Curriculum Development and Design

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A historical overview of the physiotherapy and occupational therapy programs at McMaster University will assist in providing a context for the discussions within this chapter. During the late 1960s and early 1970s, programs in both physiotherapy and occupational therapy were established at Mohawk College in Hamilton, Ontario. These programs arose from the thinking of a group of pioneers who believed that the educational approach that had been developed by medical education innovators at McMaster University was also most relevant for the preparation of occupational therapists and physiotherapists. Consequently, a group of educators from both institutions, Mohawk College and McMaster University, combined their skills and created a vision that became the diploma programs in occupational therapy and physiotherapy. This approach was problem-based learning, and was used as the foundation for both programs from their inception to the present day, across three different iterations of curriculum. One of the key innovations to the way in which the college programs were taught was the combination of using faculty from both the university and college to teach all courses. In the 1980s, a degree completion program was launched that provided graduates of the diploma program a chance to upgrade their qualification to a bachelors degree from McMaster University. This was particularly important since the minimum credential for entry to practice had been raised to the baccalaureate level by the professional associations. In 1989, the program moved completely into the university setting and the graduates were granted a BHSc(PT) or BHSc(OT), a bachelor degree in health sciences. Ten years later, in 2000, candidates were admitted to the entry-level masters programs in occupational therapy and physiotherapy.

The Pedagogical Framework: Problem-based Learning

As briefly referred to above, the occupational therapy and physiotherapy programs at McMaster University have a strong history with and legacy of problem-based learning. While the initial curriculum models were strongly influenced by the inaugural undergraduate medical curriculum, time and confidence presented opportunities to create our own models. These models reflect the special nuances of each discipline.

Problem-based learning is recognized as having begun at McMaster University, in the medical curriculum, and was in response to critical concerns about the nature of more traditional learning models in medical curricula. The intention was to create an approach to teaching and learning that was learner-centered, yet based upon clear objectives and evaluation criteria. The key difference was the expectation that learners would be facilitated and guided rather than taught (Barrows and Tamblyn 1980; Neufeld 1983; Saarinen and Salvatori 1994). Both the occupational therapy and physiotherapy programs at McMaster University have embraced these ideas, although with differing degrees of connection and commitment to the original model. In fact, true problem-based learning models should naturally emerge from each individual context and culture. There is no "right" way although there is a growing recognition of a common set of principles and elements that can be applied to determine the "problem-based-ness" of a learning environment (Maudesley 1994; Walton and Matthews 1989). Problem-based learning principles tend to become grouped in two distinct categories: first, the values upon which problem-based learning is based and second, some characteristics that are held in common understanding as being critical to the core of problem-based learning. Underlying values include: partnership, honesty and openness, mutual respect, and trust. Core characteristics incorporate:

■ Learning which is student/learner-centered

■ Faculty roles that are those of facilitator and guide

■ Learning scenarios which form the basis, focus, and stimulus for learning

■ New information and understanding that is acquired through self-directed learning (Baptiste 2003 p. 17)

Consequently, there is a continuum of problem-based curricula from pure through hybrid models. The masters entry-level physiotherapy and occupational therapy programs at the School of Rehabilitation Science at McMaster University continue to be based upon problem-based principles. Although both programs are very different one from the other, there are also many common elements and approaches that are celebrated. Examples of these similarities are cited throughout this book, particularly in the chapters focusing on evidence-based practice and ethics education.

Approaching the Task of Curriculum Renewal

Perhaps one of the most overwhelming, yet exciting, tasks with which to be confronted is the opportunity and challenge of developing a new curriculum. This task is made even more daunting when circumstances provide a chance to do something different based on external forces and not a need to change because "something is broken". Over the past few years, and in several years to come, many educational programs in rehabilitation science are facing this situation. The changing nature of the entry-level credential for occupational therapists and physiotherapists demands that faculty undertake a detailed review of curricula, to determine the optimal approach to moving toward graduate-level preparation, or, at the very least, complete a review of existing curricula models to identify their responsiveness and congruence with emerging practice expectations and demands.

Approaches to such a massive task can vary from ensuring the preservation of what is good from the existing curriculum to making a total shift and adopting a radically

Table 2.1. Principles for curricular change and innovation

Rationale should be articulated explicitly
Overall goals should be reiterated constantly throughout the process
Continuing communication is essential, coupled with a clear rationale
Ensure that the intended change is in response to a defined and recognized need or purpose
Ensure that the innovation is seen as a high institutional priority
Focus on pedagogy and not on resources for implementation
Foster strong leadership support
Identify incentives for faculty participation
Gain faculty buy-in for the curricular blueprint
Involve the active teaching faculty throughout the process
Anticipate potential barriers to change and develop strategies to address them
Recognize the potential need for and value of negotiation

Adapted from Guze (1995)

new approach and design. To have an optimal effect, options to be considered should bear relevance to the pervading culture of the institution and environment within which the curriculum is to thrive. Also, decisions must be made concerning the pedagogical choices of how learner-centered the curriculum should be, and what particular educational modalities are the best for the circumstances.

This chapter will address the entire picture of curriculum development and design, from the first conversations about how to engage in the renewal process through making decisions about methods of teaching, approaches to learner assessment, and preparation of entry-level practitioners for the emerging practice contexts.

Guze (1995) provided a clear and succinct discussion of several core principles that can guide curricular change and innovation (Table 2.1). The following is an overview of these principles.

Where to Begin?

Motivation for curriculum renewal can come from both internal and external forces. External expectations from regulatory and professional bodies are tending to impose standards for new practitioners that require:

- Preparation at an advanced level of clinical reasoning and judgment

- The ability to assume roles that require autonomy and a strong sense of professional ethics

- Engaging in their professional role from the first day of practice, in a conscious and moral manner that requires reflection and self-awareness

Regardless of whether the motivation for curricular change stems from a desire to do something differently or better, or from outside influences, the task is one that requires careful planning. However, it is imperative that any planning process recognizes the need to dream and envision what could be, to create a model that will exemplify those visions, and to produce a graduate who is well prepared to face the complexities and challenges of emerging practice.

When developing a curriculum, four general questions must be asked:

- What is the purpose of the curriculum?

- What educational experiences can be created to fulfill this purpose?

- What is the most effective manner in which to organize these educational experiences?

- How can we determine that the purpose has been fulfilled and the goals attained (Wiers et al. 2002)?

Another very critical element of any change is the recognition that the cultural context is a key in managing change successfully. Hafferty (1998), when reflecting upon the realities of a medical school curriculum, discusses the existence of informal and hidden curricula as well as the formal curriculum. He posits that, in order to induce a lasting change, the entire organizational culture needs to be engaged to facilitate students and faculty alike in embracing and working with change. When facing the task of curricular reform, redesign has to occur not only in terms of content, but also in relation to the

educational processes that enable the learning to take place. This is the difference between reforming the syllabus and reforming the curriculum; the overall learning environment of the educational program and institution is changed (Burton and McDonald 2001).

Once the decision has been made to reform the curriculum, a first step is to complete an environmental scan and situational analysis that explore the educational and organizational environment within the institution, to determine what will facilitate the proposed changes. By defining a clear and newly articulated set of priorities and guidelines, changes that are being made within the curriculum will be given the vehicle through which impact can be made upon the surrounding environment (Genn 2001). This strategy is part of the first overall phase, *the planning phase*. This is when the need for change is established and the vision for change is designed. It is during this phase of development that the non-negotiable elements of structure and process are determined. For example, within the School of Rehabilitation Science at McMaster University, both the Physiotherapy and Occupational Therapy Programs were already designed as two-year, twenty-four-month, curricula. Also, the province of Ontario mandates that all masters programs are two years in duration. Therefore, the decision was readily made, based on these graduate program regulations and history, that the new masters entry-level curricula would be twenty-four months long. One key commitment was clear and that was to the foundational philosophy of problem-based, self-directed learning utilizing the application of these principles to small group, large group, and skills-based learning experiences.

Wiers et al. (2002) provide a clear and helpful outline of ten general steps of curriculum design within a problem-based learning context (see Table 2.2). While this rubric is structured around the specific processes inherent within problem-based learning development, most of the guidelines can apply broadly across any curricular development process within any pedagogical framework.

From the onset, all faculty members at McMaster University were on board regarding the need to undertake the development of entry-level masters curricula in both occupational therapy and physiotherapy. Both disciplines had undergone dramatic changes in the preceding two decades, largely focused upon the growth of foundational science and evidence for practice. Professional practice models had emerged for both professions and provided a strong backdrop against which to create fresh ap-

Table 2.2. Ten general steps in curriculum design for a problem-based learning (PBL) environment

1. Give rationale for the curriculum and form a planning group
2. Generate general educational objectives for the curriculum
3. Assess the educational needs of future students
4. Apply general principles of PBL to the curriculum
5. Structure the curriculum and generate a curriculum blueprint
6. Elaborate the unit blueprints
7. Construct the study units
8. Decide on student assessment methods
9. Consider the educational organization and curriculum management model
10. Evaluate the curriculum and revise as appropriate

Adapted from Wiers et al. (2002)

proaches to the preparation of graduates for entering practice. While both the occupational therapy and physiotherapy programs undertook curriculum renewal at the same time, the physiotherapy program had engaged in an ongoing process of change across the preceding five years. Many of the issues, concerns, and changes addressed and implemented by the occupational therapy program had already been addressed by physiotherapy. Therefore, this chapter will focus predominantly upon the initiatives inherent within the curricular shift within occupational therapy, although reference will be made to processes within physiotherapy as appropriate.

Designing Our New Programs

Deciding upon the overarching constructs that would determine the final curriculum model was a complex and dramatic process in many ways, and one in which everyone was eager to participate and have a chance to have input.

At the onset of the development of the occupational therapy program, three faculty retreats were held that progressed from a totally unstructured brainstorm of what would be perfect, to a detailed accounting of core curricular elements in the context of a delivery structure. In the initial retreat, all full-time faculty members together with some part-time members participated in a "blue-skying" day-long session during which everyone spoke of their dreams for the perfect curriculum. What if we could do what we wanted? What if we did not have to be concerned with logistics like room bookings? – and so on. This exercise provided us with a high-level appreciation of the values and elements that were important to us as a collective. It was from this beginning "fantasy" that the next level of planning emerged. The second retreat was more structured and focused upon the creation of a continuum for learning that resulted in the overarching framework for the curriculum, together with the delivery methods. A process was followed whereby we decided upon a central construct around which the whole curriculum would evolve, namely, "occupation". To support this core notion, there were several longitudinal conceptual threads that represented continua of thought such as: wellness to illness, simplicity to complexity, local to global, and unifaceted to multifaceted. Through this process, we were able to identify the starting place for the first study term, and to create a high-level framework for the progression of the total curriculum (see Table 2.3)

In physiotherapy, the process began similarly with a faculty retreat; however, the focus varied slightly. Initial discussions identified elements of the curriculum that we

Table 2.3. Occupational therapy curricular framework

Term	Content theme
1	Wellness, health, and occupation
2	Person, environment, and occupation
3	Development, disability, and occupation
4	Youth and the development of self
5	Adulthood and disability
6	Complexities of contemporary practice

valued and wanted to maintain and those needing less emphasis. Through ongoing curricular evaluation and feedback, we identified new areas that needed to be included in the emerging curriculum and other areas that needed to be enhanced. These areas were discussed within the context of the changing practice of physiotherapy and the knowledge and skills required by the physiotherapist in the new millennium. The decision was made to use a curricular framework that incorporated a modified "body systems" design, as current physiotherapy practice and clinical specialties were aligned with this model. Inclusion of a Community Practice/Community Health unit allowed for a focus on emergent health care roles in the community and on integrating health promotion and disease prevention into practice. The faculty recognized that while many physiotherapists identified their practice in an area related to the body systems, increasingly clinicians were faced with more complex patients with multiple system involvement. Hence, the final unit of study focused on integrated practice dealing with clients with complex multisystem health care problems.

Following the initial planning process, it is now time to initiate the plan. It is during this time period that the "unfreezing" of old organizational patterns and the introduction of innovations into the educational environment take place (Burton and McDonald 2001). Often, while there is a strong commitment to engaging in the conversations that lead to the design of a changed reality, it is a very different matter to start "doing" and actually making that changed reality come to life. A cooperative internal environment is essential for the realization of that initial dream and therefore it is well worthwhile for planners to engage in a transparent and collaborative experience that enables maximum participation and open debate. A process of this nature is characterized by collaborative problem solving, effective communication, abilities in conflict resolution, and a cultural expectation of working together in harmony that guides the overall enterprise (Burton and McDonald 2001). Therefore, it is of importance to determine at the onset the values and behaviors by which the development experience will be approached to set up structures and processes that will ensure that the best attempts at making it so will be expended.

During the initiation period, we experienced intense interest and levels of emotion from all participants regarding the manner in which the planning and the visions for the two disciplines would be evolved and realized. As mentioned previously, we had determined that the existing problem-based learning principles would remain but that the key changes would be realized through the manner in which the content was introduced to the students and through which the continuum of learning would evolve. Similarly, we were committed to maintaining a student-centered approach. One core difference was to be the manner in which the experiential component of professional preparation would be integrated more centrally into both curricula. Previously, the curricula were designed in a more traditional fashion whereby the clinical fieldwork experiences were placed at the end of each study term and were linked directly to the area of academic focus for the preceding learning block. By definition, once the overarching concepts of the curricula were determined to be different from the previous models, then fieldwork placements would become less strictly aligned. This was reinforced more heavily in the occupational therapy program which was originally designed around developmental stages and central practice populations. Students would face a more eclectic approach in their clinical learning; therefore, both programs determined that learning around professional issues and practice expectations should be interwoven through the longitudinal axis of the curriculum.

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Redevelopment Within a Problem-based Learning Culture

As with any problem-based learning system, the small group learning unit is the nucleus of the whole curriculum. However, the success of problem-based, small group learning is supported by the strategic use of large group interactions for the imparting of theoretical and expert knowledge, while still maintaining a problem-based learning philosophy. Similarly, the application of problem-based learning principles is a critical piece of one-on-one learning and synthesis of knowledge and information throughout the academic and clinical components of the curriculum overall. Both the physiotherapy and occupational therapy programs elected to continue to utilize problem-based learning methods in a manner that celebrated the development already achieved over twenty-five years of curriculum development. This has evolved over time very differently in each program. For example, during the planning process for the occupational therapy curriculum, efforts were made to define new models for tutoring and many were identified and put into place. During the second year of the occupational therapy program, the problem-based tutorials occur only once weekly. This allows additional scheduling time for including the evidence-based practice courses and is also in response to the difficulties many practitioners are experiencing in gaining release time from employers to participate as tutors. In this new tutorial model, tutors are required to participate in only one weekly session with two or three tutors' meetings across the term instead of weekly.

Application of problem-based learning principles in large groups has been maintained and, in fact, enhanced particularly in the clinical skills sessions. Students often are placed in small groups (different groups from their core tutorial group) and provided with opportunities to explore assessment tools and intervention methods. Through these group experiences, the students apply a problem-based learning approach to the identification of learning issues, the uncovering of essential information and resources, and the synthesis of their understanding of the tool or technique.

Integration of Experiential Practice Preparation Within a Problem-based Learning Framework

As mentioned earlier, both the physiotherapy and occupational therapy faculty groups were committed to ensuring the integration of academic and experiential learning into the curricula from the beginning, and were focused on developing innovative models for the synthesis of practice preparation into the core academic units. It is important to note that the work related to integration commenced at the very onset of the curriculum planning process. In the case of the occupational therapy program, there had always been sessions held throughout the full curriculum that provided opportunities for the Clinical Placement Coordinator (now Professional Practice Coordinator) to inform, advise, educate, and monitor students in preparing for their practice experiences and in checking in with them following these experiences. However, a greater focus on such integration was placed within the masters entry-level curriculum model in order to ensure that students were being prepared to meet the enhanced expectations of a graduate program.

Evaluation Within a Graduate Problem-based Learning Framework

There should be clear and close linkages between how students learn and how that learning is assessed. Therefore, some information will be presented here relative to the evaluation methods developed at McMaster University in the occupational therapy and physiotherapy programs.

■ **Student Evaluation.** In the preceding years, the two programs at McMaster University had been very involved in designing evaluation/student assessment tools that reflected the principles of problem-based learning and provided students with opportunities to integrate their academic learning with their growing professional awareness and identity. Most of these tools are built around the basic problem-based learning process of exploring a learning scenario that has been developed to address the objectives for the particular learning unit. Essentially, problem-based evaluation needs to be congruent with the underlying values and principles of problem-based learning. Traditional methods of assessing students' knowledge tend to be contradictory to these principles and therefore should not be applied out of context. Problem-based learner assessment should:

- ■ Be congruent with the underlying problem-based learning process illustrated by the development of learning scenarios based on real life practice situations

- ■ Mirror the problem-based learning process of reflecting on a practice scenario, defining learning issues, researching, synthesizing, and synopsizing the learning with application to the defined case

- ■ Involve personal reflection and enhanced awareness of individual critical thinking and clinical reasoning skills

■ **Faculty Evaluation.** As with student assessment, the evaluation of faculty is central to the maintenance and enhancement of a problem-based learning culture. And, similarly, faculty evaluation is built into the roles played in any given learning context. In the case of the small group tutor role, faculty members are evaluated by each student and provide a self-evaluation to students during the course of the group process. Following the completion of the small group experience, students evaluate the faculty member as well as the overall course, and these ratings are provided to faculty and placed in their file for attention at times when promotion, tenure, and merit increase decisions are made. For those faculty members, practitioners, and others who facilitate large group sessions in both theory and practical skills, similar evaluations are completed. This process has been in place over many years and has not changed since the advent of the new curricula. However, the items being evaluated have altered to reflect the expected level and scope of graduate teaching.

■ **Student Self-assessment: Development of the OTPPI.** Students admitted into the occupational therapy program are not expected to have any prerequisite courses completed during their undergraduate education. This has been the case from the very beginning. In the program itself, there are no formal courses that provide students with basic knowledge related to the foundational sciences that underlie occupational therapy practice such as anatomy, physics, biochemistry, sociology, psychology, and anthropology. It has been the long-held belief that in a pure problem-based learning

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environment, the learning is accomplished through the horizontal meshing of various areas of knowledge and information; that through the integration of these sciences and bodies of knowledge, students can gain the understanding they require by using real life situations as springboards for integration and synthesis of all inputs. Consequently, recent efforts were expended to develop the Occupational Therapy Personal Progress Inventory (OTPPI), a tool that was developed from the experience of the undergraduate medical program over the past few years (Blake et al. 1996; Cunnington 2001). The OTPPI focuses on foundational knowledge that our students need in order to become practicing occupational therapists. It is not a test of the application of that knowledge in practice. The examination consists of 90 multiple-choice questions developed with the expectation that a "star" student would be able to answer by the time of graduation. There are three main domains included in each examination: biology (this includes anatomy, physiology, etc.), social sciences (this includes psychology, sociology, anthropology, etc.), and research (this includes statistics, research methods, ethics, etc.). The breakdown of each examination is 40 percent biology, 40 percent social science, and 20 percent research. The examination is generated each term and students in both years have the same examination, with the expectation that the students in second year will achieve a higher result than those in the first year. Students receive a detailed report with their scores and a profile of how they have progressed over time. They are provided with information about their total score as well as a breakdown on each of the three domains. They also receive a zone score, which is an indication of how well they have performed on the test in comparison to the other members of the class. Students in the yellow or red zones may want to review their scores in more detail and make learning plans to address gaps that may have been identified through the examination. This tool is designed as a self-assessment measure, the individual results of which are known only to each student. We have made a conscious choice that results are not used in the summative evaluation of the students, and are intended to provide the learners with a sense of how they are progressing in accumulating knowledge relative to the basic sciences of their discipline. The students are expected to use that information to set plans in place to address weaknesses (e.g., through problem-based tutorials, individual assignments, etc.). The OTPPI has been a pencil and paper test so far, but steps are being taken to convert it to a web-based format. While the occupational therapy program has undertaken this initiative on a pilot basis, initial responses would indicate that students are finding the process helpful to them, although this is very new at the time of publication.

■ **Integration of Evidence-based Practice Skills into the Curricula.** The integration of skills related to practicing in an evidence-based manner is seen to be critical to both programs. A detailed description of the models adopted by the occupational therapy and physiotherapy programs is found in Chapter 5. In both programs, there is a strong commitment to evidence-based practice as a central construct for the curriculum and a natural partner for client-centered and problem-based principles.

Conclusion

Since their inception, the masters entry-level programs in occupational therapy and physiotherapy have presented opportunities to revisit our history and legacy in health sciences education. In order to reflect on the overall process, the general steps for curriculum design offered by Wiers et al. (2002) will be revisited (see Table 2.2).

For us, the *rationale for the curriculum* was clear both from an internal and an external perspective, and the notion of *forming a planning group* was a natural approach to the task. Our profound commitment to involving our broad academic community was illustrated through the involvement of a wide range of individuals encompassing full-time, part-time, and sessional faculty members as well as members of the wider practice community. Such involvement was realized throughout the planning process and continues through such individuals' representation on our Education, Curriculum and Admissions committees. The need to define clear *general educational objectives for the curriculum* was also recognized at a very early stage. We found that being able to determine the goals and directions from the outset served to facilitate the planning that followed. *Assessing the educational needs of future students* was assisted by our own knowledge concerning the entry-level competencies demanded by our professional regulatory colleges. Also, the connections we have with our practice communities and past graduates were invaluable in providing a background for determining the shifts necessary within the curriculum to fulfill practice expectations. Similarly, the same thoughtful reasoning was used to consider the differences of teaching and learning between undergraduate and graduate approaches to education.

Applying general principles of problem-based learning to the curriculum was not a concern for us, given our long history of internalizing this philosophy. Specific difficulties arose when converting the undergraduate courses and assessment tools to the needs of a graduate program. Nevertheless, problem-based learning in many ways is a gift for this transition since it resembles closely the natural proclivities of graduate work – smaller groups, self-directedness, learner autonomy, and a degree of freedom to determine learning directions.

Structuring the curriculum and creating a blueprint became different experiences for physiotherapy and occupational therapy. As mentioned previously, while the planning processes looked ostensibly similar, the manner in which the final curricular models were derived was very different (see Tables 2.3 and 2.4). However, after the master models were created, the processes for *elaborating the blueprints* and *constructing study units* were again very similar. Methods of *student assessment* tended to remain grounded in the familiar processes and tools that we had developed across our history with problem-based learning. However, as each curricular element emerged throughout the planning (e.g., evidence-based practice, ethics, clinical skills, fieldwork) so did innovative ways to enhance the student assessment processes that were already strong. Details of these innovations will be discussed in the book chapters relating to these specific areas.

Consideration of the educational organization and curriculum management model required particular attention since our lines of accountability had shifted, with the

Table 2.4. Physiotherapy curricular framework

Unit	Content theme
1	Fundamentals of physiotherapy practice
2	Fundamentals of musculoskeletal practice
3	Fundamentals of cardiorespiratory and neurological practice
4	Advanced neurological practice
5	Community practice
6	Integrated practice and professional transition

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move to the School of Graduate Studies. Two slightly different models of governance emerged, with the Admissions Committee being the only shared group between physiotherapy and occupational therapy. However, both governance models reflect a central group responsible and accountable for curriculum and another group that oversees general program functioning.

Curricular evaluation remains an ongoing responsibility and expectation. Chapter 13 provides a particular model for curriculum evaluation that was used by the occupational therapy program, the Program Logic Model. However, there are many ways in which faculty members can retain a clear image of what makes up a curriculum and what indicators are critical to evaluate for the success of the program overall.

The three years of planning and launching the new curricula at McMaster University were years of extremely hard work, high energy and output. As we see each student cohort graduate, and receive feedback concerning our students and graduates in practice settings, we feel heartened that we appear to be on the right track. We know, however, that curriculum development is an ongoing process. We also know that curriculum design must be fluid and flexible enough to withstand challenges and changes that come from internal and external sources.

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