Integrating Problem-based Learning with Community-engaged Learning in Teaching Program Development and Implementation

Su-I Hou

Department of Health Promotion and Behavior, College of Public Health, The University of Georgia, Athens, GA, 30602, United States
*Corresponding Author: shou@uga.edu

Abstract　　Purpose: Problem-based learning (PBL) challenges students to learn and work in groups to seek solutions to real world problems. Connecting academic study with community-engaged learning (CEL) experience can deeper learning and thinking. This paper highlights the integration of PBL with CEL in the Implementation Course to engage graduate students in designing theory-based health promotion programs for communities. Methods: Real world scenarios were used in student-led and faculty-facilitated group discussions and projects. The end-of-class reflections and comments from students enrolled in the Implementation Course during 2005-2013 were analyzed (total n=162). Inductive, descriptive analyses via an iterative process were conducted to identify themes and patterns. Results: Overall the Implementation Course received high evaluation (16-items), ranging from "very good" to "superior" (mean of 4.78 on a 5-point scale). Students commented that (1) the nurturing PBL sessions facilitated critical thinking; (2) the life-changing CEL resulted self-confidence and self-awareness; and (3) the integrated PBL with CEL course design increased relevance. Our community partners also expressed deep appreciation towards the quality work students delivered. Conclusion: The innovations in education provided valuable learning structure for students in higher education and produced theory- and evidence-based intervention plans and material products addressing community-identified health needs.

Keywords　　Problem-Based Learning (PBL), Community-Engaged Learning (CEL), Service-Learning, Intervention Mapping, Program Development

1. Introduction

Problem-based learning (PBL) and community-engaged learning (CEL) are approaches that have been used increasingly as tools for more engaged learning as well as improved learning outcomes. Traditional classroom lectures have faced challenges to meet the needs of our complex society and to provide students with workforce related skills and competencies needed upon graduation. PBL aims to use scenarios to build problem-solving skills and challenge students to develop solutions in small groups. CEL is a structured learning experience that combines community service with explicit academic learning objectives, preparation, and reflection [1]. This article will briefly provide context on the evolution of PBL and CEL, their applications and existing evidence of success in health related fields, and most importantly, discuss the integration of the two as our attempt to explore the nexus of PBL and CEL in higher education to solve complex issues in today's society.

1.1. Problem-based Learning (PBL)

Problem-based learning (PBL) is a way of learning using scenarios involving real life problems, and is used heavily in medical schools to teach students about clinical cases [2]. It is a method that challenges students to learn and work in groups to seek solutions to problems. These problems could be real-life cases, created or modified scenarios, or a combination of real and hypothetical scenarios. Since its origin at McMaster University in Canada in mid-1960's where the medical education model took shape for student-centered, problem-based, small-group learning, there has been an increase in the use of PBL in its various adaptations and across other health-related fields, including schools of health sciences, nursing, dentistry, pharmacy, veterinary science and medicine [2-4].

Medical faculty of the University of Cologne in Germany [5] were among the first to pilot a controlled randomized trial comparing student learning outcomes between PBL and lecture-based learning (LBL) in a basic pharmacology course (total n=123). Results indicated similar scores on factual knowledge in either learning methods, and better scores in the short essays by the PBL students. Students also favored PBL over the lecture format and considered it to be an effective learning method. Students commented about the

benefits of teamwork as well as the use of additional learning resources in learning. A systematic review of evidence regarding the effects of PBL during medical school on physician competencies after graduation, conducted by colleagues in Singapore [2], also showed positive effects of PBL in social and cognitive dimensions. Furthermore, the evaluation of medical school graduates' perception of the longitudinal effects of PBL revealed that PBL curriculum graduates reported higher self-rated competencies than the conventional curriculum cohort [6], and rated their self-directed learning habits higher than graduates from the standard curriculum [7]. PBL curriculum has also been found to be more effective for nursing ethics education [8].

The general processes for PBL involves student discuss the problems, define what they know, generate hypotheses, derive learning objectives, and assign individual tasks for further work [9]. The instructor facilitates the learning process by asking open-ended questions rather than providing knowledge. In addition, the instructor provides feedback on the learning process and group dynamics. The defining characteristics of PBL therefore normally include learning driven by challenging and open-ended problems, students working in small collaborative groups, and teachers as "facilitators" of learning [9]. In contrast to the traditional lecture methods, students in PBL assume greater responsibility for their own learning as the amount of direct instruction is reduced. Students learn via contextualized problems and situations. The dynamics of group interactions and independent studies help student achieve higher levels of comprehension and develop more learning and knowledge-forming skills, and further their team building skills as well.

1.2. Community-engaged Learning (CEL)

Community-engaged learning or service-learning may be defined as the combination of service activities and academic learning objectives, with the intent that the activity will benefit both the recipient and the provider. Although there is no standard approach, the engagement with a community to meet real-life needs is common and a variety of learning tasks and processes are utilized. The connection between the service tasks and learning is facilitated by structured reflections that explore key issues of knowledge, skills and values, as well as specific dimensions relevant to the particular activities [10]. CEL activities are experiential in nature and involve thoughtful use of reflection, and respect of the concept of reciprocity between the learning experience and the individuals being served [11]. The use of reflection enables students to make connections between their learning experiences in the community with the academic setting.

Community-engaged learning strategies are used to enhance development of adults, raising their levels of educational attainment and increasing their involvement in public and civic activities. Butin [12] argues that CEL strengthens openness to diversity and difference, and promotes a better and deeper understanding of course content. Such attitudes could sustain even years after the experience has occurred. By linking theory with practice and classrooms with communities, CEL provides real-world exposure and engagement with meaningful local and global issues through concrete hands-on practices [12]. Thus, CEL can be a useful tool for "expanding the walls" of the traditional classroom. Studies have linked CEL with improved student retention, academic learning, degree completion, self-esteem, motivation, critical thinking and communication skills, and interpersonal relationships [13]. Researchers have argued that the university should be responsive to community needs and to society as a whole and that faculty members should be reflective practitioners in the education process.

1.3. The Nexus of PBL and CEL

Although PBL has demonstrated effectiveness and been increasingly used in medical and clinical education, it remains somewhat overlooked in the training of public health students and community settings. In addition, PBL is a radically different educational approach where learning is driven by challenging, open-ended problems, and small-group teamwork [4]. Some students may find PBL to be difficult as they lack knowledge for discussion or sometimes may need more guidance or context [14]. CEL has the great potential to address some of these challenges via immersing students in communities through hands-on projects, applying theory to practice skills, and engaging in real-life community context and interactions. There have been limited studies looking at the integration of PBL with CEL. Spinello and Fischbach [15] were among the first trying to integrate the concept of PBL in a virtual community environment through developing and pilot-testing a web-based computer simulation in an undergraduate health behavior course. In their study, a virtual community was designed in which the effects of a mock infectious diseases outbreak could be studied and various interventions tested [15]. Their results suggested that a PBL experience based on a community simulation might be effective in instructing public health students.

This paper describes an innovative way of integrating PBL with CEL to engage graduate public health students in designing and pilot testing tailored health promotion interventions in a Program Development and Implementation course (the Implementation Course). The course integrated PBL sessions with real-life community experience (CEL) to increases critical thinking skills and competencies building. This paper analyzed student learning outcomes and reflections on the course design, and aims to help faculty and instructors gain insights on the potential of integrating these two inter-related learning strategies, and reflect on benefits and challenges of using such pedagogies to deepen student engagement.

2. Materials and Methods

2.1. Course Description

This course was a required course for Master of Public Health (MPH) students with health promotion as their program concentration. It explored techniques and strategies used for designing, implementing, and managing health promotion interventions in a variety public health setting. Intervention Mapping [16], an innovative process of teaching students, step-by-step, how to integrate theories, empirical evidence, and new data into developing effective and tailored public health programs, was used to guide the development of program interventions (see Fig. 1). Training was provided in specifying and designing program change objectives, assessing determinants, selecting theory-based methods and translating them into practical strategies, developing and pre-testing program materials, specifying program adoption and implementation plan, developing evaluation measures, and more.

2.2. Course Design

The Implementation Course was a sequenced course that Master of Public Health (MPH) students in the health promotion concentration took after the Program Planning course (the Planning Course). In the Planning Course, students worked with community partners to assess their capacity and health needs guided by a health promotion planning model [17]. This needs assessment information was then used to help further the development of theory and evidence-based program interventions in the Implementation

Course. The majority of students often chose to work with the same group and community partners to continue developing and pilot-testing their project intervention. Each group of students was expected to design a cohesive theme of program materials and articulate how they addressed (1) change objectives of the health program, (2) underpinning theoretical methods and parameters, and (3) why specific strategies were chosen and their appropriateness to the priority group and setting. PBL was emphasized and practiced via multiple group meetings and discussions throughout the semester. Students discussed the problems, defined what they know, generated hypotheses, and assigned individual tasks for further work [18]. Students were encouraged to rotate group roles such as leader, recorder, board writer, or members, during their weekly group project discussions.

Some of the community partners that students worked with included public health departments, community cancer support centers, regional hospitals, HIV/AIDS social service agencies, senior centers, housing authorities and community churches. Projects that students worked on included working with health department to develop youth-friendly websites to increase accessibility of sexual health information and services for at-risk teens, collaborating with ethnic churches to develop nutrition life skills academy for inner city youths, working with AIDS service agencies to develop new ways to communicate health information and dispel HIV stigma, and promoting cancer screening among economically disadvantaged and racial minority communities.
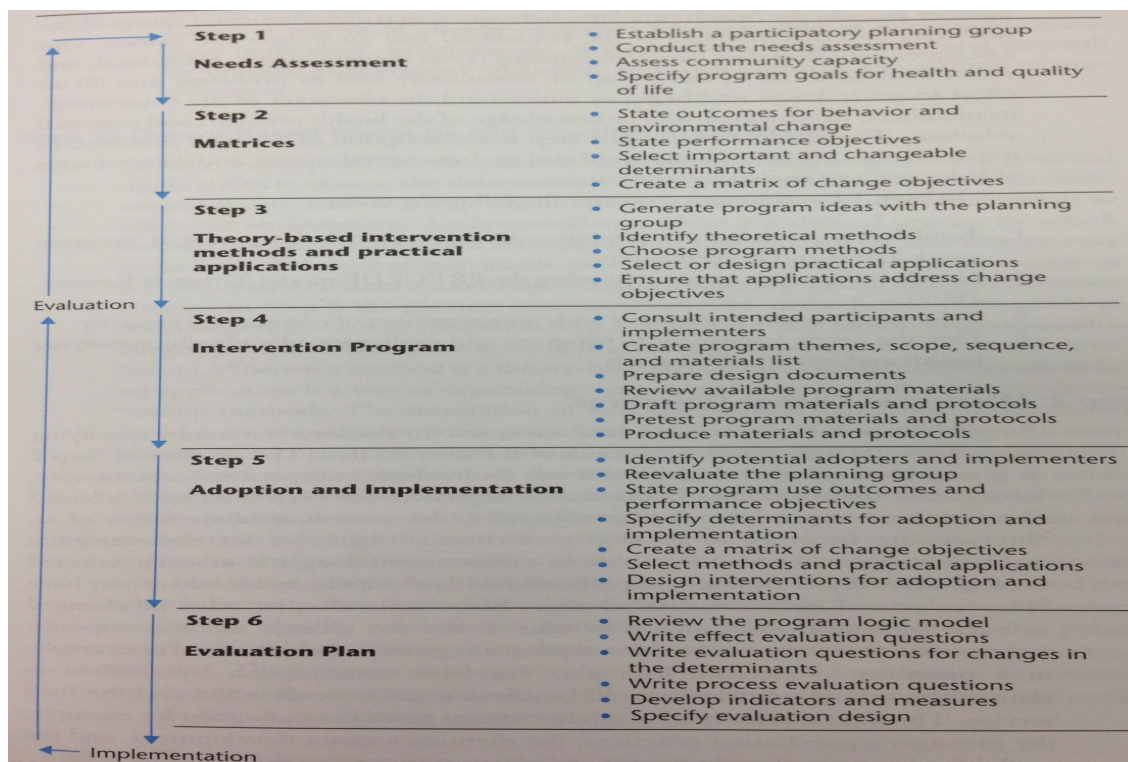

Figure 1. Intervention Mapping Steps & Tasks

Core process skills were learned in the context of theory-to-practice applications. Real world scenarios were used in student-led group discussions with the instructor as the facilitator. These scenarios came from part of their "real life" group projects developed through partnership with neighborhood communities, via integrated CEL experience. In order to develop tailored intervention programs, and to better translate theoretical methods into practical strategies in the priority group and settings, students were asked to seek community's input and feedback regularly. Selected class sessions were allocated for students to work with their community partners. The final outcome of these community service-learning projects was the tested or pilot implemented intervention program and materials which incorporate sound theoretical foundation and evidence-based research findings.

2.3. Using PBL Principles to Discuss Community-engaged Group Projects and Chairing Meetings

Group management and leadership skills are essential for health educators. In the Implementation Course, each team of students had an opportunity to organize and lead a meeting (group discussion) during a class session. With assistance and facilitation from the course instructor, students learned to set the agenda, organize the room, establish the problem to be solved or issue to be discussed, and lead discussions. General process and principles of PBL and group facilitation were explained in the first class meeting and reminded throughout the semester during each group discuss meeting. With input from each class member, mutually agreed ground rules for participation in class and group meetings were set at the beginning of the semester. These ground rules fostered a safe and supportive environment for students to practice PBL skills needed for developing their CEL projects. The activity also served as a

formal venue for students to receive input from their peers. Students were instructed to ask open-ended question and facilitate a meeting, which was discussion oriented and highly participatory, instead of simply presenting information. A debrief session with the presenting group was held with the instructor the week after to provide opportunities for students to reflect on their application of PBL during the meeting process, and for the course instructor to provide feedback on things that went well or those could be used for improvement in the future.

2.4. Working with Community Partners to Develop Theory and Evidence-based Program Interventions

This course was structured around carefully designed assignments and collaborative projects to challenge students to think critically, write thoughtfully, and apply the PBL principles. It incorporated the reciprocal learning principles to address community-identified needs and strategies with the integral involvement of community partners. Students gathered input both from classmates and community partners on the program materials they developed, pilot tested selected components of the program, tested implementation feasibility, and identified potential barriers. Students prepared their own assessment and evaluation forms to gather feedback from classmates, community partners, and priority groups. The pilot test of program material and intervention strategies could be in smaller or larger scales and varied for each project, depending upon resources available, commitment level of community partners, and experience and background of students, etc. Information obtained from these formative evaluations was used to refine the program materials students developed for the communities. See Table 1 for descriptions on the teaching and learning activities and assessment process of the Implementation Course (Table 1)

Table 1. Teaching and learning activities, along with assessment process of the (PBL + CEL) Implementation Course

Teaching & Learning Activities	Description	Assessment Process
Lectures on Intervention Mapping Steps & Tasks	A step-by-step process of teaching students on using theory and evidence to develop effective intervention programs (See Fig. 1).	Core competency assessment; CEL project – midterm & final reports
Chair a PBL Meeting	Each team of students had an opportunity to organize and lead a meeting (group discussion) during a class session.	Chair a meeting feedback form; Debriefing sessions with groups
CEL service-learning projects	A cumulative learning experience and applications of knowledge and skills learned to address community-identified need.	CEL project final reports; Community partner feedback; Group meetings & discussions
Student Reflections	Reflections on the overall learning process and lessons learned.	End of class reflections

2.5. Sample Scenarios of Integrating PBL with CEL

To illustrate how PBL was integrated with CEL, two real life scenarios derived from community partnerships that were used as problems or issues discussed by PBL group sessions are provided below. Students bring issues they experienced in developing resources or collaborating with the community agencies to their small group for discussion and resolution each week. PBL process was monitored and emphasized in small group tutorial meetings each week, and was led by students and facilitated by the course instructor.

2.5.1. Real-life Scenario 1

Target population for this project was HIV positive citizens served by an HIV primary care clinic, as well as the families, friends, and loved ones of the clinic clients. The clinic provides HIV/AIDS care services to its surrounding counties. Its overall mission is to partner with patients and community to maximize wellness, healthy choices, self-management, and coping among their clients. In response to the needs of increasing new and existing clients, the clinic would like to provide a quarterly educational program to address client-identified concerns. Students from the Implementation Course were requested to assist with developing an educational series with a focus on disclosing and coping with HIV diagnosis as its first session.

Students discussed among their student small group, with faculty members, and with clinic staff and a few HIV clients to gather input on concerns and strategies, as well as feedback on material developed. Throughout a semester-long process of ongoing program development and multiple PBL sessions, students developed a "Living Well DAILY" education series with "Talk Healthy" as its first session, which addressed barriers of telling, preparing and deciding who to tell, ways to tell partners, families and friends about their HIV status, and dealing with people's reactions. Students also delivered this very first session in real life with the clinic staff. Participating HIV clients gave extremely high praise on the high quality and helpful session and were looking forward to future sessions.

2.5.2. Real-life Scenario 2

Target population for this project was citizens and families and caregivers of Medicare enrollees (aged 65 years or older) living in a nearby rural county W. A community needs assessment indicated that many members living in the W county do not fully understand their health coverage or access to health resources. One of the priority populations identified as most at risk was the elderly population. In response to this need, a Health Committee formed via a community-university partnership decided to hold a health fair during the Medicare open enrolment focusing on senior health related issues. The Health committee requested students from the Implementation Course to work on this service-learning project to assist with developing health promotion materials relating to senior preventive health care and managing health coverage.

Students discussed among their student small group, with faculty and community liaisons to gather input and feedback on issues of concern, material developed and content covered. Throughout a semester-long process of ongoing program development and multiple PBL sessions, students developed a Senior Health Awareness & Prevention Education (SHAPE) program to create a buddy system to help friends and families get screened and get into SHAPE. A theory-based health screening brochure describing why, what, how, where, and tips related to senior health screenings, a buddy-up screening pamphlet, along with screening stickers, table tents, etc. were developed to be used for the upcoming community senior health fair.

2.6. Student Reflection and Community Partner Feedback Analyses

Each student was asked to submit individual reflection journals at the end of the project as part of the course assessment. The number of students enrolled varied each year and ranged from 10-23. Students' individual reflections and comments collected during 2005-2013 were included in the current analyses (total n=162). A reflection guide with open-ended probing questions was provided to facilitate students documenting their learning, the PBL process, as well as their CEL project experience (see Fig. 2 below). Students were noted that they could reflect on any aspect of the experience and the probing questions were meant to serve simply as a guide. Community partners were given a short feedback survey via email. The number of community partners ranged from 3-5 each semester. The researcher started collecting community partner feedback since 2010, and comments from 2010-2013 were included in the current analyses (total n=15). Student quantitative course evaluation (a 16-item survey) was collected by a designated person at the College, with averaged rating reported back to the course instructor.

The inductive, descriptive analyses were conducted for both the student reflection and community partner feedback using an iterative, analytical approach [19]. The analyses were carried out through several readings and interpretation of the raw data by two researchers independently, and the compiled responses were cross-analyzed to identify themes and patterns. Identification of codes was done by open-coding, line-by-line scrutiny of the data, and major thematic areas that inductively characterized the PBL and CEL experience were then derived with selected quotes highlighted.

[About the project]
- Describe your service-learning experience and how the experience helps you learn or relate to your academic learning and meet some of the core competencies.
- What were some of the best things you learned/did during your service-learning project?
- What were some of the challenges you had to meet during your project? How did you meet them?

[About yourself]
- What have you learned about others and yourself? What has surprised you about the community organization, the people you work with, and yourself?
- What did you do that was effective? How was it effective?
- What did you do that seemed to be ineffective? How could you have done it differently?

Figure 2.   End-of-Class Community Project Reflection Guide

3. Results

Overall the Implementation Course received very positive quantitative student evaluation ratings, ranging between "very good" to "superior". The overall mean of summarized course evaluation (16-items) was 4.78 on a 5-point scale. Reflections from students were organized and described in the following three thematic areas: (1) the PBL process, (2) the CEL experience, and (3) the overall PBL with CEL course design on student learning and self-awareness. Comments from community partners were also provided. Please note that the following statements were direct quotes; therefore, grammatical errors exist as we sought to honestly present original statements.

3.1. The PBL Process – The Nurturing PBL Discussions Facilitated Critical Thinking and Engagement

Students have commented that the PBL sessions were very educational. Many of them have never chaired a meeting or lead discussion sessions. Students have learned providing support to group dynamics while focusing on problem solving for project tasks. This open-discussion forum and process provided students self-awareness and enhanced group management skills. Some comments from students indicated:

I found myself asking follow-up questions and clarifying ideas. I felt like we were sometimes in a hurry to accomplish things that we jumped into ideas too quickly. We needed to take more time to stop and re-evaluate where we were and where we wanted to go.

Using PBL principles discussed in class to lead a meeting on how we applied the steps was very educational and really helped us understand the process. The safe environment provided a very comfortable setting for discussion and helped us practicing our group management skills that we need in our professional career.

3.2. The CEL Experience – The Life-changing CEL Experience Increased Self-confidence and Competencies

Students expressed deep appreciation of the real-life community project experience and found increased-confidence and competencies after completion of the projects.

The best thing I learned was that I gained confidence in approaching a community partner and knowing I have the tools to develop effective health programs. The whole plan we passed on to our partner was the best thing and knowing they have something to use today. I now have the confidence to apply these skills to other projects and development of future programs.

I have benefited greatly from the manner the class was presented. We were able to learn more about this community from the "horse's mouth", so to speak, than we would have been able to from any book… This experience drove home the necessity of a community-focused assessment. It also inspired me to make my work more professional because there were real people whom I could help by doing so.

What surprised me was how willing our community partners were to take time out of their busy schedules to meet with us. I was also surprised that my group was able to take on the large task of developing an intervention when we had no prior experience. It was rewarding that we were able to provide our community partner a useful intervention program that they can use to help their clients.

3.3. The overall PBL with CEL Course Design - Carefully Designed Learning Opportunities Connecting Real Life Increased Relevance and Facilitated Competencies Building

Students expressed great appreciation of the overall course design and learning experience. In particular, students

indicated that the weekly PBL sessions really enhanced understanding of class material and concepts, and provide opportunities for in-depth discussion and clarification. In addition, the real life CEL projects were life changing and deepened student learning while provide context for theory-to-practice application skills they desired and needed. Below are some sample quotes from students:

The course was very interactive. It allowed us to expand our understanding and critical thinking. The course discussion and meeting sessions (PBL) and the community-based projects (CEL) offered the perfect platform to understand the complex real life issues that are encountered during program development and implementation. I appreciated our instructor emphasized the importance of active learning via class discussion.

The course was very deliberate, especially having to apply the model to a real life situation. Interacting with the community while learning about the PBL process made it concrete to understand the program development and implementation process. I enjoyed being able to apply the information we learned in class to the community projects because it bridges that gap between academia and the actual fieldwork.

The course is well organized and designed to accomplish goals, and made learning interesting, relevant, and fun. I never feel bored. I'm actually surprised that the time goes by so quickly as each class session intrigued and excited me so much.

The semester long project was great real-world experience and helped us learn what a book cannot teach. I like that the project was done in a step-by-step process. It enabled clear understanding and reinforced our learning. We applied what we learned in class to actually helping our community. Explicitly translating theory into methods and strategies and describing how our products were based on these theories was really helpful.

The [Intervention Mapping] tool will be priceless in my future profession. This project allowed me to apply my creativity in a real life way. I learned that I enjoy being in charge. It has definitely been the best class I have taken and the most influential on my many years of schooling. It was really encouraging to finally practice some theory-based academic lessons.

Before this class and project, I was rather shy and unprepared to practically implement a public health program. This project has given me the practical insight to the whole process and has certainly expanded my horizons and boosted my ability to implement programs on my own.

3.4. Our Community Partners also Expressed Deep Appreciation towards the Quality Work Students Delivered

These community service-learning projects not only facilitated students' learning process, but also provided concrete products for local communities to use to better serve their clients.

We really appreciate the time, efforts, and energy students brought to our agency. We have adopted and implemented the plan students presented with a group of inner city minority youths we are serving. We wouldn't have been able to offer such health promotion program without students' help. Students learn and benefits greatly from such real-world experience and we in the community at the same time are very grateful of the help from these professionally-trained students. I would definitely be happy to work with students on these course-based projects again in the future.

Our community –campus partnership has directly benefited our clinic program and patients in many ways. Students did an excellent job on the "Living Well DAILY" educational program addressing disclosure and providing useful information and tools for patients when discussing their HIV status with others. Students have also provided the template for our newsletter and website. Most of these projects may not have been addressed by our staff due to the increase in patient load, decrease in staff, and lack of funding.

These students were a pleasure to work with. I never had to worry about the quality or timeliness of the work. They represented the university well and helped address a very real need in my community. I will actually be able to use their products.

4. Discussion

Results from course evaluation, student reflection, project outputs, and community partner feedback together showed positive impacts on students learning as well as community-campus partnership building. Students appreciated the active learning opportunity via PBL sessions and found elaborating through discussions, questioning, summarizing, or teaching their peers to be beneficial. Data support the inclusion of the formal PBL sessions added to the known benefits of CEL. In addition to the higher confidence in their program development and implementation competencies, students also learned more about themselves and working with people different from them.

Although benefits of PBL [2] or CEL [12] were also documented in existing literature, the integration of PBL discussions with CEL projects posed some new and challenging teamwork experience for students in higher education. The current study showed that challenges of learning via the integration of PBL and CEL approaches could provide deepened growth opportunities for students and facilitates the enhancement of student self-awareness and confidence. The PBL process allows for students who typically "ranked higher in the class by traditional measures" to learn that others can make meaningful contributions to solving problems; such as through abilities to effectively organizing tasks, managing conflict, or facilitating communications. Alternately, PBL also allows for those

who normally rank lower by traditional measures to gain more confidence in their ability to contribute to problem-solving with their higher ranking counterparts [20]. One student commented that: "One of the most important things that I have learned this semester is that it's alright for me to let go of control of a project sometimes. I've learned to trust other group members as they have different skills sets and care about the quality of the product too."

In addition, several students commented that their attitudes and views towards teamwork had changed as they learned more about working with members of different backgrounds. Students learned that everyone has different work style and had become more understanding. One said, "This was what changed through this group project and I am very glad for the change." Another commented, "I am now no longer intimidated and have a much more positive view on group projects. I do not dread them anymore and almost embrace them." Some students also changed their preconceived notion about such course-based community service-learning project. One reflected, "I have seen each of the community partners in our class having real positive impact from the projects."

It should be noted that although the integration of PBL with CEL is beneficial for students, at the same time it could be very time consuming for the instructor. These include time required supervising and mentoring students, trouble-shooting throughout the process, as well as communicating with students and community partners regarding the desired project outcomes. The time constraints also limit the type of projects students can work with [11,21]. In addition, training and practices are needed for faculty members to facilitate group discussions and manage group dynamics effectively. Additional challenges could come from community partners who may occasionally have different priorities and timeline than the course requirements or calendar.

In sum, using PBL and CEL deepens student learning and engagement. In addition, community-based project enhances the relevancy of theory-to-practice applications. It also results in theory- and evidence-informed interventions and programs to address community-identified health needs. Students worked better with communities in the Implementation Course, a sequenced course following the Planning Course. By increasing and deepening the service-learning component with each successive course, and via building upon their prior experiences and better integrating their service activities with course concepts, students gain confidence in the method and are more likely to maximize the potential civic and academic outcomes [22-23]. Indeed, students in the Implementation Course often drew their community experience from the Planning Course during class discussions and student-chaired PBL meetings. Community partners also appreciate the quality services via the continuous opportunities working with students, and the long-term relationship established. The integration of PBL with CEL and the incremental infusion of service-learning into sequenced courses demonstrate promising impact on student learning and competencies building. Future studies might further examine and describe competency related to PBL and CEL in order to better prepare students to work collaboratively, interact with real communities, and for faculty to utilize and adopt such pedagogy approaches. The study results have implication on educational development in higher education domestically and internationally.

REFERENCES

[1] Seifer, S. Service-learning: Community-campus partnerships for health professions education. *Academic Medicine* 73(3): 273-277, 1998.

[2] Koh, G.C-H., Khoo, H.E., Wong, M.L., & Koh, D. The effects of problem-based learning during medical school on physician competency: a systematic review. *Canadian Medical Association Journal* 178(1): 34-41, 2008.

[3] Achike, F.I., & Nain, N. Promoting problem-based learning (PBL) in nursing education: A Malaysian experience. *Nursing Education in Practice* 5 (5): 302-211, 2005.

[4] Norman, G. Problem-based learning makes a difference. But why? [Article]. *CMAJ: Canadian Medical Association Journal, 178*(1), 61-62, 2008.

[5] Antepohl, W., & Herzig, S. Problem-based learning versus lecture-based learning in a course of basic pharmacology: a controlled, randomized study. *Medical Education* 33 (2): 106-113, 2002.

[6] Cohen-Schotanus, J., Muijtjens, A. M. M., Schönrock-Adema, J., Geertsma, J., & van der Vleuten, C. P. M. Effects of conventional and problem-based learning on clinical and general competencies and career development. [Article]. *Medical Education, 42*(3), 256-265, 2008.

[7] Distlehorst, L. H., Dawson, B. K., & Klamen, D. L. Supervisor and Self-Ratings of Graduates From a Medical School With a Problem-Based Learning and Standard Curriculum Track. [Article]. *Teaching & Learning in Medicine, 21*(4), 291-298, 2009.

[8] Chiou-Fen, L., Meei-Shiow, L., Chun-Chih, C., & Che-Ming, Y. A comparison of problem-based learning and conventional teaching in nursing ethics education. [Article]. *Nursing Ethics, 17*(3), 373-382, 2010.

[9] Hmelo-Silver, C.E., & Barrows, H.S. Goals and strategies of a problem-based learning facilitator. *Interdisciplinary Journal of Problem-based Learning* 1: 21-39, 2006.

[10] National service-learning clearinghouse (NSLC). A definition of service-learning. Online available from http://www.servicelearning.org/what_is_service-learning/

[11] Hartwig, K.A. Moving from the usual one-sided relationship common to academic-community partnerships: Promoting students' civic engagement. Paper presented at the Conference of The University & Civil Society: Autonomy & Responsibility. May 17-19, 2006 in Bologna, Italy.

[12] Butin, D. Special Issue: Introduction future directions for service learning in higher education. *International Journal of*

Teaching and Learning in Higher Education 18(1): 1-4, 2006.

[13] Eyler, T.S, Giles, D.E, Stenson, C.M., & Gray, C.J. At a glance: What we know about the effects of service learning on college students, faculty, and institutions and communities, 1993-2000 (3rd ed). Washington D.C. Learn and Serve America, Corporation for National and community Services, 2001.

[14] Johnston, J. M., Schooling, C. M., & Leung, G. M. A randomised-controlled trial of two educational modes for undergraduate evidence-based medicine learning in Asia. *BMC Medical Education, 9*, 63-63, 2009.

[15] Spinello, E. F., & Fischbach, R. Using a Web-Based Simulation as a Problem-Based Learning Experience: Perceived and Actual Performance of Undergraduate Public Health Students. [Article]. *Public Health Reports, 123*(S2), 78-84, 2008.

[16] Bartholomew, L.K., Parcel, G.S., Kok, G., & Gottlieb, N.H. *Health Promotion Planning: An Intervention Mapping Approach* (2nd ed.). San Francisco, CA: Jossey-Bass, 2006.

[17] Green, L.W., & Kreuter, M.W. *Health Promotion Planning –*

An Educational and Ecological Approach (4th ed.). New York, NY: McGraw-Hill Co, 2005.

[18] Hmelo-Silver, C.E. Problem-based learning: What & how do student learn? *Educational Psychology Review* 16(3): 235-266, 2004.

[19] Patton, M.Q. *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc., 2002.

[20] Albanese, M. A., & Xakellis, G. C. Building collegiality: the real value of problem-based learning. [Article]. *Medical Education, 35*(12), 1143-1143, 2001.

[21] Hou, S. Service-Learning + New MPH Students = Challenges for the Professor. *International Journal of Teaching and Learning in Higher Education* 20(2): 292-297, 2009.

[22] Berle, D. Incremental integration: A successful service-learning strategy. *International Journal of Teaching and Learning in Higher Education* 18 (1): 43-48, 2006.

[23] McCarthy, A.M., & Tucker, M.L. Student attitudes toward service-learning: Implications for implementation. *Journal of Management Education* 23(5): 554-573, 1999.