An Integrative Curriculum Model Preparing Physical Therapists for Vision 2020 Practice

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Background and Purpose. Preparing physical therapist students to enter practice ready to assume high demands for productivity and autonomous practice as called for in Vision 2020 presents a challenge for physical therapist educators today. Although a significant body of education literature exists to guide physical therapist educators in curriculum and course design, few educators actually apply this evidence to their teaching and curricular development with the same rigor used to apply evidence to clinical practice. The primary purpose of this article is to describe a physical therapist curricular model grounded in education literature and research and designed to support efficient and effective learning to prepare physical therapists for practice according to Vision 2020 standards.

Method/Model Description and Evaluation. In this model, courses are structured around physical therapist practice settings. Students take 1 course at a time and content in each course is organized into 4 streams: (1) Medical and Behavioral Science; (2) Practice Environment; (3) Examination, Evaluation, Diagnosis; and (4) Plan of Care, Intervention, Outcomes. Content from the streams is purposefully organized to juxtapose medical and behavioral science, clinical application, and practice issues in each course. An integrated clinical education (ICE) component is included. The model is evaluated based on exit interviews of the graduates, results on the National Physical Therapy Exam (NPTE), and graduate, alumni, and employer surveys.

Outcomes. Students reported that the curricular design and emphasis on context and relevance enhanced their ability to think clinically (ie, think like a physical therapist) and to retain and recall information. No appreciable differences have been noted between licensure results with graduates of this curricular model as compared to graduates of our previous model. Survey data of graduates and employers indicate that this curricular model prepared students well for clinical practice.

Discussion and Conclusion. The structure of this model supports a learner, rather than an instructor-centered learning environment. Key structural elements include designing learning activities that reflect Kolb’s learning cycle, particularly reflective observation and concrete experiences; using clinical cases and early clinical education experiences (the ICE component) to help students contextualize learning; and sequencing content in a way that mirrors how physical therapists organize, retrieve, and apply information. Our model is an adaptable platform upon which content is organized to help students begin thinking like physical therapists early in their professional education. The sooner students begin thinking like physical therapists, the more likely they will be able to enter the profession as effective and efficient practitioners, prepared to meet the requirements outlined by Vision 2020.

Key Words: Physical therapy education, Curricular design, Vision 2020.

BACKGROUND AND PURPOSE

The complex and rapidly changing health care environment, workplace productivity pressures, and staffing shortages demand that new graduates of physical therapist programs be prepared to function at a high level upon entering the workforce.1,2 New graduates are expected to rapidly integrate and apply the knowledge and skills they have acquired during their professional education. Physical therapist educators are faced with the challenge of making the learning process efficient and effective for students so they are prepared to use these higher-level performance capabilities to become autonomous practitioners as described in Vision 2020.3

While physical therapist educators have expertise in their clinical content areas and recognize the importance of integrating evidence-based practice (EBP) into their courses, most are novices in pedagogical matters and are less likely to investigate the evidence base of their own practice as educators.4,5 Few physical therapist educators have been exposed to the substantial body of theory and knowledge that exists in education.4 The focus of curricular development for physical therapist programs is mostly on what students learn rather than how students learn, with little time spent seriously considering questions such as what it means to teach or what it means to learn.5

Curricular development that does consider what facilitates student learning (eg, evidence-based teaching) may result in the utilization of a new teaching method within a single course or curricular component, but rarely does a faculty undertake the daunting task of considering how an entire curriculum can reflect best educational practices. Systems, lifespan, or (less commonly) problem-based curricular approaches to physical therapist education have evolved as the profession has evolved.6 In 2007, the majority (61%) of physical therapist education programs reported using a hybrid curricular model, which combines components of the Guide to Physical Therapist Practice, or traditional, systems-based, case-based, or lifespan-based models.7,8 It is unclear, however, whether hybrid curricular models use a structure in which courses are largely autonomous and whether there is intentional integration of content from course to course. Nor is it clear whether hybrid models examine the impact of curricular structure on how students learn. The purpose of this article is to describe the development and implementation of a physical therapist education program’s unique curricular model which is grounded in education theory and
research and designed to maximize the efficiency and effectiveness of student learning by influencing not only what students learn, but how they learn. Preliminary educational outcomes related to the implementation of the model will also be described.

**Foundational Paradigm**

A seminal influence in the development of this curricular model was the work of Barr and Tagg, who advocate for a shift in higher education from an instructional paradigm to a learning paradigm. As noted by Fear et al,10(p152) Barr and Tagg's vision is based on “longstanding, deep and diverse literature about learner-and learning-centered education.” Barr and Tagg encourage faculty not to be primarily lecturers, but rather designers of the learning environment—to study and apply best methods for student learning (eg, evidence-based teaching practice). Table 1 highlights several differences between the instructional and learning paradigms described by Barr and Tagg, which influenced our curricular design and subsequent choice of learning experiences. For example, one tenant of this curriculum is to spend less time on the transfer of knowledge already digested and pre-packaged by the instructor and given to the student, and more time on activities where students are allowed to construct their own knowledge and discover the meaning of what they are learning.

**Supporting Literature**

This curricular model was built on key themes from education theory and research. Selected themes are discussed below and shown in Figure 1.

**Relevance and context.** One of the themes in the literature is the importance of relevance and context to student learning. Cognitive scientists call this knowledge conditionalized, or specific to the context in which it is useful.11 When knowledge is not conditionalized, it is often “inert,” or not activated, in spite of being relevant.12 The literature supports that information learned in the context of how it will be used promotes conceptual knowledge, critical thinking, expert reasoning, and problem solving.1315 Context broadens a learner’s knowledge base and helps learners organize information in ways that support their abilities to remember.1517 Relevant knowledge helps people go beyond the information given and think at higher levels of abstraction, engage in the mental work of making inferences, and discern what is relevant and meaningful given the context of a situation.1618 In her review of the literature on knowledge integration, Rauk19 notes that learners integrate best if given a contextual base for the information, such as when and how the content will be used.

Research on physical therapist students’ approach to learning found that students who could not see the relevance of what they were learning admitted tuned out, de-valued, and de-prioritized the course, spent less time on it, and typically utilized surface learning strategies (such as rote memorization) to do what was necessary to pass the course.19 Learning experiences that helped students see the relevance of what they were learning facilitated deep approach processes by helping students make connections between theory and practice and understand the “why” behind what they were learning. This, in turn, promoted retention of learning. Results of studies of expertise in physical therapist practice also support that there “is a need for education for practice to be rooted in practice.”20(p266)

**Intellectual skills.** Another key theme in the education literature is the need to facilitate intellectual skill development. Gregory,21 a professor in the liberal arts, argues that teachers should confront the fact that students will forget most of the content they are taught. He argues for an alternative teaching model that uses course content to stimulate developmental human skills—such things as critical thinking, rationality, language, imagination, introspection, and moral and ethical deliberation—a liberal education that can never go out of date and can never be forgotten because its effects become absorbed as developmentally advanced orientations of life, not crammed into short-term memory for the sake of passing tests.20(p95) In short, he argues that students get educated because they learn how to learn.

Jensen et al20 provide similar curricular recommendations based upon their work in expertise in physical therapist practice. They advocate curricula should focus on several areas to promote the knowledge and skills found in experts of physical therapy that have been studied.2223 Such skills include the ability to formulate good questions and to critically evaluate information, judge its usefulness, and embed it in practice. Knowledge of teaching and learning, analysis and reflection on clinical decisions, and the development of morals/virtues and self-knowledge were also important curricular recommendations.

**Active learning.** Numerous education theorists and researchers have written about the importance of experiential or active learning where students take control of their own learning. Over 60 years ago, Dewey24 advocated that students be involved in real-life tasks and challenges. He argued student learning should be organized in a way that takes into account students’ past experiences, and then provides them with experiences which will help to open up, rather than shut down, their access to future growth experiences. Kolb,25 building on the work of Dewey and others, formalized this learning organization into his well-known learning cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation. Kolb argues that for optimal learning to occur, all of the components of the cycle need to be present, with active learning an important part of the cycle. Zull26 combines neuroscience findings with Kolb’s learning cycle theory. He describes how different parts of the brain are activated during the different parts of this learning cycle, further detailing the importance of all phases of this learning cycle. Instructional methodologies used in physical therapist education programs have been categorized according to Kolb’s model by Sellheim,3 who found that physical therapist curricula provide numerous opportunities for abstract conceptualization and active experimentation, but that concrete experi-

<table>
<thead>
<tr>
<th>Instructional Paradigm</th>
<th>Learning Paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer knowledge from teacher to student</td>
<td>Elicit student discovery/construction of knowledge</td>
</tr>
<tr>
<td>Improve quality of instruction</td>
<td>Improve quality of learning</td>
</tr>
<tr>
<td>Offer course/program</td>
<td>Create powerful learning environment</td>
</tr>
<tr>
<td>One teacher, one classroom</td>
<td>Whatever learning experience works</td>
</tr>
<tr>
<td>Covering material</td>
<td>Specified learning results</td>
</tr>
</tbody>
</table>

Table 1. Comparison of Educational Paradigms2(p16)
ence and particularly reflective observation were underutilized.

Shulman describes activity as one of the principles of professional learning, one that promotes authentic and enduring learning. The literature supports that people who take the initiative in learning (proactive learners) learn more things, are more involved with their studies, and retain and make use of what they learn more effectively and persistently than people who sit at the feet of teachers passively waiting to be taught (reactive learners). Zull notes that activity is needed to link abstract mental notions with new concrete experience. It is only through exploring, through action, that students encounter new information. He argues that anytime a learner tests out his or her ideas, he or she does it through action, and that action generates learning.

One well-researched active learning method is the use of case studies. Shulman writes that case studies serve as conduits between theory and practice. When a student is wrestling with a case analysis, the student becomes an active agent in his or her own understanding. Case studies and other narrative strategies provide students with opportunities to practice interpreting, questioning, and thinking in the context of physical therapist practice, what Schön labels “thinking in practice.” Case study methods also emphasize the primacy of group discussion, deliberation, debate, and what Ironside calls “multi-perspectival thinking,” that is, thinking from multiple perspectives. In case-based learning, the cycle of experience, reflection, problem solving, and activity are utilized.

**Approach to learning.** The design of this curricular model was also influenced by the education literature on students’ approaches to learning. A number of studies have revealed that different students adopt different styles of learning and have different approaches to the learning process. These studies, showing a remarkable amount of agreement, have differentiated “deep” and “surface” approaches to learning. Surface-learning approaches are characterized by the use of rote learning (ie, memorization) out of context, resulting in poor knowledge retention. Students using surface approaches are motivated by fear of failure or the desire to simply get through the course. Students using deep approaches to learning relate new ideas to previous knowledge and personal experience with the intention to seek meaning and understanding. These students are motivated by interest in the subject, recognition of vocational relevance, or both, and demonstrate increased retention immediately and over time.

Research on physical therapist student learning supports that, in general, students come to physical therapist programs with deep-learning intentions for their coursework. These students want to learn for understanding and meaning. However, research also supports that despite the student’s intentions, teaching methods and curricular structure are powerful elements affecting the student’s approach to learning, development, and transformation.

**Knowledge retrieval.** Finally, knowledge retrieval is a key theme in the education literature. The literature supports that to develop competence in an area, learners must organize knowledge in ways that facilitate retrieval and application. Biggs argues that medical educators need to adopt a constructivist approach in which knowledge can be reorganized into packages within a context (type of practice) rather than equating expertise with the amount of knowledge that can be committed to memory. It has been reported that doctors recognize patterns or outstanding clinical features through which the relevant clinical information in memory is accessed. This pattern recognition requires a specific type of knowledge base which is deep, elaborate, and highly integrated/interspersed to facilitate recall.

**DESCRIPTION AND EVALUATION**

In order to create a learning environment that prepares students to deal with the unique complexities of physical therapist practice, this model abandons the conventional approach to course and curricular design determined by academic discipline, clinical skill sets, practice issues, systems, or lifespan. In a traditional curricular model, basic and clinical science courses would precede courses in clinical application. Education theory suggests that a traditional approach does not mirror the ways in which physical therapists encounter the complexities of clinical reality, nor does it provide the student with an optimal environment to develop the sophisticated clinical reasoning ability required of competent practitioners.

The structural framework of this curricular model is determined by intentional sequencing and positioning of curricular content. In this model, students take 1 course at a time, and most courses are 5-6 weeks long. Courses are organized around practice settings rather than academic disciplines (eg, anatomy, exercise physiology), clinical skill sets (eg, physical agents, patient handling, patient examination), or systems (eg, neuromuscular, integumentary), as illustrated in Figure 2. Within each course, content is purposefully organized to juxtapose medical/behavioral science, clinical application, and practice issues. This juxtaposition would be difficult, if not impossible, to achieve in a conventional curricular structure. This curricular design makes it possible for students to create knowledge relative to a specific clinical context.

Curricular content is organized into 4 streams: (1) Medical and Behavior Science; (2) Practice Environment; (3) Examination, Evaluation, Diagnosis; and (4) Plan of Care, Intervention, Outcomes. Streams are further organized into threads, as detailed in Table 2. Content from all 4 streams is presented and integrated within individual courses throughout the 3 years of the curriculum (Figure 3). The entire faculty collaborates to assure that threads contain all content necessary for new professional (entry-level) practice. Content is presented in an iterative or spiral fashion in which students acquire a basic level of understanding in multiple areas before they are drawn into deeper and more sophisticated ways of thinking as the curriculum progresses. In this way, content is intentionally distributed and progresses from basic to complex to facilitate reflective, active, and deep learning. Although this curricular model is not fundamentally Guide-based or systems-based, organizing features of the 4 streams include the patient/client management model, but not the preferred
practice patterns from the Guide to Physical Therapist Practice\textsuperscript{50} and systems are an organizing element within the Examination, Evaluation, Diagnosis and Plan of Care, Intervention, Outcomes streams.

In determining the sequencing of content throughout the curriculum, consideration was given to what students would need to know prior to each of their 5, full-time clinical education courses in the program in order to maximize students' utilization of clinical education courses (Figure 2). Pragmatic considerations, such as faculty teaching load, clinical education site utilization, and the need to have a workable progression of cadaver dissection also influenced content-sequencing decisions.

Courses are designed and taught by teams of faculty, a process which could be called conceptual teaming, and is an essential component of faculty work in this model. Whether the faculty teaches as a team or individually in the classroom, the sequencing, depth, and integration of course content is planned collaboratively by a faculty team. In addition, examinations are written and graded by faculty teams. Conceptual teaming results in less compartmentalized teaching which allows students to integrate information while they are in the classroom rather than assuming that this integration occurs during clinical education or post-graduation.

An eclectic, learner-centered approach is used in this model to design learning experiences within courses. Lectures, laboratory sessions, small group work, and self-directed study are used throughout the curriculum. Many of the theoretical foundations of this model are consistent with those of problem-based learning (PBL),\textsuperscript{51} but the structure of PBL is not an organizing feature of this model. Although not central to the curricular structure, tutorial learning from PBL is incorporated into most courses, as another learning strategy. In a tutorial, as utilized in this model, 7 students meet with a tutor, who is either core or clinical faculty, and the students work through a written case study in 2 sessions that are several weeks apart. The case is written so that the students encounter and think about a patient just as they would do in the clinic. The tutor facilitates the process in which students identify what they know and what they need to know about the patient in the case. Between sessions of the tutorial, the students research and investigate learning issues that the group has identified; during the second session, students share their findings with each other.

While not exclusively a case-based curriculum, this model employs case studies as organizing and galvanizing tools to support student learning. When beginning a new course, students are typically presented with a case load of patients who present with diagnoses, co-morbidities, and circumstances that embody the course objectives. Students identify what they know and what they need to know in order to manage the complexities of the given caseload. The caseload is also used to frame questions on examinations.

A clinical partnership between the college and 10 clinical facilities provides the basis for the integrated clinical education (ICE) component of the model. Students have half-day clinical education experiences beginning the second week of the curriculum and extending into the second semester of the second year (Figure 2). During ICE, students work in groups of 3 and are supervised by full-time clinicians who are partners with and extensions of the core faculty. These clinicians receive faculty appointments as clinical faculty (CF) and their facilities are paid an hourly fee for the time they spend teaching students during ICE. This financial arrangement allows the CF member to maintain a decreased case load during ICE sessions. Given the on-site guidance and supervision of the clinical faculty, the students have the opportunity to practice components of patient/client management, to begin to apply basic, medical, and behavioral sciences to clinical science, and to deepen their understanding of the breadth and complexities of physical therapist practice and the health care system.

The ICE structure facilitates focused, active learning that is intentionally linked with on-campus learning via multiple mechanisms. For example, clinical faculty receive schedules detailing course content presented week...
by week so that learning during ICE can be planned and structured to preview, review, or coincide with content presented on campus.

Integrated clinical education is structured to complement the full-time clinical education component of the curriculum. During year 1, students rotate through acute care, orthopedic outpatient, subacute and neurologic rehabilitation settings, returning to the same 4 sites and same CF numerous times throughout the year. These experiences prepare students for their first, 8-week, full-time clinical education course, which occurs at the end of year 1. In year 2 ICE, students spend 1 afternoon a month, September through March, in 5 different practice areas: cardiac rehabilitation, intensive care, spinal cord injury, wound care, and amputee care. These practice areas were selected to assure that all students would have at least one half-day in each of these practice areas during the course of the curriculum. At the conclusion of year 2 ICE, students have their second 8-week, full-time clinical education course. ICE does not extend into year 3 because students have three 8-week, full-time clinical courses during the year. Initiating clinical education early in the curriculum and distributing full-time clinical education courses throughout the 3-year program further support students’ ability to give contextual meaning to what they are learning.

Previous Curricular Model
The model described above differs from our previous curricular model in several significant ways. In the previous model, content was organized into courses based on academic disciplines, clinical skill sets, and systems. First-year foundational courses, such as anatomy, kinesiology, and neuroscience preceded second-year systems-based courses in clinical application by 6-9 months, which created challenges to linking foundational learning and clinical application. Students took multiple autonomous courses at the same time and no attempt was made to integrate assessment across courses. Most courses were designed and delivered by a single faculty member. Students had no part-time clinical education prior to their first full-time clinical education course, which occurred at the end of year 1.

Implementation
The new integrative model was implemented at the College of St Catherine which is a private Catholic liberal arts college with 2 campuses and a student population of approximately 5,000 students with associate, undergraduate (women only), and graduate programs. The Doctor of Physical Therapy (DPT) program is 1 of 9 graduate programs and is organized under the dean of Health Professions.

Prior to implementation of this curricular model, several of its components were piloted within courses in our previous curriculum. For example, 1 course was re-designed to integrate content from the neuromuscular, musculoskeletal, and cardiopulmonary systems. In another pilot, faculty collaborated in juxtaposing small segments of content from multiple courses into a case study learning experience which included an integrated examination where students were tested on multiple content areas in the same exam. Tutorial learning was piloted by including 2 tutorials in a semester-long course. We observed that these piloted components improved the learning process for students and these forays into integrative learning gave us confidence to implement these components comprehensively throughout the new curricular model.

Implementation of this curricular model began in 2003 and all courses were executed by the end of the 2005-2006 academic year. It is important to acknowledge that implementation of this curriculum has been facilitated by the supportive administration at the college. The dean of Health Professions, who believes a curriculum not in revision is a critical mass of faculty who were dedicated to shifting from an instructional to a learning paradigm cannot be overemphasized in our model. Several of its components were piloted within courses in our previous curriculum. For example, 1 course was re-designed to integrate content from the neuromuscular, musculoskeletal, and cardiopulmonary systems. In another pilot, faculty collaborated in juxtaposing small segments of content from multiple courses into a case study learning experience which included an integrated examination where students were tested on multiple content areas in the same exam. Tutorial learning was piloted by including 2 tutorials in a semester-long course. We observed that these piloted components improved the learning process for students and these forays into integrative learning gave us confidence to implement these components comprehensively throughout the new curricular model.

OUTCOMES
To date, the program has graduated 2 classes (2006, n = 20; 2007, n = 30) who have completed the new curriculum. Vehicles for examining outcomes of the new and previous curricula include exit interviews of the graduates, results on the National Physical Therapy Exam (NPTE), graduate surveys, and 1-year-out employer and alumni surveys. However, very few items on the surveys and exit interviews of the new and previous curricula are identical, thus limiting direct comparisons of these items.

At this time, only preliminary educational outcomes related to the implementation of the model are available. This paper includes outcome data from the first cohort and the available portions from the second cohort. As additional cohorts graduate from this curriculum, more extensive outcome data will be available for a more complete comparison of the new and previous curricular models.

Exit Interviews
Individual 1-hour exit interviews were completed by 1 of the authors (DS) with the 20 students of the class of 2006 at the completion of the curriculum (Appendix). After obtaining informed consent, the exit interviews were audio-taped for later verbatim transcription. Using a process of content analysis, dominant categories and patterns were identified. The scope of this paper does not allow for the reporting of all aspects of the exit interviews, rather themes related to the structure of the model and contextualization of learning will be reviewed in this paper. Secondary use of this data was categorized as exempt by the College of St Catherine Institutional Review Board.

Curriculum model structure. When asked to describe their experience as a learner in the DPT curriculum over 80% of the students talked about the curricular design. Students described how the design engaged them and enhanced their ability to think clinically (think like a physical therapist):

I thought it [the curriculum] facilitated a lot of good thought process. I feel like it translates well into the clinical setting. Like now, being out in the clinic you’ve already been thinking like that [a clinician] for a few years…. It made you think clinically from day one. It wasn’t so much memorization and trying to learn content, it was how to apply it. Right off the bat.

It is way more engaging to learn about everything and how all these different constructs come together versus one class at a time…. I felt like I knew how to think like a clinician, how to do an examination, and how to be an active listener…. that was from having been taught everything intertwined.

Many students described how the spiraling of content facilitated their learning:

…I really liked the style of the curriculum. I thought it was really beneficial to have an Acute Care I and then a year
forced and motivated their classroom learning, provided relevance to what they were learning, helped them review and recall information, and increased their confidence for their first clinical experience:

The integrated clinicals were very helpful. They eased the transition...I wasn't so frightened going into my first clinical. It was nice to see so many different people practice before I ever had to settle down with just one instructor. And so just made me feel like I was way ahead of the game. And my first instructor told me that it seems like I knew a lot more than other students coming in.

I'd say for sure ICE first year was really great. I mean, I remember my first ICE, I think we were doing MMT and for some reason I was shocked that what we learned in class was actually done. I don't know why that was shocking to me but I was just kind of like, wow. What we learned really matters. That we need to learn it cause you really have to do it, you know. So, I think ICE was huge in facilitating understanding why what we were doing in class is so important. And then also getting you out there and getting comfortable right off the bat.

National Physical Therapy Examination (NPTE) Results

No appreciable differences have been noted between licensure results of the 2006 and 2007 graduates of this curricular model as compared to 2000-2005 graduates of our previous model. These years were selected for comparison due to their proximity to the new model, thus the content was most similar to that of the integrative model. As reported for the Commission on Accreditation in Physical Therapy Education (CAPTE) the total percentage of candidates passing the licensure exam in the graduating classes of 2000-2005 was 100% each year. Total percentage of candidates passing in the graduating class of 2006 (new curricular model) was 94.7% and in the class of 2007 was 100%. The less than 100% outcome in 2006 is the result of 1 graduate who did not pass the exam.

Graduate Surveys

Each May, just prior to graduation, students are asked to complete a graduate exit survey. Students rate their level of preparation (well-prepared, adequately prepared, or under-prepared) in 24 competency categories. Twenty-three of these areas represent competencies as described by the practice expectations in the Normative Model of Physical Therapist Professional Education: Version 2004 and corresponding evaluative criteria from CAPTE. Using the same rating scale, the 24th area asks students to rate how their clinical education coursework prepared them to enter the profession. If students rated any area as “under-prepared” they were asked to note in the comments section why they felt under-prepared for that item (eg, not adequately prepared by the curriculum, no opportunity to practice this skill during clinical experiences).

The graduate exit survey from the classes of 2006 (100% response rate) and 2007 (97% response rate) indicate all graduates feel well-prepared or adequately prepared in all 24 competency categories in the survey.

One-Year-Out Survey of Employers and Alumni

Surveys were sent to the Class of 2006 and to their employers during the summer of 2007 (1-year post graduation). Employers were asked to rate the graduate on the 23 competencies described above. The rating scale ranged from superior competency (able to perform this item better than would be expected of most new professional PTs), competent (able to perform this item competently, this is the rating that most new professional PTs would receive), not competent (not able to competently perform this item at this time), or not applicable/not observed. There was a 60% return rate from employers. All of the employer respondents indicated they felt the graduates were competent or had superior competency in all 23 new professional competencies.

Employers were also asked to indicate how the graduate compares to recent graduates from other schools employed in their facility by choosing “superior in comparison,” “comparable,” or “inferior in comparison.” Since this was an identical item on the new and previous curricular model outcome surveys, a comparison of results was done as detailed in Table 3. Those employers who wrote comments on the surveys indicated that graduates are prepared to meet the complex demands of practice:

[Therapist’s name] came to us truly seeing the whole picture—department and patient needs. She has covered as lead for scheduling and daily staffing decisions and excelled with our transition to a computerized documentation system. She seeks solutions to problems and her peers respect her.

The 1-year-out survey for alumni had the same 23 curricular competencies as the graduate exit survey described above. Responses on the 1-year-out alumni survey from the
members of the class of 2006 (70% response rate) show all graduates continue to report that they were well-prepared or adequately prepared in all 23 competency categories.

DISCUSSION
Preliminary educational outcomes suggest that this model is, at a minimum, as good as our previous model in preparing students to successfully pass the licensure examination and be well-prepared to enter the profession from the perspective of the employer and the perspective of the student upon graduation and 1-year post-graduation. Impact of the curricular model and contextual learning emerged as themes in the analysis of the exit interview data which reflect key theoretical foundations upon which the model was based; thus suggesting that this curricular design influenced the students’ learning experience in a positive way. Complete and rigorous examination of the qualitative and quantitative data of previous, current, and future cohorts may yield further insight into the power of curricular structure to impact student learning, an endeavor beyond the scope of this paper.

In order to better root education in practice as Jensen et al.20(p260) call for, we believed that a major structural transformation needed to occur to fully embrace and realize a learning, rather than instructional, paradigm.9 We wanted to be sure that our students’ desire for deep learning, which they have as they begin their physical therapist education, was fostered, rather than allowing it to shrivel in the face of instructional strategies that forced students to broker their study time and energy to courses taught in the familiar, instructional paradigm. Students’ criticism of instructors who diverged from the instruction paradigm was also apparent. Thus, we believed that a holistic (curricular), rather than piecemeal (course by course) approach was needed to give students adequate time to develop the intellectual skills (such as critical thinking, and moral and ethical deliberation) required to think like a physical therapist and to integrate and give meaning to what they are learning.20,21 Relegating this fundamental imperative to a course or two seems inadequate if the learning paradigm is embraced fully and placed at the core of what we do to create a learning environment that feeds, rather than starves the developmental growth of physical therapist students as they actively engage in the emotionally demanding process of constructing their own knowledge. To do anything less at a time when information is growing at exponential rates and professional expectations are rising to support autonomous practice is a disservice to the students who entrust their professional formation to us. During the first years of practice the practitioner may or may not have mentors who are master clinicians to guide this intellectual formation. Prior to graduation, students must don the mantle of their own reality as learners to fully develop their intellectual skills and not assume a veneer from their instructors that will eventually erode in the face of the information explosion and practice complexities.

Freed from the limitations imposed by conventional approaches to course and curricular design, our curricular model is an adaptable platform upon which content is organized at multiple levels to support a student’s ability to become an autonomous practitioner. First, selected content from the 4 curricular streams is purposefully organized within each course, juxtaposing medical/behavioral sciences and clinical application so that students can give clinical meaning to the medical/behavioral sciences as they learn them. Second, content is sequenced throughout the curriculum in a spiral fashion. A broad framework for physical therapist practice is established at a basic level in the first year relative to outpatient, acute care, sub-acute, and rehabilitation settings, followed by further study in these same areas at progressively higher levels of complexity during the second and third years. The juxtaposition and spiraling of content allows students to make connections between content areas, facilitating their ability to recognize interconnected patterns.22 Third, within each level of the curricular spiral, learning activities are designed that reflect Kolb’s23 learning cycle, giving particular attention to reflective observation and concrete experience.24 Fourth, we use clinical cases and early clinical education experiences (ICE) to help students connect course material in ways that mirror the way in which physical therapists organize, retrieve, and apply information.16 By modifying cases used, the curriculum can be easily and quickly modified to keep pace with and remain relevant given the rapidly changing health care system. Fifth, by conceptualizing courses as faculty teams and monitoring content threads, teaching is less compartmentalized so that redundancies and inefficiencies in the physical therapist curriculum are minimized and content relevance, student workload, and the impact of

Table 3. Employer Comparison of CSC New Graduate Preparation to Other Graduate Preparation

<table>
<thead>
<tr>
<th>Year</th>
<th>Superior in comparison</th>
<th>Comparable</th>
<th>Inferior in comparison</th>
<th>No Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 (new model)</td>
<td>54%</td>
<td>46%</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2005*</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2004</td>
<td>40%</td>
<td>50%</td>
<td>10%</td>
<td>---</td>
</tr>
<tr>
<td>2003</td>
<td>33%</td>
<td>50%</td>
<td>---</td>
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Abbreviation: CSC, College of St. Catherine
*Data not available.

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This model presented some inherent challenges that required creative problem solving from the faculty. For example, collaborative course design is time intensive. Tracking thread content throughout the curriculum requires great attention to detail and faculty collaboration. When course content is changed in 1 course, content in subsequent courses may need adjustment. Scheduling is complex since it is guided by a logical progression and integration of course content rather than predetermined course credit hours allocated to content areas during defined and regular hours each week. As a result, faculty teaching schedules are variable from week to week throughout the semester, which sometimes presents difficulties in scheduling college committee work. Also, the unique course schedule adds complexity to exploring interprofessional coursework opportunities for our students. We found that scheduling an hour and a half each week when the entire faculty would be available for collaborative work helped us meet many of the time management and scheduling challenges associated with this model.

Our model may be useful to educators who wish to shift from an instructor to a learner paradigm. This conceptual approach to curriculum design could be applied not only to physical therapist education programs, but to other fields of study as well. The success and feasibility of transforming the structure of an entire curriculum as we have done is dependent on the desire and commitment of the faculty and the administrative support provided to the faculty to be innovative.

Future research studies could investigate whether our curriculum model affects how students approach their learning and how they prepare for examinations. The curriculum’s impact on students’ clinical performance and professional development during and after the program could also be investigated. For example, can graduates from an integrated, learner-centered curriculum model meet targeted productivity expectations earlier or exhibit the attributes of master clinicians sooner than graduates from conventional curricula? Exploring the effect of such a model on faculty satisfaction, retention, development, and recruitment would also be of interest.

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Appendix.

EXIT INTERVIEW QUESTIONS

1. Describe your experience as a learner in the DPT curriculum (consider both classroom and clinical aspects of the curriculum).

   Additional probes:
   • What assisted or enhanced your learning in this curriculum?
   • What could be changed or improved in this curriculum to further enhance your learning?
   • Please comment on how various types of assessment affect your learning.
   • Describe your best learning experience in the DPT curriculum.
   • Describe your worst learning experience in the DPT curriculum.
   • How did you approach your learning in this curriculum? What was your study pattern? Did it change over the 3 years?
     How did you prepare from day to day when you were on your clinical rotations?

2. How was your experience as a learner with the DPT curriculum different from your undergraduate curricular experience?

3. How has the program/curriculum prepared you for the workplace?

   a. How do you judge your overall competence as an entry-level physical therapist?

4. Have we accomplished the program's curricular goals? Examples?