The Value and Effectiveness of Problem-based Learning for Community Nutrition Educators

THESIS

Presented in Partial Fulfillment of the Requirements for
The Master of Education Degree in the
College of Education and Human Service Professions

By
Connie S. Burns

University of Minnesota Duluth
2014

Committee Signatures:
Advisor: Terrie Shannon
Reviewer: Chris Johnson
Director of Graduate Studies: Diane Rauschenfels
The Value and Effectiveness of Problem-based Learning
for Community Nutrition Educators

A THESIS SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
OF THE UNIVERSITY OF MINNESOTA
BY

Connie S. Burns

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
MASTER OF EDUCATION

Terrie M. Shannon, PhD, Advisor

December, 2013
Value/Effectiveness of Problem-based Learning

© Connie S. Burns, 2013
Value/Effectiveness of Problem-based Learning

Acknowledgements

I would like to acknowledge and thank my advisor, Dr. Terrie Shannon, for her invaluable assistance and words of encouragement during this project. Thanks also to Drs. Christopher Johnson, Insoon Han, and Abby Gold, and to all the professors that I worked with in the MEd Program.
Value/Effectiveness of Problem-based Learning

Dedication

This thesis is dedicated to all of the University of Minnesota-Extension Community Nutrition Educators that participated in this project, and to all other Community Nutrition Educators that I’ve worked with over the years through the Extension Center for Family Development. You have made my work with Extension so rewarding! Through your hard work and commitment to the program, you’ve made a difference in communities across Minnesota.
Abstract

Twenty first century workers need to think critically, act collaboratively, and be able to solve the ‘real world’ problems encountered in their work. This study explored the views of paraprofessional Community Nutrition Educators (CNEs) on the value of Problem-based Learning (PBL) and the effectiveness of distributed Problem-based Learning (dPBL) for their work. The study also investigated whether dPBL is effective in developing a variety of ways for CNEs to learn. Eighteen CNEs participated in an online, Moodle-based course to gain knowledge of PBL principles, and then using facilitated discussions, applied a three step process to solve a work-related problem. Survey data was collected on demographics and knowledge acquisition, and mixed methods journals were used to evaluate CNE views on PBL and dPBL. There was a significant gain in PBL knowledge from pre course to post course \( (p < .01) \). CNEs found PBL “somewhat to very valuable” in their work and dPBL “somewhat successful to very successful” in helping them solve work related problems. Discussion forums were found to be as important as viewing content as a means for CNEs to learn. CNEs felt PBL could be used to solve both teaching/participant issues and non-teaching work issues. Both PBL and dPBL are strategies for CNEs to consider when solving a wide range of work related problems. This research sheds promising light on the use of PBL and dPBL in non-traditional staff development settings.
Value/Effectiveness of Problem-based Learning

Table of Contents

List of Tables................................................................. v

Chapter 1: Introduction......................................................1

Chapter 2: Review of Literature...........................................8

Chapter 3: Methodology....................................................22

Chapter 4: Results and Discussion......................................28

Chapter 5: Conclusions and Summary.................................45

References.................................................................52

Appendices...............................................................59
Value/Effectiveness of Problem-based Learning

List of Tables

Table 1: Instructional Principles, Savery and Duffy…………………………….11

Table 2: Proportion of Respondents Who Can Name the Two Parts of the Problem Statement…………………………………………………………30

Table 3: Proportion of Respondents Who Can Name the PBL Steps………30

Table 4: Respond to Question #1: Do CNEs Find Value to PBL in their work as a CNE?.................................................................31

Table 5: Respond to Question #2: Can dPBL be used successfully to Help CNEs solve work related problems? ........................................32

Table 6: Respond to Question #3: How did you learn this week? ...............34
Value/Effectiveness of Problem-based Learning
Chapter One

Introduction

Purpose of the Study

Community Nutrition Educators (CNEs) play an essential role in the University of Minnesota Extension’s Simply Good Eating Program. From individual educational encounters to hands-on group cooking classes, CNEs provide research-based nutrition education opportunities, promoting healthy lifestyles to community members with limited resources. While some CNEs work alone in rural communities across the state, others work in proximity to each other in the more metropolitan areas. All CNEs, regardless of their geographical location, work site environment or educational setting, are confronted with situations where the ability to solve problems is an important skill to know.

The purpose of this study was to explore the views of Community Nutrition Educators on the value of Problem-based Learning (PBL) to their work; to learn about the effectiveness of online, distributed Problem-based Learning (dPBL) for Community Nutrition Educators in solving work-related problems; and to investigate whether dPBL is effective in developing a variety of ways for CNEs to learn. Quantitative results on PBL value, dPBL effectiveness, and selected methods of learning were collected from the sample. Qualitative data which may provide insight into the value of PBL in solving specific CNE work-related problems were also collected. To address course
Value and Effectiveness of PBL for CNEs
design and curriculum improvement, formative evaluations were completed by both the CNEs and the course facilitator.

Significance of the Study

In the Summer, 1997 edition of *New Directions for Adult and Continuing Education*, Jack Mezirow wrote:

> The common presumption in these lists [of competencies and skills] is that the essential learning required to prepare a productive and responsible worker for the twenty-first century must empower the individual to think as an autonomous agent in a collaborative context rather than to uncritically act on the received ideas and judgment of others. Workers will have to become autonomous, socially responsible thinkers…. Economists recognize that resources should be directed toward creating a workforce that can adapt to changing positions of employment, exercise critical judgment as it manages technology systems, and flexibly engage in more effective collaborative decision-making. (Mezirow, 1997, p. 8).

Community Nutrition Educators, in their essential community work in various work settings, need to be skilled twenty-first century thinkers: empowered, autonomous, socially responsible workers who critically think, collaboratively act, and can help solve the ‘real world’ problems they encounter in their work. Staff development opportunities that introduce CNEs to critical thinking concepts and
Value and Effectiveness of PBL for CNEs

problem solving techniques could contribute to the skills CNEs will find necessary to be successful in the twenty-first century.

Problem-based Learning is a focused, experiential learning approach organized around the investigation and resolution of messy, real-world problems (Torp and Sage, 2002). With this approach, learning is self-determined and acquired through the student’s own ‘digging’ or study, with the student becoming an active participant in the learning process (Barrows and Tamblyn, 1980). A version of PBL that can be offered in a distance learning environment is distributed Problem-based Learning (dPBL). As with PBL, dPBL enables teachers to present students with authentic problems they might encounter in the ‘real world’ (Wheeler, 2006). With many CNEs located remotely across Minnesota and with staff development distance learning opportunities becoming more common and accepted, dPBL could perhaps be an effective way for CNEs to learn how to ”problem solve” from a distance.

This study is significant because knowledge and application of structured PBL and dPBL have not been offered as part of any University of Minnesota Simply Good Eating Program paraprofessional staff development opportunity. If PBL and dPBL show promise as approaches for developing CNE individual and group problem solving skills, CNEs will gain the essential learning that Mezirow finds important for twenty-first century thinkers. Online PBL (dPBL) in particular could prove beneficial in challenging economic times, when budgets cuts are being considered.

Context
Value and Effectiveness of PBL for CNEs

A month long online course to introduce PBL concepts was developed for Community Nutrition Educators located across the state of Minnesota. After viewing content modules on PBL definitions and process, participants joined in weekly online discussion forums to apply the Problem-based Learning process using a video-taped, work-related scenario as the basis of discussion. They participated in their office environments on work time.

Scope and Assumptions of the Study

CNEs are confronted daily with questions and problems from their program participants. Nutrition education is challenging and the science of nutrition is fraught with myths and misinformation. Knowing and sharing nutrition content is important, but being able to critically think through problems and apply content appropriately could be a valuable skill for the CNE to learn and perhaps even share with their participants.

As an Extension Educator (EE) in Health and Nutrition for the University of Minnesota, I have worked closely with CNEs on a regional and statewide basis for over six years. I have participated in the Extension Center for Family Development’s Health and Nutrition Staff Development work group in the design and delivery of CNE staff development opportunities, both face to face and online. Surveys of past CNE staff development events indicate many in this audience are very interested in sharing their knowledge and learning from each other in a group. Therefore a study that uses an online PBL model (dPBL) could provide insight into possible new directions for regional and state wide staff development offerings.
Value and Effectiveness of PBL for CNEs

A Problem-based Learning model is most successful when students and the facilitator can develop a sense of community. A challenge was using an online, prescriptive curriculum that would only provide a ‘taste’ of PBL and dPBL to a cohort of CNEs who have a wide range of comfort with technology, an array of educational backgrounds, and a variety of work experiences. From this short introduction to PBL and dPBL, the hope was to gather CNE impressions on the value of PBL and the effectiveness of dPBL for possible future CNE staff development opportunities. The reader is cautioned not to make broad interpretations from this short study.

Definitions

In the world of distance education and in Extension, there are certain definitions that a general audience may not be familiar with.

- Articulate: an E-learning software and authoring tool.
- Community Nutrition Educator (CNE): a paraprofessional who delivers educational lessons, classes or one-on-one coaching, extending the resources of the University of Minnesota to help families learn how to plan and prepare meals on a limited budget and sustain the skills needed to create healthy, self-sufficient lives.
- Course Management System/Learning Management System: (CMS/LMS): a software application for the administration, documentation, tracking, reporting and delivery of e-learning education courses or training programs. Moodle is an example of a CMS/LMS.
Value and Effectiveness of PBL for CNEs

- **Distributed Problem-based Learning (dPBL):** Problem-based Learning mediated through technology. It is a shared, ‘virtual’ distributed learning environment, used to enable students to collaborate (Wheeler, 2006).

- **Extension Educator (EE):** At the University of Minnesota, Extension Educators are responsible for several major areas of work, including program development and delivery, attention to diversity, use of scholarly/scientific research, effective partnerships, use of technology and continuing professional development.

- **Facilitator/Coach/Tutor:** these terms are often used interchangeably to describe the role of the teacher in Problem-based Learning.

- **Google Drive:** a file storage and synchronization service provided by Google.

- **Google Form:** a tool to send surveys and record journal entries, provided by Google.

- **Moodle:** a free and open-source e-learning software platform; CMS/LMS.

- **Problem-based Learning (PBL):** an approach that challenges students to learn through engagement in a real problem. It is a format that simultaneously develops both problem solving strategies and disciplinary knowledge bases and skills by placing students in the active role of problem-solvers confronted with an ill-structured situation that simulates the kind of problems they are likely to encounter.

- **Simply Good Eating (SGE) Program:** University of Minnesota Extension’s nutrition education program that draws on evidence based strategies and best practices to promote healthy lifestyles for people with limited incomes.
Value and Effectiveness of PBL for CNEs

- UM Connect: technology which enables University of Minnesota faculty, staff, and eligible graduate students (e.g., teaching assistants) to host on-demand web presentations and to communicate and collaborate through web conferences.
- UM Survey: an online survey tool managed by the University of Minnesota's central Office of Instructional Technology (OIT).

Summary

The purpose of this study was to explore:

- the value of Problem-based Learning in Community Nutrition Educators’ work;
- the effectiveness of online Problem-based Learning (dPBL) to Community Nutrition Educators’ work; and
- the effectiveness of dPBL in developing a variety of ways for Community Nutrition Educators to learn.

Although Problem-based Learning has been used in post-graduate and graduate work for nearly 60 years, and dPBL more recently in higher education, the approaches have not been significantly utilized or researched with paraprofessional staff. This study provides insight into the value and effectiveness of PBL/dPBL with this audience.
Value and Effectiveness of PBL for CNEs

Chapter Two

Review of Literature

Introduction

With its basis in Dewey (1938), Problem-based Learning (PBL) addresses the importance of practical experience in learning. Adults are experiential learners (Kolb, 1984) and enjoy sharing their expertise and knowledge with colleagues. Evidence suggests that PBL is an instructional approach that offers the potential to help students develop flexible understanding and life-long learning skills (Hmelo-Silver, 2004). The trend in adult education today is towards using a learner centered, constructivist-based design and delivery model, with emphasis placed on experimental learning through real life experience. Problem-based Learning therefore appears well situated for adult learners in a variety of educational settings, ranging from graduate level work to staff development and training programs.

This study focused on Problem-based Learning and the value of PBL to Community Nutrition Educators (CNEs) in the University of Minnesota Extension’s Simply Good Eating Program. The effectiveness of distributed PBL (dPBL) for this audience, along with dPBL’s effectiveness in CNEs utilizing various learning methods was also studied.

In this literature review, a discussion of the history and theoretical frameworks of Problem-based Learning and its relevancy to contemporary education will be followed by a general discussion of the historical context, theories, and conceptual frameworks found in the field of distance education. The design and development of online learning communities includes a description of Instructional Systems Design
Value and Effectiveness of PBL for CNEs

(ISD) and the Community of Inquiry (COI) framework. This literature review concludes with a discussion of the strengths and weaknesses of the design and implementation of dPBL; an overview of PBL and dPBL research needs; and lastly, specific dPBL staff development research needs.

**Problem-based Learning**

**History and theoretical frameworks.**

An overview of the history of PBL by Savery (2006) suggests that Problem-based Learning evolved from innovative health science curricula dating back to the 1960s, then adopted in other medical institutions in the US and Europe during the 1980s and 1990s. It then became more widely used in elementary, middle-schools, high schools, universities and professional schools. With its emphasis on being experiential, the PBL approach relates well to Jerome Bruner’s concept of educational scaffolding, where the provision of support and building on experience promotes learning (Hamilton, 2009). Vygotsky’s Sociocultural Theory, which posits that social experiences shape the ways of thinking and interpreting the world, with the group being vital to the learning process (Jaramillo, 1996) aligns well with the PBL approach. The Understanding by Design framework developed by Wiggins and McTighe (1998) with its focus on ‘teaching for understanding’ is supported by the PBL approach. Barrow’s discussion on the Tutorial Process supports the facilitator role found in Problem-based Learning (Barrows, 1992).

With Problem-based Learning, students learn by solving real-world problems and then reflecting on the experience (Barrows & Tamblyn, 1980). It is based in
Value and Effectiveness of PBL for CNEs

various tenets of constructivism, such as the need to interact with the environment, the presence of cognitive puzzlement to stimulate learning, and the use of social negotiation of meaning in influencing understanding (Savery & Duffy, 1995). Contextualization of learning, learning through reflection and collaborative construction are all important aspects of PBL (Uden & Beaumont, 2006). With PBL, learners are seen as researchers, working in small groups to analyze and solve authentic problems, leading to deeper understanding and a better retention of content. In essence, PBL is student centered, fostering collaboration between learners working on an ill-structured problem.

Problem-based learning’s relevancy to contemporary education.

The focus in education today is on learner centered collaborative experiences, based in constructivist theory. Problem-based Learning is one of many contemporary instructional approaches (such as case-based instruction and project-based learning) that situate learning in a meaningful task (Hmelo-Silver, 2004). Problem-based Learning has a dual emphasis of helping learners develop strategies and construct knowledge (Cognition and Technology Group at Vanderbilt, 1997; Collins et al., 1989; Hmelo & Ferrari, 1997; Kolodner et al., 1996).

In their work with PBL, Savery and Duffy (1995) concur with Lebow (1993) and his proposal that an educational value system which includes the seven primary constructivist values of collaboration, personal autonomy, generativity, reflectivity, active engagement, personal relevance, and pluralism offers instructional designers a new set of values. These values serve as a guide to Savery and Duffy’s instructional principles, found in Table 1.
Value and Effectiveness of PBL for CNEs

Table 1: Instructional Principles, Savery and Duffy (1995)

| Anchor all learning activities to a larger task or problem. |
| Support the learner in developing ownership for the overall problem or task. |
| Design an authentic task. |
| Design the task and the learning environment to reflect the complexity of the environment they should be able to function in at the end of learning. |
| Give the learner ownership of the process used to develop a solution. |
| Design the learning environment to support and challenge the learner’s thinking. |
| Encourage testing ideas against alternative views and alternative contexts. |
| Provide opportunity for and support reflection on both the content learned and the learning process. |

Savery and Duffy maintain the above values and principles are well realized in the Problem-based Learning approach (1995). The above conclusions, values and principles suggest PBL fits well into today’s constructivist focused educational environment.

**Distance Education**

**History, theories, and conceptual framework.**

When distance education was first identified as an alternative to attending classes, it was commonly referred to as correspondence education. A correspondence school was established in Berlin in 1856 for teaching languages, and in 1891 a newspaper editor in Pennsylvania directed a correspondence writing course on mine surveying. The Regents at the University of Wisconsin developed extension correspondence courses at about the same time, and in Australia in the early 1900s, technical and primary correspondence education was initiated to reach people in isolated areas (Forster, 2004).
Value and Effectiveness of PBL for CNEs

According to Forster (2004), the British Open University in 1970 marked a time of new growth and importance in distance education through their expansion in numbers of learners and in the depth of scholarship applied to the issues of teaching and learning at a distance. The British Open University is a model of an institution devoted entirely to distance education, with team involvement in course development and with a variety of technologies used. Computers, multi-media and the Internet characterize the most recent historical period of distance education. Blended courses that include both face to face and asynchronous (anytime/anywhere) elements are currently a popular approach (Forster, 2004). In 2008, over one quarter of all higher education students were taking at least one online course (Allen & Seaman, 2010), and during the Fall 2010 term, thirty-one percent of U.S. college students took at least one online course (Bell & Federman, 2013).

Between 1920 and 1950, research focused on the traits of effective teachers, along with teacher processes, behaviors and methods and their influence on educational outcomes (Forster, 2004). Teacher centered research assumed that teaching was the direct cause of learning, and learners were seen as passive recipients of instruction. However, a shift towards learning and the learner, especially from both the behaviorist and neo-behaviorist perspectives of B.F. Skinner and Robert Gagne, respectively, dominated research in the 1960s and 1970s (Forster, 2004). Ausubel (1968) emphasized the need for all students to anchor the learning of new concepts in what they already know. Learning how to learn and the facilitation of learning are both important processes in education and were found to be essential (Rogers, 1969). These learner elements are all essential in distance education design and delivery.
In building a conceptual framework that is relevant and foundational to distance teaching and learning, Forster (2004) examined characteristics of distance education. Although technology-driven context is commonly identified as central to distance education, developments in distance education research reflect a learner-centered focus. This focus will lead to a more effective design than one that begins with technology (Forster, 2004). In essence, a distance education system begins with a consideration of learner needs.

Therefore, according to Forster (2004), distance education is a total system, with technology being only one piece of the puzzle. For distance education to be implemented and used effectively, a systems approach must be considered. From needs analysis to design and learner support, there are many major components to a distance education system (Forster, 2004). Gagne and Briggs (1979) advocated a systems approach to instructional design, which now plays a prominent role in distance education’s instructional design framework (Gagne & Briggs, 1979).

One theory that would cover the variety of learning situations, technologies, and philosophies of distance education design and delivery would be so broad that it would not be useful. Early educational theorists could not have foreseen the developments that have recently occurred in telecommunications (Forster, 2004). Implications to distance education from several researchers and theorists can be seen in online course design and delivery, and the one common denominator seen in the area of distance education is that ‘experience of the learner’.

A deep level approach to learning (Marton, 1975) also plays a prominent role in the history and development of today’s distance education offerings. A further shift
Value and Effectiveness of PBL for CNEs

toward research on the learner occurred with the ‘mediated process paradigm’ established by Doyle (1977) which states a learner’s interests, goals, past experiences and beliefs affect learning. Recent theories, such as Bereiter’s Theory of Mind and Knowledge, which provides a newer conception of what it means to be knowledgeable, may open ways of thinking about the mind that works for the new challenges faced by distance education (Bereiter, 2002).

Beyond Forster’s conceptual framework, and the various theories described above, there is a well-known instructional design method and also a ground-breaking framework, both important to note when discussing distance education.

**Design and development of online learning communities.**

Before considering PBL and its use in distance education, it is important to gain an understanding of design in online course instruction. Although not without controversy (McCombs, 1985), Instructional Systems Design (ISD) has been commonly used in both traditional training and in distance education settings for years. It is the process which leads to the solution of instructional problems by setting procedures for solving the problems, evaluating the results, and revising accordingly (Coldeway, 2005). It has much in common with Dewey’s concept of linking science theory and practical application. Instructional Systems Design had its beginnings in military and industrial training, and also shares common attributes to early programmed instructional design processes (Markel, 1980) and Keller’s Personalized System of Instruction (Keller, 1968). Innovative forms of adult and post-secondary education began to look at ISD as a way to improve instructional efficiency and learning effectiveness.
Athabasca University created an ISD model in 1977 for online curriculum design and course development (Shale & Coldeway, 1979).

Instructional Systems Design models have therefore been used in a variety of environments, and have been modified over time. A generic ISD model consists of five components: Analysis, Design, Development, Implementation, and Evaluation (ADDIE), and is the most recognized and traditional online design methodology. However, it is important to note that although ADDIE is well known and used, the need for innovation in instructional design methods has been addressed by Hokanson (2008) and others.

The Community of Inquiry (COI) developed by Garrison et al. (2000), is a ground-breaking distance education framework that aligns well with adult education needs. According to Shea and Bidjerano (2009), Community of Inquiry focuses on the development of an online learning community that emphasizes processes of instructional conversations that are likely to lead to epistemic engagement. The framework includes behaviors and processes that together lead to knowledge construction and consists of three forms of presence: teaching, social and cognitive presence. These forms of presence are addressed in both course design and in delivery with each presence overlapping and being interdependent. The overall goal is for these forms of presence, through collaboration, to create an online learning environment that results in knowledge production (Shea & Bidjerano, 2009). Although this framework focuses on different forms of presence, it aligns well with Forster’s conceptual framework and the constructivist versus behaviorist approach to learning.
Value and Effectiveness of PBL for CNEs

This review has thus far provided a brief overview of Problem-based Learning, a short history of distance education, along with a description of frameworks and theories. It is evident that a focus on the learner has developed over time, and as distance education and course design continue to evolve, various constructivist approaches or models that focus on the learner have been developed. The following discussion returns to the Problem-based Learning approach, discussing its relevancy to distance education and providing background and insight into possible research opportunities in both PBL and dPBL.

**Design and implementation of distributed PBL: strengths and weaknesses.**

The version of PBL that can be offered in a distance learning environment is distributed Problem-based Learning (dPBL). With dPBL, learning is mediated through computer technology, and a shared, “virtual” distributed learning environment is used to enable students to collaborate. As with PBL, dPBL enables teachers to present students with authentic problems they might encounter in the “real world”. Students practice problem-solving skills while reading more widely and investigating more deeply the structure and context of the presented problem (Wheeler, 2006). Facilitators act as tutors or coaches, and may even adopt the learning role themselves (Roblyer, Edwards, & Havriluk, 1997). The learning group collaborates as a team, with members monitoring the progress of others while assessing their own (Barrows, 2002).

Yun-Jo An and Reigeluth (2008) found a variety of strengths and weaknesses to distributed Problem-based Learning among three graduate-level online courses using the approach. Strengths included students learning the value of cognitive dialogue and
collaborative learning, and gaining practical experience for future “real world” work. Weaknesses among the courses included a lack of sufficient background knowledge to solve the problem; finding that cooperation instead of collaboration in student work occurred; and the need for more communication between the facilitator and the students. For these graduate level courses, suggested improvements included the importance of showing relevance to work and having a more tailored structure to the course. Based on a cross-case analysis, the authors suggested guidelines for successful dPBL should include the following: consideration of dPBL as only part of a larger course; creation of a relevant (career centered) problem; ensuring students have requisite knowledge; and providing both synchronous and asynchronous communication methods (Yun-Jo An & Reigeluth, 2008).

Murphrey (2010) examined how technology was used to engage undergraduate students in experiential eLearning (eeLearning) and found that incorporating highly interactive components into online instruction is important. Students commented that the use of the technologies encouraged experiential learning by allowing students to gain ownership of their ideas and communicate their ideas clearly. Clear instruction and timely communication by faculty to students through the use of technology was seen as important (Murphrey, 2010).

This literature review covers research into distributed Problem-based Learning as it has occurred in higher education. Results and conclusions between kinds of courses (graduate level, undergraduate) indicate a similarity in the need to provide successful communication strategies in the design of dPBL courses.
Value and Effectiveness of PBL for CNEs

**PBL and dPBL: an overview of research needs.**

According to Hmelo-Silver (2004) Problem-based Learning is most often used in higher education and medical schools, and research is needed to investigate whether PBL’s goals can be achieved in other areas of education. Furthermore, little work has been done in the areas of motivation and collaboration in Problem-based Learning.

Problem-based Learning and the Family Sciences are well aligned in both theory and practice (Teemant, B., Moen, D. & Harris, V., 2012). The PBL approach has been studied in the helping professions and Family Sciences, where assisting people in solving their problems is a necessary skill. Finding resources, applying theory and employing evidence-based practices become especially important in the field. PBL is a promising approach to motivating Family Science students and helping them to apply knowledge to authentic situations (Teemant et al., 2012).

Problem-solving as a pedagogical approach is not new or unique to Family Science, with the six-phase GO Model being a recent example (Hunts & Marotz-Baden, 2004). Furthermore, in the 1990’s, the University of Illinois Cooperative Extension Service implemented the Family Ties Program, developed to foster a sense of control among family members and paraprofessionals and to encourage participants to both solve problems and increase positive experiences in their lives. The Empowerment Model used was based on the assumption that clients are responsible, in part, for improving their life situation and are given credit for devising solutions. The paraprofessional becomes part of a problem identification and problem solving team. Intervention becomes a creative process of helping clients identify, analyze and solve
Value and Effectiveness of PBL for CNEs

problems, offering the possibility of clients solving their own problems over time (Collazo, L., Hall, T., Hare, N., Hill, J., Hughes, R., Jr., Pulido, N., Quinones, G., Shorter, M., Smith, A., & Todd, C.M., 1993). Therefore, although problem solving and PBL are not new or unique to Family Science, further research could shed more light on the use of these practices and approaches, especially in paraprofessional work with families.

Scripture (2008) has researched dPBL from a designer’s perspective and has found that several experienced designers’ recommendations are aligned with what other researchers have previously documented regarding PBL, including the use of ill-defined authentic problems; the need for an engaging and motivating way to learn challenging problems; and the importance of self-directed learning and lifelong problem solving. Online learning and technologies evolve rapidly. In terms of distributed Problem-based Learning, research has focused mostly on student and facilitator experiences, and mostly in higher education settings. Furthermore, additional work similar to Scripture needs to be done from the designer’s perspective.

In summary, considering the research cited in this literature review, there may be a need for more research to study dPBL in various areas: from an online course designer’s perspective; in courses besides graduate school and undergraduate school levels; in the areas of motivation and collaboration; and in improved communication strategy development. Since online learning and technologies do evolve rapidly, a further review of literature will provide insight into these possible areas of research.
Value and Effectiveness of PBL for CNEs

As noted, there may be a need for further research into dPBL in other adult education settings besides graduate and undergraduate school. With PBL’s history in paraprofessional Extension work through the Family Ties Program, and PBL’s alignment to family science theory and practice, new research into dPBL with this audience holds promise. Therefore, among other adult education settings, an area of particular research interest is the use of dPBL as a paraprofessional staff development opportunity.

**Staff development and dPBL: A need for research.**

Staff development, whether online or face to face, should be designed around the previously cited and well founded adult learning principles. An overview of dPBL and its use in adult staff development opportunities offers insight into future research needs.

Online collaborative knowledge building has been used to promote effective learning in in-service teacher training (Ahlberg, Kaasinen, Kaivola, & Houtsonen, 2001), and to establish communities of practice in computer based teacher training (Clarke, 2002; Tsui & Ki, 2002). But, has dPBL been used in staff development, and in particular to a paraprofessional audience?

In the Building for Tomorrow (BFT) project, library-based personnel (both paraprofessionals and graduate level) were provided problem-based learning activities using the Blackboard learning management system. Blackboard became an electronic classroom and document distribution center, and those selected to participate used it to review abstracts of useful readings, peruse relevant websites, and email anyone
Value and Effectiveness of PBL for CNEs

involved from the point of selection through the instructional sessions into the applicant phase, and on to the posting of final work products for all to review (Westbrook, 2005).

Little has been found in terms of the use of dPBL specifically for adult, paraprofessional staff development purposes. Distance education courses are becoming an acceptable and popular way to share information and are frequently used in staff development. However, often times online courses are designed to be content based, not problem based. Would staff find value in the Problem-based Learning concept for solving work related problems? Would online PBL be a successful way of solving work-related problems? What learning methods are utilized in dPBL settings? More research is needed to provide insight into these and other important staff development questions.
Value and Effectiveness of PBL for CNEs

Chapter Three

Methodology

The purpose of this study was to explore Community Nutrition Educators’ (CNE) views on the value of Problem-based Learning (PBL) to their work; their views on the effectiveness of online, Distributed Problem-based Learning (dPBL) in solving their work related problems; and to explore whether dPBL is effective in developing a variety of ways for CNEs to learn.

This chapter will first list the study’s research questions and then describe the setting and participants involved. A description of the research design will follow, including a description of the evaluation instruments; the instructional strategies used; and the process used to gather and analyze the data.

Research Questions

1. Do Community Nutrition Educators find value to Problem-based Learning in their work?

2. Can distributed Problem-based Learning (dPBL) be used successfully to help Community Nutrition Educators solve work-related problems?

3. Is dPBL effective in developing a variety of ways for Community Nutrition Educator to learn?

Setting and Participants
As an Extension Educator and member of the Center for Family Development Health and Nutrition Program’s Staff Development Work Group, I am familiar with Program Coordinators (PCs) and their supervisory role in the University of Minnesota Extension’s Simply Good Eating Program. After clearance was received from Extension Human Resources and the Center for Family Development to use this project as a CNE staff development opportunity, Program Coordinators received email requests for names of Community Nutrition Educators under their supervision whose workload would allow for participation in this project. A Social and Behavioral Sciences Application Form was completed and was approved by the University of Minnesota Institutional Review Board on March 21, 2013. Consent Forms were reviewed and signed by the CNEs; a Research Study Agreement form requested by Extension Human Resources was also signed by CNEs and their PC supervisors.

Research Design

Mixed methods often are employed to broaden understanding or build on the results of another approach (Creswell, 2009). Quantitative data were collected on the three research questions. In an effort to shed light on the first research question, qualitative data were also collected.

Evaluation instruments.

A pre and post survey instrument, designed for this research and using UM Survey, was administered to collect CNE demographics, technology comfort ratings and number of years of CNE service. Besides collecting this data, the instrument was used
Value and Effectiveness of PBL for CNEs

to measure pre and post course PBL knowledge/knowledge acquisition. To collect data on the three research questions, an anonymous journal instrument using Google Forms was designed to collect weekly quantitative ratings of PBL value; dPBL effectiveness; and selected (multiple choice) methods of learning. This journal was also used to collect qualitative data on the first research question; and to collect formative evaluation data for course improvement purposes. A separate Google Form was used by the researcher to collect formative evaluation data for course improvement.

Before IRB submission, research questions, pre and post survey and journal questions, and evaluation tool design were reviewed by an adjunct Assistant Professor in Food Science and Nutrition, University of Minnesota/North Dakota Extension. Research and study questions were reviewed for clarity and alignment by West Central (Minnesota) Regional CNEs, and revised accordingly.

**Instructional strategies.**

Those CNEs chosen and consenting to this study participated in an online setting during agreed upon work times in the Moodle-based course called the PBL Sandbox. Course content covered background information on Problem-based Learning, including the definition and use of Problem Statements and a Three Step Process to Problem Solving (“What Do We *Already* Know?”; “What Do We *Need* to Know?” and “What Do We Need to *Do*?”). Weekly CNE activities included reading web-based content on PBL definitions and process, and participating in small (3-4 CNEs) Moodle-based group discussions to apply the Three Step Process to a work-related problem scenario.
Value and Effectiveness of PBL for CNEs

Weekly activities also included responding to the quantitative and qualitative research questions and offering formative evaluations in their online journal. See Appendix A for the Course Syllabus and Student Checklist of weekly activities. Discussion postings were facilitated and then summarized by the researcher each week in an “Idea Sheet” that was shared via Google Drive and in a weekly UM Connect (audio) summary. An end of course Big Group Discussion/Wrap Up activity was used for course reflection.

Although teaching and learning events in PBL are not necessarily rigid, fixed, or strictly sequenced, providing a scaffolding of the teaching and learning process for educators is important (Torp and Sage, 2002). Yun-Jo and Reigeluth (2008) voiced a need for a more tailored structure in dPBL. This study involved the introduction, application and evaluation of a process that was new to both the CNEs and the facilitator/researcher, so it was important to include a template for the facilitator/researcher to refer to, modify and learn from before, during and after the course. Therefore, an instructional template that includes research references and corresponding notes, was designed by modifying the *Instructional Template for a PBL Unit* (Torp and Sage, 2002). See Appendix B: Instructional Template for a PBL Unit, Modified.

**Data collection and analysis.**

As noted, a pre and post quantitative survey via UM Survey collected demographic information and was also used to assess whether PBL knowledge objectives were met. The primary aim, however, was to gather quantitative data on the three research questions, with qualitative data on the first research questions taking on a
Value and Effectiveness of PBL for CNEs

supportive/integrative role. Therefore, a Concurrent/Embedded Mixed Methods design (Creswell, 2009) was used, with the collection procedure noted in the evaluation instruments section.

The mixed methods strategy allows for an overall broader perspective of the corresponding research problems. Quantitative ratings were analyzed via SPSS for journal entries addressing PBL value to CNE work and dPBL effectiveness in solving CNE work related problems; and for quantitative multiple choice responses regarding dPBL’s effectiveness in offering a variety of learning methods. Qualitative, primary material on the first research question was reviewed with descriptions and themes generated to support and expand on quantitative data, via narrative analysis.

A possible threat to internal validity includes mortality rate, which was addressed by recruiting a larger sample to account for possible drop outs. Qualitative validity was addressed through the development of themes. Possible facilitator bias in this qualitative process needs to be considered. Because the two methods are unequal in priority, a limitation to consider with this Concurrent/ Embedded Strategy includes the fact that this approach results in unequal evidence within the study, which may be a disadvantage when interpreting the final results (Creswell, 2009).

Summary

Participants were recruited for an experiential online course focusing on the basics of Problem-based Learning. A pre and post survey was utilized to collect demographics and test knowledge acquisition, and a Concurrent/Embedded Mixed
Value and Effectiveness of PBL for CNEs

Methods journal instrument was utilized to collect both quantitative and qualitative data. Formative evaluations, from both the participants and facilitator/researcher, addressed course improvement needs. A PBL instructional template was developed for facilitator/researcher use. Analysis of the results, along with a general discussion, are found in Chapter Four, Results and Discussions.
Value and Effectiveness of PBL for CNEs

Chapter Four

Results and Discussion

The purpose of this study was to explore Community Nutrition Educator (CNE) views on the value of Problem-based Learning (PBL) to their work; their views on the effectiveness of online, distributed Problem-based Learning (dPBL) for solving work-related problems; and to explore whether dPBL is effective in developing a variety of ways for CNEs to learn.

Community Nutrition Educators participated in an online course that covered the essentials of Problem-based Learning. As participants in the course, they first viewed content that defined and discussed Problem Statements. Through online discussion forums, they practiced writing Problem Statements. CNEs then viewed content on a “Three Step Process to Problem Solving”, and applied the process to a given work-related problem scenario in weekly online discussion forums. To evaluate this study’s three research questions, CNEs completed weekly, anonymous online journals which collected quantitative data on all three research questions, along with additional qualitative data on the first research question. PBL knowledge acquisition was also assessed.

This chapter begins with the study’s results and an analysis of those results. Demographics and knowledge acquisition data results and analysis are described first, followed by quantitative results and analysis of the three research questions. Qualitative results and an analysis of the first research question follows, along with
results and analysis of formative evaluations. The chapter ends with a general discussion of results and a summary.

**Results and Analysis**

**Quantitative results.**

**Demographics and knowledge acquisition.**

Eighteen CNEs completed a pre course UM Survey, which included questions on demographics, comfort level with technology (Moodle), years of work as a CNE, and their educational background. Questions on their knowledge of Problem-based Learning were included in both the pre and post course UM Surveys.

The majority of CNEs (38.9%) were age 51-61 years and 83.3% were White/Non-Hispanic. Fifty percent indicated that they were ‘Fairly Comfortable’ with using the Moodle Course Management System. The majority (44.4%) had fifteen or more years of CNE work experience and the same percentage (44.4%) had a four year college degree. All CNEs were female. See Appendix C for detailed demographic information.

Two knowledge questions on Problem-based Learning were posed on both the pre and post course UM Survey: “Can you name the two parts of a Problem Statement?” and “Can you name the Three Step Process of Problem-based Learning?” If CNEs responded yes to these questions, they were given the opportunity to provide an example.
Value and Effectiveness of PBL for CNEs

Pre course, 89% of the CNEs did not know the two parts of a Problem Statement, and 94% could not name the Three Step Process of Problem-based Learning (see Tables 2 and 3 for pre and post course data). Post course, 88% responded that they could name the two parts of a Problem Statement, and 100% could name the Three Step Process of PBL. Therefore, the proportion of those CNEs who stated they could name the two parts of a Problem Statement increased significantly from pre course (2/18, 11%) to post course (14/16, 88%) (Chi-square = 19.84, \( p < .01 \)). Of those 14 responding ‘yes’, 12 (86%) were able to correctly provide an example.

Table 2

<table>
<thead>
<tr>
<th></th>
<th>Pre (n=18)</th>
<th>Post (n=16)</th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (%)</td>
<td>2 (11%)</td>
<td>14 (88%)</td>
<td>19.84**</td>
</tr>
<tr>
<td>No (%)</td>
<td>16 (89%)</td>
<td>2 (12%)</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* **\( p < .01 \)

As shown in Table 3, there is a significant increase from pre course (1/18, 6%) to post course (16/16, 100%) (Chi-square= 30.22, \( p < .01 \)) in naming the PBL Steps. All 16 CNEs were able to correctly provide an example of the three steps/questions asked in PBL process, post course.

Table 3

<table>
<thead>
<tr>
<th></th>
<th>Pre (n=18)</th>
<th>Post (n=16)</th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (%)</td>
<td>17 (94%)</td>
<td>16 (100%)</td>
<td>30.22**</td>
</tr>
<tr>
<td>No (%)</td>
<td>1 (6%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* **\( p < .01 \)
Value and Effectiveness of PBL for CNEs

The above data suggest that CNEs’ knowledge of Problem Statements and the Three Step Problem Solving Process improved significantly during the course.

**Research question #1: value of problem-based learning.**

In a weekly journal, CNEs were asked “On a scale of one to five, five being the highest, how much value do you see in knowing about and using PBL in your work?” There were a total of fifty-one journal responses (ratings) to this question over a six week period of time. Ratings ranged from “1= not at all valuable” to “5= extremely valuable”. The average rating ranged from 3.33 to 4.15, suggesting that CNEs found PBL “somewhat to very valuable” in their work. The highest average ratings (mean=4.14, 4.15) occurred during Weeks Four and Five of the course, suggesting that CNEs found value to PBL in their work over time spent in this study. See Table 4 for detailed quantitative responses to Research Question #1.

<table>
<thead>
<tr>
<th>Week</th>
<th>Entry n</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>wk1 (3/31-4/6)</td>
<td>9</td>
<td>3.67</td>
<td>0.87</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>wk2 (4/7-4/13)</td>
<td>10</td>
<td>3.60</td>
<td>1.17</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>wk3 (4/14-4/20)</td>
<td>10</td>
<td>4.00</td>
<td>0.67</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>wk4 (4/21-4/27)</td>
<td>7</td>
<td>4.14</td>
<td>0.90</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>wk5 (4/28-5/4)</td>
<td>12</td>
<td>4.15</td>
<td>1.14</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>wk6 (5/5-5/11)</td>
<td>3</td>
<td>3.33</td>
<td>0.58</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Possible range:1-5 (1=not at all; 2=a slight value; 3= somewhat valuable; 4= very valuable; and 5= extremely valuable).*

**Research question #2: dPBL for solving work-related problems.**
In their weekly journals, CNEs responded to the question “After viewing content modules introduced so far in this course, and after your ONLINE PARTICIPATION this week, rate (on a scale of 1-5) how successful you think Problem-based Learning, ONLINE, would be in helping you solve work related problems?” Again, there were a total of fifty-one responses over a six week period of time. Ratings ranged from “1= not at all valuable” to “5= extremely valuable”. The average rating over six weeks’ time ranged from 3.33 to 4.23 suggesting that CNEs found dPBL “somewhat successful to very successful” in helping them solve work related problems. The highest weekly rating (4.23) occurred in Week Five of the course, suggesting CNEs’ thoughts about dPBL being successful in solving work related problems increased over time spent in this study. See Table 5 for detailed responses to Research Question #2.

Table 5

<table>
<thead>
<tr>
<th>Week</th>
<th>Entry n</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>wk1 (3/31-4/6)</td>
<td>9</td>
<td>3.78</td>
<td>0.97</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>wk2 (4/7-4/13)</td>
<td>10</td>
<td>3.70</td>
<td>0.95</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>wk3 (4/14-4/20)</td>
<td>10</td>
<td>3.90</td>
<td>0.88</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>wk4 (4/21-4/27)</td>
<td>7</td>
<td>4.14</td>
<td>0.69</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>wk5 (4/28-5/4)</td>
<td>12</td>
<td>4.23</td>
<td>0.73</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>wk6 (5/5-5/11)</td>
<td>3</td>
<td>3.33</td>
<td>0.58</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>51</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Possible range:1-5 (1=not at all successful at helping me solve work related problems; 2= slightly successful at helping me solve work related problems; 3= somewhat successful at helping me solve work related problems; 4= very successful at helping me solve work related problems; and 5= extremely successful at helping me solve work related problems).

In summary, data suggest that CNEs felt dPBL could be used successfully to solve work related problems. CNEs were not asked for their input on why they felt dPBL could be successful; a future study could explore CNE views on this subject.

Value and Effectiveness of PBL for CNEs
Research question #3: learning in a variety of ways.

In addressing the third research question “Is dPBL effective in developing a variety ways to learn?” a weekly journal question asked “HOW did you learn this week?” and included the following selections in the order shown (CNEs could respond to more than one selection each week):

- By reading and learning directly from what other people wrote in the discussion forum
- Doing my own research on a question I have
- Doing my own research on a question that someone else in class had
- From something the facilitator said
- From viewing or re-viewing the Content Modules

There were 101 total responses tallied over six weeks of journal postings. The two most common responses over the six weeks were “From viewing/reviewing the Content Modules” (35.6%) and “By reading and learning directly from what other people wrote in the discussion forum” (35.6%). Sixteen responses (15.8%) were to “From something the facilitator said”, seven responses (6.9%) to “Doing my own research on a question that someone else in class had”, followed by six responses (5.9%) to “Doing my own research on a question I have”. See Table 6: How did you learn this week?
Value and Effectiveness of PBL for CNEs

Table 6

Response to Q3: How did you learn this week? (mark all that apply)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>By reading and learning directly from what other people wrote in the discussion forum (“I didn’t know that!”)</td>
<td>2</td>
<td>5</td>
<td>9</td>
<td>6</td>
<td>11</td>
<td>3</td>
<td>36</td>
<td>35.6</td>
</tr>
<tr>
<td>Doing my own research on a question I have: (“Hmmm…. Before I go further I have to learn about such and such”)</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>5.9</td>
</tr>
<tr>
<td>Doing my own research on a question that someone else in class had (“Hmmm….Before I go further I have to find out more about what Mary Smith said!”)</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>6.9</td>
</tr>
<tr>
<td>From something the tutor said (“Hmmm…. I have to find out more about what Connie said!”)</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>0</td>
<td>16</td>
<td>15.8</td>
</tr>
<tr>
<td>From viewing or re-viewing the Content Modules: (“Now, what is Problem Based Learning all about, again?”)</td>
<td>4</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>10</td>
<td>0</td>
<td>36</td>
<td>35.6</td>
</tr>
<tr>
<td>Entry n</td>
<td>12</td>
<td>18</td>
<td>20</td>
<td>18</td>
<td>30</td>
<td>3</td>
<td>101</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Viewing/reviewing content modules and reading/learning directly from what others wrote in discussion forums were rated equally over time, suggesting an equal importance between reading content and learning from each other. Viewing/reviewing content was more common early in the course, with discussions gaining in importance as the course continued.

In PBL, the facilitator/coach role is to respond from the sidelines, as students generate possible solutions and problem resolution (Torp & Sage, 2002). In comparing this study’s responses to: “Learning from something the tutor said” (15.8% of responses), to responses of other methods of learning, it could be suggested that CNEs started to embrace their PBL student role as active thinkers, with the coach playing the facilitator role of being present from the sidelines. Future research that includes expanding the length of the dPBL course beyond 4-6 weeks may provide valuable insight into how course length affects student learning methods.
Value and Effectiveness of PBL for CNEs

Each week, CNEs could also respond to which specific content modules they viewed or reviewed during the week. In responding to which content modules viewed or reviewed, CNEs could choose from any of the following:

- YouTube video on “Project (Problem) Based Learning”
- “Problem Statement” Content Module
- “Three Steps to Problem Solving” Content Module
- Kelly, the Frustrated CNE, Part One
- Kelly, the Frustrated CNE, Part Two
- I didn’t view or re-view any content modules

There were forty-nine journal responses in six weeks to this question and a total of 95 selections chosen. The most popular content module viewed or reviewed was the “Problem Statement” Content Module (24/95, or 25.2% of responses), followed by the “Three Steps to Problem Solving” Content Module (19/95, or 20%). “Kelly the Frustrated CNE, Part Two” was selected 18 times (18.9% of responses), and “Kelly the Frustrated CNE, Part One” was selected 17 times (17.9%). The YouTube video on “Project (Problem)-based Learning” (listed as an optional module to view) was chosen 11 times (11.6%), followed by “I didn’t view or re-view any Content Modules”, chosen 6 times (6.3%).

As noted above, the Problem Statement Module, which provided the two part Problem Statement format, was viewed/reviewed most frequently (25.2% of responses). It was noted throughout the course, in both journal and discussion postings, that CNEs used the two part Problem Statement format discussed in the Content Module: “How can we ___________ in such a way that _______________?” This frequent use of the two part Problem Statement format in journal entries and discussions aligns well
Value and Effectiveness of PBL for CNEs

with the data showing a high frequency of Problem Statement Content Module use; and it suggests CNEs understood and could apply the two part format.

In summary, these data for the third research question suggest that dPBL offers a variety of ways for CNEs to learn, with viewing/review content modules and reading/learning directly from what others wrote in discussion forums as being the most common and equally noted. It also suggests that the CNEs were active learners, with the facilitator acting from the sidelines. Students were found to use the Problem Statement format frequently in qualitative journal responses and discussions, reinforcing the data on the “Problem Statement” Content Module’s frequent use.

Qualitative results and analysis.

Research question #1: value of problem-based learning.

To support and expand on the first research question’s quantitative data, qualitative data on the value of PBL to CNEs were also collected with descriptions and themes generated. In their weekly journals, CNEs were asked: “After participating this week, please name at least one work-related problem that might be solved using Problem-Based Learning”. Qualitative data were reviewed, a word frequency list was generated, and the words were then tallied and placed into the following sub-themes: scheduling conflicts; budget problems; class preparation/organization problems; programming issues; agency issues; participant learning issues/class teaching methods; and non-engagements of participants. From here, two overall, predominant work-related themes thus emerged: teaching practices/participant issues; and work outside the teaching realm. See Appendix D, Research Question #1: Qualitative Themes with Descriptions for a detailed list of responses.
Theme: teaching practices/participant issues.

Teaching practices and participant issues were found to overlap often in a response. For instance, this CNE- suggested a work related issue: “How can we better relate to participants?” could be seen as either a CNE teaching issue or a participant issue. CNE responses “Working with challenging participants” and “participants who disagree or question our teaching” could be seen as either an issue with teaching methods or with participant behavior. “Non-engagement of participants” was mentioned ten times over the six weeks of journal postings to this question of work-related problems, and was the most prevalent issue noted.

Of special interest was a CNE-suggested work related problem journal posting, “How can we use Problem-based Learning to teach parents how to make healthy changes?” In a similar journal posting, a CNE notes:

A lot of parents of young children I work with are not very good role models for their kids since they are picky eaters themselves and do not eat vegetables, whole grains, etc. I could use PBL to find a way to get them to be positive role models for their children so their children can develop healthy habits at a young age.

A third CNE notes:

I was planning a difficult ALC (Alternative Learning Center) class and the PBL process came to my mind! What do I already know about this group? Why are they hard to reach? What do I need to know? What do I need to do? Just
thinking about this made me more aware of what I needed to do in planning to
make the class succeed in this lesson. I put in an email to the social worker who
I partner with there and asked her for suggestions on what we should discuss for
this lesson.

Further research into these comments could provide valuable insight into
possible ways PBL could be utilized to improve CNE/participant relationships and the
program’s planning processes; to increase participant engagement in learning; and to
teach behavior change strategies.

_Theme: Work outside of the teaching realm._

Other overall work-related problem themes emerged including Scheduling
Conflicts; Budget Problems; Class Preparation/Organization Issues; Programming
Issues; and Agency Issues. In suggesting that ‘scheduling conflicts’ could be resolved
using PBL, one CNE notes:

After viewing the content modules I now feel that I might be able to review this
[scheduling conflicts] concern with a more open mind. I can try breaking the
problem down and looking at it from what is the overall conflict here as well as
what is the real outcome I am looking for. Then I can start listing the concerns
of both groups, concerns of programming goals along with the help of my
supervisor, and come up with a more detailed summary to use to try and come
up with an approach that better meets both sides of the problem as well as our
programming. This PBL approach takes some of the animosity out of the
Value and Effectiveness of PBL for CNEs

problem and helps you to break the details down so that they are not so personal
towards one program or another as well.

This qualitative data suggests that CNE understanding PBL might benefit not
only CNE teaching practices and participant issues, but may be helpful in systematically
resolving non-teaching work related issues.

In summary, this qualitative data supports the positive quantitative responses
received from CNEs to the value of PBL in their work.

**Formative evaluation results.**

As mentioned in the literature review, there is a need for more research on dPBL
from the course designer’s perspective (Scripture, 2008). In response to this need and
to collect input into overall course improvement, weekly formative evaluations were
developed and utilized by the CNEs and the facilitator/researcher.

**CNE formative evaluation findings.**

CNEs were given a Course Syllabus/Checklist to follow (see Appendix A), and
also an opportunity to suggest improvements to the course design in their weekly
journal postings. Most of the suggested improvements focused on technology issues,
including problems with viewing the content modules and the “Kelly the Frustrated
CNE” problem scenario videos. Content modules were republished in Articulate (with
more colorful slides, per CNE suggestion) and reposted. The two problem scenario
videos, made available via an embedded web link that could not be accessed by some
CNEs, were then made available as a YouTube video. Weekly audio/video summaries
Value and Effectiveness of PBL for CNEs

using UM Connect were provided after Week Two (along with written summaries), with a number of CNEs responding favorably to the UM Connect method of receiving them. Other formative evaluation statements focused on CNE appreciation for participating in an online Problem-based Learning project, “rather than just a lecture and individual activities”; several CNEs also noted that there was “not enough time” with their busy schedules to participate as much as they wanted to.

Weekly input from CNEs resulted in improved course design, including a better means of communicating weekly and an improved use of technology. The addition of audio/visual components reinforces findings by Murphrey (2010) that indicate incorporating highly interactive components into online instruction is important. Furthermore, weekly input from CNEs suggested that their busy schedules might impede full participation. If future dPBL courses are considered, CNE work schedules and other possible time constraints would need to be addressed.

**Facilitator formative evaluation findings.**

Yun-Jo An and Reigeluth (2008) discussed the need to have a more tailored structure to dPBL course design. With this in mind, a modified instructional template, with goals and actions based on Torp and Sage’s “Instructional Template for a PBL Unit” (Torp & Sage, 2002) was developed and used in this study (see Appendix B). Along with this template, a weekly facilitator journal form was developed and qualitative data on course design and curriculum were gathered, with the following findings:
Value and Effectiveness of PBL for CNEs

- Weekly facilitator summaries to participants using UM Connect worked well, technologically, and were seen by the facilitator as a valuable means of communicating throughout the course. These weekly summaries, offered via both audio and text, helped tie the course together.

- The development of a cumulative Idea Sheet (a summary of CNE discussion postings) was seen by the researcher as a valuable means of reminding students that PBL often times does not have one “quick fix”, perfect answer. Idea Sheets listed weekly CNE responses to the three questions raised in the Three Step PBL process: “What Do We Know/What Do We Need to Know/What Do We Do?” The production of an artifact (the Idea Sheet) as a milestone to move the group forward reinforces what has been suggested by McConnell (2002).

- The Big Group Discussion/Wrap Up activity proved to be a valuable way to ‘debrief’ and bring the group back together at the end of the course, reflecting as a group, and bringing closure to the study.

In summary, these facilitator findings and actions on course design responded to the need for ‘clear instruction and timely communication’ by faculty to students through the use of technology, noted as being important (Murphrey, 2010). This modification of a PBL template for use in dPBL may be valuable in future dPBL course design projects.

**General Discussion**
Value and Effectiveness of PBL for CNEs

A constructivist approach to learning continues to be central in both formal and informal settings; in both online and face to face formats; and with learners at all levels. Lebow (1993) proposed the constructivist values of collaboration, personal autonomy, generativity, reflectivity, active engagement, personal relevance, and pluralism for guiding instructional principles in all educational settings. These values are central to Problem-based Learning and were used as guiding principles in this course’s development.

Barrows and Tamblyn (1980) indicate that students learn by solving real-world problems and reflecting on the experience in a Problem-based Learning setting. CNEs readily responded to and “related” to Kelly the Frustrated CNE’s real world problem, reflecting on and offering a variety of solutions.

Furthermore, in a commentary on the use of dPBL, Barrows states that problem finding is an initial step that should, but does not, occur in much of PBL (Barrows, 2002). The high number of qualitative responses collected from CNEs that name work related issues suggests that this initial step of “problem finding” could easily be accomplished if PBL was used in CNE work settings. A more thorough and intentional use of structured PBL, to include CNE problem finding, may be possible and would respond to this concern voiced by Barrows.

At the end of the course, the small groups of CNEs returned to a Big Group/Wrap-Up online discussion forum. CNEs could reflect and respond to a variety of questions. The following discussion thread from the Wrap-Up activity provides a good summary of PBL’s value and dPBL’s effectiveness to CNEs:

42
CNE #1: After reading all the posts, I found we are more alike than different. It shows what a professional group of people are in this position (CNE). We can discuss any problems and frustrations and get lots of ideas. Also, we can utilize talents i.e., developing games, sharing research, etc. We don't have to know or do it all. I would welcome questions and concerns from others across the state - the more minds the better!

Coach: "We don't have to know or do it all"... so TRUE!

In regards to "gathering questions and concerns from others across the state":

How could we__________________ in such a way that ____________________....?

CNE #2: I would love to know:

How could we develop a discussion post thread for all CNE’s in such a way that CNE's can reach out to other CNE's for support and creative idea exchanges at any time without a formal invite/course?

I think something like that where just CNE's could pop in submit a post and then see what others add in when they can and have a moment would allow us to gain that conversation while gaining new found support and more brainstorming ideas because suggestions and activities would be coming from individuals who are preforming the same type of work and would be able to tell you how and with which groups certain ideas or activities worked the best for them. Any ideas?

Coach: Wonderful Problem Statement .... What are others thinking about this??

CNE #3: Agreed. I see CNE's in my region emailing more asking about lessons on a particular topic, but if we were to pose a problem-based statement, there are so many more varieties of answers. Many are variations on a theme, but those hit home with the person who has the problem better when answers are framed in different ways. Responses also tend to give a variety of ways to look at the problem.

When we first considered Kelley's problem, right away we were into such a multitude of thinking on where the problem actually was (agencies, planning, Kelley, participants) that we had so many more possibilities for solutions.
Value and Effectiveness of PBL for CNEs

This positive response in the Wrap-Up activity aligns well with the positive results to the research questions from CNEs to the value and effectiveness of PBL/dPBL to their work, and with Problem-based Learning’s focus on solving ill-structured, real world problems.

Summary

In summary, results to the three research questions show promise for the use of PBL and dPBL for developing the problem-solving, critical thinking skills needed by 21st century workers such as the Simply Good Eating Program’s Community Nutrition Educators. Results suggest a variety of research opportunities that may shed light and expand our understanding of the PBL’s and dPBL’s use in CNE staff development settings. Formative evaluations and the use of a modified PBL template provide insight into improved dPBL course design, and the course reflective wrap up discussion reinforced the value of PBL to CNEs. Overall, this study’s results have reinforced, extended current knowledge of, and provides insight into new avenues for using PBL and dPBL in paraprofessional staff development offerings.

After review of a significant finding from the study, Chapter Five will focus on educational implications and recommendation for implementation of PBL/dPBL as a Simply Good Eating CNE staff development opportunity. A second focus will be on future research opportunities into Problem-based Learning in Family Sciences.
Value and Effectiveness of PBL for CNEs

Chapter Five

Conclusions and Summary

This chapter will start with a broad overview of significant findings. Educational implications will include a recommendation for implementation of PBL/dPBL methods into current Simply Good Eating CNE staff development opportunities. Further educational implications will include a brief review of research into the use problem solving for empowerment in Family Sciences; and support and recommendations for research into the use of Problem-based Learning skills as a means of empowering Simply Good Eating Program participants. The chapter will offer a short conclusion on the value of Problem-based Learning research.

Significant Findings

The ability to problem solve is a twenty-first century skill that can be developed through the Problem-based Learning approach. This study explored the views that Community Nutrition Educators in the University of Minnesota Extension’s Simply Good Eating Program have on the value of Problem-based Learning; their views on the effectiveness of online PBL (dPBL) for solving work-related problems; and explored whether dPBL is effective in developing a variety of ways for CNEs to learn. After practicing how to structure a Problem Statement, Community Nutrition Educators were able to construct Problem Statements and apply a systematic, three step process to resolve a work related issue, participating in online discussion forums to practice problem solving skills. Findings indicate CNEs see value to PBL in their work; are able to practice critical thinking skills to resolve work related problems; and are able to offer
Value and Effectiveness of PBL for CNEs

a significant number of work-related issues that PBL skills could address. This suggests that PBL/dPBL could be valuable methods for CNEs to use in solving work related problems.

Educational Implications of PBL/dPBL

Problem-based Learning has a long history in graduate and undergraduate settings, and more recently can be found in the K-12 learning environment. Distributed Problem-based Learning’s (dPBL) history is even more recent and is found predominantly in higher education. PBL and dPBL is less often found in adult, paraprofessional staff development training situations. This research has shed promising light on the use of PBL and dPBL in non-traditional, adult education and staff development settings.

Incorporating PBL/dPBL into current staff development opportunities.

This research suggests that educational and programmatic implications of PBL and dPBL are far reaching for one particular population: University of Minnesota Extension’s Community Nutrition Educators. Most importantly, Problem-based Learning can help facilitate the development of the critical thinking skills CNEs will find necessary in the 21st century work place. Furthermore, as distance education becomes more common and budget concerns more prevalent, learning PBL at a distance can be an acceptable and low cost method of resolving CNE programmatic work and teaching related problems. Community Nutrition Educators responded positively to this study, finding value and effectiveness of PBL and dPBL in their work. This positive response suggests CNEs would be motivated and successful at learning PBL strategies,
both online and face to face. Program administrators are encouraged to consider continued and structured implementation of PBL/dPBL methods in CNE staff development opportunities.

**Problem Solving and Empowerment in Family Science.**

*Review of research.*

As mentioned in Chapter Two, problem-solving as a pedagogical approach is not new or unique to Family Sciences. According to Hunts and Morotz-Baden (2004):

Teaching problem solving processes is one of our most important tasks if we want our family science students to possess the skills… to help solve problems for others, and more importantly, teach rational problem solving skills to clients, customers and students.

In the 1990’s, the University of Illinois Cooperative Extension Service implemented the Family Ties Program, developed to foster a sense of control among family members and paraprofessionals, to empower participants to solve problems and increase positive experiences in their lives (Collazo et al., 1993).

This recognizes problem solving as central to empowerment. Problem solving is an important skill for Family Science students and paraprofessionals working with families to utilize and share with clients and participants they encounter.

*PBL and teaching for empowerment: recent support for research.*

The concept of using problem solving to empower program participants was furthered during an action research project conducted by this researcher in the Fall of
Value and Effectiveness of PBL for CNEs

2012. A group of nine Community Nutrition Educators in West Central Minnesota participated in the project “Problem-based Learning to Solve Frequently Asked Questions”. The background of the study notes:

The science of Nutrition changes constantly, and nutrition myths are common. A large part of a CNE’s work is to provide research based, nutrition related content to community participants. CNEs frequently field a range of nutrition and health related questions from participants. There is a need for CNEs to develop the critical thinking skills of applying, analyzing, synthesizing and evaluating information in order to appropriately answer participants’ frequently asked questions.

As part of this action research project, CNEs were surveyed for their “top five” FAQs (Frequently Asked Questions) in the Field, with the goal of finding a theme to the questions they encounter in their work. Instead of finding a theme, CNE responses suggested that a wide range of questions are encountered in their work, as noted by facilitator/researcher reflections early in the study:

In analyzing the responses that CNEs sent showing their list of “FAQs from the Field”, it became evident that there’s a broad range questions that CNEs are expected to answer in their work. Perhaps instead of expecting CNEs to answer them all, one by one, maybe the CNEs should focus on what they can say or do with these individual questions to encourage participants to be able to seek their own answers.
Value and Effectiveness of PBL for CNEs

Therefore, the initial thought of introducing PBL skills to CNEs to enable them respond to individual nutrition questions from their participants evolved into the idea of researching whether these same PBL skills taught to CNEs could somehow be transferred to their participants as a way of solving their own problems. This idea was supported when a CNE in the action research project commented: “I like the idea of encouraging conversation and encouraging them (participants) to research the correct answer”.

The idea of teaching CNEs PBL skills for transfer to their participants aligns well with Family Science research on the importance of problem solving for empowerment. Further research into the transfer of CNEs’ PBL skills to participants and the effect PBL might have on empowering our participants is needed and will be discussed next.

**PBL and teaching for empowerment: recommendation for research.**

Problem-based Learning as an empowering teaching method aligns well with the Simply Good Eating Program’s current practice. The Simply Good Eating program emphasizes helping limited resource audiences to change how they choose, purchase, and prepare their food. According to the Nutrition Education Assistant (NEA) Handbook, which provides guidelines for CNE work, experiential learning opportunities can help participants to change their behavior by taking the information they have learned and applying it directly to their own lives (NEA Handbook, 2006).

Of note, one of the fourteen methods listed in the NEA Handbook’s section “Methods for Engaging Participants in Experiential Learning” is the Discussion
Value and Effectiveness of PBL for CNEs

method, described as “Teacher or Facilitator guides an informal exchange of ideas by asking questions or presenting problems and variations to large or small groups” (NEA Handbook, 2006).

CNEs have received training in and are very familiar with the use of facilitative methods of teaching. Problem solving is an accepted method for CNEs to use when they facilitate discussions. This current research study indicates CNEs find value to PBL in their work. Future research using facilitative methods training and the “Three Steps to Problem-based Learning” could explore whether teaching CNEs PBL skills could enhance the way they deliver their nutrition messages.

Furthermore, would the sharing of PBL/problem-solving methods when delivering nutrition messages transfer over to participants who would then become more empowered themselves? Or, in the spirit of this study’s problem statement format, “How can CNEs share Problem-based Learning skills in such a way that empowers participants themselves to be successful at solving problems?”

Conclusion

In 1988, Rose Levy Berenbaum wrote:

Baking without an understanding of the ingredients and how they work is like baking blindfold[ed]…sometimes everything works. But when it doesn’t you have to guess at how to change it…. It is this understanding which enables me to be both creative and successful.

We are challenged on a daily basis to solve problems in both our personal and professional lives. Important issues are identified; steps are taken to find what is known
Value and Effectiveness of PBL for CNEs

and unknown; and then consideration of what our next steps might be. We work through problems, more or less systematically, in our journey to become successful and competent.

The ability to problem-solve increases the chance of success in our own lives as well as lives of those we interact with, guide, and empower along the way. As educators, are CNEs providing the correct tools and asking the right questions that lead towards self-efficacy in our program participants?

Rose Levy Berenbaum’s description of successful baking being one of understanding ingredients and how those ingredients work together lends itself well to the concept of Problem-based Learning. Being knowledgeable about facts and figures helps lead to success but this is just part of the story. It is the understanding of those ‘ingredients’, how they work together and then using them in appropriate and perhaps innovative ways that lead to lasting success and creativity in the ‘real world’. This is the foundation for Problem-based Learning.
Value and Effectiveness of PBL for CNEs

References


Value and Effectiveness of PBL for CNEs

Barrows, H. S. (2002). Is it truly possible to have such a thing as dPBL? *Distance Education*, 23(1), 119-122.


Value and Effectiveness of PBL for CNEs


Collazo, L., Hall, T., Hare, N., Hill, J., Hughes, R., Jr., Pulido, N., Quinones, G., Shorter, M., Smith, A., & Todd, C.M. Beyond the expert helping model. *Journal of Extension*, 31(3).


Value and Effectiveness of PBL for CNEs


Value and Effectiveness of PBL for CNEs


Value and Effectiveness of PBL for CNEs


Value and Effectiveness of PBL for CNEs


Appendix A

Course Syllabus and Student’s Checklist

Problem-Based Learning Research Project
Course Syllabus
Spring, 2013
University of Minnesota Extension

Course Description: this course is learner-driven, problem based, and experiential. Students will learn by sharing what they know/what they find out about Problem Solving; will reflect on the experience; and will contribute to solving a problem, with the goal of increasing critical thinking skills that can be transferred to their work and/or personal life.

Method of delivery:

 Moodle: the PBL Sandbox
  (https://moodle2.umn.edu/course/view.php?id=14158#section-0)

Course Timeline: CNEs will participate for approximately four weeks, starting early April and ending early May, 2013.

The Goals of the course are as follows:

Overall Goal: to expose CNEs to the concept of Problem-based Learning (PBL) and to practice PBL online, known as dPBL. As a result of this course:

- CNEs will understand that:
  ✓ PBL is an ill-structured, student led method of learning that encourages authentic learning through the development of critical thinking skills
- CNEs will know:
  ✓ How to develop a Problem Statement
  ✓ The Three Step Problem-Based Learning components
  ✓ How to identify and solve other problems using PBL and dPBL

Students Expectations

Students are expected to:

 Spend approximately one hour/week for four weeks:
  ✓ Reading/Reviewing Content;
  ✓ Posting/Responding in online discussion forums*;
  ✓ Reflecting in weekly anonymous journals; offering input on course
Value and Effectiveness of PBL for CNEs

- Improvements:
  - Completing Pre and Post-Surveys
  - Read the weekly Tutor Summaries
  - Contact the tutor or their supervisor with questions or concerns, especially if unable to commit to the one hour/week time frame allowed.

*Discussion Forum Expectations: (approximate time/week = ½ hour)
  - **Post** one initial, 1-2 sentence response per week to a discussion. There will be only 1 or 2 short discussions each week.
  - **Respond** to at least one other group postings. Ask yourself: *What do I know/what have I learned that I can share with my group?*
  - You are welcomed to visit the other small group discussion forums, but it is optional

**Student Challenge:**
As a PBL student and group member, you are challenged to:
  - find your own resources to resolve problems; add to the knowledge base using your own experiences as ‘content’.
  - think, respond, offer feedback, help others learn; and reflect
  - acknowledge the tutor as a co-learner and a guide to your learning process

**Tutor:** Connie Burns
**Phone:** 218.340.3271
**Email Address:** burns391@umn.edu

---

**Student’s Weekly Checklists/Estimated Time Needed**

**Week #1:**
- **Read:** the Syllabus (5 minutes)
- **Introduce Yourself/view other introductions:** (30 minutes)
- **View:** Content Module #1 “What is a Problem Statement?” (5 Minutes)
- **View:** Content Module #2: “Three Steps to Problem Solving” (5 minutes)
- **Reflect:** Using the anonymous Journal Form (15 minutes)

**Week #2:**
- **Read:** Tutor Summary For Week #1 (5 minutes)
- **View:** “Kelly, the Frustrated CNE” video (2-3 minutes)
- **Post:**
Value and Effectiveness of PBL for CNEs

✓ “Define the Problem”... 1-2 sentences in the week’s Discussion Forum; read/respond to other posts (10 minutes)
✓ 1-2 sentences, “What Do We KNOW about Kelly’s Problem” (10 minutes); read/respond to other posts (10 minutes)

• **Reflect:** Journal posting (15 minutes)
• **Optional Review:** “Problem Statement” and “Three Steps to Problem Solving” Content Modules (10 minutes)
• **Unknown:** time students spend in researching a problem; revisiting problem statement; visiting other groups’ discussion forums

**Week #3:**

• **Read:** Tutor Summary for Week #2 (5 minutes)
• **Review:** Kelly, the Frustrated CNE (2-3 minutes)
• **Post/Respond to:** 1-2 sentences “What Do We NEED to Know about Kelly’s Problem?” Read/Respond to posts (10 minutes).
• **Reflect:** Journal posting (15 minutes)
• **Unknown:** time students spend in researching a problem; revisiting problem statement; visiting other groups’ discussion forums
• **Optional Review:** “Problem Statement” Content Module (5 minutes); The Three Steps to Problem Solving (5 minutes)

**Week #4:**

**Read:** Tutor Summary for Week #3 (5 minutes)
**Post** (Small Group Discussion): 1-2 sentences “What Do We Need to DO?” Read/respond to posts. (10 minutes).
**View:** Kelly, the Frustrated CNE, Part 2 (3-4 minutes)
**Post** (Large Group Discussion): Choose one or more questions from the list provided in the second discussion area. Spend rest of this week’s time viewing posts from this discussion and the other (your small group) discussion, and other small groups, if you have time. (15-25 minutes). Connie will summarize this discussion and share with students, post-course.
**Complete** post-course Survey (15 minutes). Link will be provided.
Appendix B

**Instructional Template for a PBL Unit, Modified**

(Adapted from Torp and Sage, 2002, p. 36-45)

This template will provide PBL coaches with guidelines to follow and background resources to refer to as they use PBL in face to face or online settings. It is an attempt to incorporate as many of Torp and Sage’s teaching events into this research study’s distributed Problem-based Learning (dPBL) course. Coaches will understand that in PBL, these events are not necessarily rigid, fixed or strictly sequenced (Torp & Sage, 2002), and that dPBL may limit the full or exact use of these events.

<table>
<thead>
<tr>
<th>Teaching and Learning Events (includes related research)</th>
<th>Researcher notes; research background; limitations of the study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teacher as Coach</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Prepare the Learners</strong></td>
<td></td>
</tr>
<tr>
<td>• Coach’s Goal: Support learners as they encounter PBL</td>
<td></td>
</tr>
<tr>
<td><strong>Coach Actions: Week #1:</strong></td>
<td></td>
</tr>
<tr>
<td>• Share syllabus. Establish ground rules (Wenger, 1998, p. 152...“mutual engagement”) via syllabus. Have learners establish their own ground rules and name challenges to learning.</td>
<td></td>
</tr>
<tr>
<td>• In PBL, Challenge students to find their own resources (Barrows, 2002); share my role as coach... helping me help others to learn (McConnell, 2002, p. 78; Barrows, 2002); provide guidelines for forum discussions. All via syllabus. Consider asking students in a forum discussion about helpful resources they are finding.</td>
<td></td>
</tr>
<tr>
<td>• Have students introduce themselves. Complete “3/60 View of You” Online Class Introductions that include: Share a Work-related problem; or “Share a Challenge” (McConnell, 2002). “What Challenges do you foresee in completing this course?”</td>
<td></td>
</tr>
<tr>
<td>• Introduce PBL definitions. Have students View UM Connect Content Modules: “Problem Statement” (with example problem scenario, Jane Doe and Betty B. Good).</td>
<td></td>
</tr>
<tr>
<td>• “The Three Steps to Problem Solving” (approx..</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mutual engagement and collaborative learning (‘think, respond, feedback, help others learn, reflect’), per Wenger, 1998: Communities of Practice: Learning, meaning and identity. Cambridge: Cambridge University Press.

Activities must be valued in the real world (Savery, 2008; McConnell, 2002).

“3/60 View of You” guideline: Students use 3 words to describe themselves in a paragraph that takes approximately 60 seconds for peers to read.

“Offer problem verbally, visually, auditorially”... (Barrows, 2002).
Value and Effectiveness of PBL for CNEs

5 minutes each)
• Write Tutor summary, end of week (McConnell, 2002).
• Have students View Content (Optional): You Tube on PBL (4 minutes);

Meet the Problem
• Coach’s Goal: Support learners as they develop a personal stake in the problem; motivate them to want to solve it.
  
  Coach Actions: Week #2
• Introduce the authentic Problem Scenario video (4 minute long Content Module: “Kelly, the Frustrated CNE”). Place CNEs in the role of ‘fellow CNE’. Ask CNEs to review the “Problem Statement” module from Week #1 (if necessary), and then try to ‘define the problem’ in 1-2 sentences and posting it to the Moodle discussion forum. Students are then divided into small discussion groups of 3-4/group for the remainder of the course.
• Have students reflect, using journal form.
• Write and share Coach Summary, end of each week (McConnell, 2002). In the summary this week, introduce Idea Sheet, (McConnell, Savery) as end of course result.

McConnell’s ‘achievement of milestones’ in the design of the course include: summary by coach each week; reflective journal by students & coach (as part of study); end of course Idea Sheet. (McConnell: Action Research and Distributed Problem-based Learning in Continuing Professional Education. Distance Education, Vol 23, No. 1, 2002). Idea Sheet: “Have student establish an outcome…” (Savery, 2008, p. 16).

Note: Due to the brevity of this study (4-6 weeks) and its attempt to introduce the PBL concept in a succinct manner, the research model used asks students to initially develop a Problem Statement in Week #1; then posed three questions to solve the problem. This is a modification of Torp and Sage’s work, which places “defining the Problem Statement” after identifying What We Know; What We Need to Know; and Our Ideas. Note that Torp and Sage’s model was designed for face to face delivery; and PBL’s delivery is not necessarily strictly sequenced (Torp and Sage, 2002).

Iterative (in green): Weeks 2-4(or longer)
The following bulleted iterative events (identify, define, gather) are listed in the order provided by Torp and Sage.

For this dPLB Moodle-based course design, in each of Weeks #2-4 the coach will introduce one of three Problem Questions:
Week #2: What Do we KNOW?
Week #3: What Do We NEED to Know? and
Week #4: What Do We Need TO DO?

Students will learn the process of PBL by
experiencing it, with the introduction of the **Kelly the Frustrated CNE** Problem Scenario at the beginning of Week #2. The Coach will monitor need for Problem Statement updates.

### Identify What We Know, What We Need to Know, and Our Ideas:

- **Coach’s Goal**: Support learners in developing an awareness of what they know/need to know, and what ideas (solutions) they have about the problem. Provide focus for preparing to gather information needed to solve the problem.

- **Coach’s Actions**: Each week (#2-4) students will discuss/post on the given **Question of the Week**. *This provides practice in breaking down the Three Step/Three Question PBL process.* For example: Week #2, students will post a 1-2 sentence response to “What Do We Know about Kelly’s Problem?”; Week #3: “What Do We Need to Know About Kelly’s Problem?”, and Week #4: “What Do We Need to Do (students’ ideas) About Kelly’s Problem?”. Students are encouraged to respond to others’ postings.

### Define the Problem Statement

- **Coach’s Goal**: Support learners in 1) stating the overriding issue in circumstances they’ve encountered, and 2) identifying a subset of conflicting conditions that a good solution must serve.

- **Coach’s Actions**: re-Introduce the prompt: “How can we... In such a way that....” from the initial content module provided in Week #1 and in Week #2: the **Kelly the Frustrated CNE** Problem Scenario. Monitor the need to re-visit the Problem Statement; this shows students that problem statements are likely to evolve over time.

### Gather and Share Information

- **Coach’s Goals**: Support learners in planning and implementing effective info gathering/sharing/meaning making; support

---

*Note: Research study limitation: gathering/sharing of info is a critical step and can be time consuming. In a long term dPBL course, more time could be spent on this learning event. This short study has incorporated small group collaboration through discussion forums.*
learners in understanding how new info contributes to understanding the problem; support learners in interpersonal communication/collaborative learning

- **Coach Actions:**
  - revisit Problem Statement, Weeks #2-4 (reiterative). Goal met when new pertinent info is not shared.
  - monitor students for difficulties in locating/sharing information; information overload.
  - maintain focus on Problem Statement.

The above, reiterative actions are central to PBL being ill-structured. Coach’s focus is on guiding students to one (or more) solutions.

**Generate Possible Solutions**

- **Coach’s Goal:** Support learners in articulating the full range of possible options for addressing the problem they have defined.

- **Coach’s Action:** This occurs in **Week #4: What Do We Need to Do?**

**Determine the Best Fit of Solutions**

- **Coach’s Goal:** Support learners in using the benchmarks of good thinking to evaluate the benefits and consequences.

- **Coach’s Action:** monitor/coach students Weeks #2-4 on good problem solving judgment: (supported by criteria, context, self-correction; reasons for drawing conclusions).

**Present the Solution** (Performance Assessment)

- **Coach’s Goal:** Support learners in effectively articulating/demonstrating what they know/how they know it, and why/for whom knowing is important.

- **Coach’s Action:**
  - monitor/coach students in Weeks #2-4; produce an Idea Sheet (McConnell) from student discussion postings, for Kelly the Frustrated CNE;
  - provide Kelly, the Frustrated CNE video

In this research study, Generating/Determining/Presenting Solutions, and Debriefing the Problem are less developed, due to the brevity of the study. However, these events could easily be incorporated into a longer dPBL course.

The idea sheet provided an easily accessible summary of student input from online discussion postings. Students were provided a discussion forum to compare their solutions to the #2 “Kelly” video.

A Community of Learners is developed through:

- Self management
- Sharing
- Engagement with others’ stories

....especially in longer term learning communities (a limitation for this study).
#2 and have students compare their solutions to video based solutions.

- **Debrief the Problem**
- **Coach’s Goal**: For learners to reflect on what they have learned
- **Coach’s Action**: for this research study, students reflected weekly on the PBL research questions; for The Kelly the Frustrated CNE learning event, coach provided a discussion thread in **Week #4** for students to **share thoughts** with each other in a ‘Big Group’ Discussion Thread (#2). Student could choose from the following: “**What Did You Learn? How Did We Do? Compare Our Thoughts to those in Kelly #2’s video. How might PBL help you?”** (Savery, 2008). Re-introduced Jane Doe and Betty B. Good for reflection.

**Timeline for Student Use:**

**Goal for student time in Week #1= 1 hour:**
**Approximate Student Time, Week #1:**
- allow time for navigating/getting familiar with Moodle
- **Read**: syllabus (10 minutes)
- **Write/post/read**: My 3/60 View introductions; 30 minutes
- **View**: **Problem Statement/BB Good Content Module** (5 minutes); The **Three Steps to Problem Solving** content module (5 minutes);
- **Reflect/journal** (on research questions) (15 minutes)
- **Optional**: Optional You Tube on PBL (4 minutes)

**Goal for student time each week, Weeks #2-4= 1 hour.**
**Approximate Student Time, Week #2:**
- **Read/Review**: Tutor Summary From Week #1 (5 minutes)
- **View**: url: “Kelly, the Frustrated CNE” video (4 minutes)
- **Post**: “Define the Problem”... 1-2 sentences in Discussion Forum; read/respond to other posts (10 minutes)
Value and Effectiveness of PBL for CNEs

<table>
<thead>
<tr>
<th>Post:</th>
<th>1-2 sentences, “What Do We KNOW about Kelly’s Problem” (10 minutes); read/respond to other posts (10 minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflect</td>
<td>(on research questions): Journal posting (15 minutes)</td>
</tr>
<tr>
<td>Optional Review:</td>
<td>“Problem Statement” and “Three Steps to Problem Solving” Content Modules (10 minutes)</td>
</tr>
<tr>
<td>Unknown:</td>
<td>time students spend in researching a problem; revisiting problem statement; visiting other groups’ discussion forums</td>
</tr>
</tbody>
</table>

Approximate Student Time, Week #3:

| Read/Review: | Tutor Summary from Week #2 (5 minutes) |
| Post/Respond to: | 1-2 sentences “What Do We NEED to Know about Kelly’s Problem?” (10 minutes). |
| Reflect | (on research questions): Journal posting (15 minutes) |
| Unknown: | time students spend in researching a problem; revisiting problem statement; visiting other groups’ discussion forums |
| Optional Review: | “Problem Statement” Content Module (5 minutes); The Three Steps to Problem Solving (5 minutes) |

Approximate Student time, Week #4:

| Read/Review: | Tutor Summary from Week #3 (5 minutes) |
| Post/Respond to: | “What Do We Need To Do”, (10 minutes) |
| View: | Kelly the Frustrated CNE, #2 (4 minutes) |
| Share Thoughts | via Discussion thread: Discussion Thread #2: “What Did You Learn? How Did We Do? Compare Our Thoughts to those in Kelly #2’s video. How might PBL help you?” “on Kelly #2 video, and Jane Doe and Betty B. Good (15 minutes) |
| View: | The Big Idea Sheet (tutor summary, posted after the course is done) |
| Reflect | (on research questions): Journal Posting (15 minutes) |
| Unknown: | time students spend in researching a problem; visiting other groups’ discussion forums |
- **Optional Review:** “Problem Statement”
  Content Module (5 minutes); *The Three Steps to Problem Solving* (5 minutes)
## Appendix C

Research Study Demographics

<table>
<thead>
<tr>
<th>Respondents (n=18) Demographic Information</th>
<th>n (Total 18)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-28</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>29-39</td>
<td>4</td>
<td>22.2</td>
</tr>
<tr>
<td>40-50</td>
<td>3</td>
<td>16.7</td>
</tr>
<tr>
<td>51-61</td>
<td>7</td>
<td>38.9</td>
</tr>
<tr>
<td>62+</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>100</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>1</td>
<td>5.6</td>
</tr>
<tr>
<td>Asian</td>
<td>1</td>
<td>5.6</td>
</tr>
<tr>
<td>White</td>
<td>15</td>
<td>83.3</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>1</td>
<td>5.6</td>
</tr>
<tr>
<td>Educational background</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participated in College Level Classes</td>
<td>4</td>
<td>22.2</td>
</tr>
<tr>
<td>Community College Degree</td>
<td>3</td>
<td>16.7</td>
</tr>
<tr>
<td>Four Year Degree</td>
<td>8</td>
<td>44.4</td>
</tr>
<tr>
<td>Participated in Post- Four Year Degree Classes</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>Masters</td>
<td>1</td>
<td>5.6</td>
</tr>
<tr>
<td>Years working as a CNE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year to 4 years, 11 months</td>
<td>6</td>
<td>33.3</td>
</tr>
<tr>
<td>5 years to 9 years, 11 month</td>
<td>3</td>
<td>16.7</td>
</tr>
<tr>
<td>10 years to 14 years, 11 months</td>
<td>1</td>
<td>5.6</td>
</tr>
<tr>
<td>15 or more years</td>
<td>8</td>
<td>44.4</td>
</tr>
<tr>
<td>Comfort using Moodle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not sure what Moodle is!</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>Not comfortable at all</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>Fairly comfortable</td>
<td>9</td>
<td>50</td>
</tr>
<tr>
<td>Moderately comfortable</td>
<td>4</td>
<td>22.2</td>
</tr>
<tr>
<td>Very comfortable</td>
<td>1</td>
<td>5.6</td>
</tr>
</tbody>
</table>
Value and Effectiveness of PBL for CNEs

Appendix D

Research Question #1:

Qualitative Themes with Descriptions

Do Community Nutrition Educators find value to Problem-based Learning in their work?

“Name any work-related issues you feel might be solved using Problem-based Learning”

<table>
<thead>
<tr>
<th>Theme</th>
<th>Examples of Qualitative Comments</th>
</tr>
</thead>
</table>
| Teaching Practices/Participant Issues | • Class Teaching Methods/Participant Learning Issues: “How can we relate better to participants?” “Working with challenging participants”, “Participants who disagree or question our teaching”, “How can we use Problem-based Learning to teach parents how to make healthy changes?” “I could use PBL to find a way to get them to be positive role models for their children so their children can develop healthy habits at a young age”, “I was planning a ‘difficult’ ALC (Alternative Learning Center) class and the PBL process came to my mind!”, “How can I structure a series of home visits with a new client in such a way that she can meet her goal of eating healthier meals?”
|                           | • Non-engagement of participants: “How to engage participants who do not think nutrition is important for them?” “How to engage participants who do not want to be in class and do not want to learn how to live a healthier lifestyle”. “How to connect with (participants) in a way that will make them more receptive to learning”, “How can I increase sharing by participants in a class?”, “...how to know that our participants are hearing what we are saying...?” “I could use problem statements to help me figure out how to better relate to my
Value and Effectiveness of PBL for CNEs

| Work Outside of the Teaching Realm | **Scheduling/Scheduling Conflicts:**  
“**This PBL approach takes some of the animosity out of the problem and helps you to break the details down so that they are not so personal towards one program or another as well**”.  “Use the (PBL) model... when starting a new group”.

**Budget Problems:**  
“How can the CNEs reach the local and national funding stakeholders most effectively?”  “We are now limited (to a certain dollar amount at a certain location) in grocery purchases. When agencies do not supply food items, how can we best implement this change?”  “How can we utilize the resources we have in such a way that everyone feels like they are getting what they need to make the recipes for the participants?”

**Class Preparation Issues/Organization:**  
“I’m thinking I can use this idea with even things at work that aren’t teaching situations. Like getting things organized in my office”.  “How could I organize my teaching schedule in such a way that I would not be feeling crazy with the dashing about and re-organizing materials and foods constantly?”

**Programming Issues:**  
“How can I work with participants and the agency and my own program requirements so that all of our needs are met?”

**Agency Issues:**  
“How can I work with agencies in such a way that when classes are offered...people sign up for the advertised classes?” |
{Replace with the body of your thesis. Do not delete the final two paragraph returns at the end of the document in the process of pasting in the body of your thesis, as this will change the page numbering. If you do paste in the body of your thesis, you may take a second, separate step to delete the extra paragraph returns if necessary, but, if you do so, be sure to double-check the page numbering afterwards to be sure it is still correct.}