

Do the Application of Problem-Based Learning on Undergraduate Nursing Students Is Effective? A Case Study Review

Huda Mohammad Ali Rasheed

Community Health Nursing, British University in Dubai, Dubai, United Arab Emirates
Email: alhammadyh@yahoo.com

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Abstract

Objectives: The study's aims to determine and assess the application of problem-based learning to undergraduate nursing students. **Background:** Nursing students are the upcoming health care delivery system; according to their standard of learning, it will affect their clinical training. **Method:** The study design is a case study review, the data was collected using many articles related to problem-based learning collected from E-books and E-journals websites like CINAHEL, Google Scholar, etc. After that, the data was analyzed and evaluated related to the application of problem-based learning on undergraduate nursing students. **Result:** The result appeared that most of the research proved and supported that the application of problem-based learning is effective for undergraduate nursing students, and students can solve patients' problems in a better way. **Conclusion:** In conclusion, problem-based learning is an essential part of the nursing diagnosis process that will increase knowledge, and performance, and merge it with the nursing concepts.

Keywords

Problem-Based Learning, Nursing Education, Undergraduate Nursing Student

1. Introduction

Students are the building block for our community that will be built according to their academic performance and the way they perceive their education and learning. Nursing students are the upcoming health care delivery system; according to their standard of learning, it will affect their clinical training and contribute to their knowledge, attitude, and practice in the future. There are

several strategies to deliver the educational material and teaching content to nursing students. One of these strategies is to identify and encourage their theoretical, practical, and clinical thinking abilities by using problem-based learning. It's the best methodology to help the students in the clinical practice areas that can help them recognize the real situation and utilize their judgment critically by intellectual abilities to assess and find solutions to patient health issues and improve patient health outcomes. As other researchers discussed that many students may face struggles and issues while using problem-based learning during performing any care. So this study explains the main understanding of problem-based learning of nursing students. The main objective of this research study is to determine the application and performance of problem-based learning on undergraduate nursing students by using a descriptive study.

2. Background

Safety of the patient is an essential for all health care systems all over the world. Providing safety measures and good care is the main aim of all healthcare systems [1]. Nursing students should be applying knowledge, and discrimination for performing good patient safety while providing care. A lacking safety while giving care to the patient is the most of the problems faced by students that can cause dangerous to patient life during clinical performance [2]. Also, nursing students should gain good knowledge to assess and clarify the most potential threats and must protect patients against injuries or adverse side effects or events by being high self-esteem and confidence [1].

Nursing education consists of collaboration and association between theoretical and clinical experience, so the most important aim of nursing education is to apply theory in practice during clinical training [2]. The challenge that nursing students may face is understanding specific phenomena in the clinical area; this can cause them dilemmas in performing safe practice during patient care. Shin and Kim (2013) define problem-based learning (PBL) as a style and methodology of teaching and learning that emphasizes good and knowledgeable performance, ways to solve problems, and critical-thinking skills domains toward any phenomenal problems [2]. Also, Kumar and Refaei (2017) define problem-based learning as a scientific way in which complicated problems promote and enhance student learning of principles by improving critical thinking skills, solving problems abilities, and communication capabilities [3]. PBL gives learners a push to explore their knowledge and capabilities to apply them to specific circumstances by combining theoretical knowledge with clinical or practical areas to reach and meet specific goals [2].

The instructor and tutor must prepare the students with all knowledge in the theoretical, practical, and clinical dimensions to build good skills that include the ways of interacting with each other's, collaboration and coordination abilities to be highly interacted in teams, critically identifying the reasons and solutions, and self-evaluation feedback [4].

2.1. Stages of Change Model

The stage of changes model is a transtheoretical model of behavioral change [5]. This theory is discussed in six stages of change, first stage pre-contemplation stage. The individual in this stage has raised his attention toward specific problems involving observation and consciousness-raising toward certain issues. Also, the problem will be explored and identified [6]. Second, the contemplation stage discusses the realization of the issue and begins to think to change or solve this problem [5]. In this stage, the student can state what is known and try to find a plan to solve the issue [7]. Third, in the preparation stage, the individual starts to do a detailed plan for action that must be taken; by this stage, the student will formulate a nursing diagnosis and find a method to solve a problem or issue faced by a patient [5]. Fourth, the action stage that has been applied helps in solving the issues and must be a commitment to changes. The implementation stage needs students to find resources and investigate [5] [7]. Fifth, the maintenance stage that the issues must be sorted out and maintained stable. Lastly, termination stage that the problem is no longer presents any temptation [5]. The evaluation stage will apply these two stages that the solution will be supported and review the performance [6].

So this theory explains how to use problem-based learning skills by emerging (PBL) steps with theoretical stages that have been described. As Khoiriyah and Husamah (2018) discussed, implementing (PBL) in nursing education and applying it in the science curriculum [8]. By identifying and observing the problem and thinking to solve it in the pre-contemplation and contemplation stages, the first four steps of (PBL) have been identified when exploring the issue, stating what is known, defining the issues, and finding resources and information. Related to planning the solutions and investigating this solution and the following step by supporting the chosen solution.

As discussed in stages three and four in theory preparation to do a plan and action applied must be a commitment to changes. Lastly, reviewing the performance and solving the issue that will be no longer presented as discussed in the theory's termination stage.

2.2. Problem-Based Learning Approach

Problem-based learning (PBL) is essential for the learner-focused approaches and ways to improve their understanding by using critical thinking skills. Many higher education institutions have considered it a method of transporting education and learning from the educator to the learner [3]. This can lead to different meanings, the nursing diagnosis process is explained in four steps that include assessment (identifying data), diagnosis (formulate nursing diagnosis), planning (make a plan for the care), implementation (act and perform the care), and evaluation (identifying if the care provided solve the problem) (Figure 1) [7]. The nursing diagnosis process is an oriented issues paradigm that breaks down signs into nursing issues by utilizing the nursing diagnosis process to find the patient's

problem and identify solutions related to it. The aim was to have a strong, powerful, and solid knowledge base to promote autonomy and confidence of the students' to be utilized as guidance for identifying, recognizing, analyzing, and problem solving oriented. The definition of a problem was a state or phenomenon that can affect the individual and family health, which the health care provider puts hands together for improving professional functions and to have better outcomes [3]. Also, its situation is regarded as harmful and needs immediate actions to be dealt with to overcome the solutions [4].

Sayyah *et al.* (2017) add that the specialized student nurses may ignore the nursing diagnoses process to perform and practice during patient care [4]. The nursing diagnosis process has been essential to nursing performance practice and can improve and protect the patient from harm, also can provide safety measures while caring for a long period [6] [7].

There are many criteria for understanding and performing PBL in educational nursing this can support to identifying, assessing, analyzing, and implementing PBL in the students' in clinical settings.

In the beginning, by exploring the issue and identifying the problem that can be gathering necessary information related to it; learning new concepts and assumptions, principles of clarifying the issues, and skills about the proposed topic. In the assessment phase there are many roles related to tutors one of it that tutors' must review the data by classifying, analyzing, and interpreting the data to identify its completeness and encourage the students to give an explanation for each data identified [7]. Furthermore, tutors' must make observations and differentiate between relevant and important data from irrelevant and unimportant data [4] [9].

Second, state what is identified by listing the clear information that is identified in the case and states the areas that need more information and clarification. This can be done by identifying a nursing care plan. The tutor encourages the student to clarify and explain the assumptions identified by using North American Nursing Diagnosis Association (NANDA) and to formulate a nursing diagnosis based on the data or problem identified, analyzed, and discussed. After that, the tutor provides a good and suitable environmental thinking's by supporting the students' brainstorming that encourages them to reach and utilize a good stage of information analysis and hand on view of clearer concepts and assumptions this will be applied in the clinical settings for safer patient care [7] [9]. Third, define the problems by drawing a concept mapping for prioritizing the problems that must be solved in content of what is already known about the case and expectations from students' toward learning. Step four, find and identify the supply and materials that will help create an argument and final agreement. Investigate emulsion by listing actions that are possible and solving problem supported by formulating and testing probable assumptions and concepts. Implementation, the fifth step in the nursing diagnosis, contains implementing the plan of care that is recognized and prioritized. Step six, present and support the selected solution and back up your final conclusions with supported and re-

levant evidence-based. Lastly, in step seven, evaluate your performance by reevaluating their performance and planning improvements, and resolving the issue and problem that appeared. In the end, the usefulness of interventions is evaluated by reassessing the care provided. The student is performing these steps to assess outcomes and revise the plan to clarify the problems that have been unsolved. Tutors must encourage nursing students to think critically and perform the nursing diagnosis process [7] [9]. Through these steps, students can empower their reasonable thinking abilities and motivate their solving capabilities. Starting that nursing students may struggle with information that have been collected and analyze it as part of the nursing educational development. The tutors' are the main responsible person for guiding, supporting, and teaching the students about the effectiveness of the process of critical thinking [7].

Yildirim, Özkahraman (2011) discussed that the nursing planning and diagnosis steps and thinking in a critical way should not be divided each one is completing the others [7].

3. Methodology

A descriptive case study review was conducted for ten research studies done from 2001 to 2021. The data was collected by using many articles tackling the same issue related to problem-based learning skills as a quasi-experimental pre-post test study, exploratory sequential mixed methods study, quantitative comparative descriptive study, randomized control trials, pre-posttest design, learning experience report survey, quantitative explanatory transversal study and case study design study that collected from E-journals from websites like CINAHEL, EBSCO, ProQuest and Google Scholar.

After that, the data was critically analyzed, evaluated, and discussed related to the application of PBL to undergraduate nursing students from other research studies.

4. Result

The result of this study showed that most of the research proved and supported

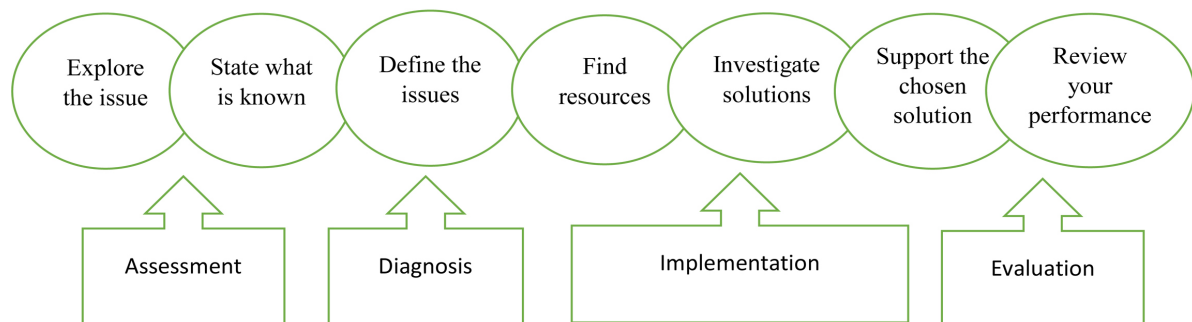


Figure 1. Steps of problem-based learning. Note: **Figure 1** shows the steps of problem-based learning that starts from assessment by exploring the issues through identifying the problem that stating what is known and defining the issues, also prioritizing diagnosis after that to find resources and investigate the application solutions by implementation, lastly evaluating the performance by supporting the solution and reviewing the performance applied.

that the application of PBL is effective for undergraduate nursing students, and students can solve patients' problems in a strategic way by using the PBL method. According to many research studies that discussed PBL in nursing education, students better understand the patient problem and solve it systematically. Other study researches agreed and supported that thinking capabilities and problem-based learning were correlated to each other and supported the students while performing safe care to the patients in the hospitals. The researches also reinforce my research study purpose and aim that the students effectively apply problem-based learning and can solve patient health issues in a safe and professional way. The research studies that been discussed are summarized and analyzed in (Table 1). Jamshidi, Hemmati Maslakpak, and Parizad (2021) did a randomized, controlled trial study for 78 fourth-year nursing students in two groups: the control group and the experimental group providing them with learning materials about using the PBL method [1]. The result showed that the dissimilarity in the end results of knowledge, and practice related to patient well-being was significant between the teams after the PBL educational sessions ($p = 0.001$). The statistical analyses of the mean knowledge of students', and practice of patient well-being and care highly improved in the experimental group than in the control group. Another qualitative, explorative, descriptive study was done for nursing students as phases of implantation of problem-based learning till formulating guidelines for tutors to guide students. Phase one includes identifying, developing, and implementing a project for a PBL case study in the clinical sittings; phase two is consists of the experiences and the outcomes of exposed students' to PBL study in the clinical sittings; phase three discusses the recognition and awareness of instructors regarding the application of PBL in the clinical areas, and; phase four including the guidelines' principles for the application of PBL. The data from phases one, two, and three were used to implement problem-based case studies guidelines. The team consisted of first-year nursing students; the result of this study showed that in phases one, two, and three, students' can use PBL in clinical sitting by answering questions related to experience, and there were positive perceptions related to it. So, in phase four, the author encouraged to utilize and implement problem-based learning in the study with a guideline [10].

Also, another research study was done by González Hernando *et al.* (2014) about students' nurses' satisfaction in problem-based learning, a descriptive transversal study [11]. One hundred thirty-four second-year students conducted the task. The satisfaction scale was administered under PBL implementation. Overall, the description by the students of the case scenarios as agreeable, effective, pleasant, and varied related to real-life situations. The analyses showed 55% preferred traditional methodology compared to PBL and 78% enjoy the new way of teaching. Students' perception of learning by using the PBL methodology showed a high level of encouragement, motivation, and joy related to material, the tutorial process, the instructor, and the student's role, whereas the assign-

ment time and the major workload were the least satisfactory for them. However, satisfaction was high in applying the new methodology of problem-based learning.

Moreover, Hamdan *et al.* (2014) did quasi-experimental pretests and post-test studies about the performance of PBL among third-year student nurses' [12]. This study examines the association between students' degree of satisfaction with PBL and its effectiveness of PBL. Convenient sample methods were conducted, and ninety-four third-year students' admired to take place in the study. The information was analyzed using a paired t-test. The outcomes showed significant differences in pretest and post-test scores $t(93) = -13.70$, $p < 0.001$, also the student's demonstrated a degree of satisfaction towards PBL associated and integrated with the achievement of PBL.

Dorri *et al.* (2020) also did a study on experience details of a learning strategy accepted in nursing care of adults with a course load of three hundred hours per semester offered in the bachelor in nursing to an average of 40 to 50 students per semester [13]. The study aims to provide students with scientific organized knowledge of nursing care for adults in medical and surgical situations; each case study was developed over three days, having two times of discussions between big groups and small groups. The big group discussed the identification, organizing, and prioritizing of the problems, but the small groups looked to resolving and evaluating the learning problems. The class was divided to carry out the case studies so that the resolving of learning problems take place, incorporating in a structural way of theoretical knowledge and health care practical skills. Besides the presence of the instructors in the classroom, there is online follow-up with students in their search and solving the problem. Every group sent their tasks for discussion forums by using the online method, and their responses to the case studies were adequately designated. Khoiriyah and Husamah (2018) discussed PBL, intellectual thinking abilities, solving problems by thinking capabilities, and outcomes from learning [8]. The problem-solving thinking capabilities details were obtained from the student assessment workflow sheet, the creative thinking abilities information were identified and recognized from the conducting grading style, and outcomes from learning were obtained from the writing test for 18 state junior students. The results show that PBL increases the estimation of practicing in solving problem by 27% with the achievement rate of 47%, the average of creative thinking abilities of 11% with an achievement rate of 17.5%, and the average end result of the learning of 13% with the achievement rate of 15%.

Kaddoura (2011) also, discussed the comparative descriptive study; the study samples' included one hundred three students; 65 participants from the PBL course, and the remaining 38 participants from the lecture-based learning (LBL) course [14]. The information was obtained using the California Critical Thinking Skills Test (CCTST) to measure the thinking capabilities of the student nurses' during lecture-based learning methodology or problem-based learning

technique.

The result appeared that the CCTST grads for the students in the PBL course were greater than in lecture-based learning (LBL). The mean of the LBLteam was 10.11 with 3.15 of an SD, and the mean was 14.45 for the PBL with an SD of 2.80. The outcomes for the critical thinking skills were affecting both the total marks and on each subdivision, with those of the PBL much higher. The PBL students' performed better in the total and all subdivisions like analysis, evaluation, inference, deduction, and induction than the LBP. The T-test was analyzed for significance in the deferences of the CCTST and the scores between the teams in the study. The T-test results showed high significance, for the total CCTST in the LBL and PBL courses. The analyses indicate that the PBL participants can have more critical thinking ability than the LBL, as analyzed and the total scores were ($t = 7.24$, $df = 101$, $p < 0.001$). Moreover, the PBL course scored significantly more than those from the lecture-based learning on the CCTST subdivision intervention ($t = 4.77$, $df = 101$, $p < 0.001$); analysis ($t = 3.36$, $df = 101$, $p < 0.001$); inference ($t = 5.29$, $df = 101$, $p < 0.001$); induction ($t = 3.94$, $df = 101$, $p < 0.001$); and deduction ($t = 5.95$, $df = 101$, $p < 0.001$).

Furthermore, Gonzalez *et al.* (2020b) did randomized control study; the participants were 11 participants from the senior nursing program intended and randomly placed into eight groups based on thinking abilities by using Kaplan Critical Thinking Integrated Test (KCTIT), group A—persistence, group B—elasticity, group C—trust and faith, group D—imagination, group E—curious and prying, group F—reasoning, group G—investigations and group H—intuition [15]. The participants were rotated between the groups discussing topics related to the fundamental health subject that contains, medication administration by using intramuscular and subcutaneous injections technique, administration of intravenous medication, physical assessment for adults, Foley catheter insertion, nasogastric insertion and feeding, skin assessment and Braden scale for bed sores, vital signs measurements for adults, and a patient safety goals. When completing all stages, then a simple evaluation must be filled and completed to identify their discernment of the effectiveness of the evaluation and intervention [15].

The quantitative portion results showed no difference on the (KCTIT) between participated in the intervention and who did not, $t(50) = 0.174$, $p > 0.05$. The data analyses between the students' who didn't participate ($M = 67.59$, $SD = 5.81$) and the students' participated ($M = 67.88$, $SD = 5.99$) were statistically same [15].

On the other hand, the qualitative coding results of the study done, from the coding and generated themes showed that the fair skills intervention encouraged experience by practicing what is learned and taught knowledge previously and reinforcing it with active learning skills and strategies [15]. The students perceived the fair skills intervention as an easy way, nonthreatening learning environmental surroundings because of joyful environment, specifically in contrast with different educational style encounter in the nursing educational program. Safe and powerful atmosphere of the skills fair evaluation intervention permit

Table 1. Analyses of the problem based research studies.

Author (year)	Sample size	Intervention	Measurement tool	Result
Jamshidi, Hemmati Maslakpak, and Parizad (2021)	78 fourth-year nursing students	control and the experimental group	providing them with learning materials about using the PBL method	knowledge of students', and practice of patient well-being and care highly improved in the experimental than in control group (p = 0.001)
Mogale, (2001b)	first-year nursing students	qualitative, explorative, descriptive study	phases of implantation of problem based learning till formulating guide lines for tutors to guide students'	phases one, two, and three, students' can use PBL in clinical sitting and there were positive perceptions
González Hernando <i>et al.</i> (2014)	134 second-year nursing students	Students' nurses' satisfaction in problem-based learning, a descriptive transversal study	satisfaction scale was administered under PBL implementation	Satisfaction was high in applying the new methodology of problem-based learning
Hamdan <i>et al.</i> (2014)	94 third-year students'	quasi-experimental pretests and post-test	examines the association between students' degree of satisfaction toward PBL and the effectiveness of PBL	outcomes showed significant differences in pretest and post-test scores $t(93) = -13.70, p < 0.001$
Dorri <i>et al.</i> (2020)	300 hours per semester for the bachelor in nursing to an average of 40 to 50 students per semester	experience details of a learning strategy accepted in nursing care of adults with a course load	provide students with scientific organized knowledge of nursing care of adults in medical and surgical situations by development of case study	responses to the case studies were adequately designated
Khoiriyah and Husamah (2018)	18 state junior student	Critical thinking identified and recognized from the conducting grading style, and outcomes from learning were obtained from the writing test	Grading style of problem solving, critical thinking abilities, learning.	PBL increase the estimation of practicing in solving problem by 27% with the achievement rate of 47%, the average of creative thinking abilities of 11% with the achievement rate of 17.5%, and the average end result of the learning of 13% with the achievement rate of 15%

Continued

Kaddoura (2011b)	103 students (65 participants from the PBL course and remaining 38 participant from lecture-based learning)	Comparative descriptive study Measure the critical thinking of the student nurses' during lecture-based learning methodology or problem-based learning technique.	California Critical Thinking Skills Test (CCTST)	The result appeared that the CCTST grads for the students in the PBL course was greater than lecture-based learning (LBL).
Gonzalez <i>et al.</i> (2020b)	11 participants from senior nursing program	randomized control study participants were rotated between the groups discussing topics related to the fundamental health subject	Kaplan Critical Thinking Integrated Test (KCTIT)	Results showed no difference on the Kaplan Critical Thinking Integrated Test (KCTIT) between participated in the intervention and who did not, $t(50) = 0.174, p > 0.05$. The data analyses between the students' who didn't participate ($M = 67.59, SD = 5.81$) and the students' participated ($M = 67.88, SD = 5.99$) were statistically same

Note: the result from study showed that problem based learning is effective and good to perform in nursing field, according to all the researchers end results of their statistical information data that the application on nursing education can give final conclusion that problem based learning is effective and can increase their ability toward critical thinking and solving issues toward patient care.

students to learn in the absence of anxiety and stress [15].

The majority of students' who participated trusted their thinking abilities and strengthened after taking part in the study. Several samples accept their perception of thinking abilities was empowered rather than changed significantly.

5. Discussion

The result of this study showed that most of the research supported that the application of PBL is effective for undergraduate nursing students, and students can solve patients' problems in a better style by using the PBL method. According to many research studies that discussed PBL in nursing education, students better understand the patient's problem and solve them systematically. Other study researches agreed and supported with evidence based that thinking capabilities and problem-based learning were correlated to each other and back up the students while performing safe care to the patients in the hospitals. The researchers also reinforce my research study purpose and aim that the students' effectively apply problem-based learning can solve patient health issues in a safe and professional way.

Many research studies discussed the effect of the application of problem-based

learning in nursing education and are supported by statistical and clear proof related to this aim. Gonzalez *et al.* (2020) discussed that in spite of the quantitative research appeared no uniformity on the KCTIT scores during the discussion, some students “allotted this final conclusion to the test not being part of the grading system and they are sure that students did not try stronger to have a good grade [15]. Nevertheless, the students” who accepted to participate in the interviews recognized the fair skills intervention as a plan of action development for thinking capabilities by serving them to develop different thinking domains. The final analyses are supported as nurses must identify and clarify ways of deterioration in the clinical areas and take priority action on time to prevent potential complications. Also, student nurses’ must analyze information and keep in mind all possible criteria for problem-solving before taking action on the most accurate and suitable ways to be considered for patient health care [16].

The final view from many types of research that the students who had been in the nursing field and the basic skills of a PBL curriculum can obtain higher CT capabilities than from the traditional lecture-based learning curriculum that has been discussed in research done by Kaddoura (2011) [14]. Moreover, discussion takes place with the nursing program curriculum that at the time of data collection information the students’ who were never exposed to PBL throughout their learning and education may face difficulties when they will start their future career and perform patient care [13] [14]. This proposes that PBL might be a good approach in comparison with a traditional method of delivering the knowledge and education to the students, so it’s encouraged to all instructors and educators to guide nursing students to improve CT skills by applying PBL in the practical and clinical areas [14] [16]. Also, Dorri *et al.* (2020) explained that students with different learning methodologies in classes could recognize differences according to their research done between experimental and control groups [13]. Students who got high marks on PBL have the capability to produce unexpected and innovative ideas than the control group. The highest participation scores on PBL appeared that students can create a large number of arguments and logical explanations in problem-solving situations and scenarios response. The problem-solving methodology approach could raise the creative and intelligent thinking skills of students compared to the traditional learning approach indicated in the study [13]. PBL can improve the quality of learning and improve the students’ skills and practice to create the mind map to solve a problem, improving cognitive and intellectual, affective, and psychomotor. PBL also enhances the ability of problem-solving approaches, and increase the capability of communication and social skills. PBL contributes well to improving aspects of health science attitudes and practices [8].

Nursing education can maximize this added usefulness in intending the educational activities in nursing programs. Hence, it suggested that teaching and learning need to encourage a new instructional methodology in a nursing program [12]. Administering scenarios to the students and real problem-based cases

via PBL requires applying thinking skills to prioritize actions and make an appropriate clinical decision, therefore will contribute to good clinical performance decisions. Students must understand their function as competent professional nurses that will be future care providers, they are in need of a powerful knowledge base and the capability to associate and coordinate this knowledge into clinical practice. Nursing programs must contain certain criteria that need the nursing students to be independent, self-directed learners to finish the program with a commitment to lifelong learning. Also, this can enhance the students toward using PBL methodology by the initiation of critical thinking, learning abilities, and creativity in knowledge, research skills, personal growth, and neurodevelopmental dimensions that can empower them during a performance in the hospitals [12].

6. Conclusion

This study identified and explored the effect of problem-based learning in nursing learning and education. Problem-based learning is the core and the essential learning and understanding in nursing education, and the students must understand how to use it, especially in the clinical training areas. By using problem-based learning, the students' critical thinking will be improved and enhanced so that students can be moved to master thinkers according to the stage theory of critical thinking. Moreover, the point of the view that faculty need to assess and check their entire view and performance application of the nursing diagnosis steps toward patient care, define learning objectives concerning thinking abilities, and identify, clarify the suitable strategic ways for promoting thinking abilities and capabilities because of changing modalities in problem-scenarios based when using problem-based of learning method.

7. Recommendations

The study recommendation is to merge problem-based learning with critical thinking that can be used in nursing education, this can be enhancing safe and professional practice during the delivery of care to the patients' in the hospitals. Also, further research must be done to include other teaching and learning methodologies that can improve students' learning and understanding to encourage safer practice during delivering the care to the patients in the hospitals.

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Author's Contributions

The author has accepted responsibility for the entire content of this manuscript and approved its submission.

Competing Interests

The author states no conflict of interest.

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