# Bridging the Gap between Theory and Practice: Applying Problem based Learning Strategy to Improve Nursing Students' Achievement

**Ahmed Farghaly Towfik[1] Sameer Hamdy Hafez[2] Hasan Abualruz[3] Hayam Ahmed Mohamed[4] Noha Ahmed Mohamed[5] Shimaa Abd El-fattah Mahgoub[6]**

[1]Lecturer, Nursing administration, Beni-Suef University, Faculty of Nursing, Egypt
[2] Assistant Professor, Community Health Nursing, Beni-Suef University, Faculty of Nursing, Egypt; Community and Mental Health Nursing, Najran University, Faculty of Nursing
[3] RN, MSN, PhD. Assistant Professor, Al-Zaytoonah University of Jordan
[4]Assistant Professor, Medical-Surgical Nursing, [3]Benha University, Faculty of Nursing, Egypt
[5]Professor, Community Health Nursing, Beni-Suef University, Faculty of Nursing, Egypt
[6]Lecturer, Nursing administration, Beni-Suef University, Faculty of Nursing, Egypt

**Abstract**

**Background:** There is now a rapid shift in the education process from teacher centered learning to student centered learning to achieve the intended learning outcome. **The aim** of the study was to evaluate the impact of applying problem-based learning strategy versus traditional learning strategy (control group) on improving the nursing students' achievement. **Subjects and Method: Design:** A quasi-experimental design was used. **Subjects and setting:** All the 112 students at 4th levels, who studied the course of nursing administration at Faculty of Nursing, Beni- Suef University and were assigned to problem-based learning and control group. **Data collection** methods: 3 structured questionnaires were used; Socio-demographic characteristics, critical thinking skills test, clinical learning environment structured questionnaire. Course outcomes measurement report was used to assess the students' academic achievement **Results:** the mean score of critical thinking and clinical area satisfaction among problem-based learning group are significantly higher than the control group (p= 0.0001 and 0.001) respectively. The mean percentage of achieving the course learning out comes (skills and values) at problem-based learning group are significantly higher than the control group ($p < 0.05$). **Conclusion:** The study results concluded that the problem-based learning approach had significant impact on improving the critical thinking skills, clinical area satisfaction, and academic achievements among the studied nursing students. It is **recommended** to integrate problem-based with traditional learning to improve students' academic achievements.

**Key words:** Bridging the gap**,** Problem based learning, Traditional learning, Nursing Students' Achievement

## Introduction

Nursing specialty is a practice embedded discipline, and one of vital goals of nursing education is to facilitate the transition from theory to practice. Clinical education is a critical link between professional practice and theoretical university education which provides knowledge acquired at faculty into the clinical setting [1, 2].

Clinical learning environment is an interactive society comprising students, instructors, health care team members, patients and peers. The clinical learning environment prepares nursing students to adopt nursing role and provides professional development. A successful clinical learning environment composed of high-quality patient care, a positive psychosocial team climate, active students learning experiences and instructor supportive relationship. This could be achieved using active learning strategies like problem-based learning [3, 4].

Problem based learning (PBL) is a student-centered learning method that enables students to learn while actively engaged with meaningful problems. Students are given the chance to solve problem in a collaborative setting, create mental models for learning, and form habits of self-directed learning through reflection and practice. Hence, the underlying philosophy of problem-based learning is that learning can be considered a "collaborative, constructive, self-directed, and contextual" activity. Problem-based learning is a small group of learning method that enables students to present problems and learn knowledge, skills, and attitudes to solve problems [5].

PBL runs in several major steps, the steps can be outlined into three major stages namely, initial stage, PBL stage, and final stage. In the initial stage, the first activity involves a group formation, whether randomly or administratively allocating students into a small group. The group is then presented with a PBL. The PBL stage begins with students performing an independent self-study. Then, students conduct a group brainstorming and discussion session. In the final stage, students prepare for a project presentation and assessment during the last meeting session [6, 7].

Critical thinking has been considered one of the required skills in the 21st century, the face of global competencies, and a core skill for 2030. Critical thinking is one of higher order thinking skills, along with problem solving, creative thinking and decision making. Critical thinking is a critical component of nursing discipline as well as nursing education. Evidence proposes that the complex cognitive skills can be taught. For that reason, teaching higher order cognitive skills such as critical thinking has always been the ultimate goal of education [8, 9].

Some previous studies [10, 11] have indicated that teaching strategies have a significant influence on student's achievement, although the evidence is still scarce and not conclusive with regard to the identification of the best teaching strategies. There was a substantial difference in the students'

achievements between the lecture-based technique and PBL (standardized mean difference [SMD] =0.80, 95% CI [0.52, 1.08], P0.000). The findings imply that decision-makers in medical education should evaluate the impact of this strategy in other different areas.

**Aim**

To evaluate the impact of applying problem-based learning strategy versus traditional learning strategy (control group) on improving the nursing students' achievement.

**Hypothesis**

1. The mean score of critical thinking among students at problem-based learning (PBL) group is higher than the mean score among students at the control group.
2. The mean score of clinical area satisfaction and task orientation among students at PBL group is higher than among the students at control group.
3. The mean percentage of achieved course learning out comes (CLOs) among PBL group is higher than the percentage of the students at control group.

**Subjects and method**

**Research design:**

A quasi-experimental design (intervention/control) posttest was utilized to achieve the aim of the current study.

**Setting:**

The study subjects are nursing students at 4th level who studied the course of nursing administration.

**Subjects:**

All the 112 students at 4th academic year who studied the course of nursing administration were included in the study and were distributed randomly to two groups. The first group is PBL and the second is traditional learning group (control group).

**Tools of data collection:**

**1. Three structured questionnaires**

**(1): Socio-demographic characteristics of the students:** age, gender and residence.

**(II): Critical Thinking Skills Test**

Critical thinking skills test: to assess nursing students' skills regarding critical thinking. It consisted of (40) question categorized under five dimensions: Inference (8 questions), Recognition of Assumptions (8 questions), Deduction (9 questions), Interpretation (9 questions) and Evaluation of Arguments (6 questions). It is a structured test was developed by Watson and Glaser (2002) [12] and modified by Safadi (2004) [13].

**Scoring system:**

The questions were scored as "1" for correct, and "zero" for incorrect so the total scores (40). The test is interpreted by calculating a mean score over the items. A higher score indicated high critical thinking skills**.**

**(III): Clinical learning environment structured questionnaire**

It consisted of (42) items divided into (6) dimensions namely, personalization, student involvement, satisfaction, task orientation, teaching innovation and individualization each consisted of (7) items. It was adapted from Newton et al. (2010) [14]. The researchers used two dimensions only; the clinical area satisfaction and task orientation and made some modification as shorthand the points related to satisfaction to 6 points and

the points of task orientation to 5 points to prevent the duplication of meaning.

**Scoring system:**

Each item had a 3-point scale ranging from one point referred to (disagree), two points for (neutral) and three points for (agree). The scale is interpreted by calculating a mean score over the items. A higher score indicated high satisfaction and high task orientation.

**2: A template of national authority for quality assurance and accreditation of education Egypt** (NAQAAE) **for course coordinator report on students' achievement of course ILOs**

**Scoring system:**

The mean percentage of achieving each intended learning outcome was calculated for each group.

**Validity and reliability:**

A panel of five Faculty members of community health nursing and nursing administration department reviewed the previous tools. The Cronbach's alpha values after translating the test of critical thinking is 0.83 and for clinical learning environment is 0.88.

**Ethical approval:**

The FM-BSU REC has approved the study from the ethical point of view with the approval No: FMBSUREC/12022023/Tawfik.

**Ethical considerations:**

The study was conducted with careful attention to the ethical standards of research and the rights of participants. Oral consent was taken from each student they were informed that the data collected will be used for the research only. They were assured about confidentiality and informed that the students at PBL group could withdraw at any time from the study and shift to the traditional learning group.

**Pilot Study**

- A pilot study was conducted on ten students to assess the content of the data collection methods, detect any need for modifications and estimate the amount of time required for data collection. Participants in the pilot study were excluded from the studied sample.

**Field work:**

**Assessment phase:**

- The researchers meet nursing students for the first time and explain the aim, objectives, and procedures of the study to get their acceptance to participate and the mechanism of distribution into the two groups.
- The researchers divided the students to problem-based learning group (PBl) group and traditional group randomly.
- The two groups were distributed by rotation schedule that don’t allow meeting in the same clinical area at the same time.

**Planning and Implementation phase**

- The researchers divide the PBL group to 5 small groups assigned to the well-trained clinical instructors.
- The researchers design the learning package and the clinical scenarios.

**Implementation phase**

- The implementation was done on three stages; at the first stage instructor provide student with a scenario and discussion started to identify the core problem or concept of the scenario and primary brainstorming and discussion regarding this problem then instructor

assign students to carry out an organized search using different knowledge sources under a team leader selected by the group, finally next meeting time decided to discuss knowledge that students have to prepare.

- Second stage (problem-based learning stage); group leader begins to allocate duties for team members then recurrent meetings take place between team members to discuss progress of achieving assigned duties, following these steps instructor hold a meeting with students to discuss knowledge students collect regarding problem or case assigned at first stage, finally instructors ask students to prepare a presentation to show the concept in its final form.
- At the third stage students prepare final presentation of the topic, meeting held by instructor and students present their project, finally instructor conclude the concept with students to summarize concept and problem resolving.

**Evaluation phase**

- At the end of intervention period post-test was performed.

**Statistical analysis:**

The collected data were organized, revised, stored, tabulated, and analyzed using the number, percentage distribution, mean and standard deviations were calculated. Proper statistical tests were used (chi-square, T-test and Pearson correlation coefficient) to determine whether there were significant differences or not by using the statistical package for the social science program (SPSS) version 20. Statistical significance was considered at p-value < 0.05.

**Results**

Table (1): The distribution of students regarding their demographic characteristics. The data illustrates that about the half (48.9%) of PBL group and about two thirds (64.3%) of nursing students at control group were females, regarding their age about three quarter of both groups were 22 years old. The data also showed that about two thirds (62.5%) of PBL group and about the half (55.3%) of the control group reside in rural areas.

Table (2): Compare between PBL group and control group according to the mean scores of critical thinking skills. The table reveals that the mean score of Inference, assumption, deduction, interpretation and evaluation skills at PBL group are significantly higher than the mean at the control group ($p<0.05$).

Table (3): Compare between PBL group and control group according to the mean scores of their clinical environment satisfaction and task orientation. Table 3 reveals that the mean score regarding clinical area satisfaction at PBL groups is significantly higher than the mean score at traditional group ($p=0.001$) while regarding task orientation there is no significant differences ($p=0.08$).

Table (4): Reveals a Comparison between the PBL group and control group according to the mean percentage of their achievement to the course-intended learning outcomes. The data illustrates that the mean percentages regarding the skills domain and values domain in the PBL

group are significantly higher than in the traditional group evidenced by a p-value of less than 0.05.

Table (5): Shows significant positive correlations between critical thinking skills and clinical area satisfaction with the achievement of intended learning outcomes (r=0.71 and 0.78) respectively.

**Table 1 :Frequency distribution of nursing students regarding their demographic characteristics (N= 112)**

| Personal characteristics | PBL group (56) | | Control group (56) | |
|---|---|---|---|---|
| | No | % | No | % |
| **Gender** | | | | |
| Male | 23 | 41.1 | 20 | 35.7 |
| Female | 33 | 48.9 | 36 | 64.3 |
| **Age** | | | | |
| 22- | 40 | 71.4 | 42 | 75 |
| 23- | 11 | 19.6 | 7 | 12.5 |
| 24- | 5 | 8.9 | 7 | 12.5 |
| **Place of residence** | | | | |
| Rural | 35 | 62.5 | 31 | 55.3 |
| Urban | 21 | 37.5 | 25 | 44.7 |

**Table (2): Comparison between PBL group and control group according to the mean scores of critical thinking skills**

| Critical thinking skills dimensions | PBL group | Control group | p- value | T |
|---|---|---|---|---|
| | mean± | mean± | | |
| **Inference** | 6.2±0.7 | 4.8±0.9 | 0.0001 | 3.9 |
| **Assumption** | 3.3±0.3 | 2.4±0.1 | 0.00001 | 5.5 |
| **Deduction** | 5.2±0.1 | 4.6±0.9 | 0.0001 | 4.3 |
| **Interpretation** | 7.2±0.3 | 5.9±0.4 | 0.0001 | 4.8 |
| **Evaluation** | 5.5±0.2 | 4.8±0.1 | 0.0001 | 6.1 |
| **Total Critical Thinking skills** | 27.8±1.7 | 23.5±1.4 | 0.0001 | 10.3 |

**Table 3: Comparison between the PBL group and control group according to the mean scores of their clinical environment satisfaction and task orientation**

| Items | PBL group | control group | p-value | T |
|---|---|---|---|---|
| | mean± | mean± | | |

| Intended learning outcomes (ILOs) | Post Intervention | | P | T |
|---|---|---|---|---|
| | PBL group | Control group | | |
| | Mean | Mean | | |
| **Knowledge** | | | | |
| 1.1. Identify the legislative framework and the role of the nurse and its regulatory functions. | **81.3** | **78.6** | **0.07** | **1.6** |

| | | | | |
|---|---|---|---|---|
| **Clinical environment satisfaction** | 13.3±0.7 | 9.6±0.9 | 0.001 | 4.9 |
| **Task orientation** | 12.2±1.2 | 11.3±0.7 | 0.08 | 1.2 |

**Table (4): Comparison between the PBL group and control group according to the mean percentage of their achievement to the course's intended learning outcomes.**

| | | | | |
|---|---|---|---|---|
| 1.2. Describe responsibility and accountability for care within the scope of professional and practical level of competence | **84.6** | **80.4** | **0.06** | **1.5** |
| **Skills** | | | | |
| 2.1. Apply leadership skills to manage personnel to maximize health, independence and quality of life for individuals, families, and communities. | **87.2** | **77.4** | **0.004** | **2.7** |
| 2.2.Organize own workload and apply time management principles for meeting responsibilities | **89.4** | **76.2** | **0.001** | **3.1** |
| **Values** | | | | |
| 3.1 Maintain inter-professional collaboration, in a variety of settings to maximize health outcomes for the patients, families, and communities | **91.8** | **76.3** | **<0.001** | **33.5** |

**Table 5: Correlation between the students' achievement of intended learning outcomes with their score regarding critical thinking skills and clinical area satisfaction.**

| Items | Intended learning outcomes | |
|---|---|---|
| | R | P |
| critical thinking skills | 0.71 | 0.001 |
| clinical area satisfaction | 0.78 | 0.001 |

**Discussion**

Advances in technology and health care science, population growth and increased healthcare costs led to profound changes in nursing education to help graduated nurses to adapt efficiently with changing patient needs and rapidly changeable health care environment. Critical thinking considered a prerequisite for nurses to cope with health care advances. Problem-based learning has been adopted in variety of fields to promote critical thinking and improve nursing students' perception of clinical learning environment [15]. Therefore, the study aimed to evaluate the efficacy of problem-based learning versus traditional learning on achieving the intended learning outcomes among students.

The study findings supported the first hypothesis that total score of critical thinking among students at PBL group is higher than the score among students at the traditional learning group as current study results revealed the presence of statistically significant difference of critical thinking mean scores in PBL group compared to traditional learning group p value less 0.05. The results of the current study were in agreement with [16] who study the effect of problem-based learning

and concept mapping on critical thinking disposition of nursing student which revealed that the total score of critical thinking disposition was increased significantly after executing the teaching methods of PBL and concept mapping.

In the same line **Aufa et al. (2021)** [9] concluded that there is a positive effect of using the e-module with the PBL model on critical thinking skills. Also**, Don (2020)** [17] whose study revealed that implementation of problem-based learning has improved learning outcomes and critical thinking skills on students. Similarly, **Santuthi et al. (2020)** [18] stated that there are differences in problem solving skills between students who follow the PBL model and students who follow the guided discovery learning model. **Ahmady and Shahbazi (2020)** [19] supported the current study and indicated that structured social problem-solving training could improve cognitive problem-solving, critical thinking, and decision-making skills.

Regarding second hypothesis current study findings supported the hypothesis that total score of clinical area satisfaction and task orientation among students at PBL group is higher than among the students at the traditional learning group as mean score of PBL group higher than mean score of traditional groups with p value less than 0.05.

Agreeing with current study findings, **Escartín et al. (2015)** [20] noticed students' satisfaction and improvement in academic performance post study. In the same line with **15** stated that the case-based learning method which was applied through multi-episode cases is an effective approach to improve the perceived problem-solving ability and learning satisfaction of nursing students.

Current study results supported third hypothesis that mean percentage of achieving the ILOs among PBL group is higher than the mean percentage of the students at traditional learning group with p value less than 0.05. In the same line **Jamshidi et al. (2021)** [21] stated that the study group is significantly higher than the control group regarding the achievement of knowledge, attitudes, and perceptions ILOs after the PBL education.

Regarding relations among study variables current study findings indicates the presence of strong statistically significant correlation between nursing students' critical thinking skills and achievement of ILOS (r=0.71) and between clinical area satisfaction and ILOs (r=0.78). Agreeing with this finding **Don (2020)** [17] stated that there was a moderate positive correlation between students' critical thinking skills and learning outcomes.

**Conclusion**

The study findings indicated that the Problem-based learning intervention had a positive effect on improving nursing students' critical thinking skills, clinical area satisfaction and task orientation. Moreover, PBL has significant impact on improving the students' achievement to intended learning outcomes.

**Recommendations**

According to study results the recommendations could be:

1. Further studies need to consider more larger and different study settings to generalize study findings.
2. Integrate problem-based with traditional learning to improve students' academic achievements which will be reflected on patient safety and the quality of the provided care.

**References**


1. Salifu A, Heymans Y, Christmals D. Teaching and learning of clinical competence in Ghana: Experiences of students and post-registration nurses. Healthcare.2022; 10(3): 538.
2. Takase M, Yoshida I. The relationships between the types of learning approaches used by undergraduate nursing students and their academic achievement: A systematic review and meta-analysis. Journal of Professional Nursing. 2021; 37(5): 836-845.
3. Ergezen F D, Akcan A, Kol E. Nursing students' expectations, satisfaction, and perceptions regarding clinical learning environment: A cross-sectional, profile study from Turkey. Nurse Education in Practice. 2022. 61: 103333.
4. Taylan S, Özkan İ. The effect of instructors' clinical experience on professional socialization from the perspective of nursing students: A phenomenological qualitative study. Nurse Education Today. 2021; 99: 104797.
5. Jang K, Jo E, Song K J. Effect of problem-based learning on severity classification agreement by triage nurses. BMC nursing. 2021; 20(1): 1-9.
6. Kristianto H, Gandajaya L. Offline vs online problem-based learning: A case study of student engagement and learning outcomes. Interactive Technology and Smart Education. 2022.
7. Hamdan A R, Kwan C L, Khan A, Ghafar N A, Sihes A J. Implementation of problem-based learning among nursing students. International Education Studies. 2014; 7(7): 136-142.
8. Liu Y, Pásztor A. Effects of problem-based learning instructional intervention on critical thinking in higher education: A meta-analysis. Thinking Skills and Creativity. 2022; 45: 101069.
9. Aufa M N, Rusmansyah R, Hasbie M, Jaidie A, Yunita A. The effect of using e-module model problem-based learning (PBL) based on wetland environment on critical thinking skills and environmental care attitudes. Jurnal Penelitian Pendidikan IPA. 2021; 7(3): 401-407.
10. Sayyah M, Shirbandi K, Saki-Malehi A, Rahim F. Use of a problem-based learning teaching model for undergraduate medical and nursing education: A systematic review and meta-analysis. Adv Med Educ Pract. 2017; 8: 691-700. Doi: 10.2147/AMEP.S143694.PMID: 29042827; PMCID: PMC5633274.
11. Servant VF, Schmidt HG. Revisiting 'Foundations of problem-based learning: Some explanatory notes'. Med Educ. 2016; 50(7): 698-701. Doi:

10.1111/medu.12803. PMID: 27295470.

**12.** Watson G, Glaser E. Watson-Glaser critical thinking appraisal, UK Edition. 5th ed. London. Pearson Assessment. 2002.

**13.** Safadi E. Development of A Nursing Educational Program Based on Evaluation of Critical Thinking Skills for the Fourth Year Students At the Jordanian Universities, Unpublished Doctorate Dissertations. 2004. https://search.mandumah.com/Record/572782/Details#tabnav.

**14.** Newton JM, Jolly BC, Ockerby CM, Cross WM. Clinical learning environment inventory: Factor analysis. J Adv Nurs. 2010; 66(6): 1371-81. Doi:10.1111/j.13652648.2010.05303.x . PMID: 20546367.

**15.** Gholami M, Changaee F, Karami K, Shahsavaripour Z, Veiskaramian A, Birjandi M. Effects of multiepisode case-based learning (CBL) on problem-solving ability and learning motivation of nursing students in an emergency care course. J Prof Nurs. 2021; 37(3): 612-619. Doi: 10.1016/j.profnurs.2021.02.010. Epub 2021 Mar 2. PMID: 34016321.

**16.** Momeni H, Salehi A, Sadeghi H. Comparing the effect of problem-based learning and concept mapping on critical thinking disposition of nursing student. Educ Strategy Med Sci 2017; 10(4): 234-244.

**17.** Don Y. Implementation of problem-based learning to improve students' critical thinking skills. Journal of Physics. 2020; 1460(1): 012058. IOP Publishing. course.

**18.** Santuthi P, Suardana N, Wijana N. The effect of problem-based learning model on problem solving and critical thinking ability of class Viii students in Smpn 1 Singaraja of Science. Journal of Physics. 2020; 1503(1): 012046.

**19.** Ahmady S, Shahbazi S. Impact of social problem-solving training on critical thinking and decision making of nursing students. BMC nursing. 2020.;19(1): 1-8.

**20.** Escartín J, Saldaña O, Martín-Peña J, Varela-Rey A, Jiménez Y, et al. The impact of writing case studies: Benefits for students' success and well-being. Procedia-Social and Behavioral Sciences. 2015; 196: 47-51.

**21.** Jamshidi H, Hemmati Maslakpak M, Parizad N. Does problem-based learning education improve knowledge, attitude, and perception toward patient safety among nursing students? A randomized controlled trial. BMC nursing. 2021; 20(1): 1-9.