

## Designing PBL Case Studies for Patient-Centered Care

**Robyn Schell**

Teaching and Learning Centre, Simon Fraser University,  
8888 University Drive, Burnaby, BC, Canada V5A 1S6

**David Kaufman**

Faculty of Education, Simon Fraser University,  
8888 University Drive, Burnaby, BC, Canada V5A 1S6

**Abstract.** Although patient-centered care is a medical practice ideal and is known to be associated with better patient outcomes, patient-centeredness declines as students progress through medical school. There is a need to integrate components into medical education that develop patient-centeredness through communications skills training, practice-based learning, and reflective practice. PBL can offer a venue for enhancing these types of skills. PBL cases based on stories can create a more authentic learning environment by telling narratives from the patient's perspective while providing engaging, memorable contexts for practicing patient-centered skills. Recounting "thick" narratives through the medium of video and supporting PBL with multimedia resources can provide a richer experience for learning and teaching. Implementing design-based research in conjunction with quantitative and/or qualitative research methodologies could provide new insights into PBL in relation to patient-centered skills and values. Although design-based research can be challenging, using it together with other research methodologies offers the possibility of new contributions to situated, constructivist theory within a PBL setting.

**Keywords:** patient-centered care; problem-based learning; hidden curriculum; narrative; design-based research

### Introduction

Patient-centered skills and values are not as ubiquitous as we might expect. Despite years of attempts to create curricula that build patient-centered skills and values, there is evidence that as medical students progress through medical school and clinical training, their patient-centeredness declines. The biomedical approach is predominant in patient-physician encounters, and this perspective is embedded in both the explicit curriculum and what is called the "hidden

curriculum,” where students learn through the processes of enculturation and socialization.

Studies show that patients experience better outcomes when their care is oriented to their needs and desires and when they are involved in their own care. Medical education has an important role in developing new physicians’ patient-centered skills. Widespread in medical education, problem-based learning (PBL) focuses on the case study as a motivator and tool for teaching and learning. As such, PBL and case study design may have the potential to support the development of patient-centered skills and values. Currently, as education transitions to the web, PBL is becoming a viable alternative to teaching patient-centered skills, particularly in decentralized systems where medical students are training in multiple regional centers. This article explores theoretical foundations and practical considerations for integrating patient-centeredness into PBL cases in order to support development of these values and skills in medical education.

### **What is Patient-Centered Care?**

An ideal that can mean many things to many people, patient-centered care lacks a single clear definition (Mead & Bower, 2000, 2002). Nevertheless, there appears to be some consensus that patient-centered care focuses on the needs, life context, and perspective of the patient. It depends on developing a productive two-way relationship between the patient and the physician.

Patient-centered care views the patient as a person with unique needs and life history. It involves interactions in which the physician engages with the patient and the patient can speak openly and ask questions (Stewart, 1984). Patient-centered care requires that the patient’s concerns, preferences, experiences, and emotions be considered as part of the doctor-patient relationship. In Epstein and Street’s (2011) description, “patients are known as persons in context of their own social worlds, listened to, informed, respected, and involved in their care – and their wishes are honored (but not mindlessly enacted) during their health care journey” (p. 100). Mead and Bower (2000) identified five dimensions common to published descriptions of patient-centeredness, including a biopsychosocial perspective, sensitivity to the “patient-as-person” and their experience of illness, sharing of power and responsibility between patient and doctor, a therapeutic alliance between them, and recognition of the importance of the personal qualities and subjectivity of the doctor. More recently, a review by Constand, MacDermid, Bello-Haas, and Law (2014) identified communication, partnership, and health promotion activities as core strategies of 25 frameworks found in the literature.

Patient-centered care is believed to be a factor in producing favorable patient outcomes (Bertakis & Azari, 2011; Mead & Bower, 2002; Radwin, Cabral, & Wilkes, 2009; Stewart et al., 2000). Recent research distinguishes between outcomes desired by the patient, such as subjective feelings of satisfaction, optimism, trust in doctors and nurses, and quality of life, and outcomes that

reflect objectively improved health or treatment compliance (Epstein & Street, 2011; Radwin et al., 2009). These appear to be interconnected; it is thought that patients who report more positive doctor-patient experiences are more likely to follow treatment plans, achieve better health outcomes, and use the healthcare system less often (Bertakis & Azari, 2011; Kuehn, 2012), although evidence is mixed to date (Epstein & Street, 2011; Rathert, Wyrwich, & Boren, 2012).

The U.S. report *Crossing the Quality Chasm: A New Health System for the 21<sup>st</sup> Century* (Committee on Quality of Health Care in America, 2001) identifies patient-centered care as one of six indicators of medical care quality. The U.S. federal government now measures and reports annually on ratings of patient-centered care across the country's health care system (e.g., see Agency for Healthcare Research and Quality, 2014) and is funding research on appropriate measurement (Methodology Committee of PCORI, 2012). This has greatly increased its prominence in the U.S. health care industry and among researchers. Since 2010 there has been a marked increase in research measuring both patient engagement and clinical outcomes in order to attempt to establish clearer relationships (Covington, Veley, & O'Donnell, 2014).

Most definitions of patient-centered care seem to agree that communication is crucial and that patients and physicians should make shared medical decisions about patient care that take into account patient values, attitudes, and preferences. However, many barriers exist to its implementation, including deficiencies in physicians' knowledge about patient needs, and physician attitudes that cling to an authoritarian, biomedical practice model (Luxford, Safran, & Delbanco, 2011; Visser, Deliens, & Houttekier, 2014).

These knowledge and attitude gaps can be addressed through education. Learning about patient-centeredness can be seen as a function of both formal and informal curriculum, both of which may involve practices that deter the development of patient-centeredness. Patient-centeredness is typically learned from both doctors' role modeling (Michalec, 2012) and from curriculum implemented by medical educators. In this way, the interactions and attitudes that form the doctor-patient relationship are learned not from the patient's point of view but from other physicians. Furthermore, medical education's culture focuses on biomedical disease mechanisms, and on instilling respect for physicians' authority and autonomy, rather than on issues and subjects that are central to the patient (Hafferty, 1998; Haidet & Stein, 2006; Michalec & Hafferty, 2013).

Despite efforts to integrate into the medical curriculum concepts and skills related to patient-centered practice, studies show that the distance between medical students and their patients increases as students progress through their training. This trend strengthens in the clinical years of the medical program, as students lose sensitivity to patients' views and life contexts, and this phenomenon is more pronounced for male students than for females (Haidet, Kelly, & Chou, 2005; Tsimtsiou et al., 2007; Woloschuk, Harasym, & Temple, 2004).

## **The Hidden Curriculum**

The socialization process that shapes the medical student's professional identity is partially attributed to the effect of the "hidden" curriculum (Hafferty, 1998; Hafferty & Franks, 1994). The hidden curriculum refers to what is being taught through the informal exchanges and relationships that occur between students and faculty. Many medical students begin their studies idealistically but lose their optimism as experience shows the fallibility of medicine and reinforces objectivity, and often cynicism, in the face of illness and death. Also, medical students learn quickly that government policy, administration, and patient advocates can challenge doctors' traditional autonomy. Through the hidden curriculum, students are ingrained into a paternalistic culture that contributes to traditional behaviors such as a reluctance to openly acknowledge uncertainty and ambiguity in clinical situations (Bleakley & Bligh, 2008; Michalec, 2012). Studies of patient-centeredness in medical education have focused primarily on medical students' attitudes, rather than their behaviors (Haidet et al., 2001, 2002; Woloschuk et al., 2004). These attitudes are often described in terms of ethics or values, rather than as activity informed by theory (Bleakley & Bligh, 2008; Krupat et al., 2009).

The literature is only beginning to consider how medical students might learn about and from patients in ways that would shift learning away from the prominence of physician-educators' role modeling and embodied attitudes. Studies describing medical students' attitudes towards patients suggest that undergraduate medical education has far to go in developing positive, patient-centered views (Haidet et al., 2001; Lamiani, Leone, Meyer, & Moja, 2011), although recent cases show promise (Christianson, McBride, Vari, Olson, & Wilson, 2007; Haidet, Kroll, & Sharf, 2006; Lévesque, Hovey, & Bedos, 2013).

## **The Patient's Perspective**

Although recent studies (Alharbi, Carlström, Ekman, Jarneborn, & Olsson, 2014; Rathert, Williams, McCaughey, & Ishqaidef, 2015) have explored patients' experiences of overall patient-centeredness, few have been concerned with the patient's specific perceptions of doctors in terms of patient-centered care. The patient's ability to influence the medical education curriculum has often been unappreciated (Boudreau, Jagosh, Slee, Macdonald, & Steinert, 2008).

On the other hand, the 1990s "Educating Future Physicians for Ontario" project (Maudsley et al., 2000) and the international conference "Where's the Patient's Voice in Health Professional Education?" (Towle, 2006) both suggested that patients should be consulted when designing curriculum. The McGill University Faculty of Medicine also considered patients when redesigning their curriculum in 2003, leading to a new component that focused on the concept of "physicianship" (Boudreau et al., 2008).

As described by Boudreau et al., physicianship included developing professional attributes that would improve the patient's experience. In a survey of patients,

terms commonly used in the curriculum were largely absent in the patient's vocabulary, for example, the word "healing" and "healer." Although there was an overlap in the faculty's and patients' expectations of a doctor's ideal behaviors, the words to describe these behaviors were quite different, underlining the fact that the language of patient's world and the medical world are distinct. While patients spoke in active terms: "is straightforward"; "encourages me"; faculty used passive terms such as "insight" or "openness." The patients viewed the word "professionalism" in a negative light and rarely expressed their expectations of doctors in these terms.

In some studies, listening has been highlighted as a crucial characteristic of ideal physician behavior (Weissmann, Branch, Gracey, Haidet, & Frankel, 2006). Listening was found to be more visible than expertise, an unexpected discovery for the researchers involved in the McGill study. Patients also deemed as important a doctor's ability to see and treat the patient as a unique individual. In other words, patients appreciated behavior that demonstrated that a doctor was interested in them as an individual, not just as a patient. Depersonalization was an important theme of patient survey responses, and researchers concluded that this was related to findings in other studies of a decline in later years of training of medical students' patient-centered attitudes (Boudreau et al., 2008).

In a study exploring patients' ideas of patient-centeredness, Stewart et al. (2000) surveyed 315 patients of 39 family doctors, asking patients to assess the patient-centeredness of their visits. Patients rated their experience based on the doctor's communication skills, understanding of patient as a whole person, and finding common ground with the patient in the interview. Communication skills received a high score when the doctor asked about the patient's feelings, ideas, and expectations in addition to symptoms and function. Doctors who explored issues such as life context, family, and personality received a high score on understanding of the whole person. Finding common ground was rated highly if the doctor clearly explained the problem and management plan, answered questions, and reached explicit agreement with the patient on the plan. The study's authors found that higher scores in patient-centered communications were associated with fewer diagnostic tests and referrals and better recovery. The importance of doctors' (and other health professionals') communication skills is confirmed by others including Alharbi et al., (2014), Epstein and Street, 2007; and Ferguson, Ward, Card, Sheppard, & McMurtry (2013).

### **The Doctor's Perceptions**

A doctor's perception of patients also affects patients' experience of patient-centered care. Studying 29 doctors and 207 patients, Street, Gordon, & Haidet (2007) found that doctors displayed more patient-centered communication when a patient's communication skills were well developed. When patients asked questions, made requests, and expressed their opinions, concerns and fears, doctors were often more informative, supportive, and accommodating. This could mean that patients with less education, older patients, or those from some ethnic groups could experience less patient-centered communication and fewer

associated benefits than educated, young, Caucasian patients. If so, this could have important implications for developing the kind of curriculum that builds patient-centered skills. For example, training physicians in self-awareness and reflective skills could help them build skills to better engage those who have difficulties in communicating or who might not understand the consultation process (Alharbi et al., 2014).

These suggestions imply that change must happen at the level of the patient/doctor interview. The taking of case histories is a pivotal point of contact in a doctor/patient encounter that results in an account of the patient's sickness and a basis for medical care. In most medical schools, students learn to write case histories that describe the history of the present illness, which focuses on the onset, symptoms, and course of disease, as gathered from the patient's story of their personal experience. Students learn to translate the patient's story into an impersonal, biomedically-oriented disease narrative (Donnelly, 1996). The differences in the doctor's and patient's accounts can be considerable (Hunter, 1991). In the process of the interview and writing of the medical record, the sick person as subject is changed into an object of professional inquiry.

In his paper on this phenomenon, Donnelly (1996) suggests that the patient be attended to as a unique person, and recommends changing the problem-oriented medical record to one with a more holistic picture of the patient's life, one that involves composing a medical case history as a story of human illness. To do this, he proposes a patient-centered medical record that contains steps such as introducing the patient as a person and using words such as "chief concern" rather than "chief complaint" to change the orientation of the interview. In the "History of Present Illness" section he suggests first collecting information relating to the biomedical aspects of the disease, then collecting information relating to the patient's perspective. The latter includes items such as:

- The patient's understanding of the disease;
- The impact of the disease on the patient's life, work or relationships, especially as they relate to the physical, mental and emotional experiences of loss, pain, worry or fear;
- The patient's personal goals regarding health;
- The patients' expectations of medical care.

In a later discussion of patient medical records, Donnelly provides examples of the kinds of questions a doctor can ask a patient that embodies the patient-centered approach (Donnelly, 2005, p. 35). In his view, teaching communication skills using patient-centered techniques addresses the patient's illness as competently as those that document a patient's biomedical disease. Problem-based learning could offer a learning environment for practicing these types of communication skills and so bring about changes in students' and physicians' patient/doctor orientation.

### **Integrating Patient-Centered Care into PBL Tutorials**

Case studies are ubiquitous as a tool for medical education, particularly in problem-based learning (PBL) tutorials. PBL was conceived by Howard Barrows at McMaster University in the 1960s and plays an important role in many medical school education programs (Srinivasan, Wilkes, Stevenson, Nguyen, & Slavin, 2007). PBL has the potential to create an authentic environment where members of a professional community undertake realistic activities using tools common to that community.

Usually PBL is carried out in small groups of students meeting together with a tutor who provides guidance and feedback (Wilkerson & Feletti, 1989). PBL generally takes place in face-to-face tutorials using paper-based cases, although newer communications and delivery technologies are increasingly transforming the PBL experience (Duffy, Dueber, & Hawley, 1998; Ellaway & Masters, 2008; Jin & Bridges, 2014; Poulton, Conradi, Kavia, Round, & Hilton et al., 2009). Traditionally, the facilitator discloses the case study in stages; students identify and discuss the case issues, their relevant knowledge, and what they need to find out in order to resolve the case. To move forward, students research the learning issues that they identify during the tutorial and share their new information with the group, repeating the steps if the case progresses in multiple stages. In summary, the first step is being presented with the problem. Group members then address the problem by applying clinical reasoning skills. By interacting with their peers, learners work together to determine the gaps in their knowledge and what they need to learn. Group members learn the required material outside of the tutorial (class) and then apply it to solve the problem and summarize what has been learned from the case (Barrows, 1985).

A PBL tutorial often concludes with the student's evaluating the session and the resources that supported the case. In general, case resources supplement and illustrate the case study with items such as images, journal articles, x-rays, test results, and photos.

PBL can be considered within the constructivist tradition (Savery & Duffy, 1995). The focus is on the learners' construction of their own knowledge in a context similar to one where it will be used. Understanding emerges as a result of interactions within an environment; learning is distributed and knowledge is created through social negotiation. Collaboration is key for the testing and formation of understanding.

PBL case studies are based on authentic situations with no obvious solution. Information is often vague and conflicting. As information is delivered to students, they define what is relevant, develop a hypothesis that might account for the situation, then do research to confirm the hypothesis (Barrows, 1985). The objective of this method is to develop competencies, critical reasoning, and learning skills (Barrows, 1984), as well as the ability to appreciate other points of view, work collaboratively, and to conduct self-assessments (Kamin, Deterding, Wilson, Armacost, & Breedon, 1999).

Savery and Duffy (1995) suggest that PBL is an approach related to cognitive apprenticeship, incorporating the knowledge domain and the problem solving methodology associated with a particular profession, for example, medical education. In PBL, the case study drives learning and the construction of knowledge, so the design, structure, and orientation of the case study influences the students' content acquisition and overall learning experience. For example, case design could influence how medical students decide what is important in problem-solving situations involving clinical reasoning. This in turn, might influence how medical students perceive patients and themselves as members of the medical community of practice.

Taylor and Mifflin (2008) contend that the PBL we see today is a product of many years of evolution in many diverse settings. Case resources can now include not only physical artifacts, but a wide variety of multimedia and links to the Internet. Cases themselves can be depicted in video stored remotely, rather than distributed in person through paper cases. In other words, there are so many variations in PBL that it is very challenging to compare results from one study to another. This is not to say that PBL has not produced the positive outcomes described in the literature, but it does help to explain why there are so many diverging opinions on how useful PBL is for producing competent doctors. There is good evidence to support claims of PBL's benefits (e.g., Kaufman & Mann, 1998; 1999), but studies are based on differing views of desirable outcomes. PBL applications vary greatly, often departing from Barrow's original conception. Research involving PBL must be carefully documented so that readers can clearly understand the innovations and components that make up the research environment and can interpret the results within the appropriate context.

### **Models of PBL in the Preclinical and Clinical years**

PBL was originally intended to introduce clinical problems in the pre-clinical years of medical training. Often PBL cases, while encouraging discussion in a group setting, emphasize the biological mechanisms underlying a particular disease, with the aim of developing clinical reasoning skills in response to possible clues in the case (Taylor & Mifflin, 2008).

Gradually PBL has been expanded into the clinical years (Taylor & Mifflin, 2008), and some claim that its limitations are more evident in these years (Mamede, Schmidt, Rikers, Penaforte, & Coelho-Filho, 2007). As students begin to work in clinical sites, integrating real patients into PBL becomes more desirable (Dammers, Spencer, & Thomas, 2001) and can provide ample opportunity for practicing and reflecting on patient-centered care (DiSalvo, 2015; Staun, Bergström, & Wadensten, 2010). This approach could include some type of hybrid PBL combining face-to-face and online sessions and providing access to opportunities to practice with real people after seeing best practices modeled in video or in person. This is offered as one possible scenario; there are many others.



The design of effective PBL cases could be quite different for clinical and preclinical students. Simpler cases in more structured tutorial settings may not require the deeper analytical and non-analytical reasoning used by more experienced physicians (Harris, Boyce, & Ajjawi, 2011). These simpler cases, however, can undermine efforts to integrate the patient's perspective, and a patient-centered care mindset, into preclinical medical education. PBL case studies can be viewed as having a significant influence on a medical student's perspective on patients and how they diagnose and treat illness. For instance, cases told from the perspective of the physician may de-contextualize the patient and enhance a tendency towards detachment (Kenny & Beagan, 2004). MacLeod's (2011) review of 67 cases at one medical school identified six themes that dehumanize the patient and lead the student to consider the patient as merely a collection of symptoms that must be diagnosed and treated by the "expert" physician. Examples include a focus on "playing detective" to "solve" a case; interchangeable disease symptoms that do not take gender into account; humorous patient names (e.g. "Jack Daniels" for an alcoholic); case descriptions that lack patients' voices or details that could help students to visualize real persons; and race, social class, gender, and other stereotypes.

### **PBL and Narrative-Based Case Studies**

Problem-based learning cases describe an encounter between a patient and doctor. Case studies structured around a story may help provide a richer context for learning than simple PBL cases, especially when these stories are told from the patient's perspective. Creating PBL case studies as a story or narrative could have a number of advantages for producing more robust situated learning experiences that could shape both individuals and culture (Polkinghorne, 1988) by framing our experience, helping us to remember it, and to cope with new situations (Schank & Cleary, 1995). Stories can also help people to remember and apply information within new situations and are thought to be central to the way humans make sense of their world (Polkinghorne, 1988; Schank & Cleary, 1995).

PBL is rooted in authentic learning situations where the problem is the driving force for learning about the professional world. In medical education, the problem presents the patient and their illness as the venue for resolving medical problems. It is generally assumed that cases strongly reflect, at some level, real patients and situations that physicians would encounter in their medical practice. Cases impart information and values about the profession (Kamin, O'Sullivan, Deterding, & Younger, 2003) and play a role in the transmission of not only medical information, but also the unspoken assumptions, attitudes, and values of the health care professional culture (Kenny & Beagan, 2004).

Reframing case content to reflect both the doctor's and patient's points of view, using language that can be understood by the patient, presenting a time line that better reflects the patient's experience, and developing a detailed picture of the patient and those in his/her world may contribute to a more authentic case study (Kenny & Beagan, 2004). Table 1 shows a summary of questions Kenny

and Beagan asked in order to analyze the level of patient-oriented content in PBL case studies. This approach creates an awareness of case perspective and can contribute to the development of cases that represent multiple voices and so diversify the PBL case study repertoire.

**Table 1. Summary of Questions for Analyzing Patient-Centeredness in PBL Cases.**

<b>Narrative Component</b>	<b>Questions</b>
Language	Is the case in the patient's language or is it presented in medical terminology?
Audience	For whom is the case written?
Point of View	Does the case narrative unfold from the patient's or the doctor's point of view?
Time Frame	What is the time frame of the case? What information is there on the patient's previous health? How much information is there about the patient's experience with the symptoms?
Crisis Point	Is there a resolution to the case? Are we told what happens to the patient after the diagnosis? Is there a sense of villain or hero in the story?
Dialogue	Is there any dialogue in the case study? Is the patient quoted? Is there any commentary on the patient's account of the illness?
Character Development	To what extent are characters present other than the doctor and patient, such as family and loved ones? How much do we get to know the patient or others important to their life? Do we get to know their emotions?

*Source:* Summarized from Kenny and Beagan (2004)

The development of case studies that are rich in narrative information, called "thick narrative," may provide a more robust context for learning than traditional case studies because rich cases more accurately reflect the complex reality of patient presentation and interaction. They also may help to lay the foundation for the development of a more holistic and "patient-centered" awareness during the training of health professionals. According to Bruner's (1986) definition, case study narratives, no matter how thin or rich, can influence students' sense of reality, appropriate behavior, and time.

Charon (2001) argues that "narrative medicine" models medical practice that is both humane and effective, and "narrative competence" can enrich it with

“empathy, reflection, professionalism, and trustworthiness” (p. 1987). In a pilot test on the use of narrative, video-based PBL case studies, Bizzocchi and Schell (2009) found that students were generally engaged by the thicker case study narrative descriptions and reported that video deepened their experience. Most participants responded positively and found that the more robust story and video presentation within a media rich narrative seemed appropriate and functional. The power of narrative, especially in a video format, may provide learning opportunities and alternatives that supplement the current repertoire of paper-based cases. Narrative constitutes a context in which audiences can immerse themselves, acting as observers and participants, while media affords the construction of narrative and a sense of immersion (Murray, 1998).

Learning evolves when collaborative groups and individuals interact, create meaning, and construct knowledge as afforded by the structures where these interactions take place (Jenkins, 2006). In a similar way, online narrative-based PBL may help medical students to understand the structures shaping their world and to develop a collective and individual patient-centered orientation.

### **Studying PBL through Design-Based Research**

If narrative-based case studies can shape the professional development of a medical student, influence their perceptions, and create a more authentic learning environment, what stories should be told and how should they be told? When patient-centered skills have been studied, patients tell us that being a good listener is an important skill for doctors to learn, and patients value being treated as individuals (Bleakley & Bligh, 2008; Constand et al., 2014; Ferguson et al., 2013). Needed skills and awareness might be stimulated through the components of the story and by telling the story of the medical encounter from the patient’s viewpoint. However, the case study is only one element of the complex PBL process, and there are many others that can influence learning and teaching outcomes, such as facilitation, participant exchanges, case resources, and technological enhancements. The PBL experience unfolds in a multi-faceted environment, and research within this setting would entail studying the phenomenon of learning and teaching as it takes place in this context.

Design-based research (DBR) is concerned with studying how design works within the context of the learning environment, that is, the everyday world of the classroom settings (whether online or off) and in the process has developed theories with general application for learning and instruction. DBR is not simply a process of trial and error to see what works. The results should have a wider applicability: “Design experiments ideally result in greater understanding of a learning ecology—a complex, interacting system involving multiple elements and by anticipating how these elements function together to support learning” (Cobb, Confrey, di Sessa, Lehrer, & Schauble, 2003, p. 9).

Designing environments that contribute to learning theory seems particularly challenging. Usually education research is based on a theoretical framework, but theoretical frameworks are rarely prescriptive. Problem-based learning, for

example, is a pedagogy in medical education that applies a constructivist approach where understanding is seen as a function of the content, context, activity and goals of the learner (Savery & Duffy, 1995, p. 136). From a situated constructivist theoretical perspective, PBL attempts to create a learning experience where students work as a group using conceptual tools to resolve authentic medical problems. PBL in its traditional form presents a rather limited implementation of situated learning theory because it relies on linear paper cases to develop learning. However, it is not obvious how the theory of situated constructivist learning theory can determine the specifics of effective design. DBR offers a possible solution to this difficulty, since it builds on a theoretical framework and works in conjunction with qualitative or quantitative methods (or both) to study and assess a phenomenon.

### **Designing Online PBL for Patient-Centered Teaching and Learning**

Studies have shown that the deterioration in communications skills experienced by medical students can be prevented or reduced through a greater emphasis on the importance of communication and increased training in the curriculum (Kaufman, Laidlaw, & Macleod, 2000). Since PBL tutorials can support the professional development of medical students and since the case study is the heart of the PBL process, the case study design is critical for the development of these skills. As described earlier, cases impart information and values about the profession (Kamin et al., 2003) and transmit assumptions and attitudes to students about the culture of health care professionals (Kenny & Beagan, 2004).

Design-based research might offer a research methodology to investigate domain specific learning processes such as the development of patient-centered competencies and attitudes. As Cobb et al. (2003, p.9) suggest, "A theory of this type would specify successive patterns in students' reasoning together with the substantiated means by which the emergence of those successive patterns can be supported." As DBR is concerned with the dynamic ecology of a learning environment, the study of PBL would include factors such as the kind of problems the students are asked to solve, the timing and content of the unfolding elements of the case released during the course of the PBL tutorial, learning processes of the students, tutorial facilitation, and the resources and tools provided. When considered from a DBR perspective, these elements would be seen as interacting components of a larger learning system rather than a list of factors that independently influence learning.

Cobb et al.'s description of how to prepare for DBR includes an arc of "conjectured starting points, elements of trajectory, and prospective endpoints" (Cobb et al., 2003, p.11) resulting in the formulation of a design that produces "significant shifts in student reasoning and the means of supporting these shifts" (Cobb et al., 2003, p.11). To begin DBR and define the scope of the research project, a researcher should answer the following questions (Cobb et al., 2003, p. 11):

- What is my theoretical intent? What is the point of the study? For example, identify and account for successive patterns in student thinking by relating these patterns to the means by which their development can be supported and organized.
- What are the salient ideas and reasoning behind the goals or endpoints for student learning? This can be discovered by conducting a systematic review of the literature in the domain.
- What is an alternate conception of this domain, i.e. case study design as related to factors outlined earlier, thought of as patient-centered skills or to have promoted patient-centeredness?
- What is the starting point for this innovation? Define current student capabilities, current practices and draw on lit review to establish this. Document learning ecology as it relates to the tutorial learning focus.

With these guidelines in mind, research on narrative-based case design within the context of PBL may focus on variations on designs that have the potential to enhance patient-centeredness. Assessment could involve the analysis of student performances showing deep or shallow understanding of patient-centeredness as compared to the student's initial interpretations and understandings. To be consistent with the goals of DBR, overall, these outcomes should illuminate the dynamics of situated constructivist learning and teaching.

The literature indicates that design-based research is uncommon in medical education research, perhaps due to its status as a relatively new approach to research and to the overwhelmingly positivist emphasis of medical research itself. Studies focusing on technology-supported education could make a useful contribution to the literature, since there is little research to date informing technology-supported educational practice in medical education (Cook, 2009). This is despite evidence that shows technology-based medical education has similar or slightly better outcomes than non-technology supported medical education (Cook et al., 2008). Therefore studies centering on the best use of technology in medical education, including pedagogies such as PBL, could yield useful information. The development of patient-centered skills is an important concept in medical education (MacLeod, 2011) and as such, research in this area within the PBL context can be considered a worthwhile contribution to the field.

Despite a lack of studies that involve all aspects of research described in this paper, that is, using DBR as an approach to study online PBL case studies in connection with patient-centered skills and values, there are many studies concerned with design-based research, online PBL, and the development of patient-centered skills. Drawing the threads together calls for implementing DBR and employing qualitative and/or quantitative methods to identify, collect, and assess the research findings. But first, as Cobb recommends, we must specify the patient-centered skills we'd like to foster in PBL tutorials, and the practices that might promote them, drawing on situated constructivist learning as the anchor to bring these elements together coherently.

Street et al. (2007, p. 586) offer a simple, workable model that captures the salient characteristics of patient-centered behaviors that produce positive patient outcomes. In this model, the quality of care a patient receives depends on the doctor's communication skills. Doctors who are informative, supportive, and respectful, and facilitate patient participation, generally have patients who are more satisfied, more committed to their treatment plans, and experience better treatment outcomes.

Stewart et al. (2000) explore similar territory, offering more tangible examples of patient centered communication skills (Table 2).

**Table 2: Stewart's Examples of Patient-Centered Communication.**

<b>Component</b>	<b>Example</b>
Exploring the illness experience	The doctor explores the patient symptoms, function, ideals, feelings, and expectations.
Understanding the patient as a whole person	The doctor elicits and explores issues relating to life stage, life context including family, and personality.
Finding common ground	The doctor clearly defines and answers questions about the problem and the management plan and takes the time to discuss and agree on them with the patient.

*Source:* Summarized from Schwartz, Webb, & Mennin (2001) and Stewart et al. (2000)

Once patient-centered skills are defined, the next step from the viewpoint of design research is to develop opportunities for practice within the PBL environment that can support the student's acquisition of patient-centered values and specific skills, such as learning the patient's perspective, getting to know the patient's life context, and working out a mutually agreed treatment plan. This may be possible, since studies have shown that PBL can offer greater opportunities to integrate patient-centered values such as humanism and empathy into their curriculum than those curricula without a PBL program (Newton, Barber, Clardy, Cleveland, & O'Sullivan, 2008).

There are many factors that could shape the PBL experience in the pursuit of patient-centered care skills and values. In a medical curriculum, doctor/patient relationships can be enhanced by mindful practice, communication training, and recognition of cultural formation (Frankel, Eddins-Folensbee, & Inui, 2011). Case design may also be a powerful tool in shaping patient centered skills and values by telling the story of the patient experience. Kenny and Beagan's work

on embodying the patient perspective in case design may offer some insights on this. Access to resources that model patient-centered interviewing techniques may be another avenue to explore.

However, for the purposes of this article, it is important to establish what is meant by patient-centered skills and values, as well as to understand how current practices may hinder their development. From here we can suggest how PBL might be designed to offer the opportunity to develop these skills and values and outline a strategy to create and test design options.

Both quantitative and qualitative methods can shed light how well our research goals have been met. Studying the medical student experience, skills, and attitudes before, during and after PBL tutorials may provide valuable insights about how patient-centeredness can be nurtured and developed. Quantitative research can offer data that measures patient-centered skills and attitudes. However, qualitative methods are more helpful for understanding a student's feelings, beliefs, values, and subjective experiences in relation to patient-centered care and how these may evolve within PBL tutorials. For example, narrative research is based on the assumption that humans interpret their own world based on their construction of reality, and that telling the story from the perspective of the individual is important. This idea is closely linked to the constructivist view that individuals generate knowledge and meaning within a social context of experience (Clandinin, 1989). Narrative research could therefore help us understand the development of patient-centered attitudes in a PBL tutorial. In particular, we are interested in understanding how the experience of just-the-facts cases (called thin cases) and rich narrative cases (thick cases) may develop different perceptions of the patient and affect the patient-physician relationship. Although it is a bit premature to pinpoint the exact methodology for our research, implementing DBR in conjunction with narrative research may provide findings that illuminate the subjective experience of PBL.

## **Next Steps**

Since learning happens in the complex, messy context of the PBL interactive setting, other components will need to be further studied, such as the teaching and learning of communication skills, the value of video cases and multimedia case resources, tutorial facilitation, and the supports necessary to encourage group discussion, an activity central to PBL. It is also necessary to recognize that PBL does not operate in a vacuum but is a component of medical education as a whole, within the socio-cultural world of the medical school experience. However, the scope of a research project will need to be defined within certain specified parameters in order to be carried out and interpreted.

## **Conclusion**

Although patient-centered care is a medical practice ideal and is known to be related to better patient outcomes, patient-centered attitudes decline as students

progress through medical school and related skills are not well-developed. Both the formal and informal medical school curricula influence the acquisition of patient-centered attitudes and skills. There is a need to recognize and integrate educational components that develop patient-centeredness through communications skills training, practice-based learning, and reflective practice. PBL can offer a venue for enhancing these types of skills. Creating cases based on stories can make the learning environment more authentic by telling a narrative from the patient's perspective while providing engaging, memorable context for practicing patient-centered skills. Recounting "thick" narratives through the medium of video and supporting PBL with multimedia resources may provide a richer experience for learning and teaching.

Implementing design-based research in conjunction with quantitative and/or qualitative research methodologies could provide new information on PBL as a whole and case study design in particular, in relation to patient-centered skills and values. Quantitative methods could involve measuring the level of patient-centeredness through tools like the Patient-Practitioner Orientation Scale (Krupat, Hiam, Fleming, & Freeman, 1999) and newer scales under development (Methodology Committee of PCORI, 2012; Van Den Assem & Dulewicz, 2015; Zill, Scholl, Härter, & Dirmaier, 2013), while qualitative methods may focus on the experience of the students as they progress through the PBL tutorial. The goal is to not only to investigate domain specific learning processes like the development of patient-centered competencies and attitudes but to develop theory that describes successful patterns in students' reasoning together with the means to support them.

More work is needed to specify the features of PBL that might contribute to a patient-centered learning environment and so define the iterations that could be studied within the context of design-based research. Although design-based research can be challenging because of the evolving learning ecology like PBL, this type of research, used in combination with other research approaches, appears likely to make significant contributions to situated, constructivist theory within a PBL setting.

## References

- Agency for Healthcare Research and Quality (2014). *National healthcare quality and disparities report 2014*. Rockville, MD: Agency for Healthcare Research and Quality. Retrieved from <http://www.ahrq.gov/research/findings/nhqrdr/nhqdr14/index.html>
- Alharbi, T. S. J., Carlström, E., Ekman, I., Jarneborn, A., & Olsson, L. E. (2014). Experiences of person-centred care - patients' perceptions: A qualitative study. *BMC Nursing*, 13(1), 28. doi:10.1186/1472-6955-13-28
- Barrows, H. S. (1984). A specific problem-based, self-directed learning method designed to teach medical problem-solving skills, and enhance knowledge retention and recall. In H. G. Schmidt & M. L. De Volder (Eds.), *Tutorials in problem-based learning: A new direction in teaching the health professional* (pp.16-32). Assen, The Netherlands: Van Gorcum.
- Barrows, H. S. (1985). *How to design a problem-based curriculum for the preclinical years*. New York: Springer.



- Bertakis, K. D., & Azari, R. (2011). Patient-centered care is associated with decreased health care utilization. *The Journal of the American Board of Family Medicine*, 24(3), 229-239. doi:10.3122/jabfm.2011.03.100170
- Bizzocchi, J., & Schell, R. (2009). Rich narrative case study for online PBL in medical education. *Academic Medicine*, 84(10), 1412-1418. doi:10.1097/ACM.0b013e3181b6ead0
- Bleakley, A., & Bligh, J. (2008). Students learning from patients: Let's get real in medical education. *Advances in Health Sciences Education: Theory and Practice*, 13(1), 89-107. doi:10.1007/s10459-006-9028-0
- Boudreau, J. D., Jagosh, J., Slee, R., Macdonald, M., & Steinert, Y. (2008). Patients' perspectives on physicians' roles: Implications for curricular reform. *Academic Medicine*, 83(8), 744-753. doi:10.1097/ACM.0b013e31817eb4c0
- Bruner, J. (1986). *Actual minds, possible worlds*. Cambridge, MA: Harvard University Press.
- Charon, R. (2001). Narrative medicine: A model for empathy, reflection, profession, and trust. *Journal of the American Medical Association*, 286(15), 1897-1902. doi:10.1001/jama.286.15.1897
- Christianson, C. E., McBride, R. B., Vari, R. C., Olson, L., & Wilson, H. D. (2007). From traditional to patient-centered learning: Curriculum change as an intervention for changing institutional culture and promoting professionalism in undergraduate medical education. *Academic Medicine*, 82, 1079-1088.
- Clandinin, D. J. (1989). Developing rhythm in teaching: The narrative study of a beginning teacher's personal practical knowledge of classrooms. *Curriculum Inquiry*, 19(2), 121-141.
- Cobb, P., Confrey, J., diSessa, A., Lehrer, R., & Schauble, L. (2003). Design experiments in educational research. *Educational Researcher*, 32(1), 9-13. doi:10.3102/0013189X032001009
- Committee on Quality of Health Care in America, Institute of Medicine (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: National Academies Press. Retrieved from <https://iom.nationalacademies.org/~media/Files/Report%20Files/2001/Crossing-the-Quality-Chasm/Quality%20Chasm%202001%20%20report%20brief.pdf>
- Constand, M. K., MacDermid, J. C., Bello-Haas, V. D., & Law, M. (2014). Scoping review of patient-centered care approaches in healthcare. *BMC Health Services Research*, 14(1), 271. doi:10.1186/1472-6963-14-271
- Cook, D. A. (2009). The failure of e-learning research to inform educational practice, and what we can do about it. *Medical Teacher*, 31(2), 158-162. doi:10.1080/01421590802691393
- Cook, D. A., Levinson, A. J., Garside, S., Dupras, D. M., Erwin, P. J., & Montori, V. M. (2008). Internet-based learning in the health professions: A meta-analysis. *Journal of the American Medical Association*, 300(10), 1181-1196. doi:10.1001/jama.300.10.1181
- Covington, D., Velez, K. M., & O'Donnell, H. B. (2014). Evolution of the patient-centered concept in the published literature [Abstract]. *Value in Health*, 17(3), A164. doi:10.1016/j.jval.2014.03.955
- Dammers, J., Spencer, J., & Thomas, M. (2001). Using real patients in problem-based learning: Students' comments on the value of using real, as opposed to paper cases, in a problem-based learning module in general practice. *Medical Education*, 35(1), 27-34.
- DiSalvo, D. S. (2015). The meaning of "Do no harm": A medical student perspective. *The International Journal of Medical Students*, 3(1), 65-66. Retrieved from <http://www.ijms.info/ojs/index.php/IJMS/issue/current/showToc#.Vjz1a9Bg7Gw>

- Donnelly, W. J. (1996). Taking suffering seriously: A new role for the medical case history. *Academic Medicine*, 71(7), 730-737.
- Donnelly, W. J. (2005). Viewpoint: Patient-centered medical care requires a patient-centered medical record. *Academic Medicine*, 80(1), 33-38.
- Duffy, T. M., Dueber, B., & Hawley, C. L. (1998). Critical thinking in a distributed environment: A pedagogical base for the design of conferencing systems. In C. J. Bonk & K. S. King (Eds.), *Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse* (pp. 51-780. Mahwah, NJ: Lawrence Erlbaum Associates.
- Ellaway, R., & Masters, K. (2008). AMEE guide 32: E-learning in medical education part 1: Learning, teaching and assessment. *Medical Teacher*, 30(5), 455-473. doi:10.1080/01421590802108331
- Epstein, R. M., & Street, R. L. (2007). *Patient-centered communication in cancer care*. Washington, DC: National Cancer Institute, U.S. Department of Health and Human Services, and National Institutes of Health. Retrieved from [http://appliedresearch.cancer.gov/areas/pcc/communication/pcc\\_monograph.pdf](http://appliedresearch.cancer.gov/areas/pcc/communication/pcc_monograph.pdf)
- Epstein, R. M., & Street, R. L. (2011). The values and value of patient-centered care. *Annals of Family Medicine*, 9(2), 100-103. doi:10.1370/afm.1239
- Ferguson, L. M., Ward, H., Card, S., Sheppard, S., & McMurtry, J. (2013). Putting the 'patient' back into patient-centred care: An education perspective. *Nurse Education in Practice*, 13(4), 283-287. doi:10.1016/j.nepr.2013.03.016
- Frankel, R. M., Eddins-Folensbee, F., & Inui, T. S. (2011). Crossing the patient-centered divide: Transforming health care quality through enhanced faculty development. *Academic Medicine*, 86(4), 445-452. doi:10.1097/ACM.0b013e31820e7e6e
- Hafferty, F. W. (1998). Beyond curriculum reform: Confronting medicine's hidden curriculum. *Academic Medicine*, 73(4), 403-407.
- Hafferty, F., & Franks, R. (1994). The hidden curriculum, ethics, teaching, and the structure of medical education. *Academic Medicine*, 69(11), 861-871.
- Haidet, P., Dains, J. E., Paterniti, D. A., Chang, T., Tseng, E., & Rogers, J. C. (2001). Medical students' attitudes toward patient-centered care and standardized patients' perceptions of humanism: A link between attitudes and outcomes. *Academic Medicine*, 76(10), S42-S44.
- Haidet, P., Dains, J. E., Paterniti, D. A., Hechtel, L., Chang, T., Tseng, E., & Rogers, J. C. (2002). Medical student attitudes toward the doctor-patient relationship. *Medical Education*, 36(6), 568-574. doi:10.1046/j.1365-2923.2002.01233.x
- Haidet, P., Kelly, P. A., & Chou, C. (2005). Characterizing the patient-centeredness of hidden curricula in medical schools: Development and validation of a new measure. *Academic Medicine*, 80(1), 44-50.
- Haidet, P., Kroll, T. L., & Sharf, B. F. (2006). The complexity of patient participation: Lessons learned from patients' illness narratives. *Patient Education and Counseling*, 62(3), 323-329. doi:10.1016/j.pec.2006.06.005
- Haidet, P., & Stein, H. F. (2006). The role of the student-teacher relationship in the formation of physicians: The hidden curriculum as process. *Journal of General Internal Medicine*, 21(S1), S16-S20. doi:10.1111/j.1525-1497.2006.00304.x
- Harris, A., Boyce, P., & Ajjawi, R. (2011). Clinical reasoning sessions: Back to the patient. *The Clinical Teacher*, 8(1), 13-16. doi:10.1111/j.1743-498X.2010.00407.x
- Hunter, K. M. (1991). *Doctors' stories: The narrative structure of medical knowledge*. Princeton, NJ: Princeton University Press.
- Jenkins, H. (2006). *Convergence culture: Where old and new media collide*. New York, NY: New York University Press.

- Jin, J., & Bridges, S. M. (2014). Educational technologies in problem-based learning in health sciences education: A systematic review. *Journal of Medical Internet Research*, 16(12), e251. doi: 10.2196/jmir.3240.
- Kamin, C. S., Deterding, R. D., Wilson, B., Armacost, M., & Breedon, T. (1999). The development of a collaborative distance learning program to facilitate pediatric problem-based learning. *Medical Education Online*, 4. doi:http://dx.doi.org/10.3402/meo.v4i.4303
- Kamin, C., O'Sullivan, P., Deterding, R., & Younger, M. (2003). A comparison of critical thinking in groups of third-year medical students in text, video, and virtual PBL case modalities. *Academic Medicine*, 78(2), 204-211.
- Kaufman, D. M., & Mann, K. V. (1999). Achievement of students in a conventional and problem-based learning (PBL) curriculum. *Advances in Health Sciences Education*, 4(3), 245-260.
- Kaufman, D. M., & Mann, K. V. (1998). Comparing achievement on the Medical Council of Canada qualifying examination part I of students in a conventional and problem-based learning curricula. *Academic Medicine*, 73(11), 85-87.
- Kaufman, D. M., Laidlaw, T. A., & Macleod, H. (2000). Communication skills in medical school: Exposure, confidence, and performance. *Academic Medicine*, 75(10), S90-S92.
- Kenny, N. P., & Beagan, B. L. (2004). The patient as text: A challenge for problem-based learning. *Medical Education*, 38(10), 1071-1079. doi:10.1111/j.1365-2929.2004.01956.x
- Krupat, E., Hiam, C. M., Fleming, M. Z., & Freeman, P. (1999). Patient-centeredness and its correlates among first year medical students. *International Journal of Psychiatry in Medicine*, 29(3), 347-356. doi:10.2190/DVCQ-4LC8-NT7H-KE0L
- Krupat, E., Pelletier, S., Alexander, E. K., Hirsh, D., Ogur, B., & Schwartzstein, R. (2009). Can changes in the principal clinical year prevent the erosion of students' patient-centered beliefs? *Academic Medicine*, 84(5), 582-586. doi:10.1097/ACM.0b013e31819fa92d
- Kuehn, B. M. (2012). Patient-centered care model demands better physician-patient communication. *Journal of the American Medical Association*, 307(5), 441-442. doi:10.1001/jama.2012.46.
- Lamiani, G., Leone, D., Meyer, E. C., & Moja, E. A. (2011). How Italian students learn to become physicians: A qualitative study of the hidden curriculum. *Medical Teacher*, 33, 989-996. doi:10.3109/0142159X.2011.577467
- Lévesque, M. C., Hovey, R. B., & Bedos, C. (2013). Advancing patient-centered care through transformative educational leadership: A critical review of health care professional preparation for patient-centered care. *Journal of Healthcare Leadership*, 5, 35-46. doi:http://dx.doi.org/10.2147/JHL.S30889
- Luxford, K., Safran, D. G., & Delbanco, T. (2011). Promoting patient-centered care: A qualitative study of facilitators and barriers in healthcare organizations with a reputation for improving the patient experience. *International Journal for Quality in Health Care*, 23(5), 510-515. doi:10.1093/intqhc/mzr024
- MacLeod, A. (2011). Six ways problem-based learning cases can sabotage patient-centered medical education. *Academic Medicine*, 86(7), 818-825. doi:10.1097/ACM.0b013e31821db670
- Mamede, S., Schmidt, H. G., Rikers, R. M. J. P., Penaforte, J., & Coelho-Filho, J. (2007). Breaking down automaticity: Case ambiguity and the shift to reflective approaches in clinical reasoning. *Medical Education*, 41(12), 1185-1192. doi:10.1111/j.1365-2923.2007.02921.x
- Maudsley, R. F., Wilson, D. R., Neufield, V. R., Hennen, B. K., DeVillaeer, M. R., Wakefield, J., ... Richardson, D. (2000). Educating future physicians for Ontario: Phase II. *Academic Medicine*, 75(2), 113-126.

- Mead, N., & Bower, P. (2000). Patient-centredness: A conceptual framework and review of the empirical literature. *Social Science & Medicine*, 51, 1087-1110. doi:10.1016/S0277-9536(00)00098-8
- Mead, N., & Bower, P. (2002). Patient-centred consultations and outcomes in primary care: A review of the literature. *Patient Education and Counseling*, 48(1), 51-61. doi:10.1016/S0738-3991(02)00099-X
- Michalec, B. (2012). Clinical experiences during preclinical training: The function of modeled behavior and the evidence of professionalism principles. *International Journal of Medical Education*, 3, 37-45. doi:10.5116/ijme.4f42.5c99
- Michalec, B., & Hafferty, F. W. (2013). Stunting professionalism: The potency and durability of the hidden curriculum within medical education. *Social Theory & Health*, 11(4), 388-406. doi:10.1057/sth.2013.6
- Murray, J. H. (1998). *Hamlet on the holodeck: The future of narrative in cyberspace*. Cambridge, MA: The MIT Press.
- Newton, B. W., Barber, L., Clardy, J., Cleveland, E., & O'Sullivan, P. (2008). Is there hardening of the heart during medical school? *Academic Medicine*, 83(3), 244-249. doi:10.1097/ACM.0b013e3181637837
- Methodology Committee of the Patient-Centered Outcomes Research Institute (PCORI) (2012). Methodological standards and patient-centeredness in comparative effectiveness research: The PCORI perspective. *Journal of the American Medical Association*, 307(15), 1636-1640. doi:10.1001/jama.2012.466
- Polkinghorne, D. (1988). *Narrative knowing and the human sciences*. Albany, NY: State University of New York Press.
- Poulton, T., Conradi, E., Kavia, S., Round, J., & Hilton, S. (2009). The replacement of 'paper' cases by interactive online virtual patients in problem-based learning. *Medical Teacher*, 31(8), 752-758. doi:10.1080/01421590903141082
- Radwin, L. E., Cabral, H. J., & Wilkes, G. (2009). Relationships between patient-centered care nursing interventions and desired health outcomes in the context of the health care system. *Research in Nursing & Health*, 32(1), 4-17. doi:10.1002/nur.20302
- Rathert, C., Williams, E. S., McCaughey, D., & Ishqaidef, G. (2015). Patient perceptions of patient-centered care: Empirical test of a theoretical model. *Health Expectations*, 18(2), 199-209. doi:10.1111/hex.12020
- Rathert, C., Wyrwich, M. D., & Boren, S. A. (2012). Patient-centered care and outcomes: A systematic review of the literature. *Medical Care Research and Review*, 70(4), 351-379. doi:10.1177/1077558712465774
- Savery, J. R., & Duffy, T. M. (1995). Problem based learning: An instructional model and its constructivist framework. *Educational Technology*, 35(5): 31-38.
- Schank, R. C., & Cleary, C. (1995). *Engines for education*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Schwartz, P. L., Webb, G., & Mennin, S. (2001). *Problem-based learning: Case studies, experience and practice*. London, UK: Kogan Page.
- Srinivasan, M., Wilkes, M., Stevenson, F., Nguyen, T., & Slavin, S. (2007). Comparing problem-based learning with case-based learning: Effects of a major curricular shift at two institutions. *Academic Medicine*, 82(1), 74-82. doi:10.1097/01.ACM.0000249963.93776.aa
- Staub, M., Bergström, B., & Wadensten, B. (2010). Evaluation of a PBL strategy in clinical supervision of nursing students: Patient-centred training in student-dedicated treatment rooms. *Nurse Education Today*, 30(7), 631-637. doi:10.1016/j.nedt.2009.12.013
- Stewart, M., Brown, J. B., Donner, A., McWhinney, I. R., Oates, J., Weston, W. W., & Jordan, J. (2000). The impact of patient-centered care on outcomes. *The Journal of Family Practice*, 49(9), 796-804.

- Stewart, M. A. (1984). What is a successful doctor-patient interview? A study of interactions and outcomes. *Social Science & Medicine*, 19(2), 167-175.
- Street, R. L., Gordon, H., & Haidet, P. (2007). Physicians' communication and perceptions of patients: Is it how they look, how they talk, or is it just the doctor? *Social Science & Medicine*, 65(3), 586-598. doi:0.1016/j.socscimed.2007.03.036
- Taylor, D., & Mifflin, B. (2008). AMEE guide no. 36: Problem-based learning: Where are we now? *Medical Teacher*, 30(8), 742-763. doi:10.1080/01421590802217199
- Towle, A. (2006). Where's the patient's voice in health professional education? *Nurse Education in Practice*, 6(5), 300-302. doi:10.1016/j.nepr.2006.04.009
- Tsimtsiou, Z., Kerasidou, O., Efstathiou, N., Papaharitou, S., Hatzimouratidis, K., & Hatzichristou, D. (2007). Medical students' attitudes towards patient-centered care: A longitudinal survey. *Medical Education*, 41(2), 146-153. doi:10.1111/j.1365-2929.2006.02668.x
- Van Den Assem, B., & Dulewicz, V. (2015). Doctors' trustworthiness, practice orientation, performance and patient satisfaction. *International Journal of Health Care Quality Assurance*, 28(1), 82-95. doi: 10.1108/IJHCQA-04-2013-0037
- Visser, M., Deliens, L., & Houttekier, D. (2014). Physician-related barriers to communication and patient- and family-centred decision-making towards the end of life in intensive care: A systematic review. *Critical Care*, 18(6), 604. doi:10.1186/s13054-014-0604-z
- Weissmann, P. F., Branch, W. T., Gracey, C. F., Haidet, P., & Frankel, R. M. (2006). Role modeling humanistic behavior: Learning bedside manner from the experts. *Academic Medicine*, 81(7), 661-667. doi:10.1097/01.ACM.0000232423.81299.fe
- Wilkerson, L., & Feletti, G. (1989). Problem-based learning: One approach to increasing student participation. *New Directions for Teaching and Learning*, 1989(37): 51-60. doi:10.1002/tl.37219893707
- Woloschuk, W., Harasym, P. H., & Temple, W. (2004). Attitude change during medical school: A cohort study. *Medical Education*, 38(5), 522-534. doi:10.1046/j.1365-2929.2004.01820.x
- Zill, J. M., Scholl, I., Härter, M., & Dirmaier, J. (2013). Evaluation of dimensions and measurement scales in patient-centeredness. *Patient Preference and Adherence*, 7, 345-351. doi:10.2147/PPA.S42759