

History, Philosophy and Criticisms of Problem Based Learning in Adult Education

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Introduction

Problem-based learning is a curricular methodology that is seeing increasing implementation across a variety of disciplines. Based on progressive and constructivist thought it espouses many benefits for the adult learner. In this paper I will establish a common understanding of problem-based learning, explore the history of problem-based learning, including antecedents to its introduction in healthcare education, and discuss the philosophies that underpin problem-based learning. I will then turn to a review of the criticisms of problem-based learning concerning andragogical and clinical success.

Problem-Based Learning

McMaster University, pioneers in the problem-based learning (PBL) approach, describes PBL as “a pedagogical approach which uses cases and problems as the starting point for acquiring the desired learning objectives” (Walsh, 2005, p. 26). Problem-based

learning is a curriculum development and instructional approach that challenges students to work collaboratively in small groups of 5-10 students to find solutions to real-world problems (Azer, 2001a; Baker, 2000; Barrows, 1998; Barrows, 2002; Camp, 1996; Hmelo-Silver, 2004; Margetson, 1998; Morrison, 2004; O’Kelly, Monahan, Gibson & Brown, 2005; Rideout, 2001; Tan, 2004; Wood, 2003). Students engage with carefully constructed complex situations that are

presented to them, decide what they know and what they need to find out, and determine which skills they need to manage



the situation effectively (Alexander et al, 2005; Baker, 2000; Rideout, 2001; Savin-Baden, 2000). Problem based learning places the action of learning on the student (Alexander et al, 2002; Camp, 1996). In a PBL approach to learning learners are actively constructing knowledge in collaborative groups (Hmelo-Silver, 2004).

History of PBL in Adult Education

Problem-based learning has been one of the most influential curricular innovations in higher education (Tan, 2004). Problem-based learning as a general concept originated in medical education in

the mid-1950s at Case Western Reserve University (Baker, 2000; O’Kelly et al, 2005; Savery & Duffy, 1996). This model consisted of a hybrid format that combined problem-based learning with more traditional teaching methods (Baker).

Problem-based learning gained popularity as a more advanced concept during the late 1960s as a result of the work of Harold Barrows, a medical educator at McMaster University who researched and observed the reasoning capabilities of both medical students and expert practitioners (Rideout, 2001; Savin-Baden, 2000; Tanner, 1999). The impetus for the small group, student-centered initiative was that medical students tended to gather information but had difficulty applying it in the clinical setting; thus, they felt largely unprepared for their upcoming practice as physicians (Alexander et al, 2005; Price, 1999; Savin-Baden, 2000). It was Barrows’ desire to bridge the gap between theory and practice in the clinical setting and to increase clinical reasoning abilities (Rideout, 2001; Savin-Baden, 2000). Barrows asserted that students learned more effectively through problem situations and that the medical skills that were most important for treating patients were problem-solving skills, not the memorization of facts (Savin-Baden, 2000).

Problem-based learning became the cornerstone of the new School of Medicine at McMaster University in 1969 (Johnson &

Finucane, 2000). Since then, medical schools around the world have introduced PBL into their curricula (Alexander et al, 2005; Baker, 2000; Tanner, 1999).

According to McMaster University, out of 125 medical schools in the United States, 120 follow a PBL curriculum (B. Brown, personal communication, June 14, 2006). PBL has seen the most widespread application in the first two years of medical school, where it commonly replaces lecture-based approaches to core courses (Savery & Duffy, 1996). As well, PBL has moved beyond health care education into the social sciences, architecture, humanities, law, business education, veterinary medicine, forestry and engineering. Distance learning and the K-12 sector have also been affected by PBL (Azer, 2001b; Baker, 2000; Camp, 1996).

McMaster University pioneered the PBL curricula in their School of Nursing in 1972 (Baker, 2000; B. Brown, personal communication, June 14, 2006). From here, several schools of nursing piloted and incorporated PBL curricula as part of an effort to better prepare graduates for clinical practice (Alexander et al, 2002). It is interesting to note that while medical schools have implemented fully integrated PBL curricula, schools of nursing have implemented it primarily on a course-by-course basis. The reason for this difference is that medical education programs deliver a second-degree to students already



holding an undergraduate science degree, whereas the majority of nursing students lack a post-secondary or undergraduate science background (B. Brown, personal communication, June 14, 2006).

Problem-based learning originated and continues to be adopted as a curricular approach in reaction to the issues surrounding traditional educational approaches, primarily that clinicians were inadequately prepared for clinical practice (Barrows, 2002). In short, it was felt that traditional methods were not equipping students for clinical practice in today's health care system. With an increasing body



of knowledge, students were being overloaded, particularly through lecture and assigned readings (Alexander et al, 2005; Azer, 2001a; Camp, 1996;

Margetson, 1998; Rideout, 2001; Tan, 2004; Tanner, 1999). A separation of nonclinical and clinical courses led to an artificial division between knowledge and practice and thus an overall lack of integration, creating a theory-to-practice gap (Alexander et al, 2002; Azer, 2001a; Johnson & Finucane, 2000; Margetson, 1998; Tan, 2004; Tanner, 1999). Students often felt

that the subject matter was irrelevant, or material was simply forgotten or became outdated (Azer, 2001a; Johnson & Finucane; Margetson, 1998; Tanner, 1999). Students also demonstrated an inability to solve problems in clinical practice (Alexander et al, 2002; Azer, 2001a; Baker, 2000; Hwang & Kim, 2005; Margetson, 1998; Tan, 2004; Tanner, 1999). It was also felt that traditional approaches did not develop in students a favorable disposition towards lifelong learning, a requirement of today's healthcare practitioner (Alexander et al, 2002; Azer, 2001a; Rideout, 2001; Tanner, 1999).

Philosophical Underpinnings of PBL

The philosophies most closely associated with problem-based learning include progressivism, constructivism, and humanism (specifically, adult education principles). However, the philosophical roots of PBL go back to Socrates, who utilized problems with his students so that through their questions he could help them explore “their assumptions, their values and the inadequacies of their proffered solutions” (Savin-Baden, 2000, p. 3). As well, Aristotle suggested that students begin problem-solving by determining both their perceptions and beliefs (Savin-Baden, 2000). Ancient apprenticeship models of learning-by-doing also promoted active learning at their core.

Prior to embarking on an exploration of the major philosophical underpinnings of PBL, it is important to consider that Harold Barrows, who popularized the PBL concept,

began his educational experiment not based on educational psychology or cognitive science but as an experiment in using small groups to learn through clinical problems to make medical education interesting and relevant to students (Newman, 2003). It is even more interesting then, that given the apparent lack of psychometric and philosophical rationales to back his 'experiment', it was implemented on such a wide basis, first at McMaster and soon after at other medical schools. It seems then that a philosophical basis for PBL has been determined somewhat *ex post facto*, as an explanation for acts that lacked articulated philosophical underpinnings in the first place.

Progressivism

Problem-based learning is associated with a progressive philosophy (Rideout, 2001). John Dewey (1859–1952) was the most prominent promoter of progressive thought, particularly as it related to education (Elias & Merriam, 2005). Hallmarks of progressive education included an emphasis on manual and vocational training, experiential learning, scientific inquiry, community involvement, and responsiveness to social problems (Elias & Merriam, 2005). Pragmatism is the philosophical basis of progressivism. Assumptions of pragmatism include the centrality of human experience which is



placed “in opposition to all authoritarian ways of arriving at knowledge” (Elias & Merriam, 2005, p. 54); an emphasis on the consequences of actions to determine whether they are true or good; and, an emphasis on social reform.

Dewey promoted the notion that the “highest ideal of the progressive movement was education for democracy” which Dewey defined as “people engaged in joint activity to solve their common problems” (Elias & Merriam, 2005, p. 53).

Thus, there were both individual and social goals of education, and the two could not be separated. Dewey considered that the mind and its formation was a communal process, and that the individual and his or her society had no meaning apart from each other. This is reflected in the PBL process of group work,

community and collaboration which form the basis of its social context of learning (Azer, 2001a; Barrows, 1998; Camp, 1996; Hmelo-Silver, 2004; Rideout, 2001; Tan, 2004).

Dewey’s early philosophy is focused on the learner-centered approach to education (Elias & Merriam, 2005; Prawat, 2000). He suggested that learners are not passive recipients of knowledge but that they need to be involved in their learning, using their experiences as a starting point. Learning, according to Dewey, is primarily an activity that students do for themselves.

Dewey adopted a more or less constructivist view of teaching and learning, in which the focus is shifted from the teacher as controller to that of being an intellectual leader (Elias & Merriam, 2005). The instructor's responsibility is to "organize, stimulate, instigate, and evaluate the highly complex process of education" and provide a context that promotes learning (Elias & Merriam, 2005, p. 68). Dewey insisted that the primary reliance in a classroom should be upon experience and discourse between members (Prawat, 2000). The PBL process promotes student-centered learning by requiring students to be active in the process of collaboration, decision-making, and pursuing knowledge through a variety of sources, while the teacher takes on the role of facilitator or guide (Baker, 2000; Barrows, 1998; Camp, 1996; Hmelo-Silver, 2004; Johnson & Finucane, 2000; Margetson, 1998; Rideout, 2001; Wood, 2003).

Dewey viewed learning as an activity or a process of finding out (Savin-Baden, 2000). Dewey's view was that knowledge is intricately united with activity, and that we are agents of change and not just mere spectators (Baker, 2000; Rhem, 1998; Rideout, 2001). Dewey asserted that true learning is established through discovery, guided by mentoring, and that learning was not a direct outcome of knowledge transmission. Dewey's pragmatic position concerning knowledge is perhaps best articulated in the suggestion that there is an "intimate and necessary relation between the process of actual experience and

education" (Dewey, 1967, cited in O'Kelly et al, 2005). This notion supports the problem-based approach, which combines process and content as equal aspects of learning (Azer, 2001a; Margetson, 1998; Rideout, 2001; Savery & Duffy, 1996). Discovery is more closely aligned with the realities of clinical practice than knowledge transmission, making PBL highly relevant to healthcare education. Qayumi (2001) suggests that "the delivery of medical knowledge is the reverse of practical medicine" (p. 64). In other words, in clinical practice practitioners encounter problems, something they are not attuned to in their knowledge-building educational experiences. This is a problem that PBL seeks to address.



Dewey's activity-based approach is supportive of the idea that when students encounter a novel situation a state of disequilibrium is created, which provides the incentive for real learning to occur (Prawat, 2000). Dewey asserted that "an experience is educative...if it increases the quality of one's interactions with important objects and events in the immediate environment and lays the groundwork for even more expansive interactions in the

future” (Prawat, 2000, p. 806). Dewey suggested that curricula be organized around problems instead of subjects (Elias & Merriam, 2005). Dewey considered it imperative that the skills and knowledge that students learn be integrated into their lives as persons, members of society, and human beings (Prawat, 2000). Dewey felt that better learning was obtained, not by rote memorization of facts, but through problem-solving, critical thinking and doing. Learning is enhanced when learners are actively involved in the process (Azer, 2001a; Rideout, 2001; Spencer, 1999). Problem-based learning uses a problem as the catalyst or starting point for learning. Through a process of social negotiation the terms of the problem are recognized and managed, a collaborative process that resembles clinical practice (Alleyne et al, 2002; Alexander et al, 2005; Azer, 2001a; Barrows, 1998; Camp, 1996; Margetson, 1998; Qayumi, 2001; Savin-Baden, 2000; Tanner, 1999).



Dewey supported the notion of socially shared cognition (Prawat, 2000). Dewey insisted that “it is through the

process of social negotiation, directed by the teacher, that powerful ideas get constructed and consensus is reached on how those ideas are to be tested” (Prawat, 2000, p. 806). Dewey felt that “intellectual freedom and group learning are not at loggerheads” but rather that “individual capacities are best brought out in group settings” (Prawat, 2000, p. 831). He emphasized the importance of shared knowledge and social negotiation as the starting point for discovery, emphasizing that individuals exist in a social context (Prawat, 2000). The problem-based learning process capitalizes on the concept of shared cognition, social negotiation and meaning-making in all phases of the process as students discuss and resolve the clinical problem (Rhem, 1998; Rideout, 2001).

Constructivism

Constructivist philosophy, concerned with how we come to understand or know, originated from Piaget’s research in the area of developmental psychology (Koschmann, 1996). Constructivism suggests that learning is a process by which the learner actively constructs knowledge. Constructivism views knowledge as not absolute but constructed by the learner according to what is previously known (Baker, 2000; Koschmann, 1996). The importance of prior knowledge in structuring new information is a central principle in PBL as students approach clinical problems (Alexander et al, 2005; Rideout, 2001).

Constructivist thought also asserts that understanding comes from our

interactions with our environment (Baker, 2000; Camp, 1996; Savery & Duffy, 1996). This implies that what is learned cannot be separated from how it is learned. Savery and Duffy (1996) state that “what we understand is a function of the content, the context, the activity of the learner, and, perhaps most importantly, the goals of the learner” (p. 3). Because both learning and life itself occur in contexts, it naturally follows that knowledge acquisition should also be context based (Hmelo-Silver, 2004; Savin-Baden, 2000; Schmidt, Vermeulen & van der Molen, 2006). PBL reflects this constructivist proposition in its situating of knowledge in clinical problems. Students acquire knowledge through the process of exploring clinical cases and building on what is already known (Camp, 1996; Johnson & Finucane, 2000; Walsh, 2005). The premise that students need to be actively involved in the learning process is a foundational tenet of PBL (Rideout, 2001).

Another constructivist premise is that cognitive conflict is the stimulus for learning (Baker, 2000; Camp, 1996; Prawat, 2000; Savery & Duffy, 1996). Dewey suggested that the problem is the impetus for learning and determines the organization of what is learned (Prawat, 2000; Savery & Duffy, 1996). Piaget put forth that when experiences do not fit into the existing schema, the need for

accommodation arises (Savery & Duffy, 1996).

This gives the learner purpose, determines to what the learner attends, considers prior experience in constructing understanding, and determines what understanding is then constructed (Savery & Duffy, 1996). Therefore, the likelihood that learning will be transferred is increased when the problems resemble real-world situations. In problem-based learning, it is the problem that is the impetus that, acting as a catalyst, initiates learning (O’Kelly et al, 2005). As such, PBL curricular organization is based around problems rather than disciplines (Newman, 2003). PBL is based on

the assumption that learning becomes relevant and meaningful when applied to real-world problems, and that new learning must be related to what is already known (Azer, 2001a; Baker, 2000; Camp, 1996; Margetson, 1998; Rideout, 2001).

Lastly, according to constructivist thought, knowledge evolves in a social context, through social negotiation and through the

evaluation of the individual understandings (Baker, 2000; Camp, 1996; Prawat, 2000; Savery & Duffy, 1996). This emphasizes the importance of the social environment in the development of knowledge and testing our understanding. Vygotsky contributed to the communal social construction of learning, stating that “knowledge is ‘constructed’ by



the learner's cognitive activity in continuous interaction with participation in the social community of which the learner is a member" (Rideout, 2001, p. 26). Retention of knowledge is enhanced through discussion, questioning and critique (Azer, 2001a; Camp, 1996; Margetson, 1998; Rideout, 2001). This is modeled in PBL, as learning is placed in a social context. Furthermore, the role of tutors is not to dominate but to assist in the learning process (Rideout). Peer interaction is viewed as pivotal for cognitive development (Koschmann, 1996).

In summary, constructivism gives rise to instructional design principles that contribute to the PBL environment. These principles are: (1) anchor learning activities to a larger purpose or problem; (2) support the learner in developing ownership of the problem; (3) design an authentic task with which the learner can engage; (4) design the problem and environment to reflect real-world complexity; (5) give the learner ownership of the process of developing a solution; (6) design the environment to support and challenge learners' thinking; (8) promote the testing of ideas against alternate views; and (9) promote reflection on old content and process (Rideout, 2001; Savery & Duffy, 1996).

Humanism and Adult Education Principles

Problem-based learning models the adult educational principles that are rooted in the work of Malcolm Knowles (Azer, 2001a; Camp, 1996; Morrison, 2004; Rideout, 2001). Adults are motivated by learning what is perceived as relevant,

builds on their previous experiences and is participatory, problem focused, designed to increase personal responsibility for learning, immediately applied in practice, and based on mutual trust and respect (Spencer, 1999). Features of PBL directly consistent with adult education include emphasizing student autonomy; building on previous knowledge and experience; building in relevance; providing the opportunity for immediate application; creating a learning environment that is comfortable; exhibiting mutual trust and respect; accepting differences; promoting freedom of expression; aligning goals with the learners' needs; encouraging students to set their own learning goals; sharing responsibility for planning, decision-making, and executing learning experiences; demonstrating commitment; and encouraging active participation (Camp, 1996; Rideout, 2001).

Criticisms of PBL

The following criticisms of PBL are not intended to oppose the methodology in principle or practice but instead highlight the need for acknowledgment and further research. Criticisms of PBL center on four areas: resources, the student experience, adulterated forms of PBL, and the question of efficacy.

PBL is resource-intensive in terms of faculty time, space (tutorial rooms), teaching materials, and library resources (Azer, 2001b; Johnson & Finucane, 2000; Morrison, 2004; Moust, van Berkel & Schmidt, 2005; Walsh, 2005; Wood, 2003;). The development of suitable cases is time-

consuming and requires staff development, current clinical practice and partnerships between educational and health care institutions (Johnson & Finucane, 2000; Tan, 2004). As well, staff orientation is required to pre-empt difficulties in integration of a PBL curricula (Azer, 2001b; Butler, Inman & Lobb, 2005; Johnson & Finucane, 2000; Tan, 2004; Walsh, 2005). Some colleges have found that due to fiscal and other resource limitations PBL is not sustainable. Lack of staff resources may cause small groups to burgeon to up to 30 students, causing a



significant degradation of the process. In consulting with McMaster University's School of Nursing, I discovered that their program is structured to incorporate 240 clinical teaching staff (over and above faculty) who are contracted on an hourly contract of 39 hours per year to teach tutorial groups (B. Brown, personal communication, June 14, 2006). If a nursing program only uses faculty, they will have insufficient numbers to manage a large number of tutorial groups. Colleges may also have space limitations and students may have limited access to library and computer resources. If a PBL program is fiscally unable to maintain the high staffing ratios required (and because staff are difficult to find in a time of global nursing shortage) the nursing program may decide to revert to a more traditional curricular approach which is more sustainable.

Another criticism centers on the student experience. Students experience stress and feel overloaded until they are familiar with the PBL process (Azer, 2001b; Johnson & Finucane, 2000; Tan, 2004; Wood, 2003). Other criticisms include the

noticeable lack of a classroom role model as seen in traditional lecture based programs; Wood (2003) suggests such role models can be very inspirational for students. As well, the learning quality in a PBL context is somewhat dependent on having a high functioning group (Azer,

2001b; Walsh, 2005). Also, it is commonly heard students disparaging that they are paying tuition to teach themselves (B. Brown, personal communication, June 14, 2006). Finally, as with any teaching method, it may not meet everyone's needs (Tan, 2004). I often hear students express frustration that they feel they "aren't learning anything" and are paying tuition to teach themselves. Some students, however, say they are benefiting from the PBL approach. Overall, PBL receives mixed reviews from students.

The third area of criticism centers on the myriad adulterated forms of PBL.

Almost forty years after the inception of problem-based learning, we are noticing that there exists a wide understanding of the nature of PBL in its pure form, and that a range of adulterated forms of PBL exist (Baker, 2000; Butler et al, 2005; Camp,

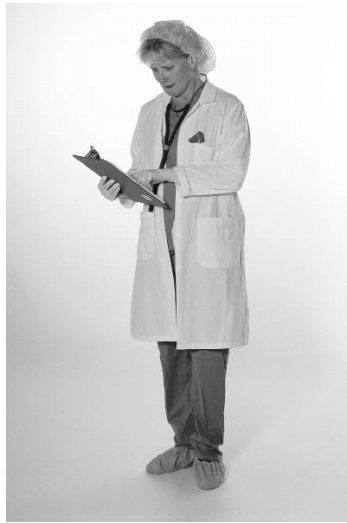
1996; Tanner, 1999). As well, the implementation of PBL is influenced by pedagogies that underpin both curricula and the staff that implement it, which also contributes to modifying its essence (Savin-Baden, 2000). There is also the perception that PBL constitutes a relatively inefficient way to learn and that not as much content is covered as in traditional curricula, which also leads individual instructors to significantly modify the PBL process (Azer, 2001b; Johnson & Finucane, 2000; Moust et al., 2005). PBL might not be fully integrated, occurring instead on a course-by-course basis, with each instructor modifying the process to compensate for its perceived deficiencies. It is difficult to tell exactly what occurs behind closed classroom doors and how individual instructors are modifying the process to suit their understanding of it.

The fourth and most significant category of criticism concerns the question of efficacy of PBL as an instructional and curricular methodology. Problems inherent in reviewing existing literature regarding the effectiveness of PBL as an educational method can be reduced to the fact that high quality evidence is simply lacking (Newman, 2003). Much of the literature does not contain enough information regarding experimental and control cohorts and to the type of PBL being used or evaluated (Camp, 1996; Newman, 2003; Tanner,

1999). In addition, variables are often confounded because PBL is accompanied with other major curriculum revisions, such as staff development, and it cannot be determined if the results can be attributed to the use of PBL (Johnson & Finucane, 2000).

Quantitatively, PBL is difficult to evaluate for several reasons. There are issues centered on the difficulty of evaluating a process-based approach with content-driven evaluative methods (Newman, 2003). Wood (2003) suggests that “if assessment methods rely solely on factual recall then PBL is unlikely to succeed in the curriculum” (p. 330); other factors need to be considered. Other issues surrounding the quantitative evaluation of the effectiveness of PBL is that examination results and clinical skills evaluations, while frequently cited as measures of the effectiveness of PBL, do not address understanding (Butler et

al, 2005). As well, there are no standardized elements that can be replicated, measured and compared (Baker, 2000). What the research has indicated is that licensure exam scores remain consistently high and comparable to traditional delivery counterparts (Alexander et al, 2005; B. Brown, personal communication, June 14, 2006). Individual studies, however, demonstrate mixed results overall, ranging from PBL exceeding traditional methods in test scores to the opposite being



determined, and several studies reported no difference between cohorts (Alleyne et al, 2002; Baker, 2000; Distlehorst, Dawson, Robbs & Barrows, 2005; Enarson & Cariaga-Lo, 2001; Hmelo-Silver, 2004; Hwang and Kim, 2005; Iputo & Kwizera, 2005; Miller, 2003; Morrison, 2004; Newman, 2003; Schmidt et al, 2006; Smits, Verbeek & de Buissonje, 2002).

Qualitatively, the literature revealed that students and instructors reported increased enjoyment and satisfaction with the educational process of PBL (Antepohl, 2003; Hwang & Kim, 2005; Johnson & Finucane, 2000; Miller, 2003; Morrison, 2004; Savin-Baden, 2000; Smits et al, 2002), although this has not been my observation, particularly regarding students. Another issue is that little information is available regarding clinical performance of former PBL students (Antepohl, 2003). Areas in which graduates felt particularly prepared were in the areas of communication, collaboration and critical thinking. As well, students noted increased retention of their learning (Tanner, 1999).

Research has not confirmed whether PBL fosters application and integration of knowledge, builds on previous learning, develops clinical reasoning and cognitive abilities similar to that of expert practitioners or brings relevance to future clinical practice (Azer, 2001b; Morrison, 2004; Walsh, 2005). Furthermore, Patel (cited in Tanner, 1999) found that PBL students “utilize more ‘backward reasoning’ than conventional students”, a characteristic of novice practitioners, as

compared with expert practitioners who engage in forward reasoning (p. 535). Anecdotal evidence from colleagues involved in clinical teaching is conflicting and varies widely among instructors and settings. Finally, it has been suggested that there may be some subjects in which foundational knowledge is best



disseminated first (Tan, 2004). One study found that students with a solid basic science foundation did better academically than students who did not, regardless of the type of curriculum (Enarson & Cariaga-Lo, 2001), suggesting that there may be some domains that require essential prior knowledge (Tan, 2004). Overall, it is clear that more research is needed concerning the efficacy of problem-based learning (Morrison, 2004; Moust et al, 2005; Newman, 2003; Savin-Baden, 2000). In short, the findings of the literature concerning the efficacy of PBL are inconclusive and at times contradictory.

On a closing note, McMaster University’s School of Medicine has recently undergone a curricular modification, changing from a PBL program to a “Compass” program, which is PBL at its heart but is more structured and delivers more content (B. Brown, personal

communication, June 14, 2006). Brown assures me, however, that PBL is alive and well at McMaster University.

Conclusion

Problem-based learning is considered to be one of the most significant innovations in adult education. Its curricular aim is to better prepare practitioners for clinical practice in a rapidly changing world. In the absence of hard and fast evidence of its effectiveness, given the implementation issues PBL presents, and given that the student experience is mixed at best, I suggest that problem-based

learning is not a panacea for the problems in adult education. However, it is an instructional tool to create practitioners that are responsive and engaged with the realities of today's healthcare environment. Perhaps we should consider that educational methods go through phases, of which PBL is the most recent. As well, we might consider that there may be yet other ways to meet the needs of students that uphold the principles of adult education and create the kind of practitioner we need in today's healthcare practice.

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