on principles of the rate processes of drug absorption, distribution, metabolism, and elimination, and their clinical applications. Topics include compartmental analysis, including one- and two-compartment models and estimation of half-lives, clearance, and volumes of distribution; non-compartmental analysis; hepatic clearance and protein binding; clinical pharmacokinetic monitoring; and non-linear kinetics.
PHAR 323 – Biophysical Pharmacy II	Pharmaceutics	A lecture course on the design, preparation, and evaluation of non-oral drug delivery systems. Topics include controlled-release and site-specific drug delivery; biomaterials, polymers, and liposomes; transdermal and transmucosal drug delivery; aerosols and inhalers; dermatologicals; ophthalmics; and preparation and administration of injectables.
PHAR 330 – Biomolecular Pharmaceutical Chemistry I	Medicinal chemistry	A lecture course on application of genetic information to pharmaceutics, pharmacokinetics, and therapeutic use of drugs. Topics include nucleic acids and gene structure, expression, and regulation; gene manipulation and analysis; drug delivery systems for nucleic acids and the use of viral and non-viral vectors as vehicles; genetic basis for variability in drug response; and ethical issues in biotechnology and pharmacogenetic testing.

Table 7 (continued)

Intended Content of Required Pharmacy Courses in Term 2 of Year 2

Course	Discipline	Description
PHAR 342 – Pharmacology II	Pharmacology	A lecture course on principles of chemotherapy and drug resistance and the mechanism of action of drugs, with a focus on anti-infectives and anti-cancer agents. Topics include ß-lactam, aminoglycoside, sulfonamide, quinolone, and other antibiotics; antifungals; antivirals; HIV/AIDS; anti-parasitics; pathophysiology of cancer; anti-cancer drugs.
PHAR 352 – Therapeutics II	Clinical pharmacy	A lecture course on drug use and management of drug-related problems in common medical conditions, focusing on infectious disease and oncology. Topics include tuberculosis; fungal infections; viral infections; HIV/AIDS; sexually transmitted diseases; intra-abdominal infections; urinary tract infections; hepatitis; endocarditis; meningitis; respiratory tract infections; skin & soft tissue infections; bone & joint infections; and common cancers.
PHAR 362 – Non-Prescription and Natural Health Products II	Pharmacy practice	A lecture course on use of non-prescription and natural health products, emphasizing natural health products. Topics include patterns of use, safety, and regulation of natural health products; pharmacognosy; homeopathy; non-prescription drugs for weight loss, foot care, cough & cold, and cancer.
PHAR 399 – Cases in Pharmaceutical Sciences II	Transdisciplinary	A tutorial course to integrate scientific and clinical concepts, focusing on research and documentation skills; literature retrieval and evaluation; communication skills; team work; and peer and self-assessment. Emphasis is on development of critical thinking and problem solving skills through interdisciplinary cases pertaining to content in other Year 2 courses.
PHAR 369 – Structured Practical Experience Program I	Pharmacy Practice	An experiential course providing an opportunity to build upon and apply skills and knowledge acquired in Years 1 and 2, emphasizing legal, technical, and professional aspects of community pharmacy practice.

Pedagogy.

Pedagogically, the espoused curriculum relies heavily on teaching in large-class lectures and assessment using written midterm and final exams, often in multiple-choice question format. However, each course was expected to contribute in some way to the achievement of the ability-based outcomes that had been developed for the program. Thus, additional learning strategies (e.g., case studies, in-class discussions, debates, and role-plays) and other assessment strategies (e.g., group assignments, presentations, and self-evaluations) were included in the plan for every course. Details of the intended learning and assessment activities for the courses in Term 2 of Year 2 taken from the draft course syllabi are provided in Table 8. In addition to the course-level assessments, the espoused curriculum also included a program-level portfolio to assess overall achievement of the ability-based outcomes.

Table 8

Intended Learning and Assessment Activities for Courses in Term 2 of Year 2

Course	Espoused Learning Activities	Espoused Assessment Activities
PHAR 303	Lab and tutorial activities	Written, practical, and oral exams Videotaped counselling Wellness clinic Professionalism
PHAR 315	Lectures Problem sets Integrated case-based problems Class discussions Tutorials	Written assignments Case study assignments Written midterm and final exams
PHAR 323	Lectures In-class case studies Problem sets Evaluation of journal articles	Written exams Problem sets Written critique of journal article
PHAR 330	Lectures Debates Oral presentations Web-based assignments	Written midterm and final exams Oral presentation Group project Web site
PHAR 342	Lectures Reading assignments In-class problem sets and cases Evaluation of primary literature	Written midterm and final exams Group assignment and presentation
PHAR 352	Lectures Reading assignments In-class problem sets and cases Evaluation of primary literature	Written midterm and final exams Group presentation
PHAR 362	Lectures Reading assignments In-class case studies Evaluation of primary literature Evaluation of natural products website	Written final exam Online quizzes Case study assignment Website evaluation
PHAR 399	Case-based tutorials Literature retrieval and evaluation Group projects Debates	Case-based exam Portfolio Case study assignments Online quizzes Tutorial leader assessment Self-assessment
PHAR 369	Practical experience	Written assignments Preceptor evaluation

Integration in the Espoused Curriculum

Integration does not appear to have been a guiding principle in the design of the curriculum. There are no mentions of integration in the planning documents, although the term "interconnectedness" is used to describe the curriculum in one instance. Rather, documentary sources and curriculum planning leaders' recollections all point to program-level ability-based outcomes as the focus of the curriculum planning process. For example, when asked about educational principles used in the design of the curriculum, one leader said "Well, we were always talking about outcomes then. What do you want to achieve? And then, if that's what we want to achieve, how do we do it?" Within the ability-based outcomes, however, integration is identified as a fundamental aspect of critical thinking and problem solving. For example, one outcome states that graduates of the program must be able "to integrate and apply knowledge to solve drug-related problems" (Faculty of Pharmaceutical Sciences, 1998, p. 5). The elaboration of this outcome refers to a range of disciplines that might be brought to bear in such problems, including anatomy, physiology, biochemistry, pathophysiology, pharmacology, toxicology, medicinal chemistry, pharmaceutics, pharmacokinetics, epidemiology, nutrition, and psychology.

Structural strategies.

Although integration was not articulated as a guiding principle of the curriculum design, various structural aspects of the curriculum do serve an integrative function. As is evident from Table 6, the curriculum consists mainly of discipline-based courses in biomedical sciences, pharmaceutical sciences, and pharmacy practice. With the exception of two practice experience courses scheduled in the summer months, these streams are scheduled in consecutive Winter Session terms of the program as shown in Figure 10. This structure suggests some deliberate attention to vertical-spiral integration during the planning process.

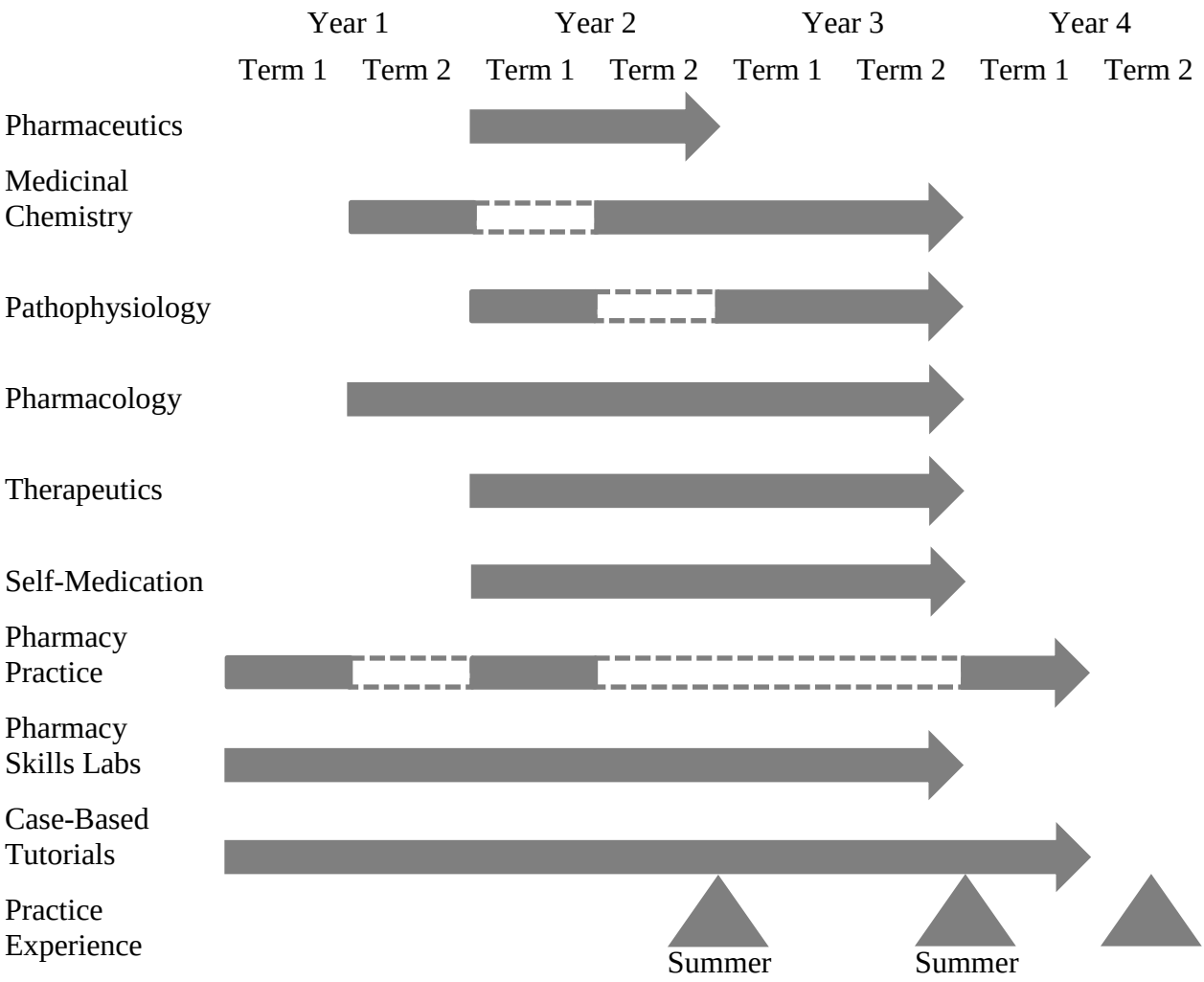


Figure 10. Scheduling of disciplinary course streams across Winter Session terms.

Of note is the separation of the medicinal chemistry, pharmacology, and therapeutics streams. This is a change from the previous curriculum, where the emphasis had been on horizontal integration of these disciplines through a series of team-taught courses, PHAR 370, 380, 385, and 480 – Drugs: Chemistry, Pharmacology and Therapeutics I to IV. Reasons given by curriculum planning leaders for the separation included varying effectiveness of the collaboration within the course coordination teams; differences of opinion on the order of presentation of content; and concern regarding students' learning of the medicinal chemistry content due to frequent omission of this aspect in students' responses on exams.

The duration and placement of the courses in the practice experience stream suggest attention to vertical-practice integration in the curriculum. There are more weeks of practice experience and the first course occurs a year earlier than in the prior curriculum. Also, the placement of the Year 2 and 3 courses in the Summer Session provides opportunities to prepare students well for these practice experiences in the preceding Winter Session, and to draw on those experiences in the following Winter Session.

The stream of case-based tutorial courses, PHAR 299, 399, 498, and 499 – Cases in Pharmaceutical Sciences (CAPS) I to IV was intended to serve horizontal and vertical-spiral integration functions. The CAPS stream is, in fact, the only aspect of the curriculum named as integrative in the planning documents. The intention was to use a variety of pedagogical strategies, with emphasis on problem-based learning, to address cases of increasing complexity to be developed by teams of faculty members from across the disciplines.

Another structural element of the curriculum intended to facilitate horizontal integration is the clustering of courses in pathophysiology, pharmacology, therapeutics, and self-medication. The Calendar makes the intentions for interconnectedness between these courses evident through designation of each course within a cluster as a co-requisite of the others, as shown in the shaded portion of Table 9 for the Term 2 of Year 2 courses. The only other course in this term that lists a co-requisite in a complementary discipline is PHAR 330 – Biomolecular Pharmaceutical Chemistry I, which names PHAR 315 – Pharmacokinetics. However, PHAR 315 does not list PHAR 330 as a co-requisite, casting doubt on the strength of the link between these two courses. Table 9 also shows pre-requisites, which mostly consist of the previous course within the disciplinary stream, providing further evidence of intentions for vertical-spiral integration. Similar designation of pre-requisites and co-requisites occurs throughout the curriculum.

Table 9

Pre-Requisites and Co-Requisites for Courses in Term 2 of Year 2

Course	Pre-requisites	Co-requisites
PHAR 303 – Pharmacy Skills II	PHAR 202 – Pharmacy Skills I	None listed
PHAR 315 – Pharmacokinetics	PHAR 341 – Pharmacology I PHAR 321 – Biophysical Pharmacy I	None listed
PHAR 323 – Biophysical Pharmacy II	PHAR 321 – Biophysical Pharmacy I PHAR 322 – Biophysical Pharmacy Laboratory I	None listed
PHAR 330 – Biomolecular Pharmaceutical Chemistry I	PHAR 321 – Biophysical Pharmacy I	BIOC 300 – Principles of Biochemistry PHAR 315 – Pharmacokinetics
PHAR 342 – Pharmacology II	PHAR 341 – Pharmacology I	PHAR 352 – Therapeutics II PHAR 362 – Non-Prescription and Natural Health Products II
PHAR 352 – Therapeutics II	PHAR 351 – Therapeutics I	PHAR 342 – Pharmacology II PHAR 362 – Non-Prescription and Natural Health Products II
PHAR 362 – Non-Prescription and Natural Health Products II	PHAR 361 – Non-Prescription and Natural Health Products I	PHAR 342 – Pharmacology II PHAR 352 – Therapeutics II
PHAR 399 – Cases in Pharmaceutical Sciences II	PHAR 299 – Cases in Pharmaceutical Sciences I	None specified, but draws on all other Year 2 courses
PHAR 369 – Practical Experience I	None specified, but completion of all Year 2 courses is required	None

Note. The shaded area indicates the pharmacology/therapeutics/self-medication course cluster.

Content strategies.

Curricular integration through structural strategies will have little impact if content and pedagogy are not also effectively designed to support integrative learning. For example, naming a prior course as a pre-requisite or a concurrent course as a co-requisite has little meaning if no effort is made to draw on the learning from those courses. Thus, draft course syllabi were analyzed to assess the extent to which the topic lists suggested (a) vertical-spiral integration within disciplinary course streams; (b) horizontal integration, particularly within the pathophysiology, pharmacology, therapeutics, and self-medication course clusters; and (c) vertical-practice integration between the practice experience courses and prior and subsequent courses. Findings include that

a) With respect to content within disciplinary course streams, there is a logical flow of topics, but little apparent return to prior topics that would be indicative of vertical-spiral integration. As illustrative examples, chosen for their diversity, the intended content for the courses in three streams, namely medicinal chemistry, therapeutics, and pharmacy skills, is shown in Table 10. There do not appear to be any recurring topics from course to course in the medicinal chemistry and therapeutics streams, and only a few examples in the pharmacy skills lab stream. For example, dispensing and compounding appear in both PHAR 202 and PHAR 303. A few isolated examples were located in other streams not shown in Table 10, including similar content on the pharmaceutical care process in PHAR 201 and PHAR 302 in the pharmacy practice stream, and similar content on literature retrieval and evaluation skills in PHAR 299, PHAR 399, and PHAR 498 in the case-based tutorial stream.

Table 10

Summary of Intended Content in Selected Disciplinary Course Streams

Stream	Content			
	Course 1	Course 2	Course 3	Course 4
Medicinal Chemistry	PHAR 220: Physicochemical properties and analysis of small molecules; factors affecting drug absorption, metabolism, and elimination; drug stability	PHAR 330: Introduction to molecular medicine; gene characterization and analysis; nucleic acids as drugs; genetic variability in responses to drugs	PHAR 430: Enzymes as drug targets; enzyme inhibition; selected enzyme targets, e.g., acetycholinesterase; enzymes of drug metabolism	PHAR 435: Drug receptor structure and function; receptor types, e.g., kinases; selected receptors, e.g. cholinergic receptors
Therapeutics	PHAR 351: Drug therapy in immunology; dermatology, e.g., atopic dermatitis, psoriasis; gastrointestinal disorders; respiratory disorders	PHAR 352: Drug therapy in infectious disease, e.g., bacterial, fungal & viral infections; respiratory and urinary tract infections; hepatitis; endocarditis; cancer	PHAR 451: Drug therapy in hormonal disorders, e.g., diabetes; thyroid disorders; cardiovascular diseases; anemia; eating disorders	PHAR 452: Drug therapy in glaucoma; pain; neurological and psychiatric disorders; musculoskeletal disorders
Pharmacy Skills Labs	PHAR 202: Interpretation of prescriptions; technical skills of dispensing; compounding of oral products; pharmaceutical arithmetic; first aid; communication skills	PHAR 303: Dispensing and patient counselling on selected products; compounding topical products; home health care; community presentation; asthma and diabetes workshops	PHAR 401: Pharmaceutical care in hypertension and diabetes; self-medication in smoking cessation and cough, cold & allergy; osteoporosis and healthy heart clinics	N/A

Note. The shaded area indicates coursework in Term 2 of Year 2.

b) In addition to scant evidence of vertical-spiral integration, Table 10 shows little evidence of horizontal integration between the Term 2 of Year 2 medicinal chemistry, therapeutics, and pharmacy skills courses. That is, there is no commonality of topics that would be indicative of intended links between any courses in these three disciplinary streams. However, with respect to content within the pathophysiology, pharmacology, therapeutics, and self-medication course clusters, summarized in Table 11, there does appear to be strong alignment of topics. Even here, though, the self-medication courses include some topics that are not complementary to those in the other courses within each cluster. For example, weight loss products do not appear to fit with the theme of infectious disease and cancer in Term 2 of Year 2. Also, antiparasitic products are scheduled in Term 2 of Year 3, although this topic would be a better fit with the infectious disease theme in Term 2 of Year 2.

Some additional isolated examples of horizontal integration were located in courses other than those shown in Tables 11 or 12. These include drug distribution, communication skills, and several other topics in common between PHAR 201 – Pharmacist, Patient, Society in the pharmacy practice stream and PHAR 202 – Pharmacy Skills I in the pharmacy skills stream; and principles of absorption, distribution, metabolism, and excretion in common between PHAR 220 – Physicochemical Properties of Drugs in the medicinal chemistry stream and PHAR 315 – Pharmacokinetics in the biophysical pharmacy stream. In both these instances, however, the disciplinary streams are complementary so the cross-disciplinary leap is small. For example, the separation of the pharmacy practice and pharmacy skills streams is somewhat artificial, as the skills labs were embedded in the pharmacy practice courses in the prior curriculum, and the biophysical pharmacy and pharmaceutics streams are sufficiently similar that a merger of the two curriculum planning working groups was considered.

Table 11

Summary of Intended Content in Pathophysiology, Pharmacology, Therapeutics, and Self-medication Courses

Term	Content			
	Pathophysiology	Pharmacology	Therapeutics	Self-Medication
Term 1 Year 2	Pathological processes in disease; structure, function, and diseases of the skin, gastrointestinal tract, and respiratory tract	Drug action; receptors, agonists, and inhibitors of the autonomic nervous system; pharmacology of drugs for gastrointestinal and respiratory disorders	Drug therapy in immunology; dermatology, e.g., atopic dermatitis, psoriasis; gastrointestinal disorders; respiratory disorders	Patient counselling; non-prescription drugs for allergies; skin and gastrointestinal conditions; smoking cessation
Term 2 Year 2	[No pathophysiology course]	Chemotherapy and drug resistance; pharmacology of anti-infectives, e.g., antibiotics, antifungals, and antivirals; anti-cancer drugs	Drug therapy in infectious disease, e.g., bacterial, fungal, & viral infections; respiratory and urinary tract infections; hepatitis; endocarditis; cancer	Regulations, safety, and patterns of use for natural health products; non-prescriptions products for weight loss; foot care; cough and cold; cancer
Term 1 Year 3	Pathological processes in diabetes; cardiovascular diseases; disorders of the urinary system	Pharmacology of drugs affecting the endocrine, cardiovascular, and renal systems; vitamins and minerals	Drug therapy in hormonal disorders, e.g., diabetes, thyroid disorders; cardiovascular diseases; anemia; eating disorders	Non-prescription and natural health products for contraception; women's & men's health; nutritional supplements
Term 2 Year 3	Pathological processes in pain; headache; sleep disorders; depression; schizophrenia; epilepsy; Parkinson's disease	Pharmacology of drugs affecting the central nervous system; drugs used to treat rheumatic disease	Drug therapy in glaucoma; pain; neurological and psychiatric disorders; musculoskeletal disorders	Non-prescription and natural health products for sleep; depression; dementia; parasites; first aid; baby care

c) With respect to vertical-practice integration, there are numerous connections between content in the practice experience courses and content in other courses. Topics in PHAR 369, the practice experience course scheduled in the Summer Session following Term 2 of Year 2, include dispensing, legislation, pharmacy administration, patient care, and professionalism, and all of these are found within prior pharmacy practice and pharmacy skills courses, as might be expected. However, the strongest connections are actually with the Year 1 courses, PHAR 201 – Pharmacist, Patient and Society and PHAR 202 – Pharmacy Skills Lab I, which brings into question the placement of PHAR 369 in the summer following Year 2 rather than Year 1. Also, there is content in later courses that might be better provided prior to PHAR 369, such as the regulations on transfer of prescriptions between pharmacies in PHAR 401 – Pharmacy Skills Lab III in Year 3 and the pharmacy administration material in PHAR 400 – Pharmacy Management in Year 4. However, the provision of this content in later courses does present an opportunity to draw on students' learning from their practice experience.

A further issue is the apparent lack of vertical-practice integration of PHAR 369 with courses in other disciplinary streams in the curriculum. For example, linkages with the prior and subsequent courses in the case-based course stream, PHAR 399 – CAPS II and PHAR 498 – CAPS III, might be expected but are not evident from the topic lists in the course syllabi. Similarly, linkages with the prior and subsequent therapeutics and self-medication courses might be expected, but are not apparent from the syllabi. However, this may reflect the lack of detail in the draft course syllabi, rather than a missed opportunity for integration.

Pedagogical strategies.

The use of ability-based outcomes to underpin the design of the curriculum, the intention to use case-based learning and assessment activities in numerous courses, and the inclusion of

experiential learning in the espoused curriculum all potentially serve to facilitate integrative learning. In addition to these course-level pedagogical strategies, the curriculum design included two program-level assessments, a portfolio and a comprehensive exam. The portfolio was to be a repository of artifacts from across the curriculum demonstrating students' achievement of the ability-based outcomes, to be assessed at early (at the end of Year 1), middle (at the end of Year 3), and exit (at the end of Year 4) points of the program. The comprehensive exam was to be a high stakes exam on learning from Years 1 to 3 to determine promotion into Year 4 and entry into the final experiential courses of the program. However, at an April 2001 curriculum planning retreat where a number of final decisions regarding the curriculum were made, there was agreement to implement the portfolio but not the comprehensive exam. The portfolio was discontinued within three years of being implemented, before the first cohort of students in the curriculum had graduated, with no explanation provided in the available documents.

Integration in the Enacted Curriculum

In contrast to the espoused curriculum, a great deal of detail regarding structure, content, and pedagogy of the enacted curriculum was available through documentary sources, classroom observations, and interviews with course coordinators. As in the espoused curriculum, integration was not a strong guiding force in course coordinators' approaches to planning and teaching their courses. When asked what principles they used in designing learning and assessment activities, course coordinators made frequent reference to addressing program-level outcomes and ensuring relevance to pharmacy practice. Three indicated they were guided by key concepts in their discipline. Some spoke of varying their approaches and using active learning strategies to appeal to different learning styles and to maintain student engagement, while others spoke of being constrained by traditional teaching methods and large class sizes. Only two of the

24 made any mention of integration, with one referring to aligning the cases used in the CAPS course with therapeutics content and the other to linking pharmacology and therapeutics content.

Structural strategies.

Structurally, the enacted curriculum is as per the espoused curriculum, with streams of discipline-specific required courses, courses that are internal and external to the Faculty, and electives. Timetabling is a small but important aspect of the enacted curriculum that facilitates horizontal integration. Throughout the program, lecture courses in complementary disciplines are scheduled in adjacent timeslots where possible. For example, in Term 2 of Year 2, the five hours per week of class time for the pharmacology, therapeutics, and self-medication courses are scheduled with the pharmacology and therapeutics courses in back-to-back one-hour timeslots on Wednesdays and Fridays, with the self-medication course in a corresponding Monday timeslot.

This sort of timetable has permitted a restructuring of the courses in the pathophysiology, pharmacology, therapeutics, and self-medication clusters, where the total hours are pooled and redistributed to allow a logical flow of content. Typically, the sequence starts with pathophysiology, followed by pharmacology and then therapeutics and, when appropriate, self-medication for a given medical condition or body system. This order is based on the premise that an understanding of the body system malfunctions that occur in a particular disease state (pathophysiology) helps students appreciate the mechanism of action of the relevant drugs (pharmacology), and this collective knowledge is foundational to rational therapeutic decision-making for that condition (therapeutics, and also self-medication when treatment involves the use of non-prescription products). As one course coordinator put it, “If you don’t understand the pathophysiology of a disease state, how do you know where the drug is going to work? That is

the pharmacology of it. Naturally, that leads to therapeutics…and then OTC[14] and natural health thrown in with the therapeutics part of it. So I look at all of those in a continuum." A similar rationale was provided by other course coordinators and by students for the sequencing of content in the combined schedule for each cluster.

The combined schedule for the Term 2 of Year 2 pharmacology, therapeutics, and self-medication cluster shows the desired "front end loading" of pharmacology[15] prior to related therapeutics lectures. For example, most of the collective class time in the first two weeks of the term (7 of 10 hours) is assigned to the pharmacology course for lectures on principles of chemotherapy and drug resistance and the pharmacology of several common types of antibiotics, and most of the time in the following two weeks (6 of 10 hours) is assigned to the therapeutics course for lectures on principles of treating infectious diseases and treatment of some common bacterial infections. However, the combined schedule also shows imperfect connections between the disciplines, where the sequence is less logical (e.g., therapeutics of vaginal infections, which are often fungal, prior to pharmacology of antifungals, and therapeutics of sexually transmitted infections and prophylactic uses of antibiotics between a set of pharmacology lectures on cancer chemotherapeutic agents and a set of therapeutics lectures on treatment of common cancers).

Content strategies.

The scheduling strategies described are merely a useful support to horizontal integration through coherence of content across disciplines. With respect to content in the enacted curriculum, contemporary course syllabi and the class handouts and field notes for the sessions observed were the primary data sources. From the syllabi, it appears that the content in the

[14] OTC = over the counter, that is drugs that do not require a prescription. This is a reference to the self-medication course in each cluster.

[15] In the absence of a concurrent pathophysiology course, relevant pathophysiology is scheduled in the prior term in PHAR 371 – Pathophysiology I or at the appropriate time in either the pharmacology or therapeutics course.

enacted curriculum is generally as per the espoused curriculum, with distribution of disciplinary content through course streams and complementary content in the pathophysiology, pharmacology, therapeutics, and self-medication clusters.

Content at the level of individual class sessions was analyzed using handouts and field notes for the classes observed. Immediately apparent from these sources is the enormous amount of content in the curriculum. As a crude indicator of quantity, the two-week period of classroom observations in the Term 2 of Year 2 courses included 24 hours of lectures, one 3-hour lab, and one 2-hour and one 3-hour tutorial. For these classes, there were handouts containing a total of 414 PowerPoint® slides, dense with text and complex diagrams such as anatomical drawings, tables of drugs, drug structures, mechanistic pathways, schematics of drug delivery devices, and the like; a further 68 pages of detailed class notes; pre-class reading of one 15-page online course module and 4 book chapters; and recommended post-class reading of 7 book chapters. At the same time, there was a pre-class assignment to review all the content from the self-medication course in the previous and the current term; one problem set and one assignment; and quizzes in three courses and midterm exams in two courses. From an observer's perspective, the volume of content verged on overwhelming and searching for coherence within it was a daunting task.

Further complicating the search for coherence in content was the variation in style between instructors, as each had his or her own way of organizing and presenting content. Look and feel of course syllabi, lecture slides, handouts, and material within the University's learning management system all varied. This was so even in the pathophysiology, pharmacology, therapeutics, and self-medication clusters, where horizontal integration was intended. From class materials and observations, it was not clear whether instructors in these clusters co-created or shared content or used their access in the online learning management system to view content in

other courses. In interviews with course coordinators, all those who were involved in the clusters made reference to alignment of content (e.g., “presenting a more united front in terms of information”) and/or collaboration with other colleagues (e.g., “working with the coordinators of those courses to keep us as integrated as possible”) when asked how their course contributed to curricular integration. For example, one indicated that instructors within the cluster shared their slides with each other, mostly to avoid overlaps. However, another reported that there was no contact between instructors within their cluster. One also related an incident where an instructor had, without permission or notification, copied and presented another instructor’s set of slides that had been posted in the learning management system for another course within the cluster.

In contrast, one course coordinator described a recent initiative to have all instructors involved in teaching related to a particular disease state to meet as a group and agree on the content. Goals of these meetings included ensuring there was appropriate flow of content, and reducing overlaps and contradictions in content. Within that same cluster, another course coordinator described using a common vignette across courses:

> Starting with whoever does the pathophysiology, you can give a little case first and that same case can be used in pathophysiology, pharmacology, and therapeutics, and students can see the relevance and the link between the three and how each fits.

However, this course coordinator also indicated that “some people forget [the case] as they start teaching,” and no instances of the use of a common vignette across a course cluster occurred during any of the classroom observations. Rather, the overall impression obtained during classroom observations was that, although the clusters facilitated logical ordering of content, the courses within the clusters remained quite independent.

Among the course coordinators who were engaged in these course clusters, there were differing perspectives on the integrative effectiveness of this approach to organization of content. One felt that "in our semester, given the design of the curriculum, I think we do it about as well as could be done" and another that

> Our little course clusters are a nice example of working within the constraints that the courses create but squeezing as much flexibility as one can….We've been thoughtful about how the pathophysiology and pharmacology, and therapeutics, and patient self-care issues intertwine and progress from one to the next to the next. And that content, in that one term…is integrated.

Others were more critical, with one course coordinator acknowledging that "we are probably doing a mediocre job" and that "scheduling can be a problem…it will be a week apart, or the pharmacology will go behind the therapeutics." Another judged that "right now I'd say [the courses are] still pretty de-integrated."

To further assess the degree of integrative effort at the level of content, field notes from classroom observations were analyzed for instances where instructors made verbal reference to other classes. These included comments on content in courses in different disciplines, suggesting horizontal integration; comments on content earlier or later in the same course or another course in the disciplinary stream, suggesting vertical-spiral integration; and comments linking to pharmacy practice, suggesting vertical-practice integration. All such instances from the observations in Term 2 of Year 2 classes are tabulated in Appendix E. The type of integration each comment reflects is noted, as is sureness, that is, whether the instructor knew about the content (e.g., "As Instructor X has mentioned…") or was asking the students or guessing about the content (e.g., "Has Instructor X mentioned…?" or "I think Instructor X has mentioned...").

Of the 11 instructors observed, 1 made no integrative comments of any kind, while 3 made numerous and varied types of comments, although not always with sureness. Overall, the comments were roughly evenly distributed between the three integration types. All horizontally integrative comments were multidisciplinary, rather than interdisciplinary or transdisciplinary in nature. Most vertical-spiral comments were harkening back to prior classes in the same term rather than projecting forward to upcoming classes. In every instance, the comments were quite brief, reflecting a micro, or at best meso, depth, and were simply incorporated into the flow of the instructor's content delivery. Where comments were in the form of a question, in only one case was there an intention for the students to provide more than a "yes/no" type of response.

In the comments reflecting vertical-spiral integration (e.g., "Do you remember this from…?"), instructors were often referring to their own teaching, usually in the same course but occasionally in a prior course. Only 1 instructor made a comment demonstrating knowledge of another instructor's content in a previous course within the disciplinary stream, and only 3 made comments demonstrating they were familiar with content in courses in other disciplines (e.g., "I know you've learned this in…"), reflecting horizontal integration. Instructors in the pharmacology, therapeutics, and self-medication cluster made few, and no knowledgeable, comments regarding content in the other courses within the cluster.

In comments reflecting vertical-practice integration, only 1 instructor (F36) made reference to an activity that students might engage in during their upcoming practice experience course (i.e., "I hope you get to do this on your rotations"). In all other cases, the comments reflected the instructors' own knowledge of pharmacy practice, with varying degrees of certainty. In only two cases were the comments making clear reference to the instructor's actual practice experiences (e.g., "In practice, we do it this way").

Pedagogical strategies.

The structure and content of the enacted curriculum have implications for pedagogy, and vice versa. For example, the block timetabling being used suggests that pedagogical variety might be needed to sustain student engagement for several hours in a row. It also accommodates situations where a particular pedagogical approach, such as the use of a complex case study, is better served by two or more hours of class time in a row rather than separate one-hour sessions interrupted by unrelated courses or spread over several days. The large amount of content presents its own pedagogical challenges. Conversely, intended pedagogical approaches may be best supported by particular structures and accommodate certain types and amounts of content.

Contemporary course syllabi and classroom observations served as the data sources for examining integrative pedagogy in the enacted curriculum. As might be gathered from the above descriptions of the structural and content strategies, the curriculum relied heavily on traditional lectures to the whole class, which ranged in size from 152 to 224 students. Exceptions included the pharmacy skills lab and case-based tutorial courses with section sizes from 25 to 37, and one medicinal chemistry course that used various small group activities during the classes observed.

Effective active learning strategies were seldom seen during classroom observations in other courses. The use of questions requiring show of hands or brief verbal answers was the most common technique observed during lectures, but the response elicited from students was often minimal. The next most common active learning strategy observed during lectures was the use of "think-pair-share" or similar brief small group discussions and activities. However, this technique was seen in only 7 of 24 lecture-based courses and in a total of 10 instances during all lectures observed. These activities provided a change of pace within the lectures, and were

always directly associated with the lecture content so were not designed to overtly facilitate integrative learning. Examples of these sorts of small group activities observed include

a) developing a list of indicators of health status of British Columbians during a class on determinants of health and quality of the health care system;
b) providing an explanation for the poor solubility of a drug in water during a class on the effect of physicochemical properties of drugs on disposition of drugs in the body; and
c) making recommendations for treatment and monitoring of pinworm infections in a scenario involving 3 members of a household during a class on parasitic infections.

Case studies with the potential to support integrative learning were also incorporated into a number of the clinical pharmacy classes observed, but almost invariably these were limited in scope and were used as brief supplements to the lecture. In only one instance observed, a patient case was the focus of the entire class session and students were given ample opportunity to work on the case in small groups. In all other instances, the cases were presented and deconstructed by the instructor, usually through a process of asking a short series of brief closed-ended questions.

Integration in the Experienced Curriculum

Data sources for the experienced curriculum include focus group interviews with students in each year of the program and field notes from classroom observations. The main purpose of the classroom observations was to document instructors' integrative efforts in action; however, the time spent in classrooms also provided a glimpse into student experience. The "Day in the Life of a Student" is a representation of that vicarious experience, with a few small alterations to protect the privacy of individuals. For example, the structure of the case element accurately represents in-class cases observed, but the content has been reimagined. The two "Profs" are not representations of particular individuals. Almost all of the "Prof" statements are direct quotes,

but are assembled from a number of individuals. Some of the protagonist student's thoughts are derived from comments made during the student focus group interviews.

A day in the life of a student: A medley of experiences.

6:00 a.m. *There's the alarm. Get up, shower, and throw on some clothes. Sure glad I took Biochem in the summer to avoid that 8:00 a.m. class, otherwise the alarm would be set for 5:00. Pharmacy practice lab this afternoon, so dress pants and shoes go in the knapsack. Grab breakfast and go.*

7:00 a.m. *Out the door and walk to the bus that connects to the SkyTrain. It's raining again. Transfer to 99 B-Line bus at Broadway. Standing room only the whole way as usual, so no chance to review class notes downloaded from Connect last night. The slides for the second class weren't posted, so hopefully they're up this morning and the Wi-Fi in Room 1101 is working. Traffic is sure slow in the rain, and it's a 10-minute walk from the bus stop to the new Pharm Sci building. It's a beautiful building, but more study space would be nice. Yikes, look at the time!*

9:01 a.m. *One minute late for class. Half the time those back doors are locked, so no choice but to walk in at the front of the room…*

Prof: "You know there is another entrance, it's probably better if you're late to come in the back entrance. OK, let's start over."

Ouch! Of course the only seats left are in the middle of the row. There's one. Let's get this laptop fired up. Which slide are we on? This prof never numbers them.

9:35 a.m. *Twenty-five slides later, here comes a question for the class....*

Prof: "What effect do NSAIDs[16] have on platelets?"

Student in the front row: "They increase aggregation."

What did she say? Why don't people use the microphones so everyone can hear? That's what they're there for. Did she say increase? Didn't Dr. ___ say they decrease aggregation in pharmacology last term? Isn't that why ASA is used to prevent heart attacks? I forget the mechanism, though. And NSAIDs. They were on our 1st Year Frequently Prescribed Drugs List. I didn't get it at the time, but now I think it was a fair thing to get us to learn those.

Prof: "No, they decrease aggregation. NSAIDs make platelets more slippery, so don't use them for this condition because it involves bleeding."

That makes sense. I might actually have been able to figure that out on my own if I'd had a couple of minutes to think about it. Only 15 minutes left and there are still 20 slides to go.

9:50 a.m. *OK, time's up. Hmmm. This last slide is a little scenario. Maybe there'll be something like this on the exam.*

Prof: "Oh good, we've got one minute left. In groups of four, come up with five to six questions to ask this patient."

OMG, really? Well, okay. I had a situation something like this last week with my peer teacher. How about: Have you had this before? And then maybe…

9:51 a.m. Prof: "Sorry to cut you off. What did you come up with?"

Student #1: "Is this the first time you've had this problem?"

[16] Non-steroidal anti-inflammatory drugs

Prof: “Good. What else?”

Student #2: “What did you use last time?”

Prof: “Yes, but that is jumping ahead. You need to establish what her specific symptoms are.”

9:53 a.m. *Good point, but, once again, time’s up.*

Prof: “We’ll pick this up next day. Are there any questions? No? I’ll stay for a few minutes or you can e-mail me if you have questions.”

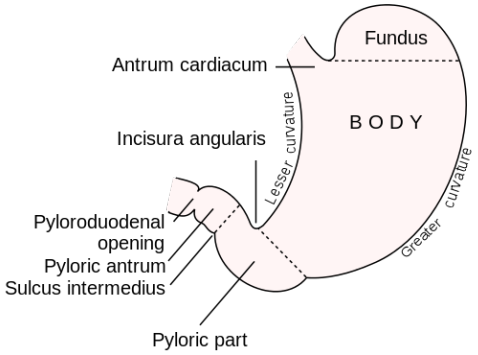
Maybe there’s still time to grab a cup of coffee at the café. Or use the washroom. Certainly not both.

9:58 a.m. *Time to download the handout. Log in to Connect. Honestly, this system is so slow, and every course is set up differently so you have to hunt around for the notes. Which class is this again? The timetable says it’s Therapeutics, but you never know with this integrated schedule. Wow. 126 slides. That must be a record. Well, but it is a two-hour class. Hopefully the lecture capture system is working today, because it’s going to be hard to keep up taking notes.*

10:00 a.m. Prof: “Good morning, everyone. We’re shifting topics today. The learning outcomes are in the handout. I’m sure you’ve seen this diagram other places.”

Slide 1:

Anatomy of the Stomach[17]



That slide is not in the package that was posted. Maybe it's copyrighted. It does have that fuzzy, copied-from-the-internet look about it.

Prof: "We'll start with a case."

Slide 2:

CASE

- SA, previously healthy 24 year old male, Ht = 180 cm, Wt = 100 kg, presents in the Emergency Room with:
  - Temperature 39.2 ^{o}C
  - Severe abdominal pain and tenderness x 2 days
  - Nausea
  - Loss of appetite

Prof: "So here's the case of S.A., a healthy 24 year old male, who presents in the emergency room with a temperature of 39.2 degrees. He's had severe abdominal pain and tenderness for the past couple of days, nausea, and not much appetite. Does he have a fever?"

Class: Mumble, mumble.

[17] This image from http://commons.wikimedia.org/wiki/File:Gray1046.svg is in the public domain.

Prof: "Yes, a temperature of 38 ^{o}C or above would be considered a fever. I think Dr. ___ might have mentioned that last week. No? Okay. What else do you observe about this patient?"

Class: Mumble, mumble.

Prof: "Well, if you were to calculate his BMI,[18] I think you'd find he's obese. Okay, what other information would you like to know about this patient?"

Class: "Allergies" "Any recent changes in diet" "Is he on any medications?"

Prof: "Good. What else?"

Class: Silence.

Prof: "Somebody, please. Give me some suggestions. I'll take any guesses. Okay, well, this patient's symptoms suggest this is case of…"

10:05 a.m *And we're off and running again, frantically typing on the laptop, trying to keep up for the next two hours. With one five-minute break.*

11:54 a.m. Prof: "The last slide I'm going to talk about is newer drugs in development."

What?? Time's up!

11:56 a.m. Prof: "OK. We'll stop here. Please read the summary yourself."

Six minutes over time, and there's a lunch and learn on pharmacy careers starting at noon. That'll leave me an hour to work on my learning issues for CAPS tomorrow morning and study for the quiz in lab this afternoon.

1:50 p.m. *Time to get changed for lab and drop off the knapsack in my locker. Can't be late or I'll lose professionalism points. White lab coat, check. Name tag, check.*

[18] Body Mass Index, calculated from an individual's height and weight.

Calculator and pen, check. Copy of Therapeutic Choices, check. Laptop, check. Good to go. Oh wait, we're also supposed to bring all our self-medication course notes for the counselling part. Check.

2:00 p.m. *The marathon begins:*

1 x 25-minute quiz.

7 x 7 minute stations: 1) two patient scenarios on mobility aids; 2) counselling on the use of a home health care device; 3) a scenario of a patient requiring identification of a drug therapy problem and role-playing a phone call to the physician to recommend a change in the medication; 4) several questions regarding availability of a product in Canada and drug scheduling; 5) a scenario of a patient requiring a non-prescription drug therapy recommendation; 6) a scenario of a patient requiring selection of a drug delivery device and counselling on its use; 7) a scenario requiring conversion calculations for switching a patient from an oral liquid to long-acting tablets. [19]

1 x worksheet with 6 questions: 3 questions requiring calculations for multiple-ingredient compounded medications; 2 multi-part questions on prescription regulations; and 1 question asking for a drug therapy recommendation for a patient with multiple conditions on multiple medications.

2 role-play scenarios involving selection of and counselling on an appropriate non-prescription medication.

[19] Most of these scenarios, and the worksheet questions and role-play scenarios that follow, link to other courses, including the previous year's pharmacy skills lab and the concurrent therapeutics, self-medication, and case-based tutorial course.

5:00 p.m. *Whew. And now the commute home. I've still got those learning issues to do, and I'd better start studying for the next midterm…*

Students' integrative experiences: In their own words.

Students were generally appreciative of the integrative efforts they saw being made in the curriculum. For example, with regard to curricular structure, one Year 2 student said, "I think you could see that a lot of effort went into coordinating the timetable for each course, because I'm sure it took the coordinators a lot of planning to make sure all the topics lined up." A Year 3 student observed that the diabetes section they'd had was particularly well integrated "because everything flowed: the pathophysiology to pharmacology to therapeutics…and then in CAPS we had diabetes, too." This student attributed the integrative success of this section to having one instructor teach content from more than one discipline and to having three key instructors meet to plan the whole diabetes section. Similarly, a Year 1 student said, "I have to say that I think our pharmacy courses were very well done in terms of their integration, especially in first semester with the way [the coordinators of two PHAR courses] organized the lectures." Another Year 1 student contrasted this with the experience of being in a degree program in Science, where "you have all these courses you can pick from and it's just by chance that anything matched up."

With regard to curricular content, students provided examples of integration in their coursework, with responses varying with year level as would be expected. Year 1 students mentioned serendipitous horizontal integration between their pharmacy coursework and the external biomedical sciences courses they were taking, including anatomy, physiology, and microbiology. One example of such unplanned integration was content on clearance of drugs from the body in PHYL 301 – Human Physiology that connected to PHAR 241 – Foundations of Pharmacology and PHAR 220 – Physicochemical Properties of Drugs. Similarly, there had been

coincidental content in BIOC 302[20] – General Biochemistry, a Year 2 course taken in advance by many students, and a patient scenario in the Year 1 pharmacy skills lab course. As one student stated, "They did allopurinol[21] right when we were doing allopurinol, and they actually went into what enzyme it affects and stuff, so that, I found, was interrelated." The Year 1 students appreciated these intersections between their different courses, describing them as "really nice" and giving a "light bulb effect" of "Oh, wait, we did that in another course." They described receiving a sense of affirmation that "we've learned a couple of things" and feeling encouraged to "think more" and "really connect things."

Students in Years 2 and up found the alignment of topics in the pathophysiology, pharmacology, therapeutics, and self-medication clusters particularly helpful, suggesting "it's a lot easier to learn the therapeutics of something when you know the reasoning behind it, which you learn in pharmacology." However, these students were also alert to missed opportunities for more of this type of alignment of content. Year 3 and 4 students who had experienced most of the curriculum were readily able to give examples of topics out of order within the clusters. They also wished for better alignment with courses beyond the clusters. Year 3 students felt that their pharmacy skills lab course was particularly poorly aligned, saying it was "probably the furthest off everything" when "it could be so useful [if it were] in sync with the lectures." The same issue was raised regarding the case-based tutorial courses, with students commenting on their instructional value (e.g., "I find I learn the best when they have CAPS cases that are relevant") and their lack of synchronization at times with other courses. One Year 2 student commented that "sometimes we get new conditions we don't know about yet," and a Year 4 student said "In

[20] The combination of BIOC 202 and 302 replaced the BIOC 300 shown in Table 6 in 2012.

[21] A medication used in the treatment of gout.

terms of timeline, they didn't really relate well to the courses." Another Year 4 student commented on the lack of alignment of the medicinal chemistry course stream, saying

> For med chem, I feel like they should at least get the timing right so it makes more sense. Because what happens is in the other courses we're learning about cardiovascular and then two hours later we're learning the chemical structure of penicillin. It's very awkward.

Two other aspects related to content that surfaced through the student focus groups were the learning benefits of repetition and relevance of content. A degree of repetition or overlap of content, indicative of vertical-spiral integration, was seen as helpful to retention and rapid recall of knowledge by students in all years of the program. For example, a Year 4 student suggested that "repetition…certainly makes it easier to learn," while a Year 1 student said "It helps you be a quick thinker, I think, when it's reiterated so many times. It just gets so ingrained in you that you kind of just know right away." However, a Year 3 student cautioned that, while some repetition was helpful, students should not "spend half a semester relearning everything" before being exposed to new content, and others felt there was excessive repetition of pathophysiology content in the pharmacology courses and that "half the therapeutics lecture is wasted on pharmacology." These students felt that better communication on content between instructors in the pathophysiology, pharmacology, therapeutics, and self-medication course clusters would be useful "so then they don't have to reteach it and they don't have to rush through the lectures." Year 1 students, in fact, suggested that just a hint or a brief reminder was all that was necessary for them to recall previous content and that this sort of brevity in the repetition encouraged them to develop integrative learning skills on their own, which would serve them well in the future.

Relevance of content, indicative of vertical-practice integration, was a concern raised by the Year 1 students, especially in relation to their external coursework. One student suggested the anatomy courses were more targeted to the needs of medical students than pharmacy students, and cited having to learn "that there are seven muscles in the eye." This student went on to ask "In pharmacy, do we really need to know that? And if we do, how does it relate?" These students described finding it very difficult to learn content they considered irrelevant, and indicated that they forgot it soon after being examined on it. They considered learning such content a "waste of time" when they should be learning pharmacy skills. For example one student with partial credit for physiology was taking an animal physiology course to complete the requirement and said "I'm learning about lobster hearts…and I just couldn't care." Conversely, students who had advance credit for some of the external courses indicated they had paid insufficient attention to content they had not appreciated the relevance of at the time. These students felt they would have learned the material better if they had taken the courses as scheduled in Year 1 of the program. For example, during the discussion of allopurinol content in the biochemistry course mentioned previously, one student said, "I took it before I came into pharmacy, so it didn't really mean anything to me then, so it didn't stick with me at all." Another provided a similar example, saying "I took microbiology before and it had a section on immunology, and I think they talked about drugs, but I didn't pay as much attention as I would have since I got into the program."

Two pedagogical strategies that students felt were particularly supportive of integrative learning also came to the fore during the focus group interviews, these being learning activities that required application of knowledge and integrative assessment activities that required multidisciplinary knowledge and/or verbal or practical demonstrations of knowledge. For example, one said "I think any time you can put what you are learning into practice, it helps."

Several students pointed to the use of cases in their CAPS course as helpful to their learning. Year 4 students were appreciative of having more cases and less onerous requirements for documentation of their case workups than they'd had in previous years. The importance of realism of the cases was also mentioned. Relatedly, two students recommended incorporating more opportunities to interact with actual patients into the curriculum, and one indicated a preference for being taught by an experienced pharmacy practitioner. Several students also made reference to their own pharmacy practice experience, acquired either through their experiential coursework or their jobs, as being very helpful to integrative learning. Year 1 students indicated they would like the experiential coursework to start in the first year of the curriculum.

The importance of assessment practices in supporting integrative learning was identified by Year 2, 3, and 4 students. They did not feel that discipline-specific multiple-choice tests of knowledge, for which they "memorized small details," supported their learning, especially when they were not provided with feedback on their incorrect responses. There was general agreement that exams based on disease states rather than on disciplines would be preferable. They recognized the work this would entail for their instructors and that students would "all complain about studying for it;" however, they felt that "the quality of learning would be better that way." One student, in fact, suggested that "it would be easier to have exams based on disease states as opposed to courses." Students also agreed that if the current system of discipline-specific assessments continued, scheduling them in a logical sequence (e.g., pathophysiology before pharmacology before therapeutics) would assist their learning. Year 3 students also pointed to the oral exams they had in their case-based tutorial course as benefiting their learning, perhaps because they had felt compelled to study "very, very, very hard" for it. They indicated that the

challenge of having to provide verbal rather than written responses forced them to know the content better, and one opined that this type of exam was “the ultimate integration.”

Another experience of “ultimate integration” mentioned by Year 2, 3, and 4 students was a two-week module on pulmonary disease that had been introduced in the Year 2 curriculum in 2011. The Year 2 students and one of the two groups of Year 3 students had both experienced this module, and felt it was very successful in supporting their learning. They felt that the keys to this success included the transdisciplinary approach taken to the content and the use of integrative pedagogies. On the point of content, one student said of the pulmonary module

> It wasn’t like we had pathophysiology and then we had the therapeutics, and then we had pharmacology. It was like just one big class where we learned everything. You didn’t have to differentiate it in your mind.

An important aspect of the pedagogical approach was the inclusion of hands-on and role-playing activities in the pharmacy skills lab component. As one student said,

> The thing about the pulmonary module, I felt like the lab put it in a better, more practical perspective, so you can see how you can apply the knowledge. Because sometimes I feel like it’s hard when we just learn about it in lectures. You just sit there and listen to it and after that you kind of forget about it. But when we had the pulmonary module, we had to do counselling, and just the lab activities really made you understand it, because you had to explain it and do things with it, so you had to understand it a lot better than if you just sat through a lecture.

Students described further how the lab consisted entirely of patient counselling activities, where they rotated through stations where they practiced counselling on various pulmonary drug delivery systems and monitoring devices. As one said, “You saw it over and over and over. And

so, by the end, I've done it a whole bunch of times, I can do it." Another described how this hands-on approach and requirement to verbally explain or physically do something helped students realize how well they actually knew or were able to do something, saying

> I feel that if I only get something in lecture, I have the stance of "Oh, I completely understand it." But when, for example, in lab, they put you on the spot…[and you have to explain it…or when] we had the chest exam, we actually have to do it and there's a person watching you, taking notes, you go from being the expert at it to somebody who barely knows what they're doing.

The assessment activities in the pulmonary module, of which the chest exam mentioned was just one, were also considered key by the students. Although some admitted to complaining about exams that covered content in more than one course, they also suggested that exams that holistically assessed their knowledge of a disease state and its drug treatment rather than discretely assessing discipline-specific content might be easier and certainly helped them retain their knowledge. They made it clear that the way they studied for exams depended on the nature of the exam. For example, one said that "if exams are written such that you can get by on memorizing, people are going to do it." In contrast, for the pulmonary module, one student said

> I think a big part of our retention [of knowledge] is also how we studied for it. Because we didn't just study to write the exam, but we studied for the practical. So it was a whole lab exam just on asthma, but it incorporated all the pathophysiology, all the pharmacology. You had to know it all. Rather than "Oh, I'm just going to study the therapeutics for this disease state and then I'm going to go on."

Another student similarly commented that

> I think the assessment is important because, in terms of the pulmonary module, you're tested on the therapeutics, the pharmacology, the pathophysiology of it, whereas other midterms just test you on one aspect of it. Which is why I think the pulmonary module is so helpful for people, why they've been able to retain the information because you have to apply it all at once, verbally and on a piece of paper.

As a result of the singular focus on one disease state in all courses, the coordination of the content in a manner that addressed the disease state as a whole and downplayed disciplinary distinctions, the inclusion and repetition of relevant hands-on and case-based activities, and the comprehensive assessment process that included both written and verbal components, students felt they had retained their knowledge of asthma in a way that they had not for other disease states. For example, one said

> If you ask me today, if I was working today, what some of the dosage forms are about asthma, anything about asthma, I will be able to tell you, right straight up, and I haven't looked at asthma for more than two months. If you ask me something about [pause] psoriasis, not much.

Others similarly said "I feel like I still know it" and "I actually remember."

External stakeholders' perceptions of students' learning

The four pharmacy practitioners interviewed had a general awareness of the curriculum, but other than one who had served on the Curriculum Review Committee during the planning of the curriculum they were not very familiar with details of structure, content, and pedagogy. They mainly relied on students for information about the curriculum. When asked about the quality of students they were seeing, the pharmacy practitioners described large variations in students' knowledge and skills, and their ability to apply these in practice. For example, one said "If I have

two students in a year…or from year to year…sometimes there's such a discrepancy between them that you actually sometimes wonder whether they're in the same curriculum."

On the positive side, they described students as bright, eager, and serious about their learning. As one put it, "Our good ones are just amazing." Another gave the example of students doing a better job of medication reviews than their preceptors. However, they all had also seen students with knowledge gaps and difficulties translating their knowledge into practice. They described some students as "very book smart" but unable to function well when faced with a real patient or patients with more than one disease state. They had also seen students who seemed to lack understanding of the pharmacist's role and either to lack or have an excess of confidence. Two also pointed to problems with retention of learning where there was a significant time lag between when students were exposed to particular content in the curriculum and when they were being called upon to apply that knowledge at the practice site. Both quoted students as saying things like "Oh yeah, I learned about [that but] we haven't touched on that since the beginning of third year" or "I haven't gone back over that for my PEBC[22] studying yet." As one said, students "should be keeping that knowledge throughout; it's not just something you learn for an exam."

Overall, however, the pharmacy practitioners were in agreement that students were arriving at the practice site better prepared than they had been in the previous iteration of the curriculum. They attributed some of this improvement in student performance to the curriculum itself, with two mentioning the value of the case-based courses. Two also mentioned the positive impact of using interviews during the admission process, which they saw as helping to select students with more life experience and better verbal communication skills. However, three of the

[22] PEBC = Pharmacy Examining Board of Canada, which administers the licensing exam that graduates of the program take.

four also suggested that students' ability to function well in the practice site was related as much to their personality as to their academic preparation. As one put it, "I think they're born with it."

Conceptions of Curricular Integration

One of the main purposes of the interviews conducted for this study was to address the research question "What conceptions of curricular integration are held by those leading, planning, teaching in, and learning in an undergraduate degree program?" All participants were asked to define or describe the meaning of the term curricular integration and to indicate what they saw as barriers to and necessary supports for curricular integration. Course coordinators were also asked how their course contributed to integration of the curriculum and how they thought curricular integration contributed to students' learning. Students were similarly asked how curricular integration contributed to their learning. The definitions given by all participants were analyzed for the degree of sophistication, locus of integration (i.e., whether they were teacher- or learner-oriented), and type(s) of integration. For the course coordinators for whom a complete set of data was available, including course documents, observation of one or more class sessions, and an interview, further analysis was undertaken to compare words with actions.

Curriculum planning leaders' conceptions.

The four curriculum planning leaders' descriptions of curricular integration ranged from low to high sophistication. Two were quite well-developed, with inclusion of examples of specific content (e.g., asthma) and pedagogical strategies (e.g., use of cases). All described integration from the perspective of the teacher, albeit in varying ways. One suggested that integration involved discussion and sharing of material between instructors and "not working in silos," while another equated integration with team teaching. Another focused on curricular content and structure, expressing integration in terms of teaching discipline-specific material in a

particular sequence followed by application of that material in labs, tutorials, experiential learning, and actual practice. The fourth focused on pedagogy, linking integration with case-based teaching where the cases draw on material from different discipline-specific courses.

As they elaborated on their descriptions unprompted, three of the four did volunteer student-oriented statements of purpose for curricular integration, although these were quite diverse. One saw the purpose as "placing the material in context for students so it makes more sense to them and they retain it better," another as "building on confidence and skills," and the third as "helping them to see the importance" of their basic science knowledge.

All four of the planners' descriptions of curricular integration clearly reflected the concept of horizontal integration, primarily from a multidisciplinary perspective. They each gave examples of disciplines, naming medicinal chemistry and/or pharmacology and/or therapeutics and sometimes additional disciplines, and described integration in terms of instructors developing mutual awareness of each other's content, blending material, or teaching disciplinary content knowledge sequentially. The concept of vertical-spiral integration was also hinted at in one planner's description of "building on a foundation" and another's description of the integrative strategy of including of a stream of case-based courses through all four years of the program and the use of increasingly complex cases. Similarly, the vertical-practice dimension of integration is hinted at in one planner's mention of application of learning in practice.

Course coordinators' conceptions.

The 24 course coordinators interviewed gave a broader range of responses than the four curriculum planning leaders, as might be expected, given the larger number and greater variability in years of experience in the Faculty. A larger proportion gave brief, unsophisticated responses, with only 7 of the 24 providing fairly well-developed descriptions of curricular

integration. The range of sophistication is illustrated by the two responses below to the question "What does the term "curricular integration" mean to you?" The difference in degree of elaboration between these two quotations is evident, with the second referring to a broader range of disciplines and providing a more detailed rationale for curricular integration. The second quote also goes beyond the boundaries of the curriculum to consider the application of knowledge in pharmacy practice, which was encouraging to see coming from a course coordinator who did not have a pharmacy background.

Quote #1: I guess looking at what else is taught in the curriculum, and trying to mesh what you're teaching so that things line up. So they have, say, the background…if you need background in [my discipline] to understand therapeutics or practice lab. Integrating, I guess, seamlessly, or trying to, what's being taught between different topics. So you get the full picture kind of thing.

Quote #2: I would say it would be teaching from the point of view of the end users, the way that they would apply this knowledge. So, for example, pharmacists…would be told about a patient's condition, the diagnosis, and their drug therapy. First of all, they would have to understand what the disease is. And they would have to know why the therapeutic choices would be made and what the consequences [are] of these drug therapies and why these particular sets of drugs, over the others, are being selected. And then they have to know a little bit about physiology, what age group that person belongs to, is it the best choice, dosage information, all these other physiological aspects of the drug therapy, and then drug interactions,

> ADME[23], all these things that are supposed to be a pharmacist's domain to know. So in order to pool all this information together, that means the person has to be trained really well in all these different disciplines and be able to recall and be able to apply this information in a case-specific manner. So if we actually taught everything individually, yes, a really good student would be able to synthesize it themselves. But we are not talking about the most effective way of doing our job.

These quotes also illustrate the two patterns observed with regard to the locus of integration. Half of the course coordinators expressed integration mainly from the teacher's perspective, similar to the first example, which is rooted in the course coordinator's own practice as a teacher within a particular discipline. For instance, several made reference to the teacher's responsibility to be aware of the content in other courses with the purpose of "making it so the pieces fit well together," "relating the disciplines to each other," "so it's part of a more overall system," etc. Other examples of teacher actions to foster integration that were mentioned included collective planning of content, avoiding duplications and discrepancies, building the level of difficulty, and ensuring relevance of content to practice. The other half of the course coordinators' responses reflected a combination of teacher's and learner's perspectives, similar to the second example, with learners viewed as responsible for "seeing everything linked together," "tying principles and concepts together," and "making a variety of different connections," and for applying their knowledge effectively in practice.

The two sample quotes are also typical in their emphasis on curricular content and horizontal integration across disciplines, which was almost universal in the course coordinators' responses. Most referred in some way to their own discipline or disciplinary content and

[23] ADME = the pharmacokinetic processes of absorption, distribution, metabolism, and excretion of drugs.

suggested connections to other disciplines. For example, all those involved in a pathophysiology, pharmacology, therapeutics, and self-medication cluster made reference to one or more of the other disciplines within the cluster. A number did this in way that suggested multidisciplinary integration, with the disciplines and/or discipline-based courses remaining intact, similar to the first quote. Others implied a more interdisciplinary approach, similar to the second quote, with the lines between disciplines becoming blurred in the process of avoiding teaching "everything independently." This was expressed as "breaking down disciplinary barriers" and "crumbling everybody's walls down" and moving away from courses being "more in silos."

Some responses did also reflect vertical integration, although these references tended to be fairly vague. As an example, the mention of application of learning in practice in the second quotation implies the vertical-practice dimension of integration. However, only two course coordinators made specific reference to connections they made with the coordinators of the experiential courses. Similarly, the concept of building the level of difficulty or ensuring "a logical flow in progression from their first to third year," as one course coordinator put it, implies the vertical-spiral dimension of integration, but mentions of this sort were rare, except among the coordinators of the pharmacy skills lab and the case-based tutorial courses.

Of the small number of course coordinators who made reference to curricular structure in their description of an integrated curriculum, half mentioned the existing traditional course structure (e.g., "this course relies on what's been previously taught as well as contributes to other courses") and half mentioned a potential shift to a modular structure based on disease states or body systems (e.g., "we'll talk about asthma in a pulmonary module of some sort"). The few who mentioned pedagogical strategies focused on program-level outcomes (e.g., "where we want

to be is AFPC outcomes[24] and Blueprint[25]"), realistic case-based learning activities (e.g., "where we do a lot of those complex cases and try to solve real patient problems"), and assessments that crossed disciplinary boundaries (e.g., "making a quiz out of three courses").

When asked about the value of curricular integration to students' learning, most course coordinators identified some sort of benefit, such as "a better appreciation of the big picture" and "making it easier to connect the dots." Other benefits mentioned included helping students understand the purpose of learning certain content (e.g., "It gives them the context, and therefore gives them meaning instead of learning a bunch of standalone facts") and the expectations for their performance, and providing them with a "roadmap" for their learning and the "tools" they needed to solve drug therapy problems. Several also suggested that a more integrated curriculum would help students retain their knowledge (e.g., "it may stick a little better") and two attributed this to the way the human brain naturally works to make connections. However, several course coordinators were skeptical about the impact of curricular integration on students' learning. Three suggested that a more integrated curriculum would not likely improve the learning outcomes for the program. One, for example, said "I don't know, at the end of the day, is it going to make them better able to serve patients? I don't know that it would." Another asked the cogent question, "How much can we expect from the curriculum itself, in classrooms, and laboratories and tutorial rooms?" when the development of expertise takes significant practice experience.

[24] This is a reference to the Association of Faculties of Pharmacy of Canada's document, Educational outcomes for first professional degree programs in pharmacy in Canada (Association of Faculties of Pharmacy of Canada, 2010).

[25] This is a reference to the Canadian Pharmacists Association's Blueprint for Pharmacy initiative and documents such as The vision for pharmacy: Optimal drug therapy outcomes for Canadians through patient-centred care (Canadian Pharmacists Association, 2008).

Concepts in action.

For 10 of the 24 course coordinators, including the two quoted above, a complete set of data was available, including an interview, course syllabi, field notes and class handouts from one or more classroom observations, and, in most cases, copies of course assignments and exams. Thus, for these individuals it was possible to assess the congruence of their words regarding integration with their actual pedagogical practices in a small portion of the curriculum.

In general, course coordinators' actions were consistent with their words. For example, the course coordinator who provided Quote #1 above mentioned limited connections to other courses (e.g., speculating about the possibility of needing background in the course's discipline "to understand therapeutics or practice lab"); spoke in more theoretical than actual terms when asked about the contribution of the course to integration in the curriculum (e.g., "there are several topics that can be integrated"); and mentioned potential connections to the pharmacy skills labs (e.g., "I know that stuff is also taught in the practice lab"). When asked about the principles of curriculum design considered in the development of learning and assessment activities for the course, this participant indicated that a deliberate effort was made to ensure clarity in the lecture notes and to "mix things up" by incorporating analogies, clinical examples, and demonstrations into lectures so as to appeal to different learning styles. The syllabus for the course indicated that students would gain an understanding of discipline-specific principles. These findings suggest that the course is discipline-specific and isolated in the curriculum, and that the strongest integrative link is a hypothetical horizontal connection with the concurrent pharmacy skills lab.

As documented in the field notes of five observations of class sessions for this course, the course content was indeed discipline-specific, the handouts were very clear, and the lectures

were quite interactive, with good use of questioning and incorporation of several small group activities, demonstrations, and video presentations to engage the students. During the lectures, the coordinator made frequent, and mostly well-informed although superficial, comments regarding the students' prior exposure to some content in the concurrent pharmacy skills lab courses (e.g., "I know you've had this in your pharmacy practice courses" and "I've looked through your lab manual"). While the content was specific to the particular discipline, the course coordinator did also make some connections to pharmacy practice and applications of the material to providing care to patients (e.g., by asking "As a pharmacist, how do you deal with [this situation]?"). Exams were not available for this course, so it was not possible to assess this aspect of this course coordinator's pedagogical practice.

The participant who contributed Quote #2 was the coordinator of a course within one of the pathophysiology, pharmacology, therapeutics, and self-medication course clusters. As previously indicated, this individual expressed a fairly comprehensive and concrete description of curricular integration. However, when asked how the course contributed to integration in the program said "we are probably doing a mediocre job, but we're attempting…to present a more united front in terms of information," and with regard to integrative learning said "we are force feeding them information and then saying [to the students] "Okay, you take it home and do your homework then synthesize it all together." When asked about principles of curriculum design employed in the course, this participant provided a response that did not reflect any underlying theoretical approach to teaching and learning. Rather, s/he provided an example of a collaborative effort with another instructor to ensure that the appropriate disciplinary content was provided as background to a case being used to teach therapeutics in a particular disease state. As

with the previous example, the course syllabus indicated that students would gain an understanding of discipline-specific principles.

The field notes of the observation of one two-hour class session and the handout for that session confirm that the course content was, in fact, discipline-specific and was not explicitly connected to the content on the same topic in the other courses in the cluster that were also observed. There was a large volume of content, which the course coordinator taught in a traditional lecture format with the incorporation of a few "show of hands" questions (e.g., "How many of you have experienced [this medical condition]?"). The lectures ran over time and students were directed to review on their own the content in the handout that had not been presented due to time constraints. During the lectures, the coordinator made passing remarks to content in several courses, including those in the disciplines of pharmaceutics, biochemistry, and microbiology (e.g., "If you recall from biochemistry…"), but not to any of the other courses in the cluster. The exams in the course consisted of a mixture of multiple-choice, true-false, fill-in-the-blank, and short answer questions testing factual recall of course content.

As one further example that perhaps confirms the integrative value of case-based pedagogy, another course coordinator spoke of integration as a continuum of disciplines that students have to see as linked together, naming pathophysiology, pharmacology, and therapeutics. When asked about the contribution of the course to integration in the curriculum, this participant mentioned providing students with cases and practice, setting high expectations, and aligning with the requirements of the experiential coursework. When further asked about the value of curricular integration in students' learning, the response given was that "integration and active learning go together. It's the best way to learn. That's what learning is." The syllabus for this course indicated that students in the course would resolve case-based problems through

integration and application of relevant knowledge from other courses and from work and life experiences.

What was observed during three class sessions in the course was entirely consistent with all this. The classes revolved around a complex, realistic patient case that not only drew on a recent topic from the concurrent courses but also on principles from a previous course. Students engaged in small group and plenary discussions expertly facilitated by the course coordinator. During these classes, the coordinator made comments such as "You should be studying [for all your courses] together" and "When you go to clerkship, this is what you do." Consistent with the case-based learning activities, exams in this course were also case-based.

Students' conceptions.

When asked what they thought curricular integration meant, each group of students rapidly constructed a fairly comprehensive, learning-oriented definition as individuals took turns building on the comments of those who had spoken before them. A particularly good example is the exchange of four Year 1 students, as follows:

Student #1: I think curriculum integration means combining different subject areas. For instance, combining pharmacokinetics and therapeutics. It's combining them together and it's going to lead to a greater appreciation for your learning and also leads to the opportunity to apply what you know to scenarios that can mimic real-life scenarios.

Student #2: Yeah. I also sort of thought about it as a way of looking at a given topic from many different angles. Like, say, in a lab course and as a case study and as a theoretical model in a different course. And you just look at, say, a module or a case or something from many different ways, and you learn concepts at the same time while you're looking at a real-life example.

Student #3: Yeah. When I was thinking about it, I wasn't sure if we were just looking within one year, when we are tying all the courses that we learn within that one year together, or if we were looking at our growth and building a concept across all four years, and then also within our practical work in our SPEP.[26] And then in practice when we graduate, too.

Student #4: And so, obviously, these different subjects and courses, they should share the same goal. For us, it would be safety and effectiveness. It would just be how to apply different things we learn in different subjects in order to achieve safety and effectiveness.

This example is representative of the responses from each of the six student focus groups in its reference to a combination of disciplines, indicative of horizontal integration; building from year to year, indicative of vertical-spiral integration; and application of knowledge and skills in experiential learning and/or practice, indicative of vertical-practice integration. It is also one of several that include mention of a focus on a common set of practice-based program-level outcomes and the use of realistic case studies as effective pedagogical approaches to supporting integrative learning.

External stakeholders' conceptions.

The pharmacy practitioners were not familiar with the concept of curricular integration. Three of the four said "I have no idea" when asked what the term meant, although on prompting, one made a reasonable guess at defining horizontal and vertical integration. The fourth offered no description of integration, but equated it with practitioner competence.

[26] SPEP = Structured Practical Experience Program, i.e., the experiential coursework in the program.

Barriers to and Supports for Curricular Integration

As part of the inquiry into conceptions of curricular integration, all participant groups interviewed were asked about the barriers they perceived to curricular integration and the types of supports they felt would facilitate better integration. While interview transcripts were initially analyzed separately for responses reflective of barriers and responses reflective of supports, it became apparent that these barrier and support concepts were essentially the same, with one mirroring the other. What was phrased negatively and considered a barrier by one person (e.g., "We never get to debate these things") was often phrased more positively and identified as a support by another (e.g., "We need opportunities to discuss and debate and question and answer"). These findings have therefore been organized by thematic categories, such as communication and leadership, rather than by distinguishing barriers from supports. They have also mostly been reported in a positive sense of what is already in place and what would facilitate improvement, while not neglecting the challenges to be overcome. Also, course coordinators provided far more detail in their responses than the curriculum planning leaders, students, and pharmacy practitioners, so what is reported mainly reflects the perspective of the course coordinators. Findings from the other participant groups are identified as such.

Communication.

Most of the comments regarding communication referred to meetings of faculty members, and revolved around the purpose, type of information to be exchanged and subjects for debate, and ways of communicating. Purposes for such meetings that were expressed included exchanging information about the curriculum, developing a shared understanding of curricular integration, and making decisions regarding curricular change. The information most commonly desired was detail regarding the content being taught by other faculty members in order to have

better awareness of the curriculum as a whole ("I don't even know all the courses that are being taught in [my] year, to be honest"); to identify gaps, overlaps, and discontinuities in content ("and just see how we could reshuffle that"); and to ensure that changes in the content taught in one course did not adversely affect other courses ("You can't do funky new stuff and get rid of stuff. And if you're going to do that, you need to make sure that people know…because it might be important in the bigger scheme."[27]). Different suggestions were made regarding how to share this information, from a curriculum map to a collection of course descriptions to "a big chart with little dots that we move around" to an occasion where "everybody is put into a room for a few hours and we put it on a giant board." However, some appreciated the challenge of sufficiently informing faculty about the curriculum this way, with one acknowledging that "it's not practical to review everything" and another saying it would only be when "we get into those classrooms and actually see what's going on in there can we really understand what's happening."

In most cases, the inferred forum for communication between faculty members was a face-to-face meeting "where everybody would meet together…where you get everybody focused on trying to do something." However, there was also recognition that it might be difficult to get full turnout of faculty members and there might not be a strong appetite for this sort of meeting when "we're already meetinged out." Smaller gatherings were also suggested, including meetings of those teaching in a single year of the program and, once commonalities had been identified, groups of three or four people getting together to look at "collectively, how can we make this better?" Opportunities for informal communication, such as social gatherings, hallway conversations, and chance meetings were also desired. For example, one lamented the loss of

[27] This is a reference to an instance that had recently come to light where one course coordinator had, without consultation, made room for new content by eliminating some material that others subsequently deemed essential.

contact with former office neighbours in another discipline as a consequence of moving to the Faculty's new building where office assignments were determined by discipline, and another wished for a faculty lounge "where you can just go and hope you bump into somebody."

With regard to meetings for decision-making purposes, one expressed a strong preference for plenary discussion and debate rather than breaking into smaller groups with "these little bullet things, which have no substance." This is at odds, however, with another's preference for "a full day workshop in a fun environment" that is safe and "not toxic," where people do not feel forced or restrained and those who are "really verbose about things" do not dominate the discussion. Thus, one of the communication challenges identified was that any meeting format would be likely to engage some faculty members and disengage others. Another challenge was the difficulty of navigating areas of controversy identified by participants. These included determining the amount of time dedicated to particular disciplines and ensuring equity of workloads. Specific to curricular integration, several mentioned the challenge of negotiating an appropriate balance of the basic and clinical sciences. As one course coordinator put it,

> Within our Faculty [there is] a lack of consensus about the balance between what someone conventionally called basic sciences kinds of content and applied kinds of content. So we don't have consensus about that at the moment. And that makes the idea of opening up this discussion more daunting. And I guess, in fact, there's a tremendous reticence to even having the discussion about significantly altering our current curriculum just because people are well aware they will run into that particular freight train early on.

Beyond these issues of communication between faculty members, a few participants identified needs and opportunities for communication with students and with pharmacy practitioners. With respect to students, the main concern was ensuring that students were well

aware of the nature of the curriculum and, in particular, the assessment strategies that would be used. This was seen as necessary to articulating expectations that students would be self-directed learners who did more than memorize content and warding off the types of complaints faculty members had received in the past from students who did not appreciate "thought-provoking questions" or integrative exams that crossed course boundaries. One participant also noted the importance of unity of faculty voice in team teaching situations, where "it has to be a common message" to students. Students would also appreciate this sort of coherence, as they described experiences they'd had where instructors contradicted each other. One example they provided was of being given conflicting information on the dosing regimen for a drug by instructors in two different courses, and having to recall which instructor had said what when a question about this detail appeared on an exam.

With respect to communication with pharmacy practitioners, several participants saw it as essential that practitioners be included in discussions about the curriculum. Roles perceived for practitioners in this arena included "helping us understand where the outages are" and where students were performing weakly; helping those teaching in the basic sciences to connect their content to pharmacy practice; and peer reviewing the program. Several faculty members described their personal connections to practitioners and how they relied on those to ensure their content was up to date and relevant. One said "I'm lucky that I can lean on these people and they're willing to give me the time" and suggested that the Faculty should consider ways to "give the greater community a method of that engagement." The practitioners interviewed also indicated willingness to participate in discussions about the curriculum and appreciated it when the Faculty appeared to be "listening to what's going on out in the pharmacies." However, two acknowledged the limits on their availability and another suggested that, while practitioner input

was essential, diverging views in the practice community would make it "hard to get any sort of consensus" from practitioners on the curriculum. The practitioners also expressed mild interest in knowing more about the curriculum to assist them with setting realistic expectations for the students they supervised during the experiential coursework. Two were somewhat skeptical of the usefulness of this, one because of the amount of time it would take to review and the other because of the vast difference in performance they had observed between students in the same class. One, however, indicated an interest in knowing "what is being taught in each course, and maybe a timeline of what they're actually learning," in part to assess the veracity of students' claims that they had not learned something yet.

Leadership and (or versus?) buy-in.

The process of designing and teaching an integrated curriculum requires strong direction but also individual engagement and hard work by faculty members. Achieving a functional balance between these two concepts is challenging, particularly in an institutional environment where a high value is placed on individual autonomy and innovation. This was evident in course coordinators' comments with respect to leadership and buy-in by faculty members. As one participant expressed this dilemma, "A coherent academic program requires a hierarchy. It can't be just a just a bunch of cats doing what they think is important in their own little domain. [However,] in universities…these guys are completely allergic to hierarchy."

Not surprisingly, some course coordinators were of the view that "we need someone to actually say you've got to do it, period" and looked to the Dean and the Associate Dean Academic to provide this direction. An equal number did not want curricular change to be "mandated from up above." As one curriculum planning leader observed, "When you start saying that people have to do it, people's backs get up." However, there was agreement that it

was necessary for everybody to be "onboard" or "on the same page" to work effectively together to plan and implement an integrated curriculum, and leaders would presumably have a role in facilitating achievement of that sort of consensus.

Specific areas where it was suggested consensus would be important included the necessity for curricular integration; the structure, content, and pedagogical approach, and in particular the assessment strategies, for the curriculum; and the goal of the program (i.e., the education of practice-ready pharmacists). Although it was acknowledged that "there will always be a lack of absolute consensus," and that within the Faculty there were a "few pockets of resistance," and the tendency to "work around certain people," there was also a fair amount of positivity about cohesion and collegiality within the Faculty. For example, the coordinators of first year courses interviewed all commented on the "good synergy" in the group and the "great discussions" they'd had recently to improve integration between their courses. Another participant said

> I perceive quite a bit of coherence among faculty who are involved in the sort of applied aspects of pharmacy practice about what we want to see and enthusiasm for really active learning kinds of activities and it being non-controversial what the important patient care skills and disease states are to focus on. I think we would have no difficulty coming to some broad consensus about that.

Nobody suggested the work involved would be easy, however. The act of buying in to the design and implementation of an integrated curriculum was perceived as requiring individuals to give up some of the control they had enjoyed and some of their pedagogical habits. A number of participants expressed this as a process of "letting go." The list of things that faculty members might need to let go of included such non-trivial items as instructor autonomy, control over

courses, ownership of content, habits of "doing things a certain way" and scheduling "certain things at certain times of the year," the number of teaching hours for their discipline, the notion that "we are training our own replica," and the idea of perfection. Several expressed particular concern about buy-in from more seasoned faculty who "by the mere fact that they might have been doing what they're doing today for a longer period of time [would find it] harder to break habits [or] to think outside the box or to get onboard to change" and who might find it hard to give up "tried and true" course content and pedagogical strategies, where they would "know what to expect" in the way of student responses.

The proposed responsibilities of curriculum leaders included having a comprehensive understanding of the curriculum and managing change processes. Actions that were expected from the leadership team to facilitate faculty buy-in included presenting a united front on the importance and nature of curricular integration, organizing team-building activities, maintaining momentum, and "backing good ideas [rather than] allowing them to die when the going gets tough." Other leadership functions mentioned included establishing "some type of monitoring system" to ensure that faculty members would be held to account but also appreciated for their contributions to the curriculum. Concerns about accountability stemmed from the knowledge that it was difficult to force faculty members to conform to a curricular plan and that lack of a monitoring system might account for failure to fully implement the curriculum as espoused. With respect to being appreciated, one participant noted the importance of peer recognition as a motivator of performance and another observed that, unlike research efforts, individual's curricular initiatives tended "not to be accompanied by much in the way of a carrot."

Personal Initiative.

As an extension of the notions of curriculum leaders showing the way and faculty members buying into and enacting curriculum plans, some participants expressed the importance of proponents of improved curricular integration setting an example in their own teaching and of individuals taking the initiative to learn new content or try new pedagogical approaches. With regard to those who were vocal about the need for better curricular integration being the first to adopt change, one course coordinator suggested that

> The people who are strongly opinionated about it need to actually create examples. They need to be doing the work in their own class and they need to be bringing that forward as an example of "the way I think about doing this," and "this is the way I've implemented it in my course."

With regard to individual educational development initiatives, several cited activities they had undertaken of their own volition, including self-study on teaching and learning and participation in centrally supported programs such as a 5-day workshop on course design and an 8-month SoTL leadership certificate program, which had helped broaden their curricular awareness and pedagogical repertoire. Two others indicated they had addressed issues in their courses by learning new content themselves so they could teach it on their own. For example, one described spending two years developing knowledge about subject matter that had previously been taught by guest lecturers who were "experts in the field" but who "would not teach it in relation to pharmacy." Another had recently taught a particular area for the first time, and was of the view that faculty members should be "adaptable to new material." As this participant said,

> As an academic, you have to be able to be a lifelong learner and be able to pick up a textbook and look at the primary literature and sort of see what's valuable. What you think would be valuable for students to know, that would enhance their overall pharmacy experience.

Desire for evidence.

Examples from early adopters were seen as important data sources for educational scholarship, which would help satisfy the need expressed by a number of participants for evidence to support curriculum-wide revision. For example, many assumed that a more integrated curriculum would be structured in disease state modules. One participant wondered whether this sort of curricular structure was just the latest fad, akin to problem-based learning, and several were skeptical about the need to restructure the curriculum so dramatically when there was existing evidence to suggest that "we're still putting out a really good product." For example, one participant described being reassured about the quality of the curriculum by hearing pharmacists say "Whatever you guys are doing, you're doing a really good job." On the whole, participants were looking for evidence to justify the need for better curricular integration and to support the selection of a particular curricular model. As one said of structuring the curriculum in disease state modules,

> To me, it seems like the right way to go but I have no idea whether it is. Like whether there have been studies or evidence that it is the right way to go, I have no idea. And that's what we would need to listen to and if there are studies, or if we run our own study, that should dictate whether we actually do it or not.

Another asked

> Can we look at other models that have been successful? At least then there's something to kind of refer to. Has it been done elsewhere? Because I'm thinking these questions are probably discussed all across North America. Right? And so are we able to draw any experiences from other people? Or how has this worked out for other Faculties who go through similar challenges?

In addition to this kind of evidence to justify and guide curricular revision, some recognized the need to conduct internal program evaluation within a year of two of implementing any curricular changes and using that evidence to continue to refine the curriculum.

The power of history.

Awareness of Faculty history was considered important by some to improving curricular integration. Several participants mentioned the old governance structure with its discipline-based Divisions and the lingering traces of these "academic tribes." As one participant said, "If we look at the divisions between pharmaceutics, pharmacology, med chem, there's still traditional barriers there." Also, although the new governance structure with its Year Coordinators was seen by some as an "enabler" of curricular integration, there was insufficient history of success with this structure to convince all faculty members of its effectiveness.

Personal history of success or failure with teaching innovations was also mentioned as a factor in faculty members' comfort level with engaging in new pedagogical practices. For example, one participant described "having some really uncomfortable moments" as a new teacher, which had been mitigated by "a super-forgiving classroom." This person had continued to innovate and had "tried a bunch of different things," but also described the experience of a

colleague “who took a chance, gave it a go, and it blew up in their face, and so they’re not going to do it again.”

Resources.

Change of any kind requires resources, and participants did make general reference to the need for time, money, and expertise to support curriculum revision. Specific to enhancing curricular integration, virtually all resources mentioned were related to anticipated pedagogical change. In particular, a number of individuals recognized that additional resources would be needed to support integrative assessment strategies, including markers, examiners, and administrators to assist with scheduling and with organizing University-sanctioned accommodations for students with disabilities. Other suggestions for additional personnel included curriculum experts, education developers to “give the lecturers some training on how to present a lecture in active learning engagement,” case writers, mentors for students, and administrative assistants to organize the collection and distribution of lecture slides and handouts. Suggestions for new information resources included a curriculum map, data regarding students’ learning styles, and a repository of course materials that students could access during their experiential coursework.

Two resource challenges mentioned repeatedly were the demands associated with large class size and the limitations of graduate teaching assistants. With regard to class size, there had been a recent increase in intake from 152 to 224 students, and faculty members were concerned about the feasibility of implementing more integrative pedagogies in classes of this size. As one said, “224 students is crazy. How do you do a good job with 224 students?” With regard to teaching assistants, the concern was not sufficiency of number but of ability, as the great majority of graduate students in the Faculty do not have a pharmacy practice background. One

curriculum planning leader was undoubtedly correct in suggesting that the teaching assistants (TAs) were "smart people" and that "there should be a way to somehow utilize that resource better." However, course coordinators perceived them to be of limited usefulness as teachers and markers. As one put it, "We do have them do some grading on the exams, but it's problematic because the TAs that we get are not necessarily pharmacists [so] they don't have the training or the skill set." Another was more critical, saying "I'm finding that the TAs that I've had, honestly, I don't want them. They're just, I don't like to use this word, but almost hopeless."

Convergence and Divergence in the Curriculum: An Exploration of the Intersections

The second research question for this study is "What is the relationship of these conceptions to the observed integration in the espoused, enacted, and experienced dimensions of the curriculum and the areas of convergence and divergence between these dimensions?" It is apparent from the preceding descriptions of the espoused, enacted, and experienced dimensions of the curriculum that there are important similarities and differences between them with respect to curricular integration. Equally apparent are the similarities and differences between the conceptions of curricular integration held by the primary actors in each of these dimensions, namely curriculum planning leaders in the espoused curriculum, course coordinators in the enacted curriculum, and students and pharmacy practitioners in the experienced curriculum. What follows here, then, are the findings related to the intersections between these dimensions of the curriculum and the linkage of these to the conceptions held by the associated individuals.

Integration at the intersection of the espoused and enacted curriculum.

The espoused and the enacted curriculum appear very similar in terms of structure and content. At the superficial level of description of content available in course syllabi, there is good congruence between the draft syllabi and the contemporary syllabi, with the differences observed

easily attributable to advancements in knowledge during the approximately 10 years separating the creation of these syllabi. The horizontal dimension of integration is more prominent than the vertical dimension in the espoused and the enacted curriculum, facilitated mainly through alignment of content in the pathophysiology, pharmacology, therapeutics, and self-medication course clusters and the use of interdisciplinary cases in the CAPS course stream.

With respect to pedagogy, differences between the espoused and enacted curriculum are more apparent. The learning and assessment activities documented in the contemporary syllabi for the enacted curriculum are less varied than those documented in the draft syllabi for the espoused curriculum, as Table 12 and Table 13 show for the Term 2 of Year 2 courses.

Table 12

Comparison of Espoused and Enacted Learning Activities in Term 2 of Year 2 Courses

Course	Espoused Learning Activities	Enacted Learning Activities
PHAR 303 Pharmacy Skills II	Lab and tutorial activities	Lab and tutorial activities
PHAR 315 Pharmacokinetics	Lectures Problem sets Integrated case-based problems Class discussions Tutorials	Lectures Problem sets Class discussions
PHAR 323 Biophysical Pharmacy II	Lectures In-class case studies Problem sets Evaluation of journal articles	Lectures In-class small group activities
PHAR 330 Biomolecular Pharmaceutical Chemistry I	Lectures Debates Oral presentations Web-based assignments	Reading assignments Group discussion
PHAR 342 Pharmacology II	Lectures Reading assignments In-class problem sets and cases Evaluation of primary literature	Lectures
PHAR 352 Therapeutics II	Lectures Reading assignments In-class problem sets and cases Evaluation of primary literature	Lectures In-class cases
PHAR 362 Non-Prescription and Natural Health Products II	Lectures Reading assignments In-class case studies Evaluation of primary literature Evaluation of website	Lectures Reading assignments
PHAR 399 Cases in Pharmaceutical Sciences II	Case-based tutorials Literature retrieval and evaluation Group projects Debates	Case-based tutorials Lectures
PHAR 369 Practice Experience I	Practical experience	Practical experience

Table 13

Comparison of Espoused and Enacted Assessment Activities in Term 2 of Year 2 Courses

Course	Espoused Assessment Activities	Enacted Assessment Activities
PHAR 303 Pharmacy Skills II	Written, practical, and oral exams Videotaped counselling Wellness Clinic Professionalism	Practical exam In-class mini-assessments Quizzes Filmed counselling Peer teacher assessment Professionalism
PHAR 315 Pharmacokinetics	Written assignments Case study assignments Written midterm and final exams	Written midterms x 2 Written final exam In-class quiz
PHAR 323 Biophysical Pharmacy II	Written exams Problem sets Written critique of journal article	Written midterms x 2 Written final exam
PHAR 330 Biomolecular Pharmaceutical Chemistry I	Written midterm and final exams Oral presentation Group project Web site creation	Individual and group quizzes Written midterm Written final exam
PHAR 342 Pharmacology II	Written midterm and final exams Group assignment and presentation	Written midterm Written final exam
PHAR 352 Therapeutics II	Written midterm and final exams Group presentation	Written midterm Written final exam
PHAR 362 Non-Prescription and Natural Health Products II	Written final exam Online quizzes Case study assignment Website evaluation	Online quiz x 1 Written final exam
PHAR 399 Cases in Pharmaceutical Sciences II	Case-based exam Portfolio Case study assignments Online quizzes Tutorial leader assessment Self-assessment	Oral case-based exams x 2 Case assignments Quizzes Peer assessment
PHAR 369 Practice Experience I	Written assignments Preceptor evaluation	Written assignments Preceptor evaluation

Table 12 demonstrates a pattern of lectures being retained from the espoused to the enacted curriculum and other types of learning activities, such as reading assignments, problem sets, case studies, literature evaluation, and the like, being shed. Similarly, assessment activities in the enacted curriculum are not as varied as those in the espoused curriculum. Table 13 shows a pattern of retention of written midterm and final exams and shedding of case study assignments, group projects, oral presentations, etc. Significant reliance on multiple-choice questions and testing of minutiae of content knowledge was observed on contemporary written exams. Also, the program-level portfolio of the espoused curriculum was short lived and no longer among the assessment strategies of the enacted curriculum at the time of the study.

It is possible that the curriculum is pedagogically richer than the syllabi and observations would suggest, as a syllabus a few pages long does not capture much detail of a course in action, and a two-week period of observation is a sample representing less than 20% of the total class time for a course. However, the available data do suggest that the enacted curriculum has not met the pedagogical promise of the espoused curriculum, and it is the learning and assessment activities with the greatest potential to facilitate integrative learning that are often not occurring as intended. What is not clear is whether this point of divergence between past intentions and current actions is associated with a failure to implement the curriculum as planned or with deliberate curricular change over time, or some combination of the two.

The emphasis on horizontal integration and retention of disciplinary boundaries in the espoused and the enacted curriculum correlates well with the conceptions of curricular integration expressed by curriculum planning leaders and course coordinators. Also, the emphasis on connecting at the level of discipline-specific content and the rarity of consideration of pedagogy in these conceptions correlates with the gap between the intended and the

implemented pedagogical strategies. Virtually all the planning leaders and course coordinators mentioned one or more disciplines and spoke of integration as a process of "coordinating" or "bringing everything together" to "get the full picture." However, only one of the four curriculum planning leaders mentioned pedagogy, saying "If they were doing something in medicinal chemistry and pharmacology and therapeutics that was all related to, I don't know, anti-infectives, then we would build cases that took the same drug that they were studying in those three courses and build a case around it." Similarly, only six of the 24 course coordinators made references to pedagogical strategies, with three mentioning a case-based approach, one mentioning the use of projects, and two mentioning assessments covering content in multiple courses.

Integration at the intersection of the enacted and experienced curriculum.

Pharmacy practitioners had minimal awareness of the curriculum, so their perspectives do not figure here although they were considered "recipients" of the curriculum, albeit vicariously, through their experiences with students and graduates of the program. Students, however, were acutely aware of the curriculum, as, unlike any other participant group, they were actively engaged in the entire curriculum. They did recognize the structural, content-related, and pedagogical efforts to facilitate integration that were being made by their instructors, but they were also sensitive to the ways these fell short. This was especially true of the Year 3 and 4 students, who had experienced more of the curriculum than the Year 1 and 2 students. For example, at the level of structure and content, two course coordinators involved in Year 3 pathophysiology, pharmacology, therapeutics, and self-medication clusters, one in Term 1 and one in Term 2, said of the group of course coordinators involved "we work quite nicely together" and "we've been thoughtful [about how the courses] intertwine and progress." However, as one

Year 3 student observed, “I see the *intent* in connecting pharmacology, pathophysiology, and therapeutics, *which is not well done* [emphasis added].” Another said, “I do feel like more work can be done if the profs met together.” These shortfalls and other missed opportunities for integration from the students’ perspectives were described in another Year 3 student’s recollection that

> When we first started pharmacy, I looked at the schedule and I saw there was the three classes that were, like, you don’t really know what the schedule is like until you get your related course. I thought that it would be a lot more like all of them being at the same time. Like first you have your pathophysiology and then you have your pharmacology. In order, in time. Not like two therapeutics classes or two pharmacology on different things, right? I thought that even the OTC would go with it. And then that week in lab, I thought we would be doing what you see in a pharmacy, counselling a patient on those medications, and then CAPS would be you’re working in a hospital setting and you’re working up a patient.

From this, and other students’ comments, it appears that course coordinators were overestimating the effectiveness of the alignment of topics in the course clusters. Conversely, they underestimated students’ readiness for integrative approaches to assessment. For example, two course coordinators associated with the clusters mentioned their concerns about student resistance to or “annoyance” with exams that covered material from two or more courses. Issues raised included how best to distribute the marks in the various courses involved and students being “messed up” in multiple courses when they did poorly on this type of exam. They might have been surprised to hear one of the Year 3 students say

> Something else that shocked a lot of us, it would have been a good opportunity, was our first semester therapeutics exam. I think all of us came totally prepared for the integration exam of a lifetime, because there were so many good things we were learning about diabetes and osteoporosis and cardiovascular. They all tied together. Some of the students I practice with, they made the most awesome cases where everything had to be considered. And they literally made it the easiest test ever, and it was such a disappointment to me, because I was ready for so much more.

Other students agreed that "it was the worst exam ever," with one adding "And the final was just as bad. If anything I felt like I benefited more from what I memorized than the ideas that I had." Rather, these students would have preferred case-based exams that contributed to their marks in all the appropriate courses. As one said, "Don't you feel the quality of learning would be better that way?" Another elaborated on how such an exam might be constructed, suggesting that

> I feel like even on one test you could do different questions. Like, why are we learning pathophysiology? We're learning it so we can assess a patient that comes in with a disease to make sure that that's the correct diagnosis and that we understand what we're going to aim our drug therapy towards. So your first question can be about something like "When would you refer this patient?" Like a red flag or something like that, based on the pathophysiology. And then the next one could be "What are your drug options and what would you monitor for?" like side effects, like pharmacology style. And your third one could be "Which of these would you choose and why?" That's your therapeutics. Think about why you're learning each one of these things at the end, right? And then med chem somehow.

With respect to the CAPS courses, the perspective of the course coordinators in this stream was that "CAPS itself is integrative," and that the case-based tutorials provided students with "meaning instead of learning a bunch of facts" and the opportunity to "apply the knowledge they've learned in lecture." However, while the students appreciated that "it's nice to have CAPS integrated into the curriculum," students in all years of the program saw shortcomings in the way they experienced the CAPS courses. Comments, with emphasis added, included:

1. Year 1 student: "We definitely did one particular example with the ketoconazole and a few others with antibiotics, but *we can definitely do more*."
2. Year 2 student: "The thing about CAPS that I felt was…*there's only so many cases* per term"
3. Year 3 student: "I find I learn the best, *when* they have CAPS cases that are relevant"
4. Year 4 student: "I just feel like CAPS *could be used better* as a tool to help us learn."

As with the enacted curriculum, the horizontal dimension of integration was more prominent than the vertical dimension in the experienced curriculum. Using Harden's integration ladder as a way of characterizing the curriculum from the students' perspective, they did see the CAPS course stream as reaching the level of "correlation," but incompletely and less frequently than they considered possible. They also saw the pathophysiology, pharmacology, therapeutics, and self-medication course clusters as often not achieving the "temporal coordination" the course coordinators suggested was occurring. Students saw more "isolation" than the course coordinators.

This divergence in students' and course coordinators' perspectives on integration in the curriculum correlates with the differences in the conceptions of integration expressed by these two groups. Students' conceptions, at least as constructed collectively in the focus group setting, were richer than those of course coordinators. As previously mentioned, course coordinators'

conceptions of integration focused primarily on the horizontal dimension of integration and the crossing of disciplinary boundaries with respect to content. Students' conceptions, however, included both horizontal and vertical dimensions of integration. In particular, they had a strong focus on vertical-practice integration, reflecting their desires to become competent pharmacy practitioners. Thus, they had higher expectations for integration in the curriculum and were more attuned to the shortfalls and missed opportunities than the course coordinators.

Integration at the intersection of the espoused and experienced curriculum.

None of the students and only one of the pharmacy practitioners had any awareness of the espoused curriculum. Thus, there were no significant findings in the comparison of the espoused and the experienced curriculum. However, given the similarity of the espoused and the enacted curriculum, it is reasonable to assume that the enacted curriculum could stand in for the espoused curriculum in such a comparison and that the students' perception would be that the curriculum was less integrated than the curriculum planners had in mind.

Summary

The foregoing findings provide an in-depth look at the context within which the UBC B.Sc.(Pharm.) program was designed and was being taught and learned, the integrative characteristics of the curriculum, and the conceptions of curricular integration held by key actors in the curriculum. The points of correlation between the curriculum as designed, the curriculum as taught, and the curriculum as learned and between the integrative features of these curriculum variants and participants' conceptions of integration have also been explored.

With respect to context, the curriculum was designed during a dynamic time in the history of the Faculty, with energetic leadership at the helm and a strong desire to substantively revise the curriculum. Faculty members were considered hard-working, forward-thinking, and

collegial with each other but distant from the pharmacy profession, and were hampered by serious budgetary and space constraints. This context had not changed much a decade later when the curriculum was examined for this study. There had been some faculty turnover and growth in the intervening years, concerns about space had been mitigated, and efforts were underway to connect more effectively with the profession. Curriculum change was once more in the air. Overall, the consistent picture is of a small cadre of committed faculty members pushed to the limits of its abilities and resources to provide a high quality undergraduate program to educate large numbers of students to a practice-ready level.

Integration was not a driving principle in the design of the curriculum. Rather, the focus was on defining program-level outcomes and designing a curriculum to achieve these. Nevertheless, some integrative structural, content-based, and pedagogical features were incorporated into the espoused curriculum. For the most part, these had been achieved in the enacted curriculum, with the exception of some of the pedagogical strategies. These integrative features were consistent with the conceptions of curricular integration held by curriculum planning leaders and course coordinators, and were mainly confined to horizontal integration of content across disciplines within the pharmacy program. However, students' had richer conceptions of integration and, unlike curriculum planning leaders and course coordinators, directly experienced the curriculum in its entirety. Thus, they were astute observers of the curriculum, able to identify the potential for, and open to the learning challenges presented by, a more fully integrated curriculum.

Chapter 5: Discussion and Conclusions

The curriculum for the UBC B.Sc.(Pharm.) program, selected as the case for this research project, is the product of the collective effort of the faculty members of the Faculty of Pharmaceutical Sciences, some of whom held leadership roles. The planning and implementation of any curriculum and the daily work of teaching and learning within a curriculum are social processes, shaped by contextual factors and the knowledge, skills, and attitudes of the people involved. Thus, there is great value in asking interpretive, "What is going on?" sorts of questions to develop an understanding of these processes, as has been done in this study.

A fundamental feature of this research project is the recognition that the term curriculum has different meanings for different people. Many understand it as a plan for a program of study; that is, as an intention. This curriculum exists in the minds of the individuals involved in the planning process and in documentary records of the planning process, including the records of meetings, the draft course syllabi, and the proposals submitted for institutional approval. This has been referred to throughout as the *espoused* curriculum. Implementation of the curriculum involves parcelling out small portions to course coordinators and instructors to teach to students. This curriculum exists in the course syllabi and the learning and assessment activities created by these individuals and in their day-to-day actions in the classroom. This has been referred to throughout as the *enacted* curriculum. The students in the classroom bring their own learning motivations, expectations, and proclivities with them. They also are not just sitting in one instructor's classroom but in all the instructors' classrooms so they have the opportunity to develop a more holistic view of the curriculum. This curriculum exists in the students' minds and in the products of their work, including their on-the-job performance in practice settings. This has been referred to throughout as the *experienced* curriculum.

The curriculum for the UBC B.Sc.(Pharm.) was a fruitful case for examining integration in the espoused, enacted, and experienced dimensions of the curriculum. This was so because of the availability of documentary sources, access to classrooms, and the availability and willingness of curriculum planning leaders, course coordinators, students, and pharmacy practitioners to share their thoughts during interviews. It was also so because of the incompleteness of integration in the curriculum, which provided motivation for understanding differing conceptions of integration and for examining points of divergence between curricular intentions, actions, and outcomes. This imperfection fostered contemplation of the reasons why the enacted curriculum or the experienced curriculum might be falling short of the espoused curriculum and ways such gaps might be bridged.

Discussion of these issues follows, guided as all else in this study, by the research questions posed and the conceptual framework adopted. Consistent with the presentation of the findings, identification of key contextual features and connections of these to the curriculum is contemplated first. This is followed by discussion of the findings directly related to the research questions, including exploration of the conceptions of integration held by actors in the curriculum and the connection of these to integration within the curriculum and in particular to the two major gaps observed, namely the pedagogical gap between the espoused and the enacted curriculum and the gap between the enacted and the experienced curriculum. Lastly, implications for curriculum practice and policy and suggestions for further research that arise from the study findings are provided and final conclusions are drawn.

Correlation of Context and Curriculum

The Faculty context was examined at two points in time: around 1997 when the planning process was initiated for the iteration of the B.Sc.(Pharm.) curriculum examined in this study and

around 2012 when the study was conducted. While changes clearly occurred during the passage of time between these points, several key contextual features affecting the espoused and the enacted curriculum remained constant.

The key administrative feature is the disciplinary structure of the Faculty and the long history of conducting the business of the Faculty through discipline-based groups. Although the Divisions themselves had been recently disbanded, a Division-like structure was still firmly in place within the Faculty's research endeavors and graduate programs. Thus, it is not a surprise that the bulk of the undergraduate curriculum consists of discipline-specific courses. This also may explain why horizontal integration and the crossing of disciplinary boundaries is so prominent in individual's conceptions of integration but that effective execution of horizontal integration in the classroom is rare. Further, "bulk" is a term that could also be applied to the volume of curricular content within the purview of disciplinary experts. This content continues to grow and, as one course coordinator observed, "the knowledge base is so much bigger now, and [students] have to learn all this information in the same scale of time as when we were students." As another course coordinator commented, this results in the content all being presented at an introductory level, leaving no opportunity within the curriculum to build on prior knowledge. Thus, it is no wonder that there is little attention to vertical-spiral integration in the curriculum.

The key social feature is the small size of the Faculty, which made it both possible and necessary for all faculty members to engage in a significant way in the design and teaching of the curriculum. It also meant that the work of planning a new curriculum was an added burden for everyone and that all faculty members had some investment in the curriculum being replaced. That these might be significant barriers to substantive curricular change is confirmed by the recollections of the one practitioner interviewee who had served on the Curriculum Review

Committee. This individual observed that faculty members on the Committee were focused on preservation of their own content and "ways they were comfortable doing things" in the curriculum. Thus, it is no surprise that the planning process for the B.Sc.(Pharm.) took several years and that strong traces of the prior curriculum, such as the number of credits associated with particular coursework, are evident. An obvious example is the separation of the combined medicinal chemistry, pharmacology, and therapeutics courses into individual courses in each discipline with a similar total number of credits. This represents a change at the level of curricular structure, but not necessarily of content or pedagogy.

The key contextual feature related to the practice of pharmacy is the distance between the Faculty and the profession. The majority of faculty members had completed an undergraduate pharmacy degree. However, only the clinical faculty with institutional cross-appointments could be said to have substantive and ongoing practice experience. With their practice commitments, however, they were less available than other faculty members to participate in planning and teaching the curriculum. Distance from the profession would also explain the opinion of the practitioner interviewee who had served on the Curriculum Review Committee that "It was clear that the majority of people didn't really understand the importance of working the synergy towards a practitioner, a professional." Thus, the relative dearth of therapeutics coursework and the lack of emphasis on vertical-practice integration in the curriculum are not a surprise.

The key contextual features related to the educational environment were the desire for curriculum reform within the Faculty and the widespread move to outcomes-based curricula. Planning a curriculum with outcomes in mind was hardly a new concept, having been outlined by Tyler (1949) nearly half a century previously. It was only during the 1990s, however, that this concept was taken up with vigour in higher education, typically in the form of generic abilities

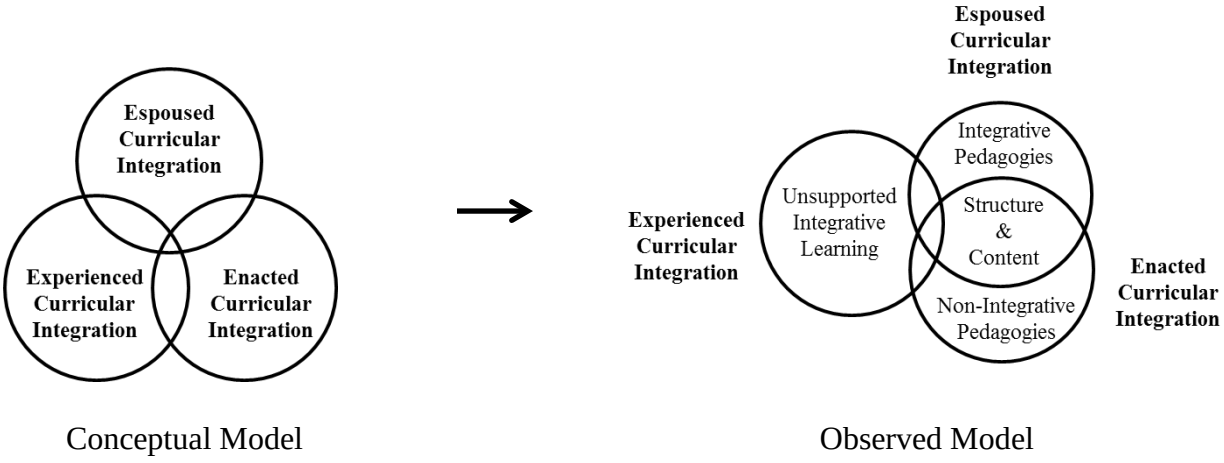
such as communication skills and critical thinking skills expected of all university graduates and, in professional programs, specific practice-related abilities (Hubball et al., 2013). As the push for curriculum revision in the Faculty coincided with the articulation of program-level learning outcomes for pharmacy programs in Canada and the US, it is no surprise that the design of the B.Sc.(Pharm.) curriculum focused on meeting outcomes and not on curricular integration.

Finally, the key contextual feature of the curriculum planning process is the fact that the majority of the work was done by faculty members organized in Working Groups that mirrored the discipline-based Divisions of the Faculty. These groups determined the course structure, the content, and the pedagogical approaches for the curriculum. Naturally, then, as has already been observed, the curriculum consists mainly of discipline-based courses and relies to a large extent on traditional lectures and exams. One other observation about the curriculum planning process is that it did not include a formal oversight mechanism for implementation of the curriculum. Rather, once the program and the courses had been approved, the steps of implementing and fine-tuning of the curriculum were primarily left in the hands of the course coordinators. Thus, it is not a surprise that the enacted curriculum diverges somewhat from the espoused curriculum.

Accounting for the Divergence

Assumptions underlying the research questions for this study are that individuals hold varying conceptions of curricular integration, that areas of convergence and divergence in integration in the espoused, enacted, and experienced curriculum are to be expected, and that these might be associated with individuals' conceptions. A Venn diagram was used as a pictorial device within the conceptual framework for the study to illustrate the intersecting dimensions of the curriculum and to guide the collection and analysis of data. It was not intended as a realistic representation of the curriculum. In particular, no specific meaning was intended by the degree

of overlap between the espoused, enacted, and experienced dimensions of the curriculum. Findings regarding the structural, content, and pedagogical characteristics of each of these dimensions have provided some insight into the actual degree of overlap with regard to integration in the curriculum. Thus, the conceptual model has been revised to create an "observed" model, shown in Figure 11, which illustrates the two major areas of divergence within the curriculum. These are (a) the discrepancy between the espoused and enacted curriculum with regard to integrative pedagogical approaches that were intended but were not occurring; and (b) the discrepancy between the enacted (and thus, equally, the espoused) and the experienced curriculum, with students perceiving less than ideal execution of and missed opportunities for curricular integration to support their integrative learning.



Conceptual Model Observed Model

Figure 11. Venn diagrams of the conceptual and observed models of the curriculum.

The enacted vs. the espoused curriculum

As the observed model illustrates, the espoused and the enacted curriculum appeared to be quite similar with respect to structure and content. The only structural difference noted was the use of timetabling in the enacted curriculum, not mentioned in the espoused curriculum, to

facilitate horizontal integration in the pathophysiology, pharmacology, therapeutics, and self-medication course clusters.

Based on the admittedly superficial level of detail regarding course content provided by course syllabi, there is good congruence between the draft syllabi of the espoused curriculum and the contemporary syllabi of the enacted curriculum. Some points of difference in course content were evident, but many of these could be attributed to deliberate change rather than failure to implement as planned. Course coordinators described a number of content changes such as reductions in material on imaging, drug analysis, and compounding, and additions of material on physical assessment, prescription adaptation, and pharmacy management. Motivating factors for these types of content adjustments mentioned by course coordinators included the desire to reflect changes in pharmacy practice, such as introduction and discontinuance of drug products in the marketplace and the expanding scope of pharmacy practice, and to respond to student feedback.

Course coordinators took it for granted that they had the authority to make these types of changes. For example, one said “My perception has been that it’s pretty much under my control to do.” Those who had acquired coordination responsibilities since the courses had been designed described a fairly rapid process of modifying course content as they saw fit. One, for example, described retaining the main course themes but adding and removing material and redesigning the notes package before teaching the course for the first time. Another described using the first year of coordinating the course as an opportunity to develop ideas on “how to move things around.” Another described revamping a course in its entirety within a year of being assigned coordination responsibility, although changes are not evident in a comparison of the draft and the contemporary syllabus for the course. Also, several course coordinators who did not

have a pharmacy practice background described changes in their teaching as they developed a deeper appreciation for the knowledge needed by practicing pharmacists. One described revising content to make it "clearly pointed to pharmacy students," having previously "overshot the mark" by teaching at a level more appropriate to graduate students. Another described letting go of some complex scientific content, indicating "the change came for me when I started to think about the types of questions that the patient would ask and the types of answers the pharmacists would be giving."

With respect to pedagogy, differences between the espoused and enacted curriculum were more apparent. Given the limitations of the course syllabi and the classroom observations as data sources, it is possible that the enacted curriculum was pedagogically richer than the findings would suggest. However, the available data do suggest that the enacted curriculum had not met the pedagogical promise of the espoused curriculum, and that it was the learning and assessment activities with the greatest potential to facilitate integrative learning, such as the use of case studies and project assignments, that were often not occurring as intended. What is not clear is whether this point of divergence between past intentions and current actions was associated with a failure to implement the curriculum as planned or with deliberate curricular change over time, or some combination of the two. One way to assess this would be to examine successive course syllabi, from the first to the current offering of each course. However, the syllabi for these years were not systematically saved and the likelihood is very small of obtaining a complete set.

Some degree of lack of fidelity of implementation with regard to pedagogy seems likely, however, based on the comments of the course coordinators when presented with a copy of the outcomes template for their course. These templates identify four ability-based outcomes to be addressed and indicate the associated instructional and assessment activities for each course in

the curriculum. However, only six of the 24 course coordinators interviewed had been involved in developing the outcomes template for their particular course. They were not specifically asked about whether their course currently, or had ever, provided the learning and assessment activities listed on the template, but when presented with the template, one volunteered

> This looks really carefully thought out and well done because of the way it's laid out, but that's not how it happened. If you remember the way the curriculum came together at the last minute, we'd had lots of discussions about outcomes for our curriculum and we'd had discussions about the courses. Things were not moving very quickly, we had a deadline, and someone said "get your lecture sequence in" and someone said "go to our list of outcomes, and choose the ones that match your course." So everybody was picking and choosing and putting things in, in no particularly thoughtful way.

Another said (of a course outcomes template that included tutorials as a learning activity to support the development of mathematical skills, but did not mention a group project)

> I think we definitely try to do these things, but this is the thing: feasibility. We're certainly not doing tutorials. And I can see that a group project could be very valuable, but you need a team to be able to do that.

It was also evident that 17 of the remaining 18 course coordinators who had not been involved in the original planning for their course, most by virtue of having been hired more recently, were not familiar with the outcomes template so may very well have been unaware of the intended pedagogical strategies.

This pedagogical gap between the espoused and the enacted curriculum is consistent with the finding that pedagogy rarely figured in course coordinators' descriptions of curricular integration, and mentions of learners' perspectives occurred in only half of these descriptions.

Rather, course coordinators' conceptions of integration focused primarily on content and emphasized teachers' perspectives.

The experienced vs. the enacted curriculum

The observed model in Figure 11 shows a fairly substantive gap between the experienced and the enacted curriculum (and, therefore, by implication also the espoused curriculum). The size of this gap may be somewhat exaggerated, but it would not be an exaggeration to say that students were acutely sensitive to what faculty members might consider minor shortcomings in integration in the curriculum. The fact the Year 1 students could provide some very specific examples of lectures that had "matched up" implies that mostly their lectures were not aligned. With regard to the pathophysiology, pharmacology, therapeutics, and self-medication course clusters, where structural alignment is intended, course coordinators seemed satisfied with their efforts to schedule the classes in a logical order. Year 2, 3, and 4 students all acknowledged the effort, saying things like "they did try" and "I know it's really hard," but they had clearly had dissatisfying experiences of the lectures being out of sequence and were readily able to provide specific examples. Another structural issue in these courses mentioned by students, but not by course coordinators, was the order of the exams. As a Year 4 student recalled, "We had our pathophysiology exam at the very end, and I remember thinking if we had that first, I probably would have done a lot better on therapeutics." In a similar vein, a Year 2 student who, for personal reasons, had written a therapeutics exam before the associated pharmacology exam described the experience as "brutal," because "I had to learn the therapeutics before I learned the medications individually, and that made things far more difficult than they should have been."

An obvious contributor to the gap here is the large volume of content and the organization of it by discipline in the enacted curriculum. Although course coordinators'

conceptions of integration mostly related to the horizontal dimension and the crossing of disciplinary boundaries, their efforts to implement this concept in the curriculum were modest at best. Connecting to other disciplines mainly consisted of making the occasional passing comment in class. Even these comments were not always made with certainty. Rather, a number of these comments documented during classroom observations were in the form of a guess or a question regarding whether students had encountered the content elsewhere. Of this particular practice, one course coordinator correctly observed,

> When we ask "I don't know if you heard this before" or "I don't know if that course did this or that course did this, they should have, but I don't know if you heard it," that just kills the credibility. Right there, as a student, you're like "Yeah. It's just not integrated."

This minimal effort at horizontal integration was occurring even in the pathophysiology, pharmacology, therapeutics, and self-medication course clusters where it should have been prominent. Content was not consistently shared and was certainly was not co-created. As an unfortunate example, the course coordinator who said "we've been thoughtful about how the pathophysiology and pharmacology, and therapeutics, and patient self-care issues intertwine" also confessed to being "not a shining example of being very knowledgeable about what everybody else is doing" and reflected that this was due to lack of personal initiative.

Horizontal integration was also hampered by the reliance on guest lecturers in some courses, a practice that one course coordinator described as "getting people from all over the place coming in for a single lecture." An examination of the complete set of contemporary course syllabi revealed that this was an accurate assessment of some courses. In fact, six courses were identified where more than half the lectures were provided by guests, five of which were in the pathophysiology, pharmacology, therapeutics, and self-medication course clusters. All the

guests were well-respected pharmacy practitioners with expertise in the subject matter. However, it is unclear whether or how they might have been familiarized with the relevant content in the other courses in the cluster. It seems likely, though, that if the course coordinator was unaware of this content, the guest instructors would be equally ill-informed. The students were probably accurate in their assessment that these guest lecturers were "very knowledgeable" but that "they're coming into something, and they're kind of like, "I don't know what you guys have learned."" One course coordinator also felt that guests relied on lecturing and did not incorporate active learning opportunities. This impression was confirmed during the classroom observations of guest lecturers in several courses.

While one can see how it would be easy for guest lectures and even course coordinators to be unaware of the content in other courses in the cluster, the students could not help but be aware. Thus, they were also very aware of the lost potential for integration and were able to provide specific examples. One confirmed the finding from the classroom observations that something as simple as the variation in style of handouts was a barrier to integration, saying "It also drives me a little crazy just to have different styles of notes." However, at least some students were obviously engaging in integrative learning of their own accord. For example, when asked about "putting the pieces together" on their own, one Year 1 student responded

> I do it by myself if I'm not too busy. If I just see a passage on drugs, and this drug affects the distal tubule, then I'll connect to physiology, and say "Whoa, look at the clearance values…"[28] and so on. So I would do it if I'm not busy and stressed to finish an assignment. Usually when I do things, I finish the assignment first. That's the primary goal. And then if I have any other time for any extra thinking, then maybe I'll take my time and do some integration.

[28] This is referring to the rate of elimination of drugs by the kidneys.

The general praise from pharmacy practitioners for students and recent graduates of the program might be taken as evidence that many students were fairly successful at doing this. However, there is no doubt that one student's observation that "it would definitely make it easier if it was actually presented to us in an integrated way" is correct.

The largest gap between the enacted and experienced curriculum may well be the pedagogical one, however. The students were quite singular in their purpose of becoming competent pharmacy practitioners, providing safe and effective care to their patients. Thus, they were appreciative of pedagogical approaches that emulated practice. In particular, students in all of the focus groups mentioned case-based learning, such as they encountered in the CAPS courses, as most helpful to their integrative learning. However, case-based learning was rarely seen outside the CAPS courses during this research project. Although case vignettes were a common feature of the therapeutics classes observed, the pedagogical value was lost when instructors verbally deconstructed the cases themselves and provided no substantive opportunity for student engagement. The missed learning opportunity in this approach was corroborated by a Year 3 student, who said

> I don't like cases where they're like "Here's this patient, here's what we did, here's blah." I like cases where, you know what, if they spent just as much time but had half as many cases, but yet have them such that they're set up so it's, like, we're forced to get out of our comfort zone. "What would you do? Why would you do that?" Like ask us those questions so that we have to do…because what we need to do is develop a thought process ourselves, and if we're just kind of spoon fed information that's not going to happen.

Students were similarly unimpressed with the integrative learning value of the assessment practices in most courses. One student, in fact, described putting more effort into preparing for the experiential coursework than into studying for exams, saying,

> When I'm getting ready for [my clerkships], I make sure I know way more than I do for my actual exam. The marks don't motivate me as much as, at work and stuff, I'm super vigilant about checking things, because I don't ever want give a patient something wrong. But on a test, "My god, it's a mark off," you know? What can you do? You can't memorize everything, right?

This comment reflected the fact that the assessment strategies in the majority of courses were exams that tested the minutiae of discipline-specific content knowledge, and not the application of that knowledge in realistic patient care situations.

Consequently, just as with the learning activities, the students recommended case-based assessments that examined content across multiple disciplines. They suggested a variety of strategies, including adding case study assignments to courses to dilute the emphasis on summative exams of content knowledge; the use of a single exam "with 10 cases or something and then that encompasses all of pathophysiology, therapeutics, and pharmacology;" and having "exams based on disease states as opposed to courses." They did acknowledge that not all students would welcome these types of approaches, with one recalling that "when Dr. __ asked us if we wanted to have pathophysiology questions on the pharmacology midterm, everyone said no." However, the student who observed "I always found it really comes down to how you're assessed" confirms the oft-stated contention that assessment is a fundamental driver of learning (e.g., Frederiksen, 1984) and thus points to assessment as the largest contributing factor to the

failure of the enacted curriculum to foster integrative learning, and to a place where pedagogical change might be initiated.

This pedagogical gap between the enacted and experienced curriculum is similar to that between the espoused and the enacted curriculum. Again, it is consistent with lack of attention to learners' perspectives and considerations of pedagogy in course coordinators' conceptions of curricular integration. It is also magnified by the comparative richness of students' conceptions.

Warranted Assertions

Only modest claims regarding the connection between individuals' conceptions of curricular integration and the observed integration in the intersecting dimensions of the curriculum are supported by the findings from this study. In part, this reflects the various shortcomings of this study, including the limitations of the methodology and methods, data sources, and researcher competence, and the inevitable gaps in data due to individuals declining to participate in interviews or classroom observations. Defensible claims specific to the research questions include

1. The conceptions of curricular integration articulated by curriculum planning leaders and course coordinators primarily reflected the horizontal dimension of integration and therefore integration as creating some sort of continuum or coherent whole from two or more disciplines. These conceptions reflected integration at the level of multidisciplinary content and rarely included considerations of pedagogy. These conceptions were not anchored in theoretical models of integration, such as Harden's integration ladder, or any educational scholarship or, in most cases, the practice of pharmacy. Rather, they reflected the individual's own experiences as disciplinary content experts and teachers.

2. The espoused and enacted curriculum created by curriculum planning leaders and course coordinators were discipline-based and were congruent in most regards. Some structural, content-related, and pedagogical strategies were used to support integration primarily in the horizontal dimension. The largest discrepancy between the espoused and enacted curriculum was in the pedagogical strategies, with the enacted curriculum falling short on some of the intentions for use of learning and assessment activities that would facilitate integrative learning.
3. Students generated richer conceptions of integration during focus group interviews than curriculum planning leaders and course coordinators did during one-on-one interviews. The horizontal dimension of integration was prominent, but vertical-spiral and vertical-practice dimensions were also present in these conceptions. Integration at the level of content was prominent, but consideration of pedagogy was also present. These conceptions were not grounded in scholarship or theoretical models, but did reflect applications in pharmacy practice.
4. The experienced curriculum was rich in opportunities for horizontal integration and vertical-practice integration. The students who participated in the focus groups were aware of these opportunities, many of which were not executed as effectively as they could be in the enacted curriculum. The students were engaging in integrative learning largely on their own, with minimal support from the enacted curriculum. The largest discrepancy between the enacted and the experienced curriculum was the shortfall in the enacted curriculum in integrative pedagogy, particularly integrative assessment strategies.
5. The conceptions of integration expressed by different actors in the curriculum are related to their roles in the curriculum. Curriculum planning leaders' and course coordinators'

conceptions focused mainly on horizontal integration across disciplines, reflecting the discipline-based curricular structure and the main integration strategies in the espoused and enacted curriculum of clustering the pathophysiology, pharmacology, therapeutics, and self-medication courses and having a stream of case-based courses in which the cases were multidisciplinary in nature. The lack of emphasis on pedagogy in course coordinators' conceptions correlates with the minimal use of integrative teaching and assessment practices observed in most courses in the enacted curriculum. Students' conceptions of integration were more holistic, with references to horizontal and vertical integration, content, and pedagogy, reflective of their holistic experience of the curriculum.

Implications for Practice, Policy, and Further Research

Although subject to the limitations of the methodology and methods and to various threats to validity and reliability described in Chapter 3, the findings from this study point to a variety of implications for curriculum practice and policy and to several avenues for further curriculum inquiry. It is evident from this study that changes could be made to the B.Sc.(Pharm.) program to enhance curricular integration and that students would welcome this to support their learning. Various interventions would be required to achieve this, which flow from the implications and might be supported by evidence obtained through areas of further research outlined here.

Curriculum practice implications.

The main implication for curriculum practice arising from this study is that integrative pedagogical approaches could be better utilized to support students' integrative learning. A substantive move towards the use of case-based, problem-based, or other practice-based learning and assessment activities would be helpful, and would apparently be well accepted by students.

This need not necessarily extend to a complete restructuring to organize the curriculum by body systems rather than disciplines, but this is an intriguing possibility suggested by the students' positive reaction to the pulmonary module and by similar shifts in other programs, such as the UBC medical program (Faculty of Medicine, 2014). It is, in fact, hard to escape the conclusion that a fully integrated curriculum demands that patient care be at the heart of the program and that this requires the organization of content around common disease states and the effective use of case-based pedagogies and simulated and actual experiences interacting with patients in order to facilitate students' development of the knowledge, skills, and abilities to become competent, caring pharmacists. Figure 12 is an attempt at illustrating such a curriculum model.

One observation of this model is that the distinction between the horizontal and vertical dimensions of integration begins to blur. That is, teaching and learning in authentic ways to provide pharmaceutical care to patients would involve transdisciplinary horizontal integration at the highest step on Harden's integration ladder, which is arguably indistinguishable from a seamless joining of the basic and clinical sciences, or theory and practice, in the inverted triangles model of vertical integration. Treating these forms of integration separately has been a useful analytic strategy for this research project, but there is undoubtedly some truth in one course coordinator's statement that

> Horizontal and vertical integration concepts are a little tedious… and I guess the way I think about it, it's not really necessary for me to distinguish much between horizontal and vertical integration. It's all vertical. It's all moving towards meeting of competencies across various domains by some time on the clock.

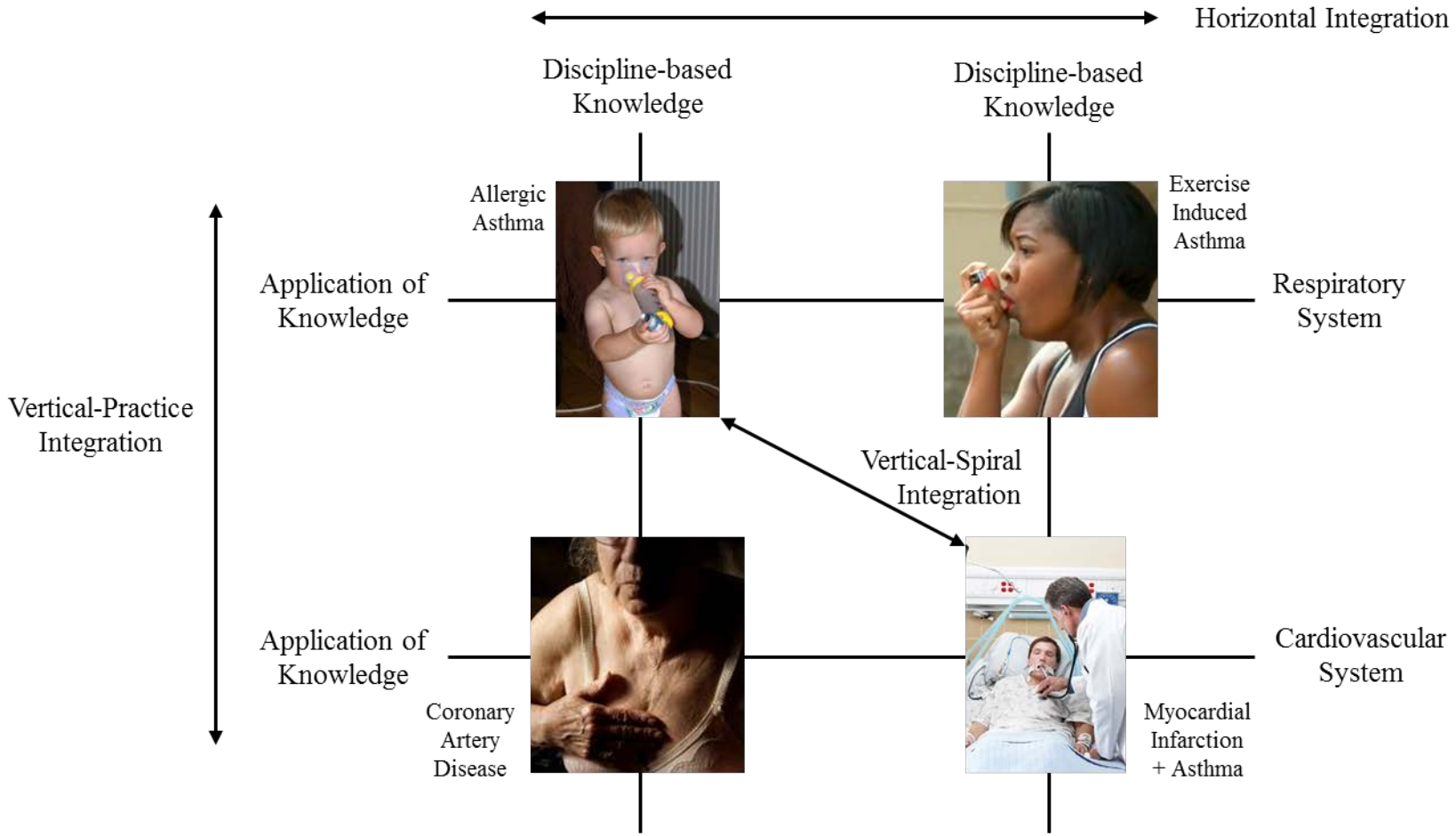


Figure 12. Model of integration in a curriculum structured by body systems using authentic patient cases.[29]

[29] All pictures permitted to be shared with attribution for non-commercial use.
1. Child with inhaler © Phyllis Buchanan, http://en.wikipedia.org/wiki/Asthma_spacer#mediaviewer/File:Baby_inhaler.jpg.
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Effectively implementing such significant changes in curricular structure and pedagogical practice in the large class settings that are the reality for the program would require educational development and curriculum leadership. Leadership functions here might be to identify development needs and opportunities, to provide incentives for participation, and to be pedagogical role models in their own teaching. Some educational development would likely also be required for students, who although apparently appreciative of realistic case studies to support their learning are nevertheless accustomed to receiving large amounts of content in lectures and being examined on disciplinary content knowledge on multiple-choice exams. However, the seeds of the pedagogical change envisioned are in the case vignettes already incorporated into a number of courses. Students might also be able to assist with case development as, by their own account, they can create "awesome cases."

One minor practice change that would be beneficial and easy to implement while contemplating larger curricular changes is the optimal scheduling of exams. If the order of exams makes a difference to students' integrative learning as they report it does in the pathophysiology, pharmacology, therapeutics, and self-medication course clusters, then the exams should be scheduled in the appropriate order. This might be the first step in the development of an overall program of assessment for the curriculum (Van der Vleuten, 1996) that would better foster integrative learning.

Curriculum policy implications.

The pedagogical gap between the espoused and enacted curriculum, including failure to implement integrative learning activities within courses and early discontinuation of the program-level portfolio, and the finding that course coordinators take it for granted that they have authority to make changes to their courses, suggest that greater curricular oversight and

support might be required on the part of the Associate Dean Academic and the Program Director. It would be reasonable, for example, to implement a policy requiring that the Program Director be conferred with regarding course changes to prevent unintended discontinuities to the already imperfect integration in the curriculum. Because of the potential encroachment on faculty members' autonomy implied by such a policy, support from the Associate Dean Academic and the Dean would be essential.

To facilitate curriculum oversight, the Program Director, in concert with the Year Coordinators, might also be charged with the responsibility of developing a better system for information-sharing about the curriculum. Given the complexity of the curriculum, it is no wonder that course coordinators, who also have other significant work responsibilities, are at best only superficially aware of the curriculum beyond their own course. All course coordinators do currently have access to the materials posted for every required course in the program on the university's online learning management system. However, they appear to be making little effective use of it and have not established other systematic ways of communicating with each other. Thus, they need proactive encouragement and support to do this. This is especially true of new faculty members, who are obviously in need of information about the curriculum and the intended place of courses they inherit within it.

If the existing course structure remains intact, a useful starting place for a communication initiative would be the pathophysiology, pharmacology, therapeutics, and self-medication courses. Effective sharing of content in these clusters would be the first step towards co-creating content and achieving the integrative potential of these clusters. Ideally, however, the clusters would not be limited to these four course streams, but would incorporate concurrent courses in other disciplines. The next step beyond the clusters might be to make better integrative use of the

CAPS and pharmacy skills lab courses. It is worth considering the argument advanced by one course coordinator that not all learning activities in these courses should be linked to concurrent coursework because of the unpredictable and varied nature of the situations normally encountered during "two hours of working in a real pharmacy environment." However, there is no reason why more CAPS cases and lab activities could not be deliberately connected in some way to the content in the clusters to support horizontal integration or to prior or future learning or experiential coursework to support vertical integration. In some cases, simply rescheduling existing activities is all that is needed. Students would be a good source of information on activities that are currently misplaced.

Another issue that could be resolved through policy is the extensive use of guest lecturers in some courses. The guest lecturers are valued contributors to the program for their expertise and practice experience. However, they appear to be unaware of the curriculum and the place of their contribution within it and they also do not engage students very effectively in class. These issues could be resolved by either limiting the use of guest lectures within each course or requiring that guests be properly oriented to the relevant curricular content and pedagogical expectations. Alternatively, a better use of guests might be to harness their practice expertise to assist faculty members with developing realistic teaching cases for their own use. They might also prove valuable as mentors to faculty members who do not have a pharmacy background.

Suggestions for further research.

Several avenues of further curriculum inquiry present themselves, either to extend this study or to investigate issues arising from the findings. One extension of this research project that might be worth pursuing is an examination of integration of the parts of the curriculum that were excluded from the study. In particular, it would be useful to determine the extent to which

the required external coursework is integrated into the curriculum and contributing to the intended learning outcomes. Findings from the Year 1 students suggest that some serendipitous horizontal integration is occurring but also that integrative learning is hampered when students take the external courses prior to when they are scheduled in the B.Sc.(Pharm.) curriculum and/or take alternate courses to complete these course credits. There seems little educational rationale, for instance, in having those with partial credit for the required physiology course take an alternate animal physiology course with content on lobster hearts rather than human hearts as one student described, and there are probably many other similar examples to be found. However, solid evidence of this will be required to support curricular change with respect to transfer credit.

Another useful extension of this research project would be a closer examination of the four pathophysiology, pharmacology, therapeutics, and self-medication clusters. There are hints in the findings here of significant differences in the integration within these clusters, and it would be useful to understand the factors that are contributing to or detracting from effective integration in each case. It would also be useful to have a better understanding of the potential for and barriers to inclusion of additional disciplines in the clusters. It is curious, for example, that the medicinal chemistry component of the curriculum, which was integrated with pharmacology and therapeutics in the prior iteration of the curriculum, was identified by several course coordinators and students as being poorly aligned.

In a similar vein, scholarly inquiry into the pulmonary module would be worthwhile to further investigate the learning benefits indicated by student participants in this study. Faculty perspectives should be included in such a study, given students' recognition of the work involved and the absence of findings here from curriculum planning leaders and course coordinators

regarding the pulmonary module. Beyond this, though, it would be useful to examine pharmacy curricula structured in modular or other ways and their integrative learning potential. It would be very enlightening, for example, to replicate this study in a contrasting case, such as the program at Dalhousie or Regis University, with their disease state modules and either problem-based or case-based pedagogical approaches. An avenue of inquiry to contemplate including in such studies is an examination of the teaching perspectives of the instructors involved. Most of the classroom practices observed in this study are consistent with the transmission perspective (Pratt, 1998). It would be useful to know how dominant that perspective actually is, what secondary perspectives exist that might be drawn upon to facilitate curricular change, and how these perspectives differ among faculty members in contrasting cases. These types of studies would begin to address the desire expressed by course coordinators for evidence to support a change to a modular curriculum based on body systems.

In contemplating such a change in the next iteration of the curriculum and in undergraduate degree program reform more generally, further inquiry into the source of the pedagogical gap between the espoused and the enacted curriculum found here might be useful. An understanding of how this gap arose, for example through low fidelity implementation or unchecked curricular drift or a combination of the two, and the factors that contributed to the development of this gap would assist curriculum planning leaders in preventing a recurrence.

Conclusions

The knowledge, skills, and abilities that students must develop through the B.Sc.(Pharm.) program are myriad; thus, the curriculum is voluminous and complex. This research project has confirmed how daunting the task is of understanding the curriculum for an undergraduate

program as a whole, with all its working parts and actors, even when the focus of inquiry is limited to one particular aspect of the curriculum such as integration, as has been the case here.

Although the focus of the design process in the B.Sc.(Pharm.) curriculum was the program-level outcomes rather than integration, the vital outcomes of critical thinking and problem-solving to provide pharmaceutical care to patients demand integrative learning on the part of students and therefore attention to curricular integration on the part of the curriculum leaders and faculty members who plan, support, and teach the curriculum. As stated at the outset, real world problems, such as those that pharmacy students will encounter in practice, require knowledge from multiple disciplines and the ability to apply that knowledge in clinical settings (Husband et al., 2014; Jacobs, 1989). That is, pharmacy practice is inherently integrative, so a pharmacy curriculum that aims to educate practice-ready graduates ought to be horizontally and vertically integrated.

As the case of the B.Sc.(Pharm.) program has illustrated, with its mixture of isolated and variably integrated elements, integration is not a dichotomous feature of curricula, but rather might be thought of as a continuum, illustrated simplistically in Figure 13.

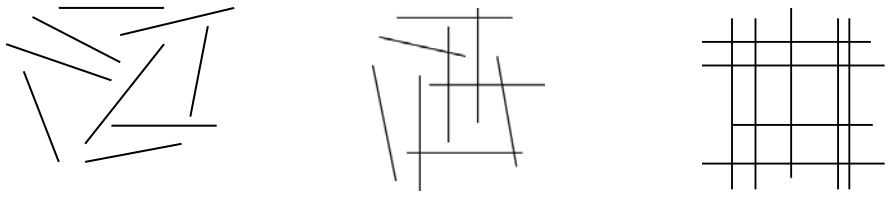

Figure 13. A continuum of curricular integration, with horizontal and vertical dimensions.

Different actors will have different views of where the curriculum for a particular program lies on this continuum. Students, for example, with their unique experience of the entirety of the curriculum, are likely to be aware of gaps and missed opportunities for integration. Accordingly,

they may see the curriculum as more fragmented than curriculum leaders or instructors do, as was reported by Muller, Jain, Loeser, & Irby (2008) with medical students and as has been demonstrated by this study with pharmacy students. This study has also shown that different actors can have different conceptions of integration that vary in sophistication, locus, and dimensions of integration, and that their conceptions are linked to their role and experiences within the curriculum.

General consensus may be unobtainable on a model for integrated curricula in undergraduate degree programs, but does appear to be emerging in medical education in the current post-Flexner era of curriculum reform and is being taken up similarly in pharmacy programs. An integrated curriculum in these health professions is coming to mean one in which basic and clinical science disciplines are learned together and in which experiential learning begins early on (O'Brien & Irby, 2013). The "signature curriculum" in pharmacy programs is thus evolving from one that has a discipline-based structure, relies on teaching-centred pedagogy, and has some experiential learning at the end to one that is structured according to body systems or disease states, relies on pedagogical strategies that foster integrative learning such as case-based approaches, and has experiential learning throughout.

A change from the former to the latter form of curriculum would require willing participation by all actors in the curriculum, educational development, and effective leadership. Hubball and Burt's (2004) curriculum design model that has served as the conceptual framework for this study would be useful in guiding the iterative processes of assessing needs, appreciating the influence of contextual factors, and designing, implementing, and evaluating a reformed curriculum. Chinowsky's (2008) practice implementation matrix, with its steps of preparing to make a practice change, initiating a new practice, growing the practice beyond a pilot project,

and establishing the practice as a norm, would also be useful. Attention to this matrix would help ensure high fidelity implementation so that the enacted curriculum is congruent with the espoused curriculum. Meaningful inclusion of the student voice throughout the design and implementation process would also be beneficial. As this study has demonstrated, students can have sophisticated understandings of curricular integration and the ways in which curricular structure, content, and pedagogical approaches support their integrative learning. Attention to student perspectives would thus help ensure that the experienced curriculum is congruent with the espoused and enacted curriculum and that the "curriculum as plan" is achieving its intended learning outcomes.

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Appendix A

Delights and Dilemmas of Doing Research "at Home"

I have been associated with the Faculty of Pharmaceutical Sciences at UBC for 35 years, first as an undergraduate student, then as a teacher, and now as an administrator. My husband was one of my professors and then a faculty colleague until his retirement, after which he became an office mate and daily lunch companion. The Faculty has provided a sustaining blend of education, challenge, love, and friendship for all of my adult life. My experience goes beyond spillover between the spheres of work and home (Frone, Yardley, & Markel, 1997). My workplace is home to me. It also inspired and was the site for this case study.

I have tremendous social capital in this environment. I am also in a position of power – nominally if not actually, given the autonomy enjoyed by academics – by virtue of my appointment in 2009 as Director of the B.Sc.(Pharm.) program. Consequently, I enjoyed very open access to the individuals and documents necessary to complete my research. Almost all of the colleagues I approached allowed me to observe their classes, review their course materials, and interview them for this project. I either wrote or was the keeper of some of the curriculum planning documents used. Doing this work at home made it easy to collect data.

Doing this work at home made it easy to compromise the validity of the findings, however. I am conscious that conditions were ripe for both researcher subjectivity and reactivity (Maxwell, 2013). With regard to subjectivity, I was reluctant to be publicly critical of my colleagues, although they bore some responsibility for lack of integration in the curriculum. I am also culpable for the state of the curriculum, and I recognize the risk of being unwilling – or too willing – to be self-critical. I found the classroom visits particularly challenging. I had to

regularly remind myself that my purpose was to observe the instructors' integrative efforts and not their other pedagogical practices, although these were sometimes quite distracting.

With regard to reactivity, it is quite possible that my presence influenced the conduct of instructors I was observing or that people told me what they thought I wanted to hear in the interviews and focus groups. I attempted to mitigate this by being non-specific about the nature and goals of the study in the letter of initial contact and the consent form provided to participants. However, it is still possible that interviewees governed their comments, particularly those that might be critical of the Faculty. It is also possible that I had an unintended influence on the curriculum during the timeframe of the project. I tried to restrain myself from advocating for curricular change during this time. However, attending to integration in the curriculum is part of my mandate as Director of the program. I also sit as an ex officio member of the Faculty's Program Advisory Committee, which took an interest in curricular integration. Consequently, I was called upon in 2012 to give a presentation on the topic to the Faculty, outlining definitions, strategies, and evidence of effectiveness for integration. As Director of the program, I could not avoid this invitation, although the presentation had the potential to influence instructors' attitudes and practices that were the focus of this project, which was only partially completed at that time.

Doing this research at home made it challenging to maintain confidentiality. The instructors I interviewed were colleagues I interacted with daily, and it was sometimes difficult to recall which conversations were confidential and should not be shared with others. Similarly, I had a hard time not revealing particularly good or bad practices I observed in classrooms. I would like, for example, to share best practices with regard to use of technology in the classroom based on what I saw. However, doing so would be a violation of the terms under which I was granted access to classrooms and would run the risk of revealing instructors' identities.

Appendix B

Integration in Canadian Pharmacy Programs

Program	Horizontal Integration (Interdisciplinarity)	Vertical-Practice Integration (Practical Experience)
University of British Columbia Faculty of Pharmaceutical Sciences (Bachelor's degree)	Primarily disciplinary courses (with specified co-requisite courses) and interdisciplinary case-based courses	Yr 1: None Yr 2: 160 h Yr 3: 160 h Yr 4: 480 h
University of Alberta Faculty of Pharmacy and Pharmaceutical Sciences (Bachelor's degree)	Blend of disciplinary courses and interdisciplinary units in pharmacotherapy	Yr 1: 60 h (service learning) Yr 2: 160 h + 80 h Yr 3: None Yr 4: 640 h
University of Saskatchewan College of Pharmacy and Nutrition (Bachelor's degree)	Blend of disciplinary courses and interdisciplinary units in pharmacotherapy	Yr 1: 60 h (service learning) Yr 2: 160 h Yr 3: 160 h Yr 4: 640 h
University of Manitoba Faculty of Pharmacy (Bachelor's degree)	All disciplinary courses	Yr 1: 52 h (service learning) Yr 2: 80 h Yr 3: 160 h Yr 4: 480 h
Waterloo School of Pharmacy (Entry-level PharmD)	Blend of disciplinary courses and interdisciplinary units in pharmacotherapy	Yr 1: One co-op work term Yr 2: One co-op work term Yr 3: One co-op work term Yr 4: 24 wks
University of Toronto Leslie Dan Faculty of Pharmacy (Entry-level PharmD)	Primarily interdisciplinary courses	Yr 1: 160 h Yr 2: 160 h Yr 3: None Yr 4: 36 wks
Université de Montréal Faculté de Pharmacie (Entry-level PharmD)	Primarily interdisciplinary courses	Yr 1: 3 cr (service learning) + 4 cr Yr 2: 3 cr (service learning) + 4 cr Yr 3: 1 cr (service learning) Yr 4: 28 cr
Université Laval Faculté de Pharmacie (Entry-level PharmD)	Primarily disciplinary courses with some interdisciplinary units in pharmaceutical care	Yr 1: 2 cr Yr 2: 3 cr Yr 3: 12 cr Yr 4: 24 cr
Dalhousie University College of Pharmacy (Bachelor's degree)	Primarily interdisciplinary units in pharmacotherapy with some disciplinary courses	Yr 1: 80 h (service learning) Yr 2: 140 h Yr 3: 140 h Yr 4: 420 h
Memorial University School of Pharmacy (Bachelor's degree)	All disciplinary courses	Yr 1: 160 h Yr 2: 160 h Yr 3: 160 h Yr 4: 480 h

Sources for Appendix B:

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Note: All urls confirmed as of September 18, 2014.

Appendix C

This Appendix includes copies of documents related to the study protocol, including

1. Sample recruitment message (for course coordinators)
2. Sample letter of initial contact (for course coordinators)
3. Sample consent form (for course coordinators)
4. Notice to students of classroom observations
5. Interview questions
6. Sample course outcomes template

Text of Recruitment Message to Course Coordinators

(to be sent by e-mail with Letter of Initial Contact and Consent Form attached in January 2012 or September 2012 to faculty members named as coordinators of required pharmacy courses in the relevant term)

Hi [insert name]:

I'm writing to you because you are named as the course coordinator for [insert course name], a required course in the B.Sc.(Pharm.) program that is scheduled this term. I'm hoping you'll be willing to do three things:

1) allow me to observe your class (along with all the other 1st/2nd/3rd/4th year required courses) for a two-week period from [insert date] to [insert date];

2) share the syllabus, handouts, assignments, and similar documents for your course;

3) participate in an interview to discuss integration in the curriculum. This will take about an hour of your time and your responses will help provide an understanding of the curriculum.

The classroom observation, course documents, and interview would contribute to the research I am conducting for my PhD thesis project. The project is described more fully in the attached letter. Also attached is a consent form, a printed copy of which will be provided to you if you choose to participate. If you're willing to participate in this study, please get in touch with me.

Regards,

Marion

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FACULTY OF PHARMACEUTICAL SCIENCES

THE UNIVERSITY OF BRITISH COLUMBIA | 2146 East Mall
Vancouver, BC Canada V6T 1Z3 | www.pharmacy.ubc.ca
T 604.822.4096 | F 604.822.3035

Dear Colleagues:

I am writing to let you know about a research project I am conducting to evaluate the B.Sc.(Pharm.) curriculum. This project, entitled "Curricular Integration in the B.Sc.(Pharm) Program," will examine faculty and student understandings of integration in the curriculum and how these affect the way the curriculum functions.

I am undertaking this research project to fulfill the thesis requirement of my PhD degree in Curriculum Studies, supervised by Drs. Harry Hubball and Tony Clarke in the Department of Curriculum and Pedagogy in the Faculty of Education and Dr. David Fielding in the Faculty of Pharmaceutical Sciences. I anticipate that the results of this project will lead to informed decisions to improve undergraduate education in pharmacy and other programs.

I'm hoping you will be willing to have me attend the scheduled sessions of the course you coordinate for a two week period from [insert date] to [insert date]; to share the course syllabus, handouts, assignments, and similar documents related to your course; and to participate in an audio-taped interview. Your anonymity will be protected in any reports of this study, as no personally identifying information will be collected. Participation is entirely voluntary and there will be no consequences for choosing not to participate.

If you have any questions, feel free to contact me by e-mail at [insert e-mail address], by phone at [insert phone #], or in person in [insert office #]. If you have any concerns about your treatment or rights as a research subject, you can telephone the Research Subject Information Line in the UBC Office of Research Services at 604-822-8598.

I will be presenting the results of this project to my supervisory committee and to other academic audiences. If you are interested in the results of this project, a summary will be posted outside my office when it's available.

Sincerely,

Marion L. Pearson, B.Sc.(Pharm.), M.A.
Director, Entry-to-Practice Program
PhD Candidate

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Consent Form

for the study

"Curricular Integration in the B.Sc.(Pharm.) Program"

Principal Investigator: Dr. Harry Hubball, Associate Professor, Faculty of Education, [insert phone #].

Co-Investigator: Ms. Marion Pearson, PhD Candidate, Faculty of Education and Director, Entry-to-Practice Program, Faculty of Pharmaceutical Sciences, [insert phone #].

Why are we doing this study? We are doing this study to examine conceptions of curricular integration and how these affect curricula in higher education.

How will the study be done? This study involves analysis of curriculum documents, observations of how the curriculum is delivered in classrooms, and individual interviews of curriculum planners and faculty members and focus group discussions with students. If you agree to participate in the study, you will be asked to allow Marion Pearson to attend the scheduled sessions of the course you coordinate for a two-week period; to provide copies of course syllabi, handouts, assignments, and similar documents related to the course; and to participate in an interview at a time and place of your choosing. The interview will last about an hour and will explore your understandings of curricular integration and your impressions of integration in the pharmacy curriculum. The interview will be audio-recorded.

What will be done with the results? The results of this study will be reported in a graduate thesis and may also be published in journal articles and books. A summary of the results will also be posted outside Marion Pearson's office.

What are the risks in participating? We do not think there are any risks to you for participating in this study. We do not intend to ask personal or sensitive questions.

What are the benefits in participating? We do not think there are any direct benefits to you for participating in this study. However, the Faculty and its

students may benefit from improvements in the curriculum based on what we learn in this study.

How will your privacy be maintained? No personal information will be collected. You will not be identified by name in any reports of the study. All documents relating to this study will be stored in a locked filing cabinet in Marion Pearson's office. Computer files relating to this study will be password-protected.

Will you be paid for taking part in this study? We will not pay you for the time you take to be in this study.

Who can you contact if you have questions about the study? If you have any questions about the study, please contact the study leaders, whose names and phone numbers are listed at the top of the first page of this form.

Who can you contact if you have concerns about the study? If you have any concerns about your rights as a research subject and/or your experiences while participating in this study, you may contact the Research Subject Information Line in the UBC Office of Research Services at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598.

Consent: Taking part in this study is entirely up to you. You have the right to refuse to participate in this study. If you decide to take part, you may choose to pull out of the study at any time without giving a reason and without any negative impact on your standing in the Faculty.

Your signature below indicates that you have received a copy of this consent form for your own records.

Your signature indicates that you consent to participate in this study.

_____ _____

Participant Signature Date

_____

Printed Name of Participant

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THE UNIVERSITY OF BRITISH COLUMBIA | 2146 East Mall
Vancouver, BC Canada V6T 1Z3 | www.pharmacy.ubc.ca
T 604.822.4096 | F 604.822.3035

Dear [insert year] Pharmacy Students:

For the two-week period from [insert date] to [insert date], your pharmacy classes will be part of a research study I will be conducting as part of the thesis requirement for my PhD degree in Education. I am working under the supervision of Drs. Hubball and Clarke in the UBC Faculty of Education and Dr. Fielding in the Faculty of Pharmacy. The project title is "Curriculum Integration in the B.Sc.(Pharm.) Program" and is examining conceptions people hold of curricular integration and how these conceptions affect the curriculum.

I have asked permission from the coordinators of all [insert year] pharmacy courses to attend and observe classes to gather information on what is taught and how it is taught. There is no intention to gather information on individual students attending these classes. If you have any questions or concerns about the study and the observations taking place in your classes, I would be happy to try to answer them. You can contact me at [insert e-mail address], [insert phone #], or speak to me in person.

Thank you for your time and consideration.

Sincerely,

Marion L. Pearson, B.Sc.(Pharm.), M.A.
Director, Entry-to-Practice Program
PhD Candidate

Sample Interview Questions

Questions for curriculum planning leaders:

1. Describe your role in the design of the current B.Sc.(Pharm.) curriculum, and since then in delivering the curriculum.
2. What steps did you take and why to facilitate communication and buy-in to the curriculum?
3. What principles or models of curriculum design were you using and how were you using them and why?
4. Describe what you think the term “curriculum integration” means.
5. In what ways was integration considered in the design of the curriculum?
6. In your view, what successes and failures have occurred over time in implementing the curriculum and why?
7. What changes could be made to improve integration in the curriculum? What are the barriers to these changes, and what supports are needed?

Questions for course coordinators:

1. Describe your role in the design of the current B.Sc.(Pharm.) curriculum, and since then in delivering the curriculum.
2. To what extent were you aware of and in agreement with the curriculum that was designed? How and why?
3. What principles or models of curriculum design do you use in developing the learning and assessment activities in your course and how are you using them and why?
4. How has your course changed over time?
5. Describe what you think the term “curriculum integration” means.

6. In what ways do you see your course contributing to integration in the curriculum? In your view how important is curricular integration and why? How does curricular integration contribute to students' learning?
7. In your view, what successes and failures have occurred over time in implementing the curriculum and why?
8. What changes could be made to improve integration in the curriculum? What are the barriers to these changes, and what supports are needed?

Questions for students:

1. Describe what you think the term "curriculum integration" means.
2. In what ways do you see your pharmacy courses being integrated with/connected to each other (or not)?
3. In what ways do these connections affect and how important are these connections to your learning? Where would someone see this in your school work?
4. In what ways do you think these connections could be strengthened?
5. How would strengthening these connections affect your learning?
6. What barriers do you see to such changes and what supports would be helpful to making them?

Questions for external stakeholders (i.e., pharmacy practitioners):

1. Describe your role in the design of the current B.Sc.(Pharm.) curriculum, and since then in delivering the curriculum.

2. How aware are you of the current curriculum (content, structure, teaching & assessments, expected outcomes)? Do you think it would be helpful for preceptors to be more aware of the curriculum? To what extent were you aware of and in agreement with the curriculum that was designed? How and why? How big a change was it for you to implement the current curriculum?
3. Describe what you think the term “curriculum integration” means.
4. In your view how important is curricular integration and why? In what ways do you see experiential learning contributing to integration in the curriculum? How does curricular integration contribute to students’ learning? Have you seen evidence of integrated learning on students’ part? Any change in their abilities coming into their clerkships?
5. In your view, what successes and failures have occurred over time in implementing the curriculum and why?
6. What changes could be made to improve integration in the curriculum? What are the barriers to these changes, and what supports are needed?

Outcomes Template

Course/Module Name	**Year**	**Description/List of Topics**
Foundations of Pharmacy Practice: Pharmacist, Patient, Society	**1**	Canadian health care system, pharmacist's role in society, drug schedules, legal requirements of drug distribution, pharmaceutical care, interpersonal communication, drug information retrieval, evidence-based decision making, and patient counseling**.**
	Term	**Rationale for Course/Module in the Curriculum**
	1	Foundations of Pharmacy Practice introduces students to the role of the pharmacist (past, present, and future) in the Canadian Health Care System. It informs them of current trends and challenges in pharmacy practice and begins to develop the technical, problem-solving, and communication skills (written and verbal) required of a pharmacist.

Learning Outcomes (Knowledge, Skills, and/or Attitudes)

1. Describe the organization of the Canadian Health Care System and identify national/international trends impacting it.
2. Describe historical changes in the pharmacist's role in society.
3. Differentiate between the different types of pharmacy practice environments and pharmacy careers.
4. Describe and apply legal requirements for: dispensing a prescription, the drug distribution process, patient counseling, and patient record keeping.
5. Identify appropriate steps to prevent medication errors and how to handle errors when they do occur.
6. List the steps involved in the pharmaceutical care process and apply the concepts involved in the patient's work-up of drug therapy.
7. Access, retrieve, critically evaluate and disseminate drug and health information as appropriate to the public, other health professionals, and your peers.
8. Describe and apply necessary communication skills in patient care and scientific oral presentations.
9. Apply technical writing skills in written assignments and research papers.
10. Identify therapeutic class, side effects, contraindications, and usual dosage range of 50 of the most commonly prescribed medications in Canada.

Top 4 General or Specific Ability Outcomes	**Instructional Activities to Achieve Outcome**	**Assessment Activities for Outcome**
Manage drug distribution	Lectures, case studies, group discussions,	Written exam
Information Access and Evaluation Skills	Lectures, group discussions, oral presentations, written papers, case studies, debate, literature access tutorial at the library, interview with an expert	Written exam Written research paper Oral presentation (peer & instructor eval.)
Communication skills	Lectures, group discussions, role playing with standardized patients, case studies, video analysis	Written exam Peer feedback
Meet practice, professional, and social responsibilities	Lectures, case studies, group discussions	Written exam

Appendix D

Composition of the Divisions by Academic Rank, Gender, and Pharmacy Training

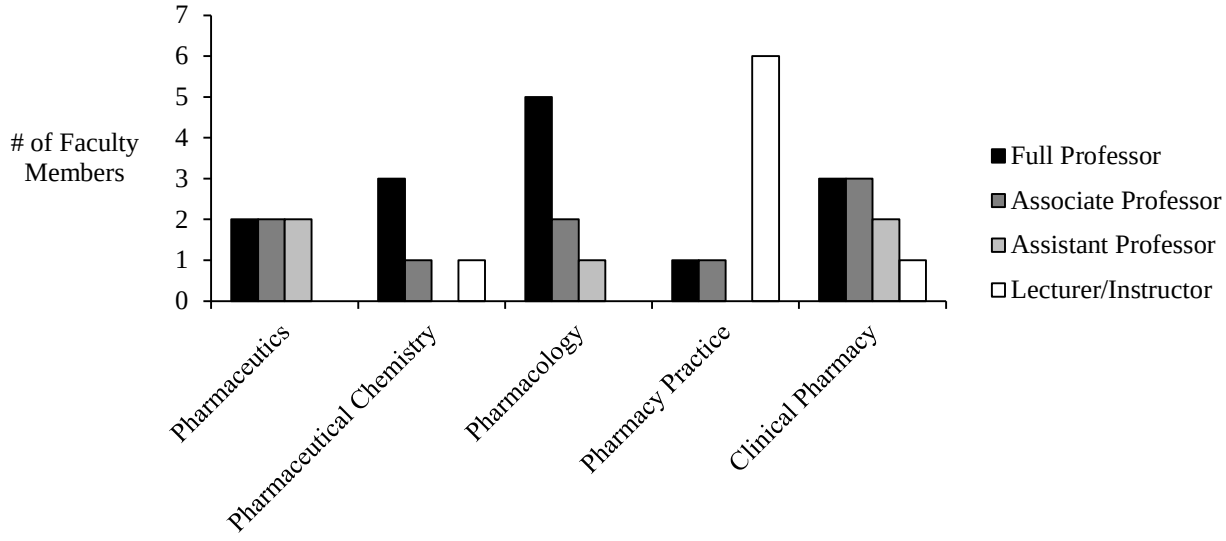

Figure D1. Makeup of disciplinary Divisions by academic rank.

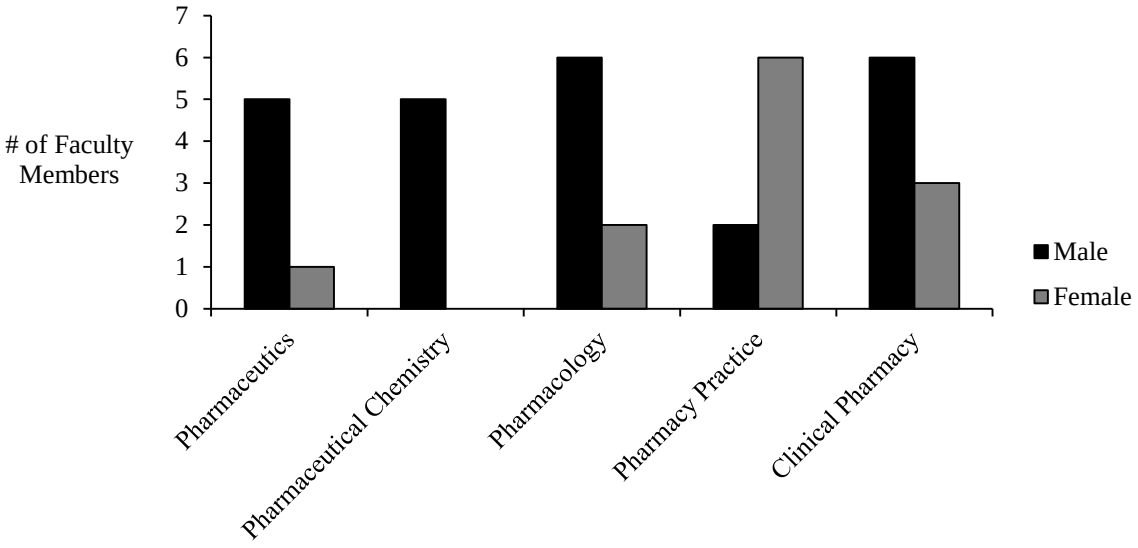

Figure D2. Makeup of disciplinary Divisions by gender.

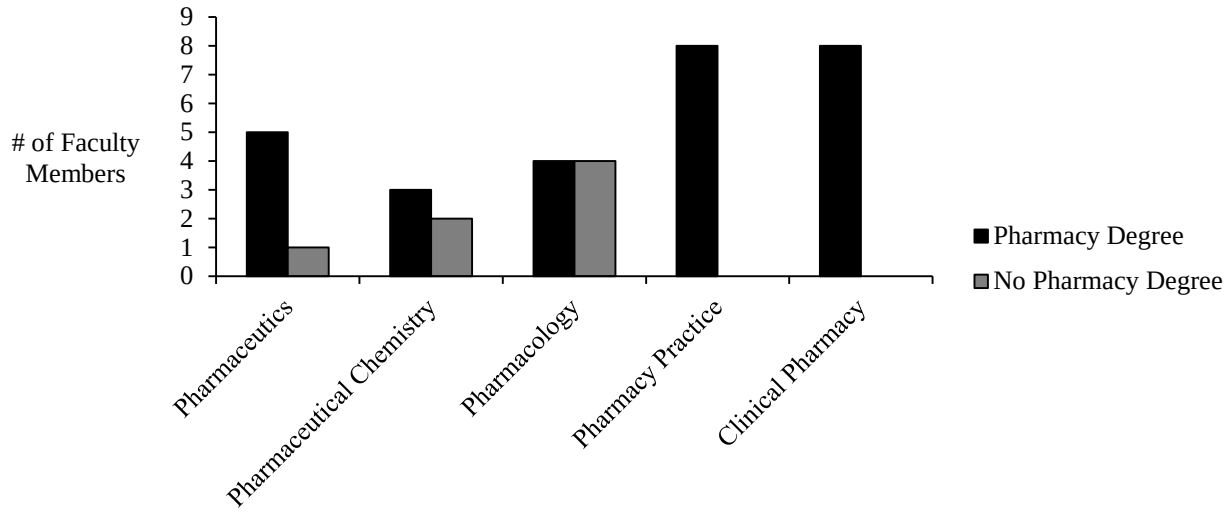

Figure D3. Makeup of disciplinary Divisions by pharmacy training.

Appendix E

Instructors' Integrative Comments from Classroom Observations in Term 2 of Year 2

Participant and # of hrs		Instructor's Comment	Integration Type
F02, 4 h		I know you've had this in your lab course. x 7	Horizontal; sure
		What drugs do you know from lab or from working in a pharmacy?	Horizontal and/or vertical-practice; unsure
		Think back to… (a previous lecture). x 2	Vertical-spiral; sure
		Did Instructor X (in another course) tell you why…?	Horizontal; unsure
		I've looked through (material from another course).	Horizontal; sure
		In (another course) did you…? x 4	Horizontal; unsure
		Did you talk about this in…(the previous course)?	Vertical-spiral; unsure
		Do you remember this from...(the previous course)?	Vertical-spiral; sure
		As a pharmacist, how do you deal with this?	Vertical-practice; sure
		You had (the patient in this scenario) in a CAPS case.	Horizontal; sure
		This is sort of like (a product) you saw…(earlier).	Vertical-spiral; sure
		The next lecture is on…(this topic). x 3	Vertical-spiral; sure
		So I know you've had physiology and anatomy classes (on this topic) but we're going to go over it specifically in relation to drugs.	Horizontal; sure
F05, 1 h		Remember (a prior case)? What did you recommend?	Vertical-spiral; sure
F06, 2 h		We discussed this before…(in previous lectures). x 3	Vertical-spiral; sure
	*	I know you've had Instructor X's lecture on… x 4	Horizontal; sure
	*	Have you had your microbiology lectures on this?	Horizontal; unsure

Note. Shaded areas denote instructors in the pharmacology/therapeutics/self-medication cluster. Comments in the shaded areas marked with an asterisk (*) refer to courses outside the cluster.

Participant and # of hrs		Instructor's Comment	Integration Type
F06, 2 h (continued)		I noticed in (this product section) of the pharmacy…	Vertical-practice; sure
		This is not seen in practice. x 3	Vertical-practice; sure
		This is common in practice. x 3	Vertical-practice; sure
		If you recall from biochemistry… x 2	Horizontal; sure
F08, 2 h		You should have learned or will learn about (a topic).	Horizontal; unsure
		Where is this kept in the pharmacy?	Vertical-practice; sure
	*	Reminder that I'll also see you in your (other course), as I'll be doing this with (Instructor X). x 2	Horizontal; sure
		What I want to remind you of is (a topic) from way back in…(a previous course).	Vertical-spiral; sure
	*	I know you've been working on it with Instructor X.	Horizontal; sure
	*	I know you learned from first year lab…	Horizontal; sure
		How many of you work in pharmacies where you… (do this)? x 2	Vertical-practice; unsure
		Do you recall this (from a previous lecture)?	Vertical-spiral; sure
		You might have talked about this in (another course).	Horizontal; unsure
F10, 6 h		We've talked about this before. x 6	Vertical-spiral; sure
		This drug is not used much anymore. x 2	Vertical-practice; sure
		Instructor X (in another course) has probably... x 4	Horizontal; unsure
		I'm sure you've seen (this diagram) other places.	Horizontal; unsure
		This drug is used a lot for… x 2	Vertical-practice; sure

Note. Shaded areas denote instructors in the pharmacology/therapeutics/self-medication cluster. Comments in the shaded areas marked with an asterisk (*) refer to courses outside the cluster.

Participant and # of hrs	Instructor's Comment	Integration Type
F10, 6 h (continued)	How many of you have heard of (this concept) in biochemistry or chemistry?	Horizontal; uncertain
	Instructor X will be applying (these concepts) later.	Vertical-spiral; sure
	Why would you (do this) in pharmacy practice?	Vertical-practice; sure
	Next class, we'll be looking at… x 2	Vertical-spiral; sure
F12, 1 h	In practice, we…(do it this way). x 4	Vertical-practice; sure
F27, 2 h	None	
F29, 2 h	So what did we learn from the previous lecture?	Vertical-spiral; sure
	In the next lecture, we will… x 3	Vertical-spiral; sure
F31, 2 h	Just like (another topic) we've talked about… x 3	Vertical-spiral; sure
	Next week I have a guest lecturer coming in to talk about (a topic), who might mention...	Vertical-spiral; uncertain
	Does this look familiar? What's special about (this)?	Vertical-spiral; sure
F36, 1 h	I hope you get to do this on your rotations.	Vertical-practice; uncertain
	Remember how to do (this procedure) from last year?	Vertical-spiral; sure
F37, 1 h	I believe in your (other course) you've already…	Horizontal; uncertain
	In practice, we commonly see... x 5	Vertical-practice; sure
F38, 6 h	So what do you know about the pathophysiology of (this condition)?	Horizontal; could be sure or uncertain

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