

## The development and effect of CPBL (Creative Problem Based Learning) for nursing students

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### ABSTRACT

**Objectives:** The purpose of this study was to verify the effectiveness of the CPBL (Creative Problem Based Learning) model on nursing students' communication skills, resolving (problem-solving) skills and empathy ability.

**Methodology:** A quasi-experimental study using a non-equivalent control group: 72 students sampled from the nursing discipline were divided into experimental (n=36) and control groups (n=36). The CPBL program offering was provided to the experimental group for 8 weeks. Data were analyzed with the SPSS /WIN 21.0 program.

**Results:** After the application of CPBL model the experimental group showed a significant increase in their abilities in communication, resolving and empathy.

**Conclusions:** Stimulus material in CPBL model led to learning outcomes consistent with improved nursing students' ability in communication, resolving and empathy.

**Keywords:** Problem based learning, Communication, Problem resolving, Empathy

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## INTRODUCTION

The present and future society demands the kind of ability to solve problems with novel and original ideas and creative thoughts. This means that higher education should aim to develop the students' ability to solve the problems creatively (Kang, 2006). The key to this kind of education is in empowering the students to behave as the leaders of change and live their lives with the options they choose. This thinking is in line with the context of the change in the education in the 21st century, where the paradigm of education is shifting to encouraging more creative thinking and enhancing the students' abilities to solve problems (Kim, 2009).

However, the wide-spread, lecture-type traditional teaching methods in South Korea and elsewhere relies upon the didactic lectures offered by the professors and is reliant on acquisition of knowledge from textbooks. Such a teaching method is optimal for delivering information that is mainly focused on the short-term acquisition of knowledge. Using this method, it is relatively easy to deliver a larger amount of content as set out in the text book. However, careful exploration of this approach shows that this educational approach fails to provide students with the opportunity to extend the students' thoughts on a particular idea or develop their problem-solving abilities. The students end up simply memorizing knowledge, which is a problem in itself. Many contemporary educators have recognized the limitations of the traditional teaching methods (Kang, 2006, Kim & Hwang, 2011). Since the teaching method is an important factor in perceptions about the learning experience, accounting for 62.7% of the satisfaction about education (Lee, 2007), it is necessary to enhance the satisfaction levels if we are to engage students more. It is necessary to change approaches it in a manner relevant to students and in a way that is more suitable to the rapidly evolving environment that students will encounter in work places and life experiences.

In the case of nursing education, it is necessary to improve and supplement the existing curriculum, in order to reflect the demands in the health service market and introduce a new type of education that is more learner-centered (Kim, 2009). This is because the health service environment has become more and more complex. Many more hospitals are run like a business and are pursuing innovation and higher performance outcomes through a corporate culture: these expectations fuel the demand for highly capable nurses in the market (Kho, Kim & Kang, 2010). In response to these demands the nurses must go beyond simply providing nursing services in a given situation to providing precise information about their patients and deeper understanding of care processes and outcomes. Nurses are involved in analyzing, summarizing and making inferences about care and outcomes. They are making judgments based on such information. Nursing education is now more focused on encouraging nurses with critical thinking skills; they can use such problem-solving traits to make efficient decisions. Schools, too, as the result of changing the approach to nursing education are now more focused on applied knowledge, directly relevant to the practice of nursing. Educators are becoming more interested in designing curriculaum where the critical thinking of the students can be developed and stimulated, through the appropriate use of technical developments and a more engaged educational experience (Shin, Ha & Kim, 2008).

The nurses who are in demand in the clinical environment are the kind of nurses who are not only skilled in nursing work, but also equipped with creative thinking skills. They can integrate the knowledge and contribute to solving problems through efficient communication (Shin, Ha & Kim, 2008). As a result, the nurses equipped with the capacity for creative thinking can integrate their knowledge and skills to solve problems with

appropriate communication (Seymour, Kinn & Sutherland, 2003). For this reason, in the field of nursing education, an integrated learning experience is now emphasized; this will equip new nurses with the ability to creatively integrate knowledge and use efficient communication skills, so that the problems they face in the clinical environment can be solved in an integrated manner (Seymour, Kinn & Sutherland, 2003).

The core elements within courses focussing on practical experiences of nursing, which are central to professional care, should include problem solving skills (Park, 2014). Nurses face various problematic situations as they care for the patients using frameworks like the nursing process (Altun, 2003). In the nursing environment which is changing rapidly, in order to provide quality care to patients, the value of nurses who can lead processes that lead to solutions is increasing. Efforts to enhance their problem solving skills continues over decades (Labelle, 1974). Nursing education extends beyond the delivery of simple knowledge and is more focused on the enhancement of the problem-solving skills and integrated thinking about nursing activities. A solutions approach, problem-solving, has become one of the key themes in programs (Lee & Brysiewicz, 2009).

Nurses have to face unexpected emergencies all the time; they are required to provide customized nursing to the needs of each individual patient (Jo, 2000). Nurses encounter more unstructured nursing problems rather than the structured problems provided in some stimulus materials. In order to solve such unstructured problems, the nurses have to think deeply and more creatively in order to create the new strategies for resolution of issues (Roberts, 2000). The core competencies designated by KUSA, include integration and application of nursing knowledge, communication and cooperation between

experts, and in-depth critical thinking to solve problems. These are emphasized for students during under-graduate education but educators need to apply new teaching methods to create more positive learning outcomes: New strategies are desperately needed.

The CPBL model, is designed for creativity in nursing, equipping them with the ability for solving various problems in the clinical context. New skills and applied knowledge is believed to contribute to enhancement of their performance in the field by

1. Developing a creative approach to Problem Based Learning (PBL) as a model which is differentiated from methods of the past and to allow that the teachers and the learners may learn together.
2. Verifying the influence of the CPBL model on the development of communication, problem resolution and empathy skills of the nursing students.

## **METHODOLOGY**

A quasi-experimental design involving a non-equivalent control group was used to verify the effect on the communication skills, resolving skills and empathy ability in the group to which the CPBL teaching model was applied for 8 weeks.

### **Setting and participants**

This research was targeted at students in their fourth year of university who understood and agreed to participation: In consideration of dropout rate, 36 students were assigned into each group randomly.

### **Instrument**

1. C (Communication skills) - to measure communication ability, the Comprehensive Interpersonal Communication Ability Scale developed by Hur

(2003) was used. The instrument consists of a 5-point scale and 15 items; the higher the score, the higher the communication ability.

2. R (Resolving skills) - measured using the College student/adult Problem-solving Skill Measurement, which is part of the life-cycle ability tools developed by Lee & Jang (2003). This tool is composed of nine categories with 45 questions: problem recognition (5 questions); information gathering (5 questions), analytical skills (5 questions); extended thinking (5 questions); decision making (5 questions); planning (5 questions); execution and risk taking (5 questions); evaluation (5 questions); and feed-back (5 questions). The five-point Likert scale; 'Very rarely' - 1 point and 'Most frequently' - 5 points a range of scores from 45 to 225 points: the higher score equates to a better problem-solving skill set.
3. E (Empathy ability) - to measure empathy, the Interpersonal Reaction Index (IRI) developed by Davis (1996) was used. This tool has 28 items, with a range of scores 29 to 140 - the higher scores equate with higher empathy ability levels.

The data were analyzed using SPSS / WIN 21.0. The normal distribution of variables was examined through using Kolmogorov-Sminov statistics.

### **Ethical considerations**

The study was approved by the Institutional Review Board of public institution bioethics committee, Korea (No. P01-201611-12-001). Survey materials with written consent forms were stored in a locked file cabinet located in the principal investigator's office. Participants were informed that they could drop out at any time without any consequences.

### **Program composition and progress**

1. In order to develop the CPBL program, the ADDIE (Analysis, Design, Development, Implementation,

Evaluation) instructional design model was applied.

#### **a. Analysis:**

- i. A literature review revealed the need to enhance capabilities of individuals through creative teaching methods and that problem-solving skills based on creative thinking was one of the traits required in order to enhance creative powers. To obtain such skills, faculty as well as students have to work together. In this regard, PBL motivated the students to learn and structure acquisition of knowledge within the clinical context. PBL prompted senses of self-achievement and enhanced the cognitive abilities such as problem-solving given that learners could engage in small-group and self-initiated learning activities to solve problems, as they practiced the critical thinking habits and develop accountability and self-autonomy in learning (Thomas, 1997). Studies have shown that PBL methods used as the basis to deal with real issues, lead to knowledge acquisition and attitude development necessary for finding solutions. The method could enhance ongoing critical thinking abilities, as well as developing sympathy and communication skills among group members (Chang, 2008; Harrison, Beverly, Rene & Karen, 2011). There were common steps in problem-solving processes - identifying the problems, defining these, generating and ideas, identifying problem-solving methods, execution, and assessment: These elements were used in the teaching method development.
- ii. Analysis about learner demands involved focus groups; results showed the most urgent need for reality based problems in classes. New reality based ancillary materials, which reflected theories in textbooks were needed: Newspapers, which were readily accessible, were used.

iii. Analysis of the demands in the nursing field – Questionnaires and interviews used to survey service enterprises showed that: problem-solving-centered critical thinking, enhanced levels of empathic behavior with the adoption of the concept of multi-culturalism were identified. Considering trends in Korea shifting from a single to a multi-cultural society, revolutionary change in teaching methods was deemed necessary.

iv. Focus Group Interview with the managers of enterprises and clinical practice discussion meetings, revealed expectations of students as communication, problem-solving, and the skill to sympathize with the target’s current status. Clinical managers identified the need to understand and sympathize with others, communicate one’s ideas, in addition to creative problem-solving techniques to identify and solve problems in a busy working environment.

b. Design: Based on the analysis of the demands identified through the literature review, questionnaires, and focus group interviews, the educational goals of CPBL and class activities were identified, while the teaching media were selected based on the analysis results and the advice from the education faculty.

c. Development: The development process was i) preparing the preliminary program, ii) adjustment for the verification of content, and iii) supplementation.

d. Implementation: In order for the development of the teaching and learning methods, five students were given information background knowledge on the purpose and methods of the program: There was time for questioning and arrangements made for more queries after implementation of the teaching method.

e. Evaluation: Profound complaints about the new teaching method reflected fears and awkwardness, comparing the new to the older approach. Comments suggested class topics and materials should be provided at the beginning of the term for the whole semester, rather than giving them one week before the classes and that there should be feedback from faculty members after the student presentations. Given the students thought the self-reflection approach was too broad an opportunity to define each topic and make a personal reflection on class participation was provided. The CPBL teaching model was then developed using ADDIE (Table 1) and implemented.

1a. 1 week before class: The Seed Box, the most basic element of the CPBL model, is provided,

**Table 1. CPBL (Creative Problem Based Learning) program**

Category	Content description	Time(min)	Strategy
Giving	• Giving paper which is related teaching material	1 week	
Seed Box	• Reading the paper	before class	
	• Finding some points		
Sowing seed	• Giving quiz	20	Small group discussion
	• Solving problems by alone or group		Presentation
Making Branches	• Discussion about different opinion	30	Lecture
	• Explain about key point		Small group discussion
Making fruit	• Providing variety media - Newspaper, Video, Book etc	40	Lecture
	• Finding problem		Small group discussion
	• Finding solution		Presentation
Evaluation	• Reflection note	10	Presentation
	• Making question		Small group discussion

\*  $p = .000$ ; # Chi-Square; ~ independent t-test

so that students may have a sufficient amount of information (5-6 pages) and preparation to limit stress during the study process: students were instructed to make five to ten Seed points.

2a. In Class - Sowing Seeds (20 Minutes): After reading the resources, and referring to their chosen Seed points, students are asked to respond to open-answer and multiple choice question. Individuals within each team compare their seed points with those of the teachers or others in the class. If selections differ individuals or groups briefly share their ideas with the rest of the class. group is six to eight. The teams in this study were composed of six to seven members, close to ideal numbers (Kim & Hwang, 2011).

2b. Making Branches (30 Minutes): The important theoretical points are revised and summarized. Additional materials are provided to enhance students' ideas and skills, but are not to deviate too much from those from the Seed Box, but stimulate a deeper level of individual thinking and knowledge acquisition.

2c. Making Fruit (40 Minutes): These activities are the practical questions, application, and adaptation activities, where various media such as videos, newspapers, and books are utilized to stimulate discussion on a problem. Here, students are to make their own decisions once more and use creative thinking to solve problems as they prepare presentation materials. At this stage, the students are to participate voluntarily, express their opinions, and present the comments collected from each group, so that they can exercise their communication skills.

3a. Closing (10 Minutes): Evaluation i) Self-reflection notes (to be prepared by the students) allow

for a self-evaluation by students themselves, reflecting on the participation in the class. Given their apprehension about being encouraged to make statements freely, their class participation focused on a set of given themes – communication and resolving skills, and empathy abilities. This feedback formed part of evaluation of the CPBL teaching model. ii). Final questions are encouraged on the items not readily understood during class.

## RESULTS

1. Verification of the Homogeneity of General Characteristics of the Subjects: The average age of the test group and the control group was, respectively, 22.9 and 23.2. There were six males - test group (16.7%) and eight - control group (22.2%). Nineteen in the test group (52.8%) and 20 in the control group (55.6%) did not have any religious affiliations. Other general characteristics of the two groups were indicative of homogeneity (Table 2).

**Table 2. Homogeneity Test for Demographic Characteristics and Dependent Variables (N=72)**

Variables	Subcategories	Exp.(n=36)	Cont.(n=36)	t	P
		n(%) or M±SD	n(%) or M±SD		
Ages		22.9±3.00	23.2±2.89	-0.36	.719
	M	6(16.7%)	8(22.2%)	0.36	.767
Sex	F	30(83.3%)	28(78.2%)		
	Yes	17(47.2%)	16(44.4%)	0.06	1.00
Religion	No	19(52.8%)	20(55.6%)		
Communication skills		3.61±0.38	3.62±0.37	-0.02	.983
Resolving skills		3.25±0.36	3.25±0.34	0.05	.964
Empathy ability		3.31±0.23	3.29±0.23	0.27	.786

## 2. Verification of Homogeneity in Dependent Variables:

The subjects' communication and resolving skills, and empathy abilities in the test and control groups did not show statistically significant differences (Table 2).

## 3. Verification of Hypotheses

Hypothesis 1- that a test group who participated in the CPBL model would have higher communication skill scores compared to the control group who did not: Findings showed that the communication skill score of the test group was 3.62 out of 5 before education and increased to 3.76 thereafter, a statistically significant increase ( $t = -4.98, p < .001$ ). The communication skill in the control group was 3.62 before education and 3.36 thereafter, not a significant difference ( $t = 1.74, p = .091$ ). Therefore, the hypothesis was supported ( $t = 3.82, p < .001$ ) (Table 3).

Hypothesis 2 - that the test group who participated in the CPBL model would have higher resolving skill scores compared to the control group who did not - findings showed that the resolving skill score of the test group before training was 3.25 out of 5 and increased to 3.81 after training, a statistically significant difference ( $t = -27.57, p < .001$ ). The resolving skill of the control group was 3.25 before training and 3.23 thereafter, not a statistically significant difference ( $t = 0.23, p = .822$ ). The hypothesis was supported ( $t = 3.21, p = .002$ ) (Table 3).

Hypothesis 3 - that the test group who participated in the CPBL model would have higher empathy ability scores compared to the control group who did not: findings showed that the empathy ability of the test group was 3.31 out of 5 before the training and 3.48 after the training, a statistically significant increase ( $t = -7.21, p < .001$ ). The empathy ability of the control group was 3.29 before the training and 3.19 after the training, not a statistically significant difference ( $t = 1.75, p = .089$ ). The hypothesis was supported ( $t = 6.98, p < .001$ ) (Table 3).

## DISCUSSION

The results around outcomes related to communication is in line with preceding studies (Choi & Lee, 2010; Oh, 2008; Shin & Lee, 2011; Won & Shin, 2008). The communication education process can be defined as one of seamlessly understanding and practising interactions in daily life by having a cognitive system of one's own and forming a meaning between participants (Ju, 2006). Most nursing classes on the topic were composed of lectures, confined to delivery of knowledge (Won & Shin, 2008). Human interactions need to be learned through a variety of subjects using more effective pedagogy involving small group dynamics, where students, are faced with new tasks. Discussion and summaries, applying these to real-life situations, and subsequent debates, result in a synergetic

**Table 3. Comparison of Dependent Variables between Two Groups after Treatment (N=72)**

Variables	Groups	Pretest	Posttest	t(P)	Mean difference	t(P)
		M±SD	M±SD		M±SD	
Communication skills	Exp.(n=36)	3.62±0.38	3.76±0.43	-4.98 (<.001)	-0.14±0.17	3.82 (<.001)
	Cont.(n=36)	3.62±0.37	3.36±0.44	1.74 (.091)	0.18±0.65	
Resolving skills	Exp.(n=36)	3.25±0.36	3.81±0.41	-27.57 (<.001)	-0.30±0.12	3.21 (.002)
	Cont.(n=36)	3.25±0.34	3.23±0.31	0.23 (.822)	0.11±0.29	
Empathy ability	Exp.(n=36)	3.31±0.23	3.48±0.22	-7.21 (<.001)	-0.17±0.14	6.98 (<.001)
	Cont.(n=36)	3.29±0.23	3.19±0.31	1.75 (.089)	0.10±0.34	

effect through the group dynamics and thus also enhance communication skills.

The resolving skills of the test group was more enhanced compared to the control group, showing that the program is effective in enhancing the resolving skills of these nursing students. This result is in line with preceding studies (Choi & Lee, 2010; Choi, Kim., & Ahn, 2010; Kim, 2009; Kim & Kim, 2011; Won & Shin, 2008). Preceding studies suggest that, in order to enhance the resolving skills in a certain area, it is necessary to obtain knowledge on the given area, and, based on such knowledge, it is also necessary to provide environmental factors to provide internal and external motivation. Therefore, in order to enhance the resolving skills, one should not exclude the provision of basic knowledge required to understand all the clinical events in the field. It is necessary to provide actual case studies, so that the students can be motivated by the need for relevant knowledge. Pedagogical approaches, such as the CPBL teaching model, should include a more in-depth lecture by the faculty members, to extend the knowledge which has been acquired during the self-initiated learning processes, which eventually enhance the resolving skills of the students. With appropriate pedagogy, it would be possible to provide higher order skills in actual nursing practices, stimulate creative and critical thinking, and enhance levels of expertise; this will eventually result in enhancement of resolving skill. The quality of nursing services will also ultimately be enhanced in substance.

In this study, the empathy skill of the test group was more enhanced compared to the control group, suggesting that the program is effective in enhancing empathy ability in these nursing students. This finding is in line with preceding studies on various programs (Ryu, 2015; Won & Shin, 2008). Empathy ability is a personal and a professional trait that is needed for caring, communication,

therapeutic relationships, and as a key element in human relationships. The concept of empathy is gaining more and more attention in the clinical context as an important issue (Ryu, 2015). Many researchers have noted the possibility to enhance empathy ability. Opinions suggest that, in the healthcare environment where empathy abilities are required, it is necessary to embrace the learning strategies covering caring aspects (Catlett & Lovan, 2011; Ozcan, Olfaz., & Bakir, 2012). Nurse educators should seek appropriate pedagogical approaches such as the CPBL method in order to not only deliver basic knowledge, but also enhance the empathy abilities of future nurses.

## CONCLUSIONS

In this experimental study, the CPBL model was developed and applied to the nursing students. Then, the influence of the model was evaluated in terms of communication and resolving skills, and empathy abilities. It was shown that the communication and resolving skills, and empathy abilities of the test group who participated in the CPBL model were significantly enhanced. It is believed that this program could be useful in providing positive influences to the development of various skillsets, which nursing students can use in clinical contexts. Also, through the development of such programs, it is believed that a new direction was provided for the department's nursing curriculum for the future.

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