National Study of Excellence and Innovation in Physical Therapist Education: Part 1—Design, Method, and Results

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Background. The Carnegie Foundation for the Advancement of Teaching commissioned the Preparation for the Professions Program, a qualitative study of professional education in 5 professions: medicine, nursing, law, engineering, and clergy. These studies identified curricular structures, instructional practices, assessment approaches, and environmental characteristics that support the preparation of professionals and led to educational reforms. The physical therapy profession has not had any in-depth, national investigation of physical therapist education since the Catherine Worthingham studies conducted more than 50 years ago.

Objectives. This research was a Carnegie-type study, investigating elements of excellence and innovation in academic and clinical physical therapist education in the United States.

Design. Five physical therapist education researchers from across the United States used a qualitative multiple-case study design.

Methods. Six academic and 5 clinical programs were selected for the study. The academic institutions and clinical agencies studied were diverse in size, institutional setting, geography, and role in residency education. Qualitative case studies were generated from review of artifacts, field observations, and interviews (individual and focus group), and they provided the data for the study.

Results. A conceptual framework grounded in 3 major dimensions was generated, with 8 supporting elements: (1) culture of excellence (shared beliefs and values, leadership and vision, drive for excellence, and partnerships), (2) praxis of learning (signature pedagogy, practice-based learning, creating adaptive learners, and professional formation), and (3) organizational structures and resources.

Conclusion. Building on the work of the Carnegie Foundation's Preparation for the Professions Program, a conceptual model was developed, representing the dimensions and elements of excellence in physical therapist education that is centered on the foundational importance of a nexus of linked and highly valued aims of being learner centered and patient centered in all learning environments, both academic and clinical.

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Given that physical therapist education prepares today's and tomorrow's physical therapists, it is crucial to the profession's success that we understand what comprises excellence in physical therapist education. As Shulman wrote, "Erik Erickson once observed that if you wish to understand a culture, study its nurseries….for the understanding of professions…their forms of professional preparation."[1(p52)] Physical therapists continue to take on increased clinical responsibilities, often serving as a point of entry into the health care system and always responsible for diagnosis, referral, and supervision. In response, the profession has undergone changes in degree structure, moving from the bachelor's degree, to the master's degree, to all physical therapist professional education programs now being at the doctor of physical therapy (DPT) level (n = 235).[2] Concurrently, there has been a growth in residencies (223) and fellowships (42) across 9 clinical specialty areas[3] and continued growth in new DPT programs (29 developing DPT programs).[2] We are faced with preparing graduates for an environment where problems are more complex and their solutions more uncertain. Changes such as implementation of the Affordable Care Act; the Triple Aim emphasis on cost, quality, and access;[4] expanding volumes of information available to students, patients, and faculty; and increasing clinical productivity demands make it imperative that we gain a better understanding of the quality and cost effectiveness of the entirety of the physical therapist education system, particularly how that system can be responsive to these changes while advancing excellence among graduates and practitioners.

Over the last 6 decades several leaders in the profession have voiced concerns about physical therapist education and have called for transformative change.[5-12] The only comprehensive, federally funded national study of physical therapist education was led by Dr Catherine Worthingham over 50 years ago.[13-19] While there have been several studies of physical therapist entry-level education since Worthingham, many have been narrowly focused on par-

ticular topics, often through descriptive surveys or single-institution studies.[20-26] Other studies focused specifically on the relationship between curricular design and student learning outcomes,[27] clinical performance outcomes from 3 curricular models,[28] and student and academic variables that related to graduate performance on the National Physical Therapy Examination.[29]

There is general agreement about the need for change in physical therapist education,[11,12,30,31] and there have been multiple attempts to bring about change through consensus-based guidelines.[32-36] While the Normative Model[37] had fairly widespread adoption in the field, perhaps because of its close ties to accreditation standards, the results of consensus conferences on clinical education have been less successful in bringing about significant changes in clinical education.[32-34,36] Our study does not seek consensus but is focused on a comprehensive, in-depth study of how excellence is achieved at exemplary physical therapist programs from both academic and clinical perspectives.

In the 2016 Pauline Cerasoli Lecture, Jette pointed out that [31(p7)]:

In spite of the fact that we are educating graduates to practice in the same US health care system and pass the same licensure exam, curricular emphases vary across programs, and course content may well reflect worn out traditional knowledge and skills….rather than what students and graduates actually need to know for best practice.

She argued that our graduates need to not only function in the health care environment but make contributions to the complex, real, and uncertain work of health care.[31]

Currently, the profession of physical therapy lacks a strong foundation of education research that provides the profession with deeper and broader understanding of physical therapist education.[26,38,39] While the profession has a number of ongoing task forces working on addressing components of excellence across the system,[40-42] the profession has no literature that demonstrates particular patterns of education that

lead to excellence.[11,12] In 2015–2016, the American Physical Therapy Association governance addressed excellence in higher education in a series of House of Delegates, Board of Directors, and appointed Task Force actions. In 2014 the APTA House of Delegates adopted 2 motions addressing excellence in physical therapist professional education and clinical education.[40] The American Council of Academic Physical Therapy (ACAPT) has instituted projects through a series of task forces (Benchmarks for Excellence Task Force, Graduate Outcomes Task Force, and Interprofessional Education Task Force) to collect benchmark data on quality among physical therapist professional programs and to improve clinical education.[41] The American Board of Physical Therapy Residency and Fellowship Education (ABPTRFE) instituted a Residency Competency Work Group to draft core competencies and critical behaviors for creating an evaluation instrument for residency education with psychometric testing to begin in 2017.[42] These initiatives, while well intentioned, are being implemented in a context where there is a paucity of recent research that provides guidance on what constitutes excellence in professional education and how innovation in professional education can lead to graduates and practitioners who can thrive in the complexities of the current health care environment.

Carnegie Foundation Research and the Professions

The Carnegie Foundation for the Advancement of Teaching has had a long tradition of studying the professions, the most well-known study being the Flexner Report on medical education.[43] In 2008 the Carnegie Foundation, under the leadership of then Carnegie Foundation President Dr Lee Shulman, commissioned a comparative study of 5 professions (medicine, nursing, law, engineering, and clergy), the Preparation for the Professions Program (PPP).[44-48] These studies were driven by a shared concern that professionals have lost their sense of calling and need a renewed sense of their civic responsibility and deeper engagement with society.

The concern was that professional schools had become too focused on expert knowledge and the academy's love of theoretical abstraction and less focused on the central importance of learning for practice and the formation of professionals who fulfilled their moral responsibilities to society. These studies have demonstrated that profound changes can be achieved when leaders in the field find compelling evidence of both the need for positive change and the means to achieve that change, as well as documentation of aspects of professional education that are not adequately addressing societal needs.[44-50]

The research teams at Carnegie grounded this work in current research and theoretical concepts across social, cognitive, and learning sciences as applied to student learning in professional education.[44-52]

Shulman's work on signature pedagogy[1] was also fundamental to the Carnegie Foundation work and is relevant to physical therapist education. He defines a signature pedagogy as the characteristic form of teaching and learning that educates students in a unique way designed to produce or form the best professional possible. To identify physical therapy's signature pedagogy is an important first step that could lead to further investigation and a better understanding of effective teaching and learning in the profession.

Unlike the historical Flexner study, where all schools were examined with a specific evaluation template in mind, to see if these schools met certain standards, the Carnegie studies used a purposeful sampling methodology, selecting institutions that were known exemplars of excellence in their professions and that represented geographic and institutional diversity. This purposeful sampling allowed them to identify the multidimensional characteristics of excellence that could strengthen the preparation of professionals within and across professions, as seen in examples of summary findings in Table 1.[45,47,48]

The purpose of this study, Physical Therapist Education in the 21st Century: National Study of Excellence and Innovation in Physical Therapist Education, was to identify and describe the attributes of excellence and innovation across academic and clinical settings for physical therapist education. Similar to the medical education study, we were interested in looking at physical therapist education across the continuum from professional education through residency. Our intent is to stimulate conversation and debate, establish a framework for future education research that explores the attributes of excellence in physical therapist education, and contribute to efforts that will transform physical therapist education toward excellence.

Method
Sample
We used a national call and self-nomination process for the initial identification of academic and clinical sites. The review criteria for study site selections were developed and refined using multiple strategies with input from key stakeholders. We developed preliminary site inclusion criteria based on the purpose of the study and prior work by the Carnegie Foundation studies.[44-48] We also sought input and comment from academic and clinical educators gathered at the APTA Education Section's Educational Leadership Conference in 2008. These revised criteria were then reviewed by an advisory board representing key stakeholder groups. A final set of 8 criteria provided the structure for the nomination call (Tab. 2). A detailed description of the national call development and implementation process and key stakeholder groups involved is provided in Appendix 1.

Fifteen academic institutions and 13 clinical agencies responded to 2 national calls for nominations. We reviewed and scored all nomination packages, and the decisions for the selected sites were confirmed by the study's advisory panel. The 6 selected academic institutions represented diversity in terms of the type of institution, geography, size of institution and program, and role in residency education (Tab. 3). The 5 clinical organizations chosen represented a diversity of clinical settings as well as geographic diversity (Tab. 4). The Creighton University Institution-al Review Board (IRB) approved this study, and each academic and clinical site submitted a letter to the sponsoring IRB, verifying their participation in the study. Anyone who participated in individual interviews signed an informed consent form. Focus group participants and those who participated in field observations received research protocol information and gave oral consent.

Research Design
The research team, working from a sociocultural perspective on learning, used a multiple, qualitative case study design[53,54] and a grounded theory approach employing a constant-comparative method for within-case and cross-case analysis.[53,55-57] The use of this design and analytic approach was similar to those used in the Carnegie PPP studies.[44-48] The research team of 5 experienced qualitative researchers, located in 5 geographic regions of the country, collectively has more than 150 years of experience in professional academic or clinical education. In addition, an experienced educational researcher in medical education served as a consultant member of the team.

Procedures and Data Collection
Site visits to all 11 sites occurred over a 2-year period. Each site visit lasted approximately 2 days. The research team data collection methods consisted of individual and focus group interviews; field observations of entire class sessions in classrooms and clinical laboratories; and observation of selected clinical education instruction or resident mentoring sessions.

Team members, in groups of 2, completed observations of teaching and learning experiences and generated field notes. A typical clinical observation consisted of viewing an entire selected patient encounter, attending the debrief or wrap-up session between the instructor/student or mentor/resident after the patient encounter, followed by a debriefing interview with the instructor/student or resident mentor/resident pair. A description of the general structure for academic and clinical site visits is provided in Appendix 2.

Table 1.
Examples of the Key Observations and Recommendations From the Carnegie Preparation for Professions Program Research for Law, Medicine, and Nursing[45,47,48,a]

LEGAL EDUCATION[45]	MEDICAL EDUCATION[48]	NURSING EDUCATION[47]
Observations		
1. Provides rapid socialization into the standards of legal thinking 2. Relies heavily on ONE way of teaching to accomplish socialization process 3. The case-dialogue method of teaching has valuable strengths and unintended consequences 4. Assessment of student learning remains underdeveloped	1. Educators must distinguish more clearly between CORE curricular material and everything else 2. Need to assess, acknowledge, and advance professional behaviors 3. Inadequate attention to the skills required for effective team care in a complex health system 4. Poor connections between formal knowledge and experiential learning 5. Clinical education overuses inpatient experiences 6. Commercial nature is a threat to professional identity	1. Nursing programs are very effective in forming professional identity and ethical comportment 2. Clinical practice assignments provide powerful learning experiences, especially in programs where educators integrate clinical and classroom teaching 3. Nursing programs are not effective in teaching nursing science, natural sciences, social sciences, technology, and the humanities
Recommendations		
1. Offer an integrated curriculum 2. Join "lawyering" professionalism and legal analysis from the start 3. Design curricula so that the students and faculty weave together disparate kinds of knowledge and skills 4. Engage a task force on legal education to focus on the need for more skills training, experiential education, and development of practice-based competencies	1. Standardize learning outcomes and individualization of the learning process 2. Integrate formal knowledge and clinical experience 3. Need a serious focus on learning and adaptive expertise, integrated clinical experiences, a developmental continuum for professional competence including an early focus on professional identity 4. Assessment must go beyond what students and residents know and can do to address learners' ability to identify gaps and next steps for learning and lifelong learning 5. AAMC, AMA, ACGME, medical specialty societies, and medical schools need to collaborate on the development of a medical workforce policy for the US	1. Move from a focus on covering decontextualized knowledge to an emphasis on teaching for a sense of salience, situated cognition, and action in clinical situations 2. Move from a sharp separation of clinical and classroom teaching to an integration of the 2 3. Move from an emphasis on critical thinking to an emphasis on clinical reasoning and multiple ways of thinking 4. Move from an emphasis on socialization and role-taking to an emphasis on professional formation 5. Require the bachelor of science of nursing entry into practice

[a]AAMC = Association of American Medical Colleges, AMA = American Medical Association, ACGME = Accreditation Council for Graduate Medical Education.

We reviewed artifacts (including program curriculum documents, course syllabi and teaching materials for courses observed, and strategic plans) prior to, during, and following the site visit. We developed interview guides based on the purpose of the study and the guides used in the Carnegie studies in medicine[48] and nursing[47] for all semi-structured, individual interviews and focus groups (eAppendixes 1 and 2, available at: https://academic.oup.com/ptj). Interview informants included students, interns, residents, academic and clinical faculty, faculty outside the discipline, and academic and clinical administrators. We digitally recorded all interview sessions, which were later transcribed by a third party. We then analyzed the transcribed data.

Data reduction. We used an iterative process throughout data reduction and analysis.[53,55-58] We held monthly conference calls, five 3-day face-to-face team meetings, and ongoing consultation with the external educational researcher to verify and revise the coding scheme, identify categories and subcategories, revise emerging themes, and develop the conceptual framework.

We created an initial case record[53,54] for each site with all of the raw data using a consistent structure that included (1) the development of a case profile based on organizational and institutional context, (2) a summary of data sources and sampling, and (3) data that fell into preliminary coding categories. We analyzed the data using an inductive, interpretive approach and constant comparison for within-case and cross-case analysis (academic and clinical cases).[53,55-58] Teams of 2 researchers, each with a primary and secondary member, used open coding to analyze the interview and observational data. Preliminary coding categories for the initial 2 cases included: learning for practice, organizational characteristics, and people, with several subcategories within these 3 categories.

We then developed a case report for each academic and clinical site, which was written based on the broad areas of investigation and conceptualization.[53,54,57] We used the key constructs of culture, enacted curriculum, and professional formation for the case report outline. This shared outline facilitated the data reduction process and allowed cross-case analysis. Emerging themes were evident early during the cross-case analysis, allowing us to refine our working conceptual model.

We used an analytical strategy of pattern matching and explanation building[53] to examine how the elements of the framework fit our academic and clinical cases. We tested our assertions and consistently found that the elements of excellence we had identified applied to all cases. The working

Table 2.

Selection Criteria for Academic and Clinical Sites[47,48]

Carnegie Criteria for Preparation of Professions Program
1. Excellent reputation for teaching and learning
2. Known nationally for educational innovation
3. High pass rate on licensure examination
4. Recommended by accrediting body
5. Consideration for geographic sampling
6. Consideration for other factors important to the profession (eg, nursing—look at an associate degree program; medicine—diversity)
Criteria for the Academic Site Selection[a]
1. Acknowledged by a group of peers for excellence in physical therapist education
2. Physical therapist program with a breadth of clinical education from entry-level to active residency, and
3. Curricular structure that has integrated clinical education
4. Examples of interprofessional collaboration within the professional curriculum
5. Evidence of at least one example of innovative educational practice
6. A commitment to inclusion of groups that are underrepresented in physical therapy across faculty and students
7. Curricular requirements for student engagement in evidence based practice (EBP) and inquiry related to clinical practice
8. Research productive faculty
Criteria for the Clinical Site Selection[a]
1. Acknowledged by academic affiliates and clinical agencies (peers) as providing excellent clinical education
2. Clinical education site/program with breadth of CE experiences from entry-level preparation to active clinical residency(ies)
3. Opportunities for interprofessional collaboration and education within the clinical education program/site
4. Evidence of at least one example of innovative educational practice
5. A commitment to inclusion of groups that are underrepresented in physical therapy across faculty and students
6. Active clinical faculty development and mentoring program
7. Institutional commitment to health care professional preparation and education
8. Administrative support for clinical education activities

[a]Stakeholder input on site selection criteria: (a) APTA Education Section, (b) American Council for Academic Physical Therapy (ACAPT), (c) Commission on Accreditation for Physical Therapy Education (CAPTE), (d) professional association leadership (APTA president), (e) national licensing board, Federation of State Boards for Physical Therapy (FSBPT), (f) APTA student assembly president, (g) Foundation for Physical Therapy president, and (h) educational research consultants.

conceptual model was stable after data collection from 8 of the 11 cases (5 academic cases and 3 clinical cases). For a 12-month period following creation of the case reports, the researchers presented findings at 5 national conferences[59-64] where both the sharing of results and feedback from these presentations were used for continued refinement and reorganization of the key concepts in the model.

Standards of verification. We employed several methods of verification to ensure dependability, credibility, and trustworthiness of the data.[53-58,65]

1. The use of low inference data, as all initial coding was done from verbatim transcripts of audio-recorded interviews.

2. All individual interview transcripts were shared with the informant for review and comment to ensure an accurate account of the interview.

3. Data triangulation occurred via multiple data collection methods, including interviews, focus groups, documents/artifact review, and field observations.

4. Data were collected from multiple sites and numerous informants in all sites, including: students at multiple levels in their professional preparation, residents, academic and clinical faculty, program directors, and faculty and administrators external to the profession.

5. Multiple experienced qualitative researchers completed independent coding and achieved consensus on categories and themes through the testing of assertions and fit with the data.

6. The team used negative case analysis to look for disconfirming data that did not fit with our ongoing analysis and to confirm

that our results reflected the preponderance of data. This strategy includes "following up on surprises" or "unpatterns" and examining not only what we were observing but also what we were *not* observing.[56]

7. The use of peer review through our external research consultant who provided a knowledgeable but outsider's viewpoint, presenting emerging findings to peers, feedback from our advisory board, and review and critique from Dr Lee Shulman, who conceptualized and led the Carnegie Preparation for Professions Program studies.[64]

Results
Academic and Clinical Site Profiles
The 6 academic sites were public and private, ranging from those classified as research intensive institutions to those classified as masters' large in the

Table 3.
Demographic Data for Academic Sites as of Visit Date

ACADEMIC PROGRAM/ REGION	Visit Date	Program Start Date	Class Size	Core Faculty Size	Residencies	PhD Programs	Carnegie Classification	Administrative Location
1 Eastern	Mar 2013	1976	36 (Expanding to 60)	18 full-time, 12 part-time	Orthopaedics Sports Geriatrics	PhD in Biomechanics and Movement Science	Public Large, research intensive	Department of Physical Therapy College of Health Sciences
2 Eastern	Feb 2013	1997	65–70	17 full-time, 5 part-time	Orthopaedics	PhD in Rehab Sciences	Private Specialized Health Sciences	Department of Physical Therapy School of Health and Rehab Sciences
3 Eastern	Dec 2013	1984	60	14 full-time	Orthopaedics	None	Private Master's	Department of Physical Therapy College of Health Sciences
4 Midwestern	Jan 2014	1942	83	22 full-time, 3 part-time	Women's Health Fellowship in Movement Science	PhD in Movement Science	Private Large, research intensive	Program of Physical Therapy School of Medicine
5 Western	Mar 2014	1946	94	25 full-time	Sports Orthopaedics Neurology Pediatrics	PhD in Biokinesiology	Private Large, research intensive	Division of Biokinesiology and Physical Therapy School of Dentistry
6 Southern	Apr 2014	1960	55 (Expanding to 75)	20 full-time	Orthopaedics Sports Geriatrics	PhD in Rehabilitation Science	Public Large, research intensive	Department of Physical Therapy College of Public Health and Health Professions

Table 4.
Demographic Data for Clinical Sites as of Visit Date

CLINICAL PROGRAM/ REGION	Visit Date	Type of Setting	Number of Schools	Students Per Year	Residents	Fellows	Number of Therapists and Clinical Specialists
1 Eastern	Oct 2012	Inpatient Outpatient Academic medical center (~2500 beds)	27	30	2	NA	300 physical therapists 104 specialists
2 Midwestern	Nov 2012	Inpatient rehab (96 beds) Outpatient rehab	36	36	2	NA	69 physical therapists 16 specialists
3 Southern	Apr 2014	Inpatient rehab Outpatient rehab Institute of higher learning (157 beds)	25	110	16	4	136 physical therapists 31 specialists
4 Western	Mar 2014	Outpatient Part of a 515-bed community hospital system	7	30	2	NA	18 physical therapists 14 specialists
5 Northwestern	Aug 2014	Outpatient 80-clinic private practice (Visited 2)	83	150	3–6	0–4	8 physical therapists 5 specialists (at sites visited)

Carnegie classification,[66] and had geographic representation across the US (Tab. 3). The 5 clinical sites included an academic medical center, rehabilitation centers, private practices, and a community clinic, and also were geographically dispersed (Tab. 4).

The Conceptual Model of Excellence in Physical Therapist Education

The conceptual model presents our understanding of the attributes of excellence for professional education in physical therapy. The model represents physical therapist education as a totality rather than academic and clinical education separately, because we observed these key components of excellence in *all* of our sites and with a high degree of interdependence between academic and clinical education

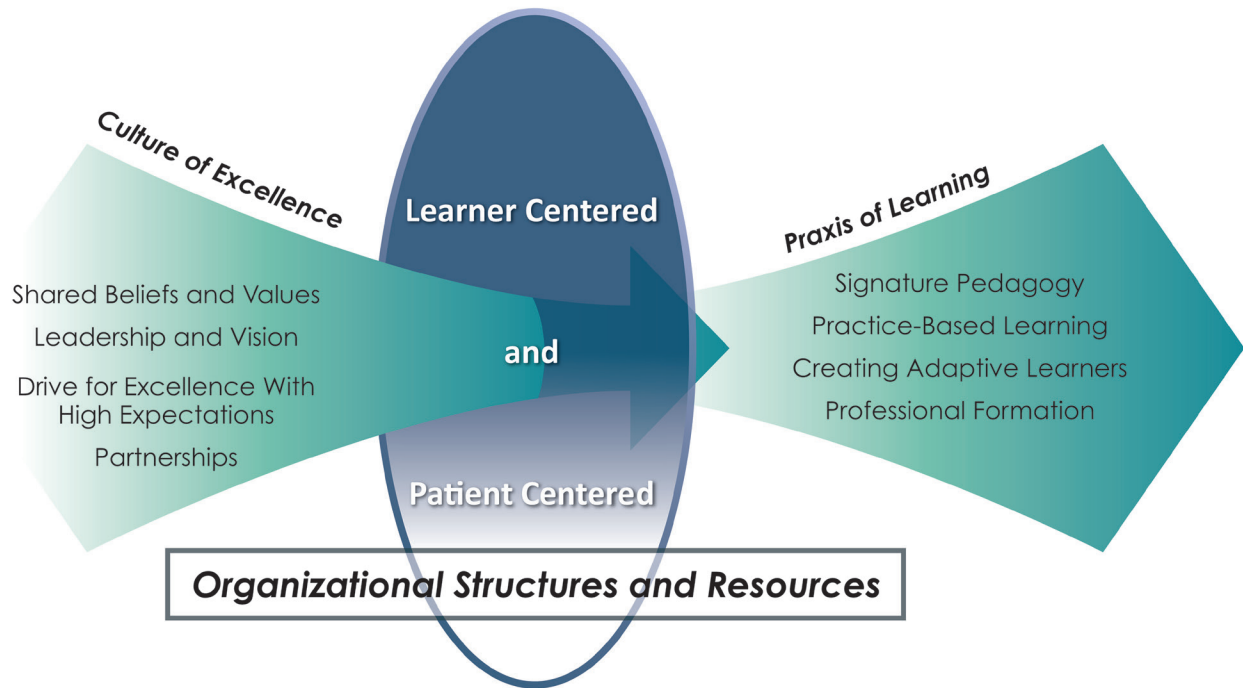# Excellence in Physical Therapist Education

Figure.
Conceptual framework representing excellence in physical therapist education.

(Fig.). We present the model here to serve as a unifying framework for the presentation of our findings. Providing this conceptual framework here is one strategy for helping readers to make sense of the descriptive data to follow.[55,56,65] The model has 3 major dimensions: culture of excellence, praxis of learning, and organizational structures and resources. Each dimension has several elements that are described below. For the purpose of brevity, we present one illustrative quote for each element; additional selected supporting quotes or observations are shown in Table 5.

The centerpiece of the model is a *nexus* of linked and highly valued aims of being learner centered and patient centered in all learning environments, both academic and clinical. This nexus is instrumental in facilitating learning for practice through practice. It also serves as an important bridge between academic and clinical environments and between the model dimensions of a culture of excellence and the praxis of learning. Each of the model dimensions, their elements, and the nexus are described here.

Conceptual Model Dimension: Culture of Excellence

A culture driven by high expectations and a focus on excellence was a prevalent and powerful presence at all of our sites. It was characterized by these 4 essential elements: (1) shared beliefs and values, (2) leadership and vision, (3) a drive for excellence with high expectations, and (4) partnerships.

Shared beliefs and values. The shared beliefs and values we observed across settings that provided the foundation for excellence were mutual trust and respect for one another at all levels, and commitment to collaboration. Those shared values were embedded in our participants'

descriptions of their culture, as seen in this example:

I believe culture is everything. … if the organization doesn't believe in education … it just doesn't happen. If that's a salient attribute of the organizations culture, then it does happen. … everything that happens here—the way we treat each other, the way we act toward patients, what we value—it's all about the culture of the organization. We have a very strong culture here, and it does come from the top. Because we advocate training, and education, and research, we make time for it, we provide resources for it, we pay attention to it … It becomes a priority for us. (CLIN-2, Administrator)

Leadership and vision. We observed that shared leadership was the norm and those leaders leveraged the institutional mission to advance the profession's goals and responsibilities to society. Leaders were attentive to internal and external forces influencing physical therapist education, practice, and research. These leaders expressed a clear vision and worked to facilitate team-based collaborations toward this greater goal.

Table 5.
Additional Supporting Evidence for Elements in the Conceptual Model of Excellence in Physical Therapist Education

Dimension	Element	Supporting Quotes or Observations
Culture of Excellence	**Shared Beliefs and Values** (Mutual trust and respect; commitment to collaboration)	I think we have a culture here in the program and across the University of growth and change…. Another thing about the culture in the program is I think the soul of physical therapy remains central to us all…. That makes for a much more cohesive organization. It makes for a commitment to the education of students. It makes for a commitment to patients if they walk in the door…. One part of the soul is that we care about people and we care about each other…. regardless of duties [in the program] people care about physical therapy and they're expected to know something about the world of physical therapy. *(ACAD-4, Intro session, Faculty group)*
		It's the culture that we have created going back to the very, very beginning, the very first residencies, people understood that this was a group effort and this a team we were building…. It's about developing something, creating something that's bigger of any of us individually and the teamwork and the camaraderie…. To work here, there is a citizenship or a stewardship or a contribution that you owe the organization that you're working in. It's not just 9 to 5… It's that you're part of the system. You are going to contribute…. They don't have to all be leaders, but they have to have passion. *(CLIN-3, Administrator)*
		Really everybody is open in the whole department and faculty…. Really support one another, want to see everyone succeed, and has the same mission and purpose in place all across the board, regardless of your rank…. That's transparent. *(ACAD-1-DCEs)*
	Leadership and Vision (Shared leadership, resourceful and visionary)	We have a leadership structure. We have a system which empowers people to be leaders in the domains in which they're acting…. But all of the people who are operating in that structure are providing leadership. The key to leadership is not to have one person telling everybody what to do——that doesn't work. It's to have many leaders. And that's what we have in this faculty is a faculty of leaders, really. That's what we try to create…. The idea here is to try to allow us to flourish but try to direct those energies in a cohesive way without stifling the creativity that's there. But in saying that, you have to realize that you can't do that without a faculty who is that committed to the process. *(ACAD-5, Intro session, Faculty group)*
		…from a staff perspective and having been here for quite a while that there are a lot of different opportunities, either for staff to grow into leadership roles or to kind of pursue areas of specialty that they're really interested in… I think if you're patient and you communicate with your supervisors and you have an area that you really want to grow in clinically and develop a specialty that you have an opportunity to do that. I think that keeps us engaged and excited about our careers and that helps promote longevity and that excitement translates to students as well. *(CLIN-2, Intro session)*
	Drive for Excellence with High Expectations	You're striving for the hundred percent. We have many…I'm very proud of our clinical team. We have five people going back for the DPT right now. So, even people who have been out twenty, twenty-five years and you think of clinical excellence and customer service and the well-rounded person, it's them. Yet, they're going back for their DPT…we've never really achieved the pinnacle of excellence, we're always raising the bar. We're always growing, we're always changing. What's new, what's different. I mean, we're in the medical field, right? We're never going to reach that top pinnacle of excellence, because there's always something a little bit more. *(CLIN-4, Administrator)*
		When I came here, one of the big mantras that I heard all of the time from faculty and students, repeatedly, was this notion of not ever digressing to the mean. That just came up repeatedly and I had never heard that used as an expression used as often as it was used here. That sums it up a lot. We are going to train you to higher standards and educate you and encourage you, and hope that all of that, when you're on your own, sticks with you and that you continue to carry that forward—and that you never become complacent and not just be satisfied…that you keep reaching and stretching. *(ACAD-1, Program Director)*
		I think one of the things that is unique about this faculty is the constant drive for…I want to say change, but not change just for change's sake, but to look at things and look at what could be done better. It's a constant, ever-evolving process here…. It never stops. *(ACAD-2, Faculty)*
	Partnerships	I think the continuation of making sure that our clinical partners are heard, and that we work closely with them. I think…that leadership has had that understanding from the very beginning. *(ACAD-2, Administrator)*
		…a better word might be a better partner in terms of who we are and how we can cooperate with each other. Our philosophy here is that we don't want to be a dumping ground for universities to take on their clinical education. We want to be a partner with the universities, to carry out clinical education, which means that when curriculum development comes around, we want to be, at some point, at the table. Being an equal partner with them for the education of those students. *(CLIN-3, Administrator)*

(Continued)

Table 5.
Continued.

Dimension	Element	Supporting Quotes or Observations
The Nexus	Learner Centered and Patient Centered	As a learning organization, [this agency] strives every day to improve our clinical expertise through education, mentoring and shared experience. We believe in the lifelong goal of always finding ways to improve and passing that insight along. [Our organization] has earned a reputation as a leader in rehabilitation by our positive outcomes with patient treatments and a nurturing environment that empowers professionals to develop into exceptional healthcare providers. It is my goal to honor the vision of our founders by continuing to develop [our organization] as the rehabilitation provider of choice: the [organization] that best improves the functional lives of its patients. *(CLIN-5, Artifact/CEO)* Patient centered is a core value [in our teaching].… What we've done in our course and it's consistent with others [faculty] here is that we're trying to be patient-centered so we're looking at it from a whole point of view…'Here's the patient——what do they say? What's the patient identified problem? What might be some non-patient identified problems?' We're starting from that point of view. *(ACAD-2, Faculty)*
Praxis of Learning	Signature Pedagogy	How do you break it down to what does it take to get them able to do that? Is it a strength deficit? Is it a neuromuscular control issue? Is it that they're tightening a particular muscle and that's causing a faulty movement pattern? We help them [the learners] to take the big picture and help break it down into the individual components that they can themselves treat while making sure that the patient is independent and not relying on us for that.… It's multifaceted obviously… *(CLIN-4, Clinical Instructor)* In this laboratory session on the shoulder, the session is grounded in a patient case shown through media. Analysis and discussion of the patient's shoulder movement by the class then becomes the structure for student review and practice of critical and appropriate examination tests. *(ACAD-2, Observational field notes)*
	Practice-Based Learning	I think being able to be in the clinical setting just makes things more relevant. If you learn something specifically about a patient with a patient, with them right there in front of you, you're never going to forget that thing. Whereas, half of what you listen to in a lecture you're not going to retain. I think being able to be there in the moment and make things so much more relevant, I think it's kind of cool. *(CLIN-5, Clinical Instructor/Resident Mentor)* We go to independent living centers. It's a group of 12 students from each of the seven disciplines. The faculty from each of the disciplines rotates so we don't stick with the group but the group stays together and they meet an elder and they go back three times over two semesters.… these are people who are in definite need of intervention. We do a team assessment.… We never know what we're going to get. Then they [the learners/ team] put together a plan and we…send the plans to physicians. We give it to the facility but the big thing is to be in the home…to do home visits and to work with the team. *(ACAD-5, Faculty)* I really enjoyed being able to be immersed in the hands-on learning experience, starting the first semester, unlike some programs where you start later on, in your first year or second year and so on.… you can practice hand skills and start applying clinical decision making models that you have learned; there is nothing like seeing true barriers, psychosocial and economic, to get a real appreciation. You have classroom learning on it, but that just extends so much. You are seeing patients that are at such a high risk for certain injuries because they are using their bodies like machines in certain jobs, or they can't get there any way but walking.… It is a very good education in that sense. *(ACAD-3, Students)* That's what's really helpful for me was having her there and asking me those questions of, "Okay. Why are you doing this? What is the goal of doing this?" Not just, "Can you teach this exercise?" kind of a thing. That is what [my instructor] has always done a fantastic job of when I was a student and now, later on [as an intern], because she is being actively mentored [as a fellow], so she knows what works really well and what doesn't work well from an instructor kind of point of view. She has always done a really good job of challenging me and making me work a lot harder that way. *(CLIN-5, Intern)*
	Creating Adaptive Learners	If every time the individual is told the information, then I don't know if you're ever really able to learn how to critically think. Those I think are some of the challenges in what we do and I think people learn from failing also too. You learn from your mistakes. When they are able to recognize what they did wrong and what they could do to improve that situation can be helpful. *(CLIN-1, Resident Mentor)* So kind of taking the step further of not just what did we see in the room, but why did this happen? How would you respond? What would you do? And he's really good at those thought-provoking questions that you need to think critically about, not just what you saw, but maybe the monitor wasn't reading what you thought it was reading. Why could that have been? Just as far as a, b and c are going on. Why would that be going on? *(CLIN-1, Student describing CI teaching)* I think they do a good job of making you not so, I guess, single-minded and focused on one little thing. They really encourage you to think outside the box and take into account other things that are out there. It is not just one way to do things. *(ACAD-3, Students)*

(Continued)

Table 5.
Continued.

Dimension	Element	Supporting Quotes or Observations
Praxis of Learning (cont)	Professional Formation	All of our decisions really are based on patient care. It's always been patient care focused…. We've done a lot of education on the WHO Model. We believe in it very strongly and so we promote it…I think it really does promote a transdisciplinary approach because for us, I think, real rehab is about returning people to life, and that's that participation piece in the WHO model. How do they participate in those life roles? We start there—say, who is this person, how do we get them participating in their life? Then rather than focus so much on discipline specific goals we're focused on patient goals…. Rather than I, as a PT, looking at the patient and saying "OK, I need to do this, this, and this as a PT," we look at the patient and say "What do they need to do to return to being a mom, or teacher, or whatever their life role, or an athlete, whatever it might be." *(CLIN-2, Intro session with Clinical Faculty Group)*
Organizational Structures and Resources		(Private university) We're a revenue center so from a financial standpoint we can re-invest our revenues in our own operation. We do pay taxes to the University, and we also have to make sufficient revenue to cover all our expenses. But at the same time, we have control and that has been critical for our growth and for our ability to make decisions about how we're going to grow and build our enterprise. *(ACAD-5, Administrator)*
		We really do see ourselves as a center that's here to train the next generation of clinicians. We benefit from that process, hopefully as much as they do, to have fresh ideas, fresh people coming in the door. We hire many of those students later on and so it's this great collaboration where hopefully we're able to train that next generation and pass on some of our knowledge to them, but also benefit from what they bring to the table. That really is what drives, I think, our student program here. *(CLIN-2, Administrator)*
		For me, [involvement in clinical education] it's an investment in the future success…. Obviously it's going to cost them some money up front. What you get back, I think, on your investment is huge. To me, you can say that about anything. It costs money—but you spend money so that in the long run you end up with a better product and a better service. *(CLIN-5, CEO)*
		Now, spend as much time digging in to the benefit piece [related to clinical education] as you've dug into the cost piece…let's make a list of the positives and the negatives. With all honesty, you're going to come out with more positives than negatives. *(CLIN-5, Clinic Director)*

This vision is not just about the present but also about the future—the dream:

I think one of the most important things for leadership to reach excellence is a can do attitude … it's kind of like field of dreams. You just dream what you want …. You don't say "Well, we don't have this so we can't do that." I think that's one of the things that each faculty [does] because they do that in their own practice areas … that then is supported by leadership saying, "Yes, you should dream and try to do these creative things and I'll support you." (ACAD-6, Faculty)

Drive for excellence with high expectations. The drive for excellence with high expectations was a pervasive and palpable characteristic in the environment of the sites we visited. This drive was grounded in a passion for learning, a willingness to take risks and to continuously seek improvement. Faculty, learners, and clinicians had a thirst for learning, a commitment to excellence through the setting of high expectations, and a willingness to hold each other accountable:

I can remember the first 3-4 years going, "These people never stop. They're like a shark swimmer. They just never stop thinking about the future." I thought I was going fast in my research. I thought I was a visionary thinker but you get in this culture and, we never talk about it but it's a risky way to do business to continuously push the envelope, continuously ask, "Why? What are we doing right, wrong? What could we do better?" (ACAD-1, Faculty)

Partnerships. Seeking and maintaining full partnerships between academic institutions and clinical sites was a prevalent goal for the academic and clinical faculties with whom we met. There was a clear recognition that each party expected, received, and gave full respect to the other party:

…it's got to be a partnership. There's got to be a strong collaborative relationship between the clinical entities where the students are doing their rotations, and the academic institutions, where the two of them have a mutual agreement. This is what we're trying to create, this is how we're going to go about doing it, and this is the effort that we're equally going to put into this. (CLIN -3, Clinic Manager)

The Nexus: Learner Centered and Patient Centered

Central to the model is the *nexus*, a metaphoric lens, where the paired and highly valued aims of learner-centeredness and patient-centeredness come together in academic and clinical realms. Learner-centeredness means focusing attention on the learning and the learner within the teaching-learning environment, rather than on the teacher and what is being taught.[52, 67] The nexus serves as an important bridge that facilitates the translation and transportation of the culture of excellence into the domain of praxis, where knowledge is transformed through action and interaction. The nexus is also a resource for developing true partnerships between academic and clinical sites where they come together for the important task of facilitating learning for practice through practice. We found evidence of this commitment to learner-centering and patient-centering in documents as well as what our participants said:

…you have a responsibility to the next generation of clinicians and to the patients that we treat. And the best way to ensure excellent patient care is to excellently train students in the clinic. And our organization and the different sites that we work with, I think helps toward our individual and group mission of providing the best possible patient care and outcomes that

we can. It's not just an individual treatment session but it is looking forward into the future–and the best way to ensure that is to train students in an excellent fashion in the clinic. So we take that mission, I think, very seriously. It is a responsibility that we all have. It informs our own practice. I think it makes our own professional life more of a rich experience. It pushes us in lots of different ways. (CLIN-1, Clinician)

Conceptual Model Dimension: Praxis of Learning

The praxis, or practice, of learning dimension of the model has 4 elements that represent the complex context of learning in professional education: (1) signature pedagogy, (2) practice-based learning, (3) creating adaptive learners, and (4) professional formation. Learning for practice through practice was a primary focus of curricula across all academic and clinical settings. The curricula were both enacted and embodied through interactions grounded in communities of practice.

Signature pedagogy. Signature pedagogy represents the characteristic form of teaching and learning in professional education.[1] While movement is readily embraced as central to the profession, there is a deeper meaning in the teaching of movement that is unique to the education of physical therapists. We observed a dominant and pervasive focus on *the human body as teacher*. We repeatedly observed teachers helping learners to focus on what they could learn through close attunement to the human body: what they could *see* about movement and function by close observation of the body; what they could *feel* about morphology and movement through their hands; and what they could *hear* about movement and function through close listening to their patients and what they said about their bodies. This signature pedagogy was evident whether the student is in the anatomy laboratory, learning in the musculoskeletal laboratory from his or her own body, working with a peer or instructor, or working with patients. In the following quote, a resident mentor describes her approach to helping a resident develop this keen sensitivity to movement through observation and touch of the body:

When she said, "I'm not seeing the breathing." It's learning [sic] your eye to look for timing, speed, change in movement, and then learning to be able to put your hands on them and feel it. That takes some time. A lot of times, we won't see it in the clinic, and then we'll take in a video of something. You can see it when you have no other information in your head and you can just focus on what you're looking at on the video. (ACAD-4, Resident Mentor)

One additional observation in this area that came as a surprise was that the use of language, key concepts, and other organizing elements for the role of movement in curricular design were diverse and variable.

Practice-based learning. We found that faculty and learners were frequently engaged in early, authentic situated learning experiences centered around patients that could occur in both academic and clinical settings. Five of our 6 academic programs had vibrant faculty clinical practices that supported teaching, clinical research, and residency education. Our sixth program had a robust, long-established interprofessional community outreach program and was working on building a faculty clinical practice. The value of learners' access to patients transcends the application of knowledge and skills. Through access to patients, learners are best able to experience the highly contextualized learning that occurs in a community of practice where patient care is central. This central focus on practice-based learning was also grounded in the use of evidence in driving practice across all sites:

I just talked to that professor. I stopped at that class and asked him if I could observe and he said "sure, no problem." It was wonderful because he knows what I'm learning. He knows my knowledge base and he welcomed me in… The other opportunity was to have currently practicing clinicians who are immediately accessible (working in the faculty practice) coming into the classroom to teach and using recent clinical examples… (ACAD-4, Students)

Having a diverse community of professional and post-professional learners (students, residents, graduate students, fellows) in both clinical and academic environments was seen as an important addition to the learning environment. The integration of learners at various levels provided a unique layering of teachers and learners and fostered opportunities for modeling and reciprocal teaching/learning at multiple levels:

Many of our students are teaching assistants so they bring to the entry-level program that perspective….the residency program has a role as well because they drive the quality of what we are doing in our practices. So residency programs are positive to the practices, they're positive to the clinicians because they are serving as mentors. They have to up their game. Our residents are also teaching in our program so they serve as exemplars …. (ACAD-5, Faculty)

Creating adaptive learners. The organizational focus on excellence and high expectations also provides the environment for creating adaptive learners. Adaptive learners are engaged in continuous learning; they have strong self-monitoring and assessment skills, seek out and embrace feedback, reflect on and learn from their experience, and incorporate new learning to be able to function in complex, uncertain, and novel situations.[67,68] We observed faculty promoting the developmental skills, attributes, and dispositions that characterize an adaptive learner, particularly by placing students early on in situations where they can safely struggle with the complexity and uncertainty of practice:

I'm in my first clinical rotation downstairs right now. It's the scariest most stressful and most rewarding thing I have ever done in my life. So I have a new patient every half hour which is exhilarating. It's as stressful as it is… it's also almost stress relieving that I know once I go out and do externships and clinical rotations at other sites, I'm going to feel so much more prepared for having made mistakes while I was here but also for having professors and clinical instructors who knew exactly what we had in classes so far, what we should be expected to know and how to go about expanding our knowledge base so that we could be evidence based practitioners as we go out into the workforce. (ACAD-1, Student)

An additional environmental affordance for the development of adaptive learners was the presence of teachers and

learners at multiple levels of professional and post-professional preparation, as described above in our discussion of practice-based learning. These individuals frequently exchanged feedback, engaged in mutual inquiry around challenging situations, and demonstrated reciprocal teaching and learning on a regular basis.

One non-observation in this realm was that while academic and clinical faculty demonstrated a basic understanding of the important aspects of the teaching and learning environment that facilitates the development of students' and residents' clinical reasoning skills, they did not all articulate or demonstrate a depth of understanding of the underlying pedagogical and critical learning concepts pertinent to most effectively creating adaptive learners.

Professional formation. There was strong evidence of a commitment to quality patient-centered care and the critical importance of our moral obligation to place patient and client needs ahead of personal needs. Patient primacy is a guiding force for decision making and taking action. We observed this commitment to patient primacy in faculty, clinicians, and students. An intentional focus on the development of professional identity and commitment to the profession was seen throughout our data:

…it's commitment to the profession…a commitment to go the extra mile, commitment to go for the patient, a commitment to search for evidence. I think too many times…I see so many clinicians just going through the motion to get in and out of that work day. I cringe. I am committed to the patient, I want to deliver the best care and I'm still doing my research for them. (ACAD-1, Clinician)

We also observed many instances of community-based activities; however, most of these were focused on how programs could meet curricular needs, rather than grounded in a deeper understanding of, and commitment to, meeting our professional obligation to address societal needs.

Conceptual Model Dimension: Organizational Structures and Resources
The final dimension in the model represents the organizational structures and resources supporting these programs. Within this section of the model are: (1) structures and models, (2) academic program size and resources, and (3) clinical education.

Structures and models. Among the academic sites, there were as many models of how the physical therapy program was organized within the institution as there were academic sites in our study. Also, there was no type of institution that had a monopoly on excellence. Thus, we concluded that the organizational structure and type of institution did not contribute to excellence, but rather it was the other elements of our model that led to excellence.

Academic program size and resources. The class sizes across our academic programs, which ranged from 55 to 94 students, were larger than the national average.[2] These larger class sizes provide the resources that the program needed to support faculty roles of research, teaching, service, and clinical care.

I believe strongly that size matters and it didn't matter 40 years ago…would have 4 or 5 or 6 faculty who could teach physical therapy because physical therapy was a reduced discipline. Nowadays, it's a complex discipline. I don't think you can teach physical therapy with a faculty of 6 people. … You can't just add more faculty and that automatically gives you better quality but I think the reverse—I don't think you can have a quality program and have a small faculty. I don't think it's possible anymore. (ACAD-5, Faculty)

The other essential element found in the academic sites was financial autonomy over revenue and expenses within the institution's overall financial system, whether a private or public institution.

(Public university) We actually proposed a budget with tuition which is no longer bound to [the] standard tuition rate of the university's graduate level and professional level tuition. We build in everything, so it has to be a self-sustaining program… (ACAD-6, Administrator)

Clinical education. We persistently investigated how clinical organizations assessed and managed the cost of clinical education and whether the participants saw any barriers to participation in clinical education. What we found is a mission-driven commitment to clinical education founded on a deep commitment to preparing the next generation of physical therapists. The most common cost-benefit analysis of clinical education was more qualitative than quantitative and considered a range of tangible and intangible benefits, such as recruitment, development, and retention.

It's been years since we've had any issues with staffing and recruitment because of our strong student program. …. We talked earlier that many of our students become our employees. Right there you have the benefit of not spending lots of time and energy on recruitment, on orientation. We feel like we have this built in flow of employees coming from students to becoming our employees. That's a huge cost savings. (CLIN-4, Administrator)

The clinical agencies did focus on their financial status, but without exception, they did not have evidence suggesting the clinical education program negatively affected their financial performance. One clinical site developed a financial model for the cost of their clinical education and residency programs. When they tested that model, they found that these programs had a neutral to positive effect on their financial performance.

The clinical agencies most often used team-based methods to manage the cost of clinical education and therapist productivity. Commonly, they considered the student and clinical instructor as one unit for the purpose of measuring productivity and they examined the productivity of the larger physical therapy team of which the student and CI were members as the other unit of analysis. They monitored productivity over longer periods of time versus on a daily basis.

From an administrative perspective, because we have such excellent clinicians the productivity dip that may occur in the initial phase of having someone who is taking more time to understand what's going on is really not so apparent, because it's the excellence that comes out of that in the end is really so worthwhile that it's compensated for in a lot of different ways. (CLIN-1, Administrator)

Discussion

This qualitative investigation builds on the larger body of research from the Carnegie Foundation for the Advancement of Teaching.[44-48] Our focus was on exploration and interpretation of factors that contribute to excellence and innovation in physical therapist education. The Results section provided evidence in support of the 3 dimensions and 8 elements of the conceptual framework (Fig.). Here we interpret our most significant findings in the context of the Carnegie studies and health professions education. Consistent with the disseminated findings from the Carnegie studies,[44-48] we also propose a number of recommendations and policy suggestions for transformational reform of physical therapist education reported in "National Study of Excellence and Innovation in Physical Therapist Education: Part 2—A Call for Reform."[69]

Culture of Excellence: People Matter

The culture of organizations in which physical therapist education occurs, including the beliefs and values, the leadership, the drive for excellence, and the partnerships that they develop, provided an important foundation for achieving excellence in learning for practice. Across all sites, we observed the presence of leaders who were visionary risk takers, adept at systems thinking, and able to create an organizational culture grounded in the core values of trust, mutual respect, and collaboration. These leaders created collaborative teams using shared leadership models that extended across the academic and clinical environments. These leaders were skilled at leveraging the organization's mission to simultaneously advance the program's and the profession's goals, and fulfilling their responsibilities to the institution and society. Continuous improvement was not just a slogan but a reality where current practices were consistently questioned, innovation and change were valued, and continuous learning for quality performance and outcomes was expected.

The critical importance of having examples of inspiring leadership was also a key finding in Carnegie's medical education study.[48, 68] These findings are consistent with those from literature on leadership in higher education that emphasizes the importance of context, mutual power, collaboration among groups, and focus on learning and change.[70] Our findings are also supported by the literature on the conditions that drive shared leadership and teamwork, such as the need for high levels of coordination and cooperation, collaboration across multiple locations, the complexity of information, and the preponderance of competing priorities.[71]

The 5 ingredients necessary for successful transformative change in medical education identified in that Carnegie study, with one exception, appear to be consistent with several of our key findings: 1) effective leaders and productive teams, 2) an institutional culture of creativity, inquiry, and continuous improvement, 3) an organizational structure that promotes action, discipline, and innovation (high expectations), 4) educational resources and support services to fuel innovation and excellence, and 5) academic communities that advance the scholarship of teaching and learning.[72] We did not observe consistent efforts to support the scholarship of teaching and learning. The absence of education research and importance of filling this void if physical therapist education is to excel has been advanced by us and others.[26,38,39]

The Nexus: A Non-Negotiable Element for Excellence

Our most powerful finding was the centrality of learner-centered and patient-centered values and focus that was shared across academic and clinical sites. This finding emphasizes the critical interdependence between the academic and clinical worlds built on a true partnership with the shared elements of excellence and innovation regardless of the setting. By placing learners and patients at the center in all learning environments, this nexus forms the lens through which a culture of excellence is translated into the dimension of the praxis of learning. Although one would suspect that academic environments are more learner centered, we found an intentional focus on patient-centered care that was ubiq-uitous and central to the curriculum and the learning environments. In clinical environments, where patient care is central, there is also a robust commitment to learning, learners, and preparation of the next generation of professionals. Our findings that learning opportunities embedded in the complex community of practice are a foundational element of excellence are supported by other research.[44-48,51,52] The importance of patient-centeredness is further emphasized by the Triple Aim,[4] and both patient-centeredness and learner-centeredness are critical elements of the Interprofessional Education Collaborative core competencies[73] and the recommendations for educating health professionals to address the social determinants of health from the Global Forum on Innovation in Health Professions Education.[74]

Learning for practice through practice cannot take place without collaboration between academic and clinical worlds. We did not find a single type of structure for these partnerships. Instead, what is essential to successful partnerships is that clinicians are not only valued colleagues, they are integral, necessary partners who contribute to all aspects of the academic program, from curriculum design to clinical research to teaching. Also, these partnerships provide academic faculty with authentic, frequent clinical practice and teaching opportunities that contribute to establishing the bridge between pedagogies of the clinic with those of the classroom and laboratory. There were many examples of how these partnerships were manifest, such as faculty practices with residencies and fellowships that also served as a site for clinical education for professional students, and cooperative residencies between clinical sites and academic programs. Equally important to these partnerships were examples where faculty, clinicians, students, and residents shared and used information to guide student learning in both settings as well as to inform curriculum and teaching and learning in the classroom, lab, and clinic.

Learning for Praxis: The Profession Has Much to Learn

The Carnegie framework focused on the 3 formative apprenticeships of

professional education, cognitive apprenticeship (habits of head), skills-based apprenticeship (habits of hand), and professional formation (habits of heart),[1,50] informed interpretation of our findings. This framework allows a normative comparison of professional education across the professions as well as a means to identify the strengths and shortcomings within a profession.[49,50] The 3-apprenticeship framework provides a higher-level, integrated model for analysis of professional education than one that focuses on curricular threads or competencies. Reductionist, hierarchical approaches, such as those that rely on simple-to-complex models, or that fail to provide the learner with the ability to identify the salience of the entirety of the clinical encounter by emphasizing a particular component, are not as likely to produce practitioners who can excel in the complexity of current clinical practice.[47,48] Our findings relative to the preparation of physical therapists within the 3 apprenticeships most closely resembled findings from nursing and medicine.[47,48] In these 3 health care disciplines, with their preponderance of immersive clinical learning experiences in which students enact their professional responsibility and develop their professional identity,[49] students rapidly grasp the importance of patient-centered care and the fiduciary responsibility they have for putting the patient's needs ahead of their own. That moral foundation of practice of the third apprenticeship (habits of heart) provides the essential link through which learning in the other 2 apprenticeships fulfills their importance in practice. In our study, all sites demonstrated a keen commitment to develop professionalism and a strong sense of professional identity in students. While examples of learning experiences that focused on the profession's interaction with the community were evident, they were not prevalent, nor did we observe an explicit philosophical commitment to the profession's non-negotiable broader social responsibility. Our findings were similar to the other Carnegie studies in that both professional formation and the ethical foundation of practice and professional commitments in society were of limited scope.[47-49]

Consistent with the Carnegie studies, we set out to identify a signature pedagogy, those learning and educational practices that might be unique to the discipline.[1] A signature pedagogy is the characteristic form of teaching and learning to prepare practitioners for the particular profession.[1] Shulman argues that signature pedagogies are important because they are pervasive and represent all 3 dimensions of professional work—to think, to perform, and to act with integrity.[1] For example, bedside teaching is the signature pedagogy in medicine,[48] the Socratic method in law,[45] and coaching for a sense of salience in nursing.[47] While movement is central to the work of physical therapist and is essential content in teaching, a signature pedagogy is more than a dominant observable characteristic of the discipline. We propose that the use of the *human body as teacher*, as a vehicle for learning, is the profession's signature pedagogy. Whenever and wherever we observed learning for practice, we observed teachers and learners in intimate relationship with the human body as the vehicle for learning. Physical therapy must begin research into its signature pedagogy to provide the profession with a deeper understanding of the fundamental ways in which we prepare physical therapists if we are to advance excellence in education and practice throughout the profession.

We observed academic and clinical faculty who intentionally created learning experiences that develop adaptive learners[67,68] who, because of their drive to learn, can succeed in the uncertainty and unfamiliarity of clinical practice. For example, we observed learners engaged in complex situations where the learning outcomes were clear, but without explicit paths to those outcomes; where they had to struggle to assemble learning experiences from several venues; where beginning learners and advanced learners were in the same learning environment.

A criticism across all of the professions that were part of the Carnegie studies was a lack of educational practices that address the important goal of preparing lifelong learners.[49] Similar to the findings from the other Carnegie studies,

while we heard about a commitment to developing lifelong learners, we did not observe explicit commitments among faculty members that uniformly foster the "…curiosity and deep commitment to the profession's aims and methods to propel students onto a path of continuing, self-directed improvement" that are critical elements of professional formation.[49(p412)] Medical education is placing an intentional focus on developing the adaptive learner where self-directed lifelong learning and learner-centeredness are both seen as essential.[67,68]

We observed academic and clinical faculty facilitating the development of students' clinical reasoning abilities but, similar to findings from other research, they did not make the clinical reasoning model explicit.[47,75-77] We also observed educators using and applying teaching and learning concepts that are essential to robust learning. However, we did not consistently observe faculty with a widely held, deep understanding of learning science and theory that they applied to teaching, learning, and assessment of performance. We also did not observe teachers and leaders who explicitly applied the linkages between the 3 apprenticeships or approaches that develop adaptive learners with a lifelong deep commitment to the profession and their ongoing development.[49,78] The transformation of physical therapist education requires that faculty obtain a deep understanding of the application of learning theory to teaching and learning in physical therapist education. It also requires that we develop a robust body of evidence in the learning sciences through the rigorous, disseminated scholarly work of education researchers.

Organizational Structures: Leveraging Collaboration and Partnership to Create Trustee Institutions

We found that there was no one organizational structure or curricular model that led to excellence, although we observed educators who shared similar visions, expectations, and attributes across their varied teaching and learning environments. Colby and Sullivan[49] advocate that professional education has significant power to influence both

the quality and public perception of the professions. A recommendation from the Carnegie studies was that professional schools, along with accrediting and licensing bodies, the professional association, and academies, ought to become *trustee institutions*, who collectively assume responsibility for the integrity of the profession, protecting it from the whims of market forces and to fulfill the profession's public purpose.[50] We found that partnerships between our academic and clinical sites were essential but need to be stronger to create such trustee institutions with shared responsibility and vision. The collaboration among the key stakeholder institutions is increasing with the formation of ACAPT, the Education Leadership Partnership of APTA, ACAPT, and the Education Section, along with their relationships with the Commission on Accreditation of Physical Therapist Education (CAPTE) and the Federation of State Boards of Physical Therapy (FS-BPT). These entities have a greater potential to assert their shared mission to achieve excellence in professional education, when working collectively.

Limitations

Our sample was small, representing 6 academic institutions and 5 clinical organizations, but was consistent with the other Carnegie studies, which had a similar purpose.[44-48] Consistent with qualitative research, our sample selection was purposeful and represented institutional and geographic diversity. We implemented a nationwide nomination process for both our academic and clinical sites. While we issued 2 calls for nominations, our responses for both nomination processes could have been more robust. The Carnegie studies had research teams with disciplinary diversity, including members of the profession being studied, education researchers, and educational psychologists. Our team included only physical therapists, which could limit us in our ability to see beyond the profession. Our use of external consultants outside of the profession was one strategy we used to help address our potential professional bias.

Our conceptual model of excellence and innovation in physical therapist education builds on existing research across professions and data from our study. We have substantial triangulation of findings through the use of multiple researchers, methods, sites, and informants. Consistent with grounded theory work, the model provides others opportunities to investigate targeted dimensions and elements of the model with other sites and participants as well as continued work to refine the model.

Conclusion

This national study of excellence in physical therapist education provides the profession with its first insight into education since the Worthingham studies over 50 years ago.[13-19] Consistent with qualitative research, our intent was to conduct an in-depth study with a relatively small sample of academic and clinical sites that demonstrated attributes of excellence and innovation. Building on the work of the Carnegie Foundation for the Advancement of Teaching's Preparation for the Professions Program, we developed a conceptual model representing the dimensions and elements of excellence in physical therapist education. Recommendations and action items arising from our findings are reported in "National Study of Excellence and Innovation in Physical Therapist Education: Part 2—A Call for Reform."[69]

The model is centered on the foundational importance of a shared partnership between academic and clinical organizations. While we found several examples of teaching strategies essential for creating adaptive learners, faculty understanding of the learning sciences and theory is weak, including strategies for developing clinical reasoning abilities. The profession would not be well served by centering on one organizational or curricular model as essential for excellence but would be better served with continued educational research investigating the elements in our model. Our conceptual model is a beginning point for the profession, as further work is needed to explore the elements that comprise the 3 dimensions of the model: culture of excellence, praxis of learning, and organizational structures and resources. Such investigation will move the profession and physical therapist education closer to excellence.

Excellence and Innovation in Physical Therapist Education: Part 1

Board of Directors from 2007 to 2016, serving as vice speaker of the House of Delegates and as secretary.

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Appendix 1.
Description of the Development and Implementation of a National Call for Participants for the Study "Physical Therapist Education for the 21st Century: Excellence and Innovation in Physical Therapist Academic and Clinical Education."

Timeframe	Activity and Key Stakeholders
2008–2010	• Initial conceptualization of study • Development of preliminary site inclusion criteria. Final criteria developed based on review of literature and Carnegie Preparation for the Professions studies, recommendations from academic and clinical educators at APTA Educational Leadership Conference, Advisory Board[a] review and input (Tab. 2 lists final criteria) • APTA request for proposal issued • Grant proposal submitted
2011	• Grant awarded—initial APTA funding received • First call for nominations; call distributed via list-servs, e-mail, newsletters, or direct mail to the following stakeholders: program directors of CAPTE accredited physical therapist education programs in the US; directors of clinical education/academic coordinators of clinical education at the same accredited programs; clinical education sites that had completed the APTA Clinical Site Information form and met additional criteria;[b] directors of all residency programs approved by the American Board of Physical Therapy Residency and Fellowship Education (ABPTRFE); members of the American Council of Academic Physical Therapy (ACAPT); and members of multiple APTA Component Sections[c]
2012	• Review of nomination materials and selection of initial 2 sites (1 academic, 1 clinical) • Additional APTA funding sought and received to expand sample • Selection of 2 additional sites (1 academic, 1 clinical) • Initiate site visits
2013	• Additional funding sought and received (APTA, APTA Education Section, ACAPT, APTA Orthopaedic Section) to further expand sample size • Second call for nominations • Review of nomination materials and selection of 7 additional sites (4 academic, 3 clinical) • Continue site visits
2014	• Continue and conclude site visits

[a]Advisory Board members were leaders/representatives from several stakeholder groups: American Physical Therapy Association (APTA); American Council of Academic Physical Therapy (ACAPT); APTA Education Section; Federation of State Boards of Physical Therapy (FSBPT); and the Foundation for Physical Therapy. Additional input was sought from our educational research consultants and representatives from the Commission on Accreditation for Physical Therapy Education (CAPTE).
[b]Criteria for clinical site inclusion were sites that affiliated with 4 or more educational programs, and had at least one APTA Credentialed Clinical Instructor (CI) and at least one board-certified clinical specialist.
[c]APTA Component Sections included: Acute Care, Cardiovascular and Pulmonary, Clinical Electrophysiology and Wound Management, Education, Federal, Geriatrics, Hand and Upper Extremity, Health Policy and Administration, Home Health, Oncology, Orthopaedics, Pediatrics, Private Practice, Research, and Sports.

Appendix 2.
General Structure of the 2-Day Site Visits Conducted by the Research Team[a]

DAY 1		
Activity	**Brief Description**	**Participants/Venue**
Orientation and overview meeting	Introductions, overview of study background and purpose, large focus group interview	Research team and participants
Individual and focus group interviews	Description of purpose, consent procedures, interview	Academic and clinical faculty; administrators, directors, managers, coordinators; students (years 1, 2, 3); residents; resident mentors
Field observations and debriefings	Description of purpose, consent procedures with key informants, observation, debriefing interview	Classrooms: entire lecture or laboratory sessions; clinics: selected patient encounters—clinical instructors/students or interns, residents, and resident mentors
Research team debriefing	Summary of Day 1: reflections; preparation, and planning for Day 2	Investigators
DAY 2		
Individual and focus group interviews	Description of purpose, consent procedures, interview	Academic and clinical faculty; administrators, directors, managers, coordinators; students (years 1, 2, 3); residents; resident mentors
Field observations and debriefings	Description of purpose, consent procedures with key informants, observation, debriefing interview	Classrooms: entire lecture or laboratory sessions; clinics: selected patient encounters—clinical instructors/students or interns, residents, and resident mentors
Closure meeting	Concluding remarks and questions	Research team and participants
Research team debriefing	Summary of Day 2; concluding reflections	Investigators

[a]Specific schedule for each visit was developed in collaboration with coordinators and participants at sites according to the type of visit (academic institution or clinical agency). Responsibilities for data collection tasks during the visits were distributed across the team of 5 investigators.