



# Interdisciplinary Journal of Problem-Based Learning

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Volume 9 | Issue 1

Article 11

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Published online: 4-1-2015

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### Recommended Citation

Salinitri, F. D. , Wilhelm, S. M. , & Crabtree, B. L. (2015). Facilitating Facilitators: Enhancing PBL through a Structured Facilitator Development Program. *Interdisciplinary Journal of Problem-Based Learning*, 9(1). Available at: <https://doi.org/10.7771/1541-5015.1509>

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# THE INTERDISCIPLINARY JOURNAL OF PROBLEM-BASED LEARNING

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## ARTICLE

### Facilitating Facilitators: Enhancing PBL through a Structured Facilitator Development Program

Francine D. Salinitri, Sheila M. Wilhelm, and Brian L. Crabtree (Wayne State University)

With increasing adoption of the problem-based learning (PBL) model, creative approaches to enhancing facilitator training and optimizing resources to maintain effective learning in small groups is essential. We describe a theoretical framework for the development of a PBL facilitator training program that uses the constructivist approach as the program's guiding philosophy. The structured, pedagogically sound program was designed for a multidisciplinary pool of basic and social/administrative scientists, clinical faculty, practicing pharmacists, and post-graduate residents enrolled in a teaching certificate program. The training program employs the PBL experience, along with interactive technology, case-based and debriefing sessions with small groups and experienced facilitators. Proposed models for assessment of the facilitator training program include evaluation of inter-rater variability between facilitators with respect to student performance in PBL.

*Keywords:* problem-based learning, constructivist philosophy, residency teaching certificate, facilitator, training, pharmaceutical sciences, pharmacy practice, clinicians

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## Introduction

Problem-based learning (PBL) is an educational method that uses real-world cases to facilitate learning through a student-centered approach. PBL has been widely accepted by health care educators as a pedagogical/andragogical model to promote and develop essential skills needed by 21<sup>st</sup>-century professionals (Schlett et al., 2010; Stewart, Brown, Clavier, & Wyatt, 2011; Tavakol & Reicherter, 2003). To corroborate this, the Association of American Colleges and Universities conducted a "National Survey of Business and Nonprofit Leaders" to determine which skills employers hold in highest regard when making hiring decisions (Hart Research Associates, 2013). The 318 employers surveyed reported that the skills most sought after include the ability to think critically, solve complex problems, communicate effectively, acquire new knowledge, and apply acquired knowledge to novel real-world settings and problems, which are many of the goals achieved through PBL (Barrows, 1986; Barrows, 1994; Hmelo-Silver, 2004). Additional goals of PBL include clinical reasoning, self-directed learning, and collaborative skills, as well as flexible knowledge and intrinsic motivation (Barrows, 1986; Barrows, 1994; Hmelo-Silver, 2004).

An appreciation of the importance of the skills developed through PBL has led to increasing adoption of the

PBL method and other forms of active learning pedagogies. Existing and proposed revised accreditation standards in academic pharmacy support and expect the use of learning strategies that encourage development of skills in critical thinking, problem solving, and self-directed learning (Accreditation Council for Pharmacy Education [ACPE], 2011). Recently, the American Association of Colleges of Pharmacy Center for the Advancement of Pharmacy Education (CAPE) has additionally identified educational outcome domains that promote scholarly methods of learning such as PBL (Medina et al., 2013). These recommendations, as well as PBL's ability to simulate the cognitive processes that occur in clinical practice, for example, data analysis and hypothesis formulation and testing (Barrows, 1986; Barrows, 1994), have resulted in over 70% of schools and colleges of pharmacy in the United States reporting incorporating PBL or some form of PBL into their pharmacy curricula (Stewart et al., 2011).

While there are numerous facets associated with the use of the PBL methodology, skilled facilitators are central to the success of this pedagogy. The literature describing training programs for facilitators has come from many of the disciplines in health sciences, such as medicine (Barrows, 1988; Bosse, Huwendiek, Skelin, Kirschfink, & Nikendei, 2010; Olmesdahl & Manning, 1999), dentistry (Dalrymple

et al., 2007; Wuenschell, Dalrymple, & Shuler, 2007), and allied health professions (Tavakol & Reicherter, 2003). Themes identified to be common amongst facilitator training programs include observing experienced facilitators facilitate live or through interactive videos, trainees playing the role of students while being facilitated by an experienced facilitator, trainees acting as facilitators after viewing an expert facilitator, and the use of a hybrid approach to training by incorporating both an information session and an active learning session (Dalrymple et al., 2007; Olmesdahl & Manning, 1999; Tavakol & Reicherter, 2003; Wuenschell et al., 2007).

Although there is a consistent approach in the literature with respect to PBL facilitator training programs that are structured and involve active learning or the PBL method itself to drive the training session, there is a paucity of literature regarding the best practices in facilitator training. Many programs assess their training using qualitative analyses of facilitators' perceptions of PBL with few research publications using objective measures to assess training programs and their effect on student assessment. More research is needed to determine the most effective models of facilitator training and the impact these models have on facilitators' assessment of student learners.

In this paper, we describe a theoretical framework for a pedagogically sound PBL facilitator training model that is rooted in the constructivist philosophy of learning (Piaget, 1997; von Glasersfeld, 1989; Vygotsky, 1986). The objectives of the model are to enhance facilitators' understanding of PBL, their facilitation skills, and their ability to construct an optimal PBL learning environment. Key operational elements that guided the development of the training program included: 1) training geared to a multidisciplinary pool of basic and social/administrative scientists, clinical faculty, practicing pharmacists, and postgraduate residents enrolled in a teaching certificate program; 2) the need for a program that can be offered multiple times a year to provide just-in-time training prior to new facilitators rotating into a series of sessions; 3) the desire to have a program that is sustainable with the use of enduring materials (i.e., videotaped sessions that can be reused); 4) strategic and effective incorporation of technology; 5) the need to develop a flexible and time-efficient program that allows for the involvement of volunteer practitioners; and 6) to create a community of practice (Wenger, 1998) amongst facilitators. Finally, we propose a method to assess the impact of the training program with respect to facilitator assessment of student learners with a goal of developing facilitators that provide fair and equitable assessment.

## Constructivist Philosophy and the PBL Method for Training

### The Philosophy

The constructivist philosophy developed in the twentieth century by Jean Piaget (1997) and Lev Vygotsky (1986) and pioneered by John Dewey (2004) has been widely applied to teaching and learning methodologies in health care education (Savery & Duffy, 1995; von Glasersfeld, 1989). Tenets of the philosophy profess that knowledge is constructed by the learner through her interaction with the environment and from her life experiences (von Glasersfeld, 1989). This constructed knowledge that an individual has can be referred to as developed conceptual knowledge. Conceptual knowledge is developed and organized in the mind of the learners, and is challenged and strengthened through their social interactions. These interactions stimulate novel conceptual structures through negotiation and consensus building. The learner's perception of what he knows and his knowledge of the process of knowing, which is referred to as metacognition, is a central concept of this philosophy. Embracing this philosophy informs educators' beliefs regarding acquisition of knowledge and thus drives instructional design or curriculum development. Teaching and learning methodologies that are rooted in the constructivist philosophy necessitate that the teacher functions more as a guide, facilitator, or coach throughout the learning experience to help the learner be successful in the process of constructing her knowledge. Applying this philosophical approach to facilitator training allows the facilitator trainee to experience the PBL environment from the perspective of the learner who constructs knowledge in a group with the guidance of an experienced facilitator.

### The PBL Method for Training

One educational method with theoretical underpinnings rooted in the constructivist philosophy is PBL. PBL originated at McMaster University and has been used formally in health care education since the 1970s (Barrows & Tamblyn, 1980; Kang, Brian, & Ricca, 2010; Savery & Duffy, 1995). The goals of PBL, generated from the constructivist philosophy, include problem solving, critical thinking, clinical reasoning, self-directed learning, collaborative skills, flexible knowledge, and intrinsic motivation (Barrows, 1986; Barrows, 1994; Hmelo-Silver, 2004). Figure 1 depicts how the goals of PBL and its instructional design can be conceptually mapped back to the underlying constructivist philosophy (Barrows, 1986; Barrows, 1994; Hmelo-Silver, 2004; Savery & Duffy, 1995; von Glasersfeld, 1989).

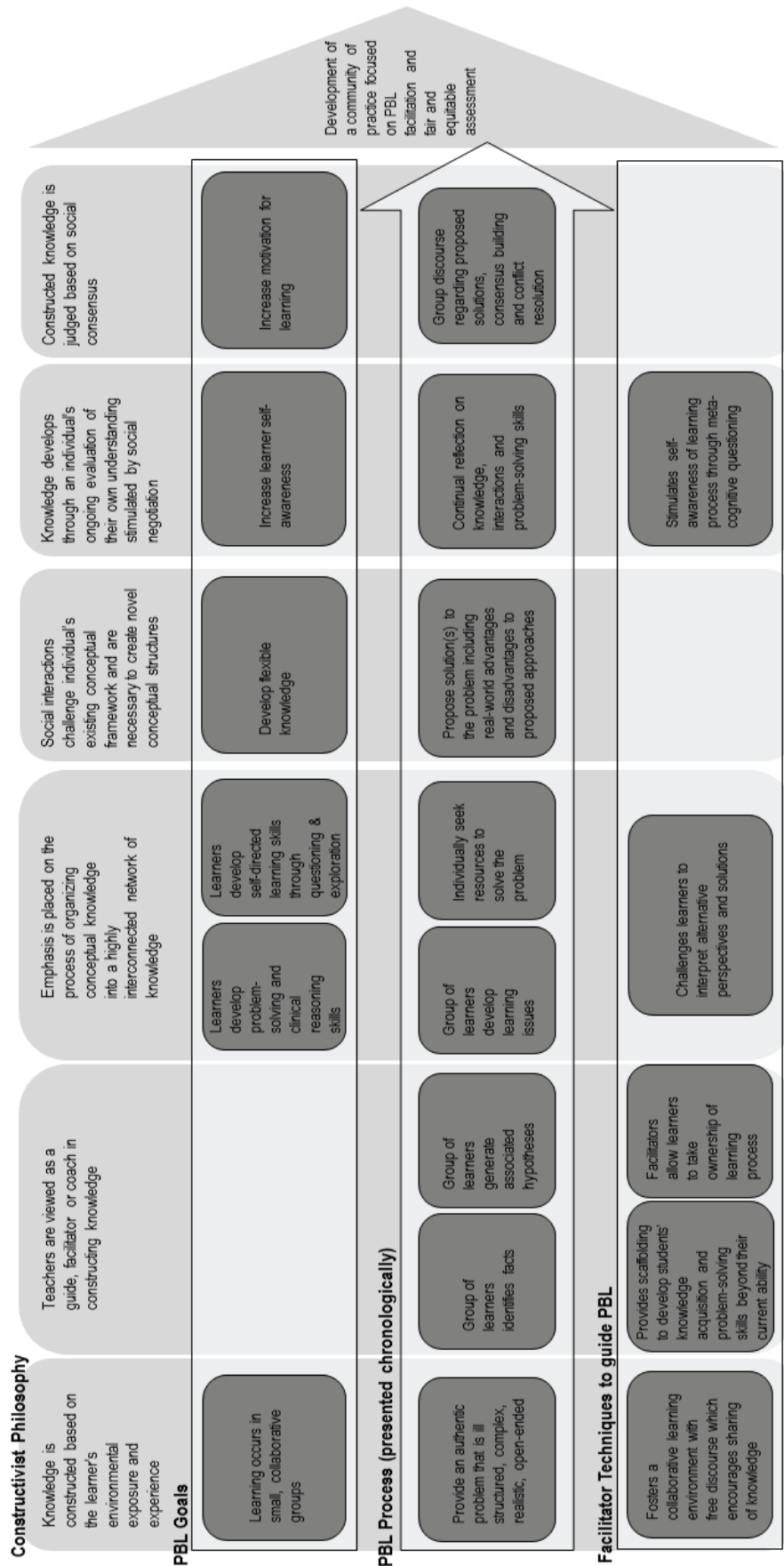


Figure 1. Conceptual map of constructivist philosophy and its relationship to PBL.

The process of PBL relies on small, collaborative group environments that are strategically facilitated and learner-centered (Hmelo-Silver & Barrows, 2006). The PBL process begins with the participants in a PBL group receiving a complex, realistic, and open-ended problem that encourages inquiry and structures knowledge in a clinical context to allow for future application (Barrows, 1986; Hmelo-Silver, 2004). The group determines the pertinent facts associated with the problem and generates hypotheses from these facts that explain the problem. The group uses prior knowledge and hypotheses to identify knowledge deficits and formulate learning issues. Learning issues guide self-directed learning and the acquisition of new knowledge. A variety of resources (e.g., primary literature, review articles, textbooks) are used by the learners to answer their learning questions and to propose solutions to problems within the case during self-directed learning. The learners critically evaluate the resources for appropriateness, applicability, strengths, and limitations. This structured problem-solving process then provides an opportunity for the small group to reconvene with a facilitator who challenges the learners to develop and share new knowledge and critically assess resources and solutions. Thereby, the group collaboratively develops critical-thinking skills and knowledge that is flexible and applicable to novel situations.

The involvement of a facilitator with each small group of learners operationalizes the constructivist philosophy through the PBL process (see Figure 1). The facilitator is essential to helping the learner develop skills, acquire knowledge, and collaborate with group members. The need for facilitator involvement with each small group makes PBL a resource-intensive pedagogical technique. As pharmacy educators continue to implement the PBL method, new and creative approaches to enhance facilitator resources are essential to maintain effective learning in small groups.

## Developing a Facilitator Training Program within a Theoretical Framework

The constructivist philosophy is used to develop the theoretical framework for the facilitator training program. Aspects of the constructivist philosophy that are the backbone for the PBL facilitator training program include constructing the facilitators' knowledge, developing their conceptual knowledge, providing social interactions, building consensus, and developing a community of practice (see Table 1) (von Glasersfeld, 1989; Wenger, 1998). Pedagogical models that have been developed from the constructivist philosophy immerse facilitator trainees in the PBL process. These models are PBL, interactive learning using technology, case-based active and situated learning, and debriefing and consolidation (see

Table 1). The use of these models helps to achieve desired learning outcomes while offering the trainees an opportunity to become comfortable with the PBL process. The facilitator trainees are the learners during their training, but their role as facilitators and the key skills required to achieve the goals of facilitation should be modeled and emphasized by experienced facilitators employing the identified pedagogical models.

The role of the facilitator in PBL is to act as a guide to help students construct their own knowledge through metacognitive questioning that leads to greater understanding. Facilitators need to create a collaborative and cooperative learning environment with free discourse within their small group. Facilitators scaffold student learning through the use of probing questions that support and provide more evident structure to the knowledge the group is constructing, as well as to push students to perform beyond their perceived ability. Scaffolding is central to Vygotsky's zone of proximal development (Vygotsky, 1986). The Zone of Proximal Development is the gap between what a learner knows or is capable of knowing and her potential knowledge and skill. The use of scaffolding within this zone provides the assistance needed for the learner to develop a deeper understanding of the topic than she would have without this support. Facilitators continually assess students' current state of independent problem solving and direct the learners and the group to a new level of learning using scaffolding to support this growth. Scaffolding most often is initiated by the facilitator, but may also come from peers within the group, especially as students become more proficient in learning skills and the facilitator plays a less active role and serves as a coach while the group acquires knowledge in a student-directed social-learning environment (Hmelo-Silver & Barrow, 2006). In addition to providing scaffolding, facilitators help learners develop metacognitive understanding and awareness, as well as strengthen critical-thinking skills. In metacognition, learners are encouraged to be actively aware of their cognitive processing, such as deciding on the approach to take in solving a problem, monitoring their understanding, and assessing their progress toward the solution (Flavell, 2004). To develop such skills in learners, facilitators employ probing questions (e.g., How do you know that is correct? Why do you feel that is an important issue? How did you come to know that information?) to move the learner through the thinking and learning process.

The facilitators engaged in the PBL process as reported in the health sciences literature are professionals, including experienced students, residents, faculty, professionals from other disciplines (both nonclinical and clinical), and experts (Chng, Yew, & Schmidt, 2011; Hmelo-Silver & Barrows, 2006; McNatty, Cox, & Seifert, 2007; Ross et al., 2007;

*Table 1.* Theoretical framework for a facilitator training program. In each of these settings, the trainee is the learner and the facilitator trainer is an experienced facilitator.

<b>Constructivist philosophy (Figure 1)</b>	<b>Setting</b>	<b>Pedagogical model</b>	<b>Learning outcomes achieved by the trainees</b>	<b>Method</b>
All aspects of constructivist philosophy (Figure 1)	Kick-off facilitator training for new PBL facilitators	PBL	All goals of PBL (Figure 1)	Five-minute video introducing the PBL methodology  Trainees are assigned to small groups, given a case scenario, and complete the PBL process as learners facilitated by experienced facilitators
Knowledge is constructed based on the learner's environmental exposure and experience	Pre-workshop online preparatory experience	Interactive learning using technology to simulate a live discussion	Learners develop self-directed learning skills through questioning and exploration	Multimedia resources introducing the constructivist philosophy, PBL goals and the process at WSU EACPHS, and facilitator roles and responsibilities  The pre-workshop resources are provided via voicethread.com as a medium for hosting large group asynchronous review and discussion facilitated by an experienced facilitator
Emphasis is placed on the process of organizing conceptual knowledge into a highly interconnected network of knowledge	Training workshop on practical facilitation skills	Case-based active and situated learning	Learners develop problem-solving skills  Develop flexible knowledge	As a large group trainees watch a recorded PBL experience, an experienced facilitator pauses the video after each aspect of the PBL process is completed to facilitate a discussion of techniques used for successful facilitation
Social interactions challenge individual's existing conceptual framework and are necessary to create novel conceptual structures			Increase learner self-awareness  Increase motivation for learning	Facilitator trainees individually complete the assessment rubric while watching the PBL video  Subsequently, trainees share ratings and discussion of discordant responses is facilitated to reduce inter-rater variability
Knowledge develops through an individual's ongoing evaluation of his own understanding stimulated by social negotiation; constructed knowledge is judged based on social consensus	Post-PBL facilitation small group wrap-up sessions	Debriefing and consolidation	Increase learner self-awareness  Increase motivation for learning	Facilitator trainees gather with an experienced facilitator after each of their first three PBL session to discuss challenges and successes encountered within the session, how facilitation techniques were applied, what approaches others have taken or would take in similar situations, and how students were assessed
Facilitators become members of a community of practice				

Stevenson, Bowe, Gandour-Edwards, & Kumari, 2005). Opinions differ regarding whether the facilitator needs to be a content expert. Chng and colleagues showed that the facilitator's ability to foster social congruence within the PBL small group by providing a safe and open environment for free exchange of ideas may be more important to the success of the students than the facilitator's content knowledge (Chng et al., 2011).

When utilizing a multidisciplinary pool of facilitators, it is important to be mindful of the fact that most clinicians and scientists have primarily spent their educational career exposed to or using traditional, teacher-centered, passive, and lecture-based learning strategies that are reflective of the objectivist philosophy (Jonassen, 1991). Experienced clinicians and faculty members have a genuine desire to transmit their knowledge, wisdom, and experience. In order to be effective in a student-centered PBL model, facilitators must reflect on their teaching philosophies and reorient their practice to a constructivist approach. For facilitator training programs to be effective, it is necessary for facilitators to be open to alternative teaching and learning strategies that promote a student-centered learning model.

The constructivist perspective emphasizes the development of a conceptual knowledge network of complex skills that facilitators are expected to learn in order for them to assimilate what they are being exposed to (von Glasersfeld, 1989). The techniques and skills of particular importance are understanding and applying the processes of scaffolding (Vygotsky, 1986) and metacognitive questioning (Flavell, 2004). By intentionally modeling scaffolding and metacognitive questioning using the PBL approach during facilitator training, facilitators become learners experiencing these processes.

The conceptual representation of a theoretical training framework was developed and is illustrated in Table 1. The framework serves to connect each setting for knowledge construction to a pedagogical strategy, to the learning outcomes for facilitators, and to the methods of instruction.

## WSU Facilitator Training Program

At Wayne State University Eugene Applebaum College of Pharmacy and Health Sciences (WSU EACPHS), the four-year doctor of pharmacy professional program adopted the PBL approach within a hybrid curriculum model in 2006. During the second and third professional years, PBL is conducted in a course series parallel to eight integrated pharmacotherapy modules delivered by pharmaceutical science and pharmacy practice faculty. The PBL course series is complementary to the modules but includes unique content presented as clinical cases. Cases span three two-hour sessions

during a three-week period. During an academic year, the students complete eight PBL cases.

Facilitators involved in our PBL program include pharmaceutical scientists, social/administrative scientists, clinical faculty, pharmacists from area health systems and community practice, and postgraduate residents who are enrolled in a teaching certificate program.

The involvement of pharmaceutical scientists and social/administrative scientists as facilitators is not unique to our PBL program at WSU EACPHS, but it does create an opportunity to design a facilitator training model that emphasizes facilitation skills rather than content expertise. Unique to this model is the in-depth training and mentoring of postgraduate residents in the teaching certificate program. The teaching certificate program is offered at WSU EACPHS and is affiliated with residency training programs in the Detroit metropolitan area. This program is designed to inculcate basic teaching skills for residents, as residency programs are the primary pipeline for clinical faculty in colleges and schools of pharmacy. Participation in PBL as part of the teaching experience develops competence and understanding of student-centered, small group learning (Havrda et al., 2013). The benefits to the residents and the curriculum are fourfold, as participation: 1) provides residents with required small group facilitation experience; 2) enhances residents' own problem-solving skills; 3) increases residents' interest in faculty positions as a career choice (McNatty et al., 2007); and 4) supplements PBL facilitation resources (Jafri et al., 2007) with reduced financial burden to the institution.

Inherently, the PBL process involves many facilitators, and in our program, this includes 50–60 facilitators per academic year. Anecdotal results from our program's PBL experience indicate that this gives rise to inconsistencies in facilitator techniques and performance evaluations. Our previous training sessions were didactic, which made it difficult for facilitators to gain a full understanding of the PBL process and their role as facilitators. Providing a standardized, thoughtfully designed training program is vital to reduce variability between facilitators regarding facilitation and evaluation. At WSU EACPHS, we developed a training program using the constructivist philosophy to inform the pedagogical models that would influence our instructional design (see Table 1). The training program goals are to enhance facilitation skills, increase facilitator confidence in the PBL process, and address inter-rater variability among facilitators.

The structured facilitator program begins with a kick-off session for all new facilitators. This session starts with a five-minute video that introduces facilitators to the general principles of PBL. Afterward, the trainees are assigned to small groups and are given a case scenario with an ill-structured, open-ended problem directly related to teaching and learning.

An experienced facilitator works with each group, modeling the facilitator role and techniques as the group develops their facts, hypotheses, and learning issues. Time is allotted for individual self-directed learning to gather answers to the learning issues, using electronic devices the trainees bring to the session. Groups then reconvene to share and discuss proposed solutions to the original problem. This kick-off session allows the facilitator trainees to be engaged in the PBL process from the vantage point of a student learner in order to experience the knowledge construction process. This session also allows experienced facilitators to model effective facilitation techniques so that the trainees appreciate how they, as facilitators, can influence the learning environment and the successful functioning of the PBL group.

The second part of the training program involves an interactive online learning environment using Voice Thread ([voicethread.com](http://voicethread.com)) as a medium to offer a pre-workshop thirty-minute video that describes the PBL process and program at WSU EACPHS, literature supporting PBL, and how PBL is used in pharmacy education within the United States. The facilitator trainees are able to leave comments and questions on the Voice Thread website that directly tie to points in the video that warrant further clarification or discussion. Other trainees and the trainers are able to reply to posted comments, allowing for asynchronous video discussion to take place prior to the training session. Additional electronic resources are provided to the trainees with the video to support understanding of facilitator and learner roles and responsibilities. This includes a document detailing the PBL structure specifying what occurs at each PBL session and roles and responsibilities of students, facilitators, and case writers. Additionally, facilitator trainees are provided example facilitator prompts, dos and don'ts of facilitation, cases used in the training session, and the rubric for facilitator assessment of student performance.

The facilitator trainees convene as a group within the week prior to their first PBL session for a training workshop to focus on practical facilitation skills and methods. As a group, the facilitator trainees are exposed to the entire PBL experience by viewing two video recorded PBL sessions of students currently enrolled in the PBL course who are facilitated by an experienced PBL facilitator. In the first session, the students are presented with a novel case for which they outline pertinent facts, and develop hypotheses and learning questions. In the second session, which follows independent, self-directed learning, the students share new knowledge and proposed solutions to identified problems. Throughout the training session, experienced faculty members pause the video to facilitate discussions to allow the trainees to construct flexible knowledge of PBL facilitation. These discussions allow the trainees to critique student and facilitator techniques using the previously

provided resources and to practice effective facilitation skills. Specific facilitator techniques and tools that are highlighted in the session include prompts that probe the depth of student learning while maintaining student-centeredness, encouraging inquiry, seeking alternative hypotheses, promoting student collaboration, increasing student participation, and developing and maintaining a collegial environment. Facilitators are encouraged to guide students, through metacognitive questioning, in a critique of their approach to self-directed learning and efficient use of information resources. Throughout the training, there is ongoing open discussion regarding approaches to facilitation. Using the video to provide case-based learning within the training workshop helps trainees organize knowledge of the PBL process and their roles as a facilitator. Discussions throughout the training also provide opportunities for an individual's knowledge of PBL facilitation to be challenged through the group's social interactions, leading to a deeper understanding. While viewing the video recorded PBL sessions, trainees assess the performance of selected students using a standard rubric without prior extensive orientation to the rubric. Following the video, facilitator trainees share their rating scores for the students assessed. Based on the responses, further discussion of discordant evaluations is facilitated to reduce inter-rater variability.

The final component of the training program is to gather facilitator trainees for debriefing sessions following each of their first three independent experiences as facilitators. During the debriefing sessions, knowledge developed by the individual facilitator is challenged and further developed by social negotiation and confirmed through social consensus. The use of debriefing sessions aligns with Wenger's theory of communities of practice (1998), which is derived from the constructivist social learning experiences. The theory of communities of practice holds that when professionals of similar disciplines and values work together, the exchange and negotiation of metacognition that occurs within the group transforms and elevates their learning because of their membership within the community (Wenger, 1998). An experienced facilitator trainer facilitates this post-session reflective discussion with the trainees to review challenges, successes, and evaluations of student performance. Thus, the facilitation techniques that are used by the facilitator during the training and the post-session discussions allow the trainees to be a part of a social constructivist learning environment and community of practice (Vygotsky, 1986; Wenger, 1998).

## Assessing a Facilitator Training Program

Assessment of the effectiveness of facilitator training sessions has been predominantly performed using qualitative assessments of faculty perceptions from the training sessions



(Bosse et al., 2010; Dalrymple et al., 2007). A method that may be additionally employed to provide a mixed-model analysis of training effectiveness could evaluate inter-rater reliability of facilitator assessment of learners following the training.

Through the use of an objective, checklist-based assessment rubric as well as a structured facilitator training program grounded in the constructivist philosophy, we expect trained facilitators to use consistent facilitation techniques and evaluate learners in a valid and reliable manner. The facilitator assessment of student performance rubric is a checklist of tasks that students should be able to perform. These tasks are derived from the course objectives that align with PBL skills that students are expected to achieve during their small group sessions. For example, under the course objective “Differentiate relevant patient characteristics,” rubric items include the following: 1) list facts from the case; 2) group facts from the case logically; 3) provide reasoning for grouping of facts; and 4) identify when facts are not relevant to the case.

In order to assess the effectiveness of the training program for producing like-minded evaluators, inter-rater reliability could be assessed. Inter-rater reliability may be evaluated at multiple time points throughout the process, such as during the training session and with the evaluation of each member of a facilitator’s PBL group for each case. Each assessment of inter-rater reliability may identify discordant evaluations that would be discussed during the training workshop or debriefing sessions to reduce variability among evaluators. The facilitators’ assessment of student performance prior to and following the debriefing discussions may also be assessed to determine the impact that continued training has on addressing inter-rater reliability. Evaluation of facilitator assessment of student learning may also be done on a longitudinal basis to determine whether continued facilitation experience affects the use of the evaluation rubric and inter-rater reliability. All assessments may be collected electronically through the use of a system such as E\*Value (e-value.net).

Given the multidisciplinary makeup of our facilitator pool, it is important to evaluate the effectiveness of the training framework for the development of facilitators from varying backgrounds and practices. Potential differences between discrete groups of raters could be evaluated with respect to assessment. Examples include stratification of the facilitators by faculty, volunteer, or pharmacy resident status. The impact of duration of practice experience on assessments also could be evaluated. These assessment strategies overall would determine if variance between facilitators decreased following the training process to provide an objective measure of the program effectiveness.

## Conclusion

By developing a theoretical framework and structuring the PBL facilitator training program around the constructivist philosophy, we expect the facilitator trainee to construct a conceptual framework of knowledge related to all aspects of PBL. Structured facilitator training programs should employ pedagogical strategies rooted in the philosophy that drives programmatic design. Using PBL methodology along with interactive learning, technology, case-based, and debriefing sessions can provide a pedagogically sound framework for enhancing facilitators’ understanding of the PBL methodology and process and developing their facilitation and assessment skills.

## Acknowledgments

We would like to acknowledge Geraldine Salinitri, PhD, associate dean of the Faculty of Education at the University of Windsor, and Thad Wilhelm, MEd, PhD candidate, from Wayne State University and Birmingham Public Schools, for their editorial support and consultation on the educational theories.

## References

- Accreditation Council for Pharmacy Education (ACPE). (2011). Accreditation standards. Retrieved from <http://www.acpe-accredit.org/deans/standards.asp>
- Barrows, H. S. (1986). A taxonomy of problem-based learning methods. *Medical Education*, 20, 481–486. <http://dx.doi.org/10.1111/j.1365-2923.1986.tb01386.x>
- Barrows, H. S. (1988). *The tutorial process*. Springfield, IL: Southern Illinois University School of Medicine.
- Barrows, H. S. (1994). *Practice-based learning: Problem-based learning applied to medical education*. Springfield, IL: Southern Illinois University School of Medicine.
- Barrows, H. S., & Tamblyn, R. M. (1980). *Problem-based learning: An approach to medical education*. New York: Springer Publishing Company.
- Bosse, H. M., Huwendiek, S., Skelin, S., Kirschfink, M., & Nikendei, C. (2010). Interactive film scenes for tutor training in problem-based learning (PBL): Dealing with difficult situations. *BMC Medical Education*, 10, 52. <http://dx.doi:10.1186/1472-6920-10-52>
- Chng, E., Yew, E. H. J., & Schmidt, H. G. (2011). Effects of tutor-related behaviours on the process of problem-based learning. *Advance in Health Sciences Education*, 16, 491–503. <http://dx.doi.org/10.1007/s10459-011-9282-7>
- Dalrymple, K. R., Wong, S., Rosenblum, A., Wuenschell, C., Paine, M., & Shuler, C. F. (2007). PBL core skills faculty development workshop 3: Understanding PBL process

- assessment and feedback via scenario-based discussions, observation, and role-play. *Journal of Dental Education*, 71(12), 1561–1573.
- Dewey, J. (2004). *Democracy and education*. Mineola, NY: Dover Publications, Inc.
- Flavell, J. H. (2004). Theory-of-mind development: Retrospect and prospect. *Merrill-Palmer Quarterly*, 50, 274–290. <http://dx.doi.org/10.1353/mpq.2004.0018>
- Hart Research Associates. (2013). *It takes more than a major: Employer priorities for college learning and student success*. Washington, DC: Association of American Colleges and Universities. Retrieved from [http://www.aacu.org/sites/default/files/files/LEAP/2013\\_EmployerSurvey.pdf](http://www.aacu.org/sites/default/files/files/LEAP/2013_EmployerSurvey.pdf)
- Havrda, D. E., Engle, J. P., Anderson, K. C., Ray, S. M., Haines, S. L., Kane-Gill, S. L., . . . Parman, M. G. (2013). Guidelines for resident teaching experiences. *Pharmacotherapy*, 33, 147–161. <http://dx.doi.org/10.1002/phar.1250>
- Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn. *Educational Psychology Review*, 16, 235–266. <http://dx.doi.org/10.1023/B:EDPR.0000034022.16470.f3>
- Hmelo-Silver, C. E., & Barrows, H. S. (2006). Goals and strategies of a problem-based learning facilitator. *Interdisciplinary Journal of Problem-Based Learning*, 1(1), 21–39. <http://dx.doi.org/10.7771/1541-5015.1004>
- Jafri, W., Mumtaz, K., Burdick, W. P., Morahan, P. S., Freeman, R., & Zehra, T. (2007). Improving the teaching skills of residents as tutors/facilitators and addressing the shortage of faculty facilitators for PBL modules. *BMC Medical Education*, 7, 1–6. <http://dx.doi.org/10.1186/1472-6920-7-34>
- Jonassen, D. H. (1991). Objectivism versus constructivism: Do we need a new philosophical paradigm? *Educational Technology Research and Development*, 39(3), 5–14. <http://dx.doi.org/10.1007/BF02296434>
- Kang, L. O., Brian, S., & Ricca, B. (2010). Constructivism in pharmacy school. *Currents in Pharmacy Teaching and Learning*, 2(2), 126–130. <http://dx.doi.org/10.1016/j.cptl.2010.01.005>
- Medina, M. S., Plaza, C. M., Stowe, C. D., Robinson, E. T., DeLander, G., Beck, D. E., . . . Johnston, P. (2013). Center for the advancement of pharmacy education (CAPE) educational outcomes 2013. *American Journal of Pharmaceutical Education*, 77(8), Article 162. <http://dx.doi.org/10.5688/ajpe778162>
- McNatty, D., Cox, C. D., & Seifert, C. F. (2007). Assessment of teaching experiences completed during accredited pharmacy residency programs. *American Journal of Pharmaceutical Education*, 71(5), Article 88. <http://dx.doi.org/10.5688/aj710588>
- Olmesdahl, P. F., & Manning, D. F. (1999). Impact of training on PBL facilitators. *Medical Education*, 333, 753–755. <http://dx.doi.org/10.1046/j.1365-2923.1999.00530.x>
- Piaget, J. (1997) *The moral judgment of the child*. New York, NY: Simon and Schuster.
- Ross, L. A., Crabtree, B. L., Theilman, G. D., Ross, B. S., Cleary, J. D., & Byrd, H. J. (2007). Implementation and refinement of a problem-based learning model: A ten-year experience. *American Journal of Pharmaceutical Education*, 71(1), Article 17. <http://dx.doi.org/10.5688/aj710117>
- Savery, J. R., & Duffy, T. M. (1995). Problem-based learning: An instructional model and its constructivist framework. *Educational Technology*, 35, 31–38.
- Schlett, C. L., Doll, H., Dahmen, J., Polacsek, O., Federkeil, G., Fischer, M. R., . . . Butzlaff, M. (2010). Job requirements compared to medical school education: Differences between graduates from problem-based learning and conventional curricula. *BMC Medical Education*, 10, 1–8. <http://dx.doi.org/10.1186/1472-6920-10-1>
- Stevenson, F. T., Bowe, C. M., Gandour-Edwards, R., & Kumari, V. G. (2005). Paired basic science and clinical problem-based learning faculty teaching side by side: Do students evaluate them differently? *Medical Education*, 39, 194–201. <http://dx.doi.org/10.1111/j.1365-2929.2004.02057.x>
- Stewart, D. W., Brown, S. D., Clavier, C.W., & Wyatt, J. (2011). Active-learning processes used in US pharmacy education. *American Journal of Pharmaceutical Education*, 75(6), Article 68. <http://dx.doi.org/10.5688/ajpe75468>
- Tavakol, K., & Reicherter, E. A. (2003). The role of problem-based learning in the enhancement of allied health education. *Journal of Allied Health*, 32(2), 110–115.
- von Glasersfeld, E. (1989). Cognition, construction of knowledge, and teaching. *Synthese*, 80, 121–140. <http://dx.doi.org/10.1007/BF00869951>
- Vygotsky, L. (1986). *Thought and language*. Cambridge, MA: MIT Press.
- Wenger E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge, UK: Cambridge University Press. Retrieved from <http://books.google.ca/books?hl=en&lr=&id=heBZpgYUKdAC&oi=fnd&pg=PR11&dq=wenger+communities+of+practice&ots=kekb0ogC2f&sig=DX0FyloH5nPKwqnFX-5NztnDgxE#v=onepage&q=wenger%20communities%20of%20practice&f=false>
- Wunschell, C., Dalrymple, K. R., & Shuler, C. F. (2007). PBL core skills faculty development workshop 2: Training faculty in group learning facilitation skills through role-modeling and role-play activities. *Journal of Dental Education*, 71(5), 606–618.

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