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Implementing a Paradigm Shift: Incorporating Pain Management Competencies into Pre-Licensure Curricula

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Abstract

Objective

The purpose of this article is 1) to present the historical context and rationale for competency-based pain management education; and 2) to suggest learning tools that faculty might apply into their teachings and their institutions' pre-licensure curricula for promoting conceptual learning based on competency-based pain management education.

Design

Based on the well-documented need to improve the competency of health care professionals in pain assessment and management, [1-3] an interprofessional group of health care providers collaborated and then convened in August 2012, to develop Core Competencies for Pain Management for the pre-licensure programs of study across health care disciplines. This interprofessional group of pain educators achieved consensus on a common set of pain-related competencies[5] intended to be implemented across a variety of pre-licensure professional programs.

Setting

A group of the interprofessional faculty, who participated in the development of the Core Competencies for Pain Management, provide a follow up of how to implement learning tools within teaching and curricula, based on competency education in pre-licensure health care.

Results

Broad questions about how to incorporate competencies into pre-licensure curricula, for all

health provider pre-licensure programs, including how to assess competency across individuals and how to teach in ways that emphasize the demonstration of conceptual learning, remain unanswered. This article reviews how the use of competencies creates historical context for a shift from teaching to learning and concludes with suggestions and exemplars in applying Core Competencies for Pain Management in pre-licensure programs.

Introduction

Pre-licensure programs designed to educate aspiring health care providers recognize the importance of students' learning to assess and manage pain. However, traditionally, pain management for beginning practitioners was conceptualized as a knowledge-based content category rather than as a set of learned competencies in which students must demonstrate proficiency. Therefore, pain management often is embedded across a curriculum of study using only knowledge-based testing, thus not assessing competency. Testing for knowledge about how to manage pain is not the same as being able to demonstrate competency in pain management. Professional competencies in health care are defined as the integrated enactment of knowledge, skills, and values/attitudes that embody the domains of practice of a particular health profession applied in specific care contexts (Core Competencies for Interprofessional Collaborative Practice Report, 2011).[50] The purpose of this article is two-fold: 1) to present the historical context and rationale for competency-based education; and 2) to suggest learning tools that faculty might apply into their teaching and their institutions' curricula for promoting and assessing conceptual learning based on Core Competencies for Pain Management.

Post Modern History of Competence and Performance

Cultural assumptions about the role of the educator and the student have changed since the 1950's. During the 1950's, and the next several decades, two major educational beliefs provided

the basis for most education: behaviorist beliefs and the belief that performance equals competence. The first belief was that a set of behaviorist methods (e.g., Skinner[6, 7]) exists where performance equals imitation. If students repeat the teacher's presented knowledge or modeled demonstration of skills, then the students were determined to "show competence." Skinner's theory supported the beliefs that all knowledge and skills can be taught through repetitions, models, or imitations. In essence, student learning was a mirror of teaching. In contrast, Chomsky[8] philosophically suggested that all humans have an innate competence. This innate competence can be assessed through performance.

The education field combined Skinner's methodology and Chomsky's philosophy which supported the belief that testing students' imitated knowledge and performance of skills would represent students' competence or their innate ability to learn.[9] Curricula were developed that consisted of objectives with lessons arranged in a stair-step hierarchy of curriculum difficulty.[11] This approach purported that the better the lessons were sequenced, the easier it was for students to provide the expected outcome (demonstrated acquired skill and knowledge); and, the easier it was for the faculty members to test the students' performances. Instructors across disciplines focused on teaching methodologies and curricula content rather than on learners' needs.

Under this paradigm, struggling students were viewed as needing more "practice". To provide this additional practice, struggling students were assisted by breaking expected knowledge and skills into smaller parts followed by more practice. For example, students in labs might have study sessions or additional handouts; teachers gave students copies of their notes or posted power point slides before class or after class. Faculty would set up weekly study sessions for students, with additional time to practice imitated psychomotor tasks in labs. Closer to exam

time, faculty would increase office hours in which they would re-teach the same knowledge and skills in the same way, and offer practice with old exams. However, focus on re-teaching did not improve the performance for all students, nor did this type of practice insure competence in healthcare practice

By the 1990's; educators, employers, and the public-at-large were demanding that students be better prepared to succeed in their real-world tasks. This demand for improved clinical practice was initially addressed by the development of numerous taxonomies to emphasize teaching differently for differences in learning, learning styles, individual learning intelligences, and differences in cognitive styles. Eventually, these taxonomies about differences yielded to examining ways to assess competence, not as a mirror of an imitated performance but as an expected set of outcomes. Various curricula and teaching methods were designed to broadly apply to all students' needs and to meet workplace expectations by assessing competence.[14]

Educators diligently worked to create curricula that fostered breadth of performance and depth of skill competence. Breadth of performance was achieved by distributing comprehensive content across levels or coursework to allow for adequate student practice, which educators believed would, over time, allow for a depth of competence.[15] For example, basic biology would be followed by advanced biology. Biochemistry would follow basic chemistry and so forth. Professional organizations called for standardized measures of student knowledge and skills that would demonstrate levels of performance that would equal expected clinical competence.

By the 21st century, many disciplines realized that the teaching and mirrored testing to measure student content knowledge did not assure clinical or professional competence. The Joint Commission recognized that despite 20 years of work by educators, clinicians, and professional

organizations, there were "modest" improvement in the clinician's ability to manage pain.[16] For example, a report on medical schools[56] shows that few have a pain curriculum.[56] According to The Joint Commission, pain-related performance in clinical settings was suboptimal and needed improvement. This assessment outcome demanded that institutions who educate health care providers undertake another educational paradigm shift[17] to accommodate for clinical competence.

The educational paradigm shift has two primary foci of change: 1) shift the emphasis of teaching to an emphasis on conceptual learning[18]; 2) move away from modeling and memorizing parts to a whole concept-based assessment of "why" and "how" to manage client situations.

Shift from Teaching to Learning

This paradigm shift in pain management education suggests that teaching methods have to consider how learners acquire concepts; and, ways to assess conceptual understanding have to be developed. In other words, this new paradigm for "practice education[19]" focuses on the complex nature of conceptualizing. The term "practice" in this case means application of knowledge and skills in real client situations, not imitation or knowing what to based only on the rules of best practice. This complexity of focusing on pain management concepts for pre-licensure education necessitates a collaborative-interprofessional approach[20] much like what the Expert Summit for Interprofessional Consensus on Pain Management created[21] in order to focus on the breadth and depth of competence clinical practice.[22] Table 1 provides a summary of those Pain Management Core Competencies.

DOMAIN	COMPETENCIES
Domain One. Multidimensional Nature of Pain: What is Pain? This domain focuses on the fundamental	Explain the complex, multidimensional and individual-specific nature of pain. Present theories and science for understanding pain. Define terminology for describing pain and

concepts of pain including the science, nomenclature, and experience of pain, and pain's impact on the individual and society.	associated conditions. Describe the impact of pain on society. Explain how cultural, institutional, societal and regulatory influences affect assessment and management of pain.
Domain Two. Pain Assessment and Measurement: How is Pain Recognized? This domain is related to how pain is assessed, quantified, and communicated, in addition to how the individual, the health system, and society affect these activities.	Use valid and reliable tools for measuring pain and associated symptoms to assess and reassess related outcomes as appropriate for the clinical context and population. Describe patient, provider, and system factors that can facilitate or interfere with effective pain assessment and management. Assess patient preferences and values to determine pain-related goals and priorities. Demonstrate empathic and compassionate communication during pain assessment.
Domain Three. Management of Pain: How is Pain Relieved? This domain focuses on collaborative approaches to decision-making, diversity of treatment options, the importance of patient agency, risk management, flexibility in care, and treatment based on appropriate understanding of the clinical condition.	Demonstrate the inclusion of patient and others as appropriate, in the education and shared decision-making process for pain care. Identify pain treatment options that can be accessed in a comprehensive pain management plain. Explain how health promotion and self-management strategies are important to the management of pain. Develop a pain treatment plan based on benefits and risks of available treatments. Monitor effects of pain management approaches to adjust the plan of care as needed. Differentiate physical dependence, substance use disorder, misuse, tolerance, addiction, and non-adherence and how these conditions impact pain and function. Develop a treatment plan that takes into account the differences between acute pain, acute-on-chronic pain, chronic/persistent pain, and pain at end of life.
Domain Four. Clinical Conditions: How Does Context Influence Pain Management? This domain focuses on the role of the clinician in the application of the competencies developed in domains 1-3 and in the context of varied patient populations, settings, and care teams.	Describe the unique pain assessment and management needs of special populations. Explain how to assess and manage pain across setting and transitions of care. Describe the role, scope of practice, and contribution of the different professions within a pain management care team. Implement an individualized pain management plan that integrates the perspectives of patients, their social support systems and health care providers in the context of available resources. Describe the role of the clinician as an advocate in assessing patients to

	meet treatment goals.

Table 1. Pain Management Domains and Core Competencies.[1]

The Pain Management Core Competencies were developed based on increasing conceptual learning, not on measuring imitation and performance of skills. The following section offers interprofessional health care providers some learning tools for integrating these Pain Management Core Competencies into curricula, teaching, and assessment.

Application of Competency-Based Education Relative to Pain Management

Literature from what is known about the neuroscience of the learner, the cognitive psychology of the thinker, and the use of language to name the thinking provides principles and tools for shifting the educational paradigm of teaching to learning; from testing memorized parts of knowledge and skills to assessing the learner's understanding of concepts; and, from performance to concept acquisition or "thinking" in the way that learners acquire concepts. Specifically, the integration of this literature from multiple professions highlights learning principles[23] that are essential in understanding how learners acquire concepts. Two of the most important acquisition principles are as follows: 1) Students learn concepts in relationship to each other so providing multiple opportunities for learners to overlap connections between and among concepts leads to better depth of understanding and therefore higher competence; and, 2) Most learners think with a visual meta-cognition so learning concepts through an integration of the use of visual concepts creates improved visual "mental" thinking or meta-cognition. Each of these principles will be addressed in relationship to incorporating the Pain Management Core Competencies in pre-licensure curricula.

Learning Concepts in Relationship to Other Concepts

Connecting the literature about cognitive psychology with language and neuroscience provides knowledge about how to design learning opportunities for most students[4]. For example,

Domain 1 of the Core Competencies (Table One) is primarily knowledge-based requiring the learning of foundational concepts of pain management. These concepts can be aligned with course objectives and incorporated across the coursework. In this way, learners are provided access to the same foundational concepts interconnected across multiple course experiences. This type of conceptual learning increases student performance on complex patient types of test questions which assess conceptual learning.[24] To assess for competence of complex patient needs, an understanding of the levels of cognitive development is important. For example, the understanding of what the *learner* knows or can see and touch is preoperational at best. Whereas understanding what *others* have rules about is concrete; and, the understanding of complex concepts from *others' perspectives* which cannot be seen or touched is formal.[23]

Using these levels of understanding lead to better conceptual assessments and models such as the SIMBaLL (Simulation Based on Language Learning)[26] designed to provide a foundational place for considering how to turn simulations and other clinical activities into conceptual learning opportunities. Conceptual learning increases in depth as learners or students add more meaning by participating in carefully crafter assignments that layer and overlap concepts. Therefore, multiple experiences with the same concepts increase students' understanding which also increases students' levels of conceptualization. As students increase their conceptual understanding, their abilities to perform at higher levels of competence also increase. So, the Domains of Pain Management show this increasing level of conceptualization starting with the foundational concepts in Domain One, multi-dimensional nature of pain, and finishing with the applied complex concepts of pain management in Domain Four.

For conceptual learning and competence at the formal level to occur at Domain Four, multiple layers of conceptual experience are required by the learner. For example, clinicians are

expected to build client relationships based on "trust, effective communication, mutual understanding, compassion, empathy, and respect." These types of concepts cannot be touched, seen or felt by the learner; therefore, these concepts require multiple layers of integrating and connecting thinking experiences to be acquired in clinical practice, which is at a formal level of knowledge. For example, a program might delineate what is meant by "effective communication" and require inclusion of those elements across multiple field experiences or multiple real time drawings (see following section on visual meta-cognition) to layer concept depth of "effective communication" and therefore an increase in understanding.

The formal concept of "effective communication" is acquired through scaffolds of joint activities between the person managing the pain and the patients with meaning being assigned and refined. For example, during a high fidelity simulation of client pain management, a student notices that the patient who had a knee replacement is moaning and appears to be in pain, so the student might ask if the client is experiencing pain and ask the patient to rate the pain using a pain scale of 0-10. The student is making an assumption that the pain is from the surgery. The student then leaves to get the prn pain medication to manage the client's pain. This act does not mean that the student understands why this client is having pain at that specific time. For this particular patient, the pain is related to a blood clot and not from surgery. [25] The student's thinking is valuable in assessing at what level the student is able to clinically practice. A follow up debriefing session; or, better yet, a follow up written explanation for why the student did not explore duration, type, and location of pain provides a better understanding of the student's level of conceptual thought. The student's thinking also requires feedback and refinement by the instructor to increase the student's conceptual learning. By using these types of clinical experiences across the curriculum, with adequate

effective feedback, students are able to reach competence within Domain 4 of the Pain Competencies.

Clinical activities such as high and low fidelity simulations may offer additional benefits to the learner's acquisition of higher conceptual thinking. Fidelity refers to the ability of the simulation to portray the clinical environment[52] or real life situation.[54] High fidelity simulation may include actors, standardized patients (SPs) who follow a script or variations of computer-programmed mannequins that create hemodynamic variables for learners to respond; whereas low fidelity simulation may be the use of task managers or static mannequins that replicate anatomical areas of the body but have no interactive computer functions[55] For example, the use of SPs using pre-established scripts and with prior training in depicting a particular clinical situation may be ideal for the assessment of foundational competencies in pain management[31] such as history taking, physical examination, and initial patient assessment.[32] Communication, including non-verbal cues that add to the clinical interaction between a patient and clinician, has been successfully assessed using SPs[33-34] to further increase the complexity of concepts assessed.

Feedback to the student is necessary to refine the student's thinking in these clinical situations. As the concepts increase in complexity, assessment of particular challenges in communication regarding pain care may include difficult conversations regarding opioid medications or treatment compliance that may be best suited to practice in a simulated patient encounter prior to those interactions in practice.[35-37] It should be noted however that the practicing of a skill set or task does not assess for conceptual learning. Again, it is important to ask students to reflect in writing after the simulation in order to assess the student's rationale and thinking or conceptual learning. Furthermore, a debriefing session with the

instructor and students with/without the SP allows for discussion to refine the students' conceptual understandings of the clinical case. However, without these written assessments, the instructor may not know what the student actually understands. Clinical simulations using SPs that arrange concepts from easy psychomotor tasks to difficult concepts, such as clinical situations that rely on formal concepts such as "empathy and compassion," may provide ideal opportunities to assess the learner's competence of understanding the complex issues of those who suffer from acute and chronic pain.

Not only can basic science concepts be assessed using human-like simulations, clinical concepts can also be assessed effectively.[38-39] Mannequin based simulation may solidify an emotional component to learning memory without the added risks. For example, if a student experiences a situation that creates a potent memory and emotional experience, such as a difficult patient encounter or adverse event, that individual is able to recall the memory more readily because the student will often assign meaning with language. Language connects multiple access points of the brain for better conceptual learning.[23] However, conceptual learning is rooted in personal experience, and is therefore unique and cannot be controlled for assessment of clinical competence, and, may also carry clinical risk to the patient. Creating a realistic, yet artificial, experience through simulation may help create the emotional memory without the risks to the patient or provider. SPs and high, and/or mid-fidelity, mannequin based simulation has been shown to be effective in the teaching and retention of clinical skills. [40-43]

Other benefits to utilizing both SPs and mannequin based simulation, for assessment of competencies and learning of more complex concepts, include the use of digital recording that can be reviewed at a later time for feedback, for immediate feedback during a debriefing session, self-assessment, teaching of teamwork, [44] providing the same standardized experience

to multiple learners, evaluating by the SP, adapt to different learner levels or experiences,[45] and emphasizing individual responsibility. The use of SPs may be limited to larger resource areas that are able to fund and support a simulation program based on trained and paid actors, facilities to house such resources, and employ trained staff to create case studies and debrief properly. The associated costs and time intensive nature of SPs may limit its routine use in a variety of educational settings.

Mannequin based simulation has similar costs but with the added issue of the equipment purchase and maintenance. Other disadvantages of simulation, in general, include inability to replicate physical exam findings, dependence on realism, and reliance on the buy in of the learner.[46] Lastly, technical (checklists of tasks completed) and non-technical tools (scales assessing leadership, communication, etc.) have been developed to assess student performance in simulation, but whether that translates into improved clinical care or patient safety is not yet fully known.[46-48] Simulation is not a replacement for teaching through patient encounters and mentorship by experienced clinicians, but may add an opportunity to refine, assess, and evaluate learners' conceptualizations of performance and therefore help provide for continuous refinement of clinical competence. The real issue is that for complex pain management concepts to be acquired, and used, in safe clinical practice, the concepts must be interconnected over time through multiple experiences to be learned and demonstrated at a concrete or formal level of competence. The previous section dealt with the conceptual learning and assessment of concepts specific to the pain core competencies listed within Domains 1-4. This next section deals with how learners acquire these pain management concepts.

Visual Meta-Cognition

Since the majority of learners think with a visual-metacognition[23], it is important that foundational as well as complex concepts about pain management are acquired as mental graphics that are interconnected in the learner's brain for long term retention to be recalled for later clinical applications. For example, one of the authors, Dr. Joanna Rowe, draws out concepts in real time so that students are able to see the thinking that goes with her spoken language. She no longer has to provide numerous outside opportunities to memorize material (study sessions, power point slides, her lecture notes, etc.) as the students are taking their own visual notes[53] which means they are using their own thinking and overlapping their visuals with the professor's visuals to create the layers of depth for higher order thinking. Drawing in real time by the professor with students drawing their notes provides for better conceptual learning. Figure 1 provides an example of what the real time drawing for a session on pain related to sickle cell might look like at the end of a class.

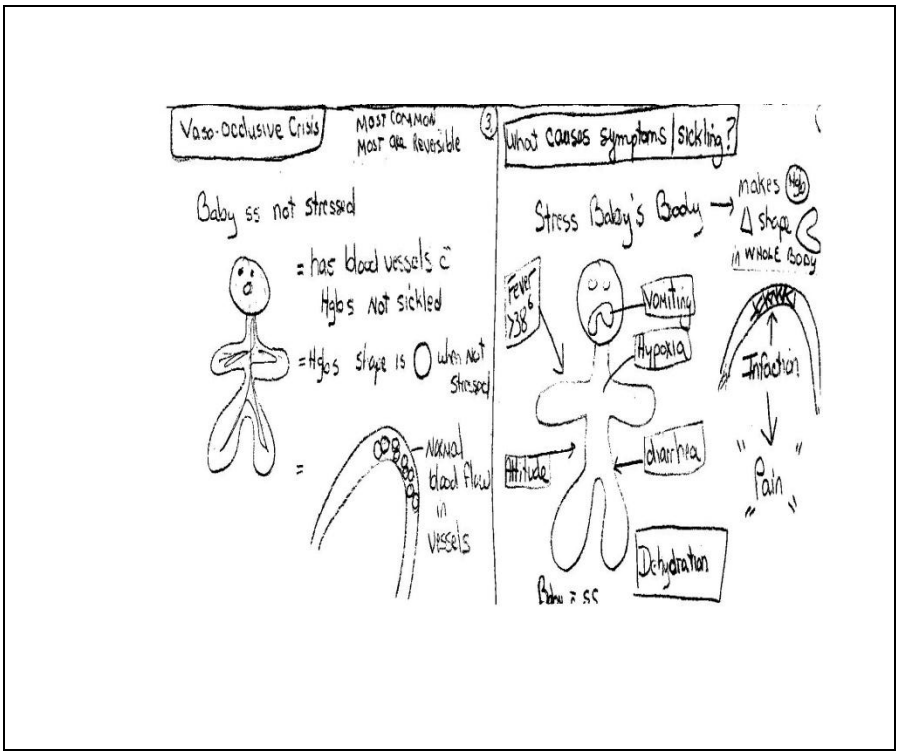

Figure 1. Drawing concepts in real time.

Since, most thinkers use a visual way of accessing their thinking; educators need to provide visual ways of presenting ideas[23.] Notice in Figure 1 that the concepts are connected with arrows and that drawn pictures or concepts connected to written language make real time connections between ideas the instructor is presenting and what students already know.

The learner's achievement of conceptual goals can be complicated by the complex nature of pain itself, a syndrome with psychosocial and spiritual aspects along with a biological or physiological basis. It should be noted that these types of concepts may also be drawn in real time so that learners are able to make mental graphics that connect philosophies with practices with goals of patients. Follow-up questions that are scaffolded or layered across examples create multiple opportunities for learners to acquire these complex concepts, such as the traits of an effective physician-patient relationship in the setting of acute and chronic pain.

Domains 2 and 3 of the Core Pain Management Competencies, in particular, require learners to assess patient preferences, demonstrate empathetic and compassionate care, demonstrate the inclusion of the patient and other significant individuals in pain care decisions, and assess for adverse events, such as addiction and misuse of medications. These particular concepts are not easily testable in a classroom or routinely assessed in a clinical setting. Instructors must use other, non-traditional, methods to ensure accomplishment of these core competencies critical to an effective and comprehensive patient centered pain management plan. Simulation paired with visual layers of refinement and expression could provide such learning opportunities that may meet the goals of student learning or competency; and simulation can be arranged to provide for the assessment of competencies for pain medicine as it has done in other areas of conceptual medicine.[28-30, 51]

So, the pain management competencies can be arranged conceptually across the curriculum for multiple opportunities to interconnect and increase the depth of understanding while the concepts are being visually overlapped for improved conceptual learning and demonstration of competence. The following example is for an existing nursing pre-licensure program where competencies are deliberately arranged to increase in *conceptual* complexity over time within the curriculum while student assessment of pain competencies occurs across the domains for the four semesters through traditional conceptual testing, oral debriefing, and written explanations. Conceptual clinical learning is evidenced by demonstrating the four domains of competencies in both the mid-fidelity and high-fidelity (HiFi) simulation labs. Assessment and refining of learning occurs during debriefing to scaffold learning. Table Two outlines the way that the Pain Management Core Competencies are spread through the curriculum and assessed.

Curriculum	**Concept Learning**	**Clinical Assessment**
Theory Course: **1st semester**. Foundations: The concepts of the first three domains are visually taught but tested in a typical format. Emphasis on specific applications to collaborative pharmacological and non-pharmacological concepts of pain management used to integrate concepts. The elderly client is pulled out as an exemplar for application. **Clinical:** 48 hours of elderly clients in nursing homes. **Domains 1-3**	**Integrated Experiential Learning Lab:** Concurrently in the integrative experiential learning lab students learn and practice vital signs and pain assessment skills.	**Simulation Experience:** High Fidelity and mid fidelity simulations are created and student learning assessed with debriefing followed by student written explanation of understanding of concepts HiFi simulation lab students are digitally recorded providing care to a standardized mannequin client, observed by a faculty member and debriefed. Detailed scoring rubrics have been designed to assure each student demonstrates competency with a passing score of 90%. Students must pass this simulation to remain in the course of study.
Theory Courses: 2nd Semester Students take 3-4	**Integrated Experiential Learning Lab:** Students have	**Simulation Experience:** High Fi Simulation is used to help

courses that integrate concepts relative to chronic illness across the lifespan. **Clinical Experience:** 100 hours in chronic illness settings with elderly clients and 100 clinical hours in mental health facilities. **Domains 1-3**	three HiFi simulations. Students work in pairs. One simulation adds complexity to the previous exemplar of the elderly.	students deal with chronic pain versus acute pain issues and to consider more complex problem solving issues related to compassion, communication, and diversity. Rubrics used to measure performance. Competence measured by written application of understanding about performance.
Theory Courses: 3rd Semester Courses integrate concepts relative to acute care across lifespan. Students learn non-pharmacotherapeutic interventions for acute pain management in a variety of illness exemplars. **Clinical Experience**: 200 hours in acute care settings across lifespan **Domains 2,3**	**Integrated Experiential Learning Lab:** The students participate in three HiFi simulations designed to test and teach acute pain management care	**High Fidelity Simulation**: Student is expected to recognize a client who is experiencing a myocardial infarction and understand who to call, as well as to treat from a pharmacotherapeutic standpoint, and be able to explain the pathophysiology. Competence measured by performance as well as written debriefing of clinical rationale for performance.
Theory Courses: 4th Semester students take management/leadership course along with professional community course. **Clinical Course:** 256 hours of clinical experience. Students work with preceptors in the acute care settings providing care that would include actual experience with clients who are experiencing pain	**Integrated Experiential Learning Lab:** The students must manage and provide care for three clients with pain management needs during a 3 hour simulation. The students work in pairs during this HiFi simulation. Non-participating students observe and assess student performance. The entire simulation is debriefed with the students.	**High Fidelity Simulation:** Three very involved complex care patient scenarios are created to assess student performance with debriefing and write ups to determine their conceptual understanding and therefore their level of pain management clinical competence. Students are assessed for individual performance and team work in providing safe effective and efficient care. This is a learning simulation and is not graded.

Table 2. Competencies and Assessment as a Pre-Licensure Curriculum Exemplar

In trying to integrate the pain management concepts into multiple experiences across the curriculum, there are numerous resources to assist in creating the conceptual hierarchy needed to provide for student learning about pain and pain management. For example, individual health

professional disciplines as well as the International Association for the Study of Pain (IASP) have created curricula in which the Pain Core Competencies may be aligned. These consensus-based internationally endorsed curricula provide a scope and sequence that faculty members can use as a foundation to create student learning opportunities within the resources and faculty expertise of their institutions. Furthermore, the National Institute of Health has invested in funding Centers of Pain Excellence in Education with the purpose of developing case-based tools that will be available for all schools. Case methodology provides for similar opportunities as the Hi-Fi simulations to assess conceptual development.[26] Finally, learners may also show evidence of competencies within the medical model of closely supervised field work with clients in a variety of health settings. For example, beyond the lab of role play and simulation, the learner is supervised with a "real" patient, building on the knowledge and understanding previously established. In these real-world situations, the teacher needs to be more flexible as not all patients will provide great teaching/learning opportunities, and quality supervision is necessary to minimize client risks. For clinical interaction to show evidence of competency, the educator must use competency-based objectives and be able to use the patient-based opportunities that present themselves. So, real clinical patients won't be as structured as simulation-based learning and other models; but another step in the scaffolding of conceptual understanding of pain and pain management.

Table 3 highlights the learning tools suggested in this article that can be used with some of the curricula resources to promote conceptual learning for competence-based practice.

Faculty Objectives	**Student Objectives**	**Learning Principles**
Draws concepts in real time with learner or patient central to drawing	Listens and watches and draws in personal notes as the faculty member draws	Most learners today are visual thinkers so ideas must be presented in the way learners think
Builds from the simplest	Adds old information to new	Concepts are learned in

concepts to most complex across coursework	information through a scaffold of cognitive layers from what student knows to what others know to what they do from a patient's perspective	connection to other concepts in order to scaffolded the depth and not just breadth of conceptual learning
Provides opportunities for students to explain the why and how of "doing" or performance in reflection as a way to provide opportunities for learning to be competent	Integrates theory with practice through performance on tests, responses to oral questions during debriefings, and in written form of explanation for competence	Use of language increases student learning from simple psychomotor acts of preoperational thinking to concrete levels of rule based thinking to formal understanding from patients' perspectives
Uses standardized patients (SPs) in carefully arranged scenarios from least complex concepts to most complex concepts to provide multiple layers of overlapped concepts	Learns the basic concepts of what to do in a given situation as evidenced by tests and low fidelity simulation or highly supervised clinical experience	Conceptual learning scaffolds from foundational pain management concepts (Domain1) to more integrated concepts (Domain 2 and 3) to formal applications (Domain 4) of pain management plans
Uses increasingly complex levels of simulation or field work with careful supervision and measured outcomes	Increases their conceptual learning to most complex pain management situations as evidence by high fidelity simulations, oral, and /or written explanations	Application of thinking requires increasingly more complex feedback to activities for refinement of concepts
Uses case and population exemplars in increased complexity across time and across the domains	Shows effective pain management across multiple settings over time and across multiple populations	Conceptual learning increases in depth across multiple opportunities to refine for higher order thinking
Uses closely supervised clinical situations with outcomes assessed for conceptual understanding, not just for "doing"	Interacts with patients in clinical setting	Doing a task is not evidence of competence; therefore, explanations are needed to show an understanding of theory and practice

TABLE 3. Tools for developing conceptual learning within a curriculum that addresses Pain Management Core Competencies.

Summary

The ultimate goal of shifting, from teaching students and testing performance, to providing opportunities for students to conceptually learn as assessed with a competency-

based curriculum, is to provide quality care for patients. As faculty from pre-licensure programs engage in creating teaching, curriculum, and assessment methods that focus on learner competence, not the teacher or faculty member's philosophies and assumptions, the assumption is that professional competence for safe and effective practice will improve. To encourage incorporating pain management competencies into pre-licensure health professional curricula, this article provided contextual history behind the educational paradigm shift from teacher imitation and performance to an emphasis on learner competency.[49] Illustration of how to focus on the learner acquiring concepts about pain and pain management, as well as examples on how to incorporate pain competences into a pre-licensure health profession curriculum, were provided as impetus for pre-licensure faculty across health care disciplines to provide competency-based education.

1. Fishman, SM, Young, HM. Interprofessional pain management competency program. Available at http://www.ucdmc.ucdavis.edu/paineducation/About_us/index.html (accessed October 2013).
2. Schatman, ME, Campbell, A. *Chronic Pain Management: Guidelines for Multidisciplinary Program Development*. New York: Informa Healthcare USA, Inc. 2007: 190-194.
3. Wells N, Pasero C, McCaffery M. Improving the Quality of Care Through Pain Assessment and Management. In: Hughes RG, editor. *Patient Safety and Quality: An Evidence-Based Handbook for Nurses.* Rockville (MD): Agency for Healthcare Research and Quality (US); 2008 Apr. Chapter 17. Available from: http://www.ncbi.nlm.nih.gov/books/NBK2658/
4. Arwood E, Mitchell D, Robb B, Varner E. Neuroeducation: A translation of neuroscience, cognitive psychology, and language for effective literacy practices for those with autism spectrum disorders. *Oregon Society for Neuroscience.* Oregon: SFN, April, 2014.
5. Fishman, SM, Young, HM, Arwood, EL, Chou, R, Herr, K, Murinson, BB, Watt-Watson, J, Carr, DB, Gordon, DB, Stevens, BJ, Bakerjian, D, Ballantyne, JC, Courtenay, M, Djukic, M, Koebner, IJ, Mongoven, JM, Paice,JA, Prasad, R, Singh, N, Sluka, KA, St.Marie, B, Strassels, S. Core competencies for pain management results of an interprofessional consensus summit. *Pain Med.* April 11, 2013.
6 Skinner BF. Are theories of learning necessary? *Psych. Rev.*1950; **57**, 193-216
7 Skinner BF. *Verbal Behavior.* New York: Appleton-Century-Crofts; 1957.

8 Chomsky N. *Aspects of the Theory of Syntax.* MA: MIT Press, 1965.
9. Georg von K, Roos, J. A perspective on knowledge, competence and strategy. *Personnel Rev*., 1995; **24,** 3, 56 – 76
10. Connor-Greene PA. Assessing and promoting student learning: Blurring the line between teaching and testing. *Teaching of Psych.* 2000; **27,** 2**:** 84-88. doi: 0.1207/S15328023TOP2702_01
11. Sanders WL. Value-added assessment from student achievement data: Opportunities and hurdles. *J of Personnel Eval in Ed* 2000; **14**; 4: 329-339.12. Zettel J J, Ballard J. The education for all handicapped children act of 1975 (PL 94-142): Its history, origins, and concepts. *Special education in America: Its legal and governmental foundations* 1982: 11-22.
13. Fitzpatrick RB Americans with Disabilities Act of 1990. *J Nat'l Ass'n Admin. L.Judges* 1991; **11.** Available at http://digitalcommons.pepperdine.edu/naalj/vol11/iss1/2 2
14. Spencer LM., Signe PHD, Spencer M. *Competence at Work Models for Superior Performance*. Wiley. com, 2008.
15 Per-Erik E. The many meanings of occupational competence and qualification. Jof European Industrial Training 1997; **21**, 6/7: 266 – 273.
16 Berry PH, Dahl JL. The new JCAHO pain standards: Implications for pain management nurses. *Pain Management Nursing*, 2000; **1**, 1, 3-12.Available at http://dx.doi.org/10.1053/jpmn.2000.5833.
17. Carraccio C, Wolfsthal SD, Englander R, Ferentz K, Martin C. Shifting paradigms: From Flexnor to Competencies. *Academic Medicine* 2002; **77**,5: 361-367.
18. Arwood EL.The neuroeducation of learning: Learning systems, not styles. In: Parkay FW, Anctil, EJ, Hass G. Curriculum Leadership: Readings for Developing Quality Educational Programs. NY: Pearson, 2014: 233-245.
19. Edmond CB. A new paradigm for practice education. *Nurse Educ Today* 2001; **21**, 4: 251-259.
20. Pickering J, Embry E. So long, silos. *The ASHA Leader*2013; **18**, 6 38-51.
21. Fishman S, Young, HM. Experts launch pain management competency program. *Pain Medicince News* 2013. Available at http://painmedicinenews.com/PrintArticle.aspx?A_Id=23501
22. Doolen J. The Development of the Simulation Thinking Rubric. Unpublished dissertation, Colorado, 2013.
23. Arwood E. *Language Function: An Introduction to Pragmatic Assessment and Intervention for Higher Order Thinking and Better Literacy.* UK: Jessica Kingsley Publishers, 2011.
24. Woo, T., Arwood, E., & Rowe, J. (2013). *Proceedings of World Nursing Conference in Singapore*. Translating Neuroscience: When is the use of clickers Effective for Student Learning? July 2013.
25. Kaakinen, J.R. & Arwood, E. (2009) Systematic Review of Nursing Simulation Literature for Use of Learning Theory, *International Journal of Nursing Education Scholarship: Vol. 6*: Issue 1, Article 16.
26 Arwood, E.L. & Kaakinen, J.R. (2009) SIMulation Based on Language and Learning (SIMBaLL): The Model. *International Journal for Nursing Education Scholarship: Vol. 6:* Issue 1, article 9. (Reported to be top 8 articles on this subject as of Fall 2013.)

27. Pillars, W. Visual notetaking in the classroom. *Education Week: Teacher.* Available online http://www.edweek.org/tm/colections/ctq-collaboratory/2013/09/23/
28. Bond WF, Spillane L. The use of simulation for emergency medicine resident assessment. Academic emergency medicine : official journal of the Society for Academic Emergency Medicine 2002;9:1295-1299.
29. McNaughton N, Ravitz P, Wadell A, Hodges BD. Psychiatric education and simulation: a review of the literature. Canadian journal of psychiatry Revue canadienne de psychiatrie 2008;53:85-93.
30. Humphrey HJ, Marcangelo M, Rodriguez ER, Spitz D. Assessing competencies during education in psychiatry. International review of psychiatry (Abingdon, England) 2013;25:291-300.
31. Larsen DP, Butler AC, Lawson AL, Roediger HL, 3rd. The importance of seeing the patient: test-enhanced learning with standardized patients and written tests improves clinical application of knowledge. Advances in health sciences education : theory and practice 2013;18:409-425.
32. Grice GR, Wenger P, Brooks N, Berry TM. Comparison of patient simulation methods used in a physical assessment course. American journal of pharmaceutical education 2013;77:77.
33. Deladisma AM, Cohen M, Stevens A, et al. Do medical students respond empathetically to a virtual patient? American journal of surgery 2007;193:756-760.
34. Stroud L, McIlroy J, Levinson W. Skills of internal medicine residents in disclosing medical errors: a study using standardized patients. Academic medicine : journal of the Association of American Medical Colleges 2009;84:1803-1808.
35. Matthias MS, Krebs EE, Collins LA, Bergman AA, Coffing J, Bair MJ. "I'm Not Abusing or Anything": Patient-physician communication about opioid treatment in chronic pain. Patient education and counseling 2013.
36. Bergman AA, Matthias MS, Coffing JM, Krebs EE. Contrasting Tensions Between Patients and PCPs in Chronic Pain Management: A Qualitative Study. Pain medicine (Malden, Mass) 2013.
37. Brenner GJ, Newmark JL, Raemer D. Curriculum and cases for pain medicine crisis resource management education. Anesthesia and analgesia 2013;116:107-110.
38. Fitch MT. Using high-fidelity emergency simulation with large groups of preclinical medical students in a basic science course. Medical teacher 2007;29:261-263.
39. Karnath B, Thornton W, Frye AW. Teaching and testing physical examination skills without the use of patients. Academic medicine : journal of the Association of American Medical Colleges 2002;77:753.
40. Gordon JA, Hayden EM, Ahmed RA, Pawlowski JB, Khoury KN, Oriol NE. Early bedside care during preclinical medical education: can technology-enhanced patient simulation advance the Flexnerian ideal? Academic medicine : journal of the Association of American Medical Colleges 2010;85:370-377.
41. Stevens DL, King D, Laponis R, et al. Medical students retain pain assessment and management skills long after an experiential curriculum: a controlled study. Pain 2009;145:319-324.
42. Boet S, Borges BC, Naik VN, et al. Complex procedural skills are retained for a minimum of 1 yr after a single high-fidelity simulation training session. British journal of anaesthesia 2011;107:533-539.

43. Barton J, Bair AE. High Fidelity Simulation Increases Medical Students' Comfort in Managing Critically Ill Patients. Simulation in Healthcare 2010;6:535.
44. Vyas D, McCulloh R, Dyer C, Gregory G, Higbee D. An interprofessional course using human patient simulation to teach patient safety and teamwork skills. American journal of pharmaceutical education 2012;76:71.
45. Okuda Y, Bryson EO, DeMaria S, Jr., et al. The utility of simulation in medical education: what is the evidence? The Mount Sinai journal of medicine, New York 2009;76:330-343.
46. Griswold S, Ponnuru S, Nishisaki A, et al. The emerging role of simulation education to achieve patient safety: translating deliberate practice and debriefing to save lives. Pediatric clinics of North America 2012;59:1329-1340.
47. Naik VN, Brien SE. Review article: Simulation: a means to address and improve patient safety. Canadian journal of anaesthesia = Journal canadien d'anesthesie 2012.
48. Zendejas B, Brydges R, Wang AT, Cook DA. Patient Outcomes in Simulation-Based Medical Education: A Systematic Review. Journal of general internal medicine 2013.
49. Jason F, Snell LS, Cate OT, Holmboe ES, Carraccio C, Swing SR, P Harris, Glasgow NJ, Campbell C, Dath D, Harden RM, Iobst W, Long DM, Mungroo R, Richardson DL, Sherbino J, Silver I, Taber S, Talbot M, Harris KA Competency-based medical education: Theory to practice. *Informa Healthcare* 2010; **32**, 8 , 638-645 (doi:10.3109/0142159X.2010.501190)
50. Core Competencies for Interprofessional Collaborative Practice Report. May, 2011. (doi: http://www.aacn.nche.edu/education-resources/ipecreport.pdf)
51. Brenner GJ, Newmark JL, Raemer D. Curriculum and cases for pain medicine crisis resource management education. *Anesth Analg. 2013* Jan: 116 (1): 107-110. doi 10.1213/ANE.0b013e31826f0ae0.Epub 2012 Dec 7.
52. Maran NJI, Glavin RJ. Low -to-high fidelity simulation-acontinuum of medical education? *Med Educ.* 2003; Nov: 37 Suppl 1:22-8.
53. Forsythe G. Drawing in class. *ITED Talks* 2012. Retrieved from http://maps.playingwithmedia.com/visual-notetaking/
54 Seropian M. A., Brown K., Samuelson Gavilanes J., & Driggers, B.. Simulations: not just a manikin. *Journal of Nursing Education*2004;*43*(4), 164-169
55 BrayB., Schwartz C. R., Weeks D. L., & Kardong-Edgren S. Human patient simulation technology: perceptions from a multidisciplinary sample of health care educators. *Clinical Simulation in Nursing*2009 *5*, 145-150. (doi:10.1016j/ecns.2009.02.002)
56 Mezei L., Murinson B.B., Johns Hopkins Pain Curriculum Development Team. Pain eduation in North American medical schools. *J. Pain.*2011; Dec; **12**,121199-208.(doi: 10.1016/j.jpain.2011.06.006. Epub 2011 Sep 25. PubMed PMID 21945594).