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RESEARCH ARTICLE

Application of Problem-Based Learning in Community Health by Undergraduate Nursing Students

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ABSTRACT

Introduction: Nursing students are the upcoming health care delivery system; according to their standard of learning, it will affect their clinical training and can be attributed to their practice. One of the best method is to identify and encourage their thinking abilities by utilizing problem-based learning. **Objective:** The study aimed to determine and assess the application of problem-based learning in community health by undergraduate nursing students. **Methodology:** A descriptive with case studies reviewed used by extracting data from many articles related to problem-based learning in community health which borrowed and assessed from E-books and e-journal websites like CINAHEL, EBISCO, and Google Scholar, etc. After that, the data was critically analyzed and evaluated related to the application of problem-based learning on undergraduate nursing students. **Result:** The result appeared that most of the research studies proved and supported the application of problem-based learning as effective learning paradigm for undergraduate nursing students in community health, and students can solve patients' problems in a better way by using the problem-based learning method. **Conclusion:** In conclusion, problem-based learning is an essential part of the nursing education that cause increase knowledge, performance, and merge it to the nursing concepts. It was suggested that teaching tutors and instructors need to examine their perceptions about merging problem-based learning in nursing education.

Keywords: *Problem-Based learning, Nursing Students, Nursing Education, Community Health*

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Introduction:

Students are the building blocks of our community which will be built according to their academic performance and the way they perceive their education and learning. Nursing students are the upcoming healthcare delivery system; according to their standard of learning, their clinical training could be affected and contributed to their knowledge, attitude, and practice in the future. There are several strategies to deliver educational materials and teaching contents to nursing students. One of these strategies is to identify and encourage their theoretical, practical, and clinical thinking abilities by using problem-based learning. (Bastable, 2019).

It's the best method to help the students in clinical practice areas that can help in recognizing the real situations and utilizing critical judgment by using intellectual abilities to assess and find solutions related to patient's health issues and improve outcomes. As other researchers discussed many students in community health may face struggles and issues while using problem-based learning during care performance. In other research studies there are many queries and gaps related to utilizing problem-based learning and patient care with safety in community health. (Jamshidi, Hemmati Maslakpak, and Parizad, 2021). So, this study aimed to determine and assess the application of problem-based learning in community health by undergraduate nursing students by using many reviewed cases from other research studies discussing about problem-based learning.

Background:

The safety of the patient is essential for all healthcare systems all over the world. Providing safety measures and good care is the main aim of all healthcare systems (Jamshidi, Hemmati Maslakpak, and Parizad, 2021).
Harming patients is one of the causing factors of death worldwide; most patients are harmed and die during hospitalization. (Jamshidi, Hemmati Maslakpak and Parizad, 2021, Sayyah et al., 2017).
Nursing students should apply knowledge to perform good patient care; a lack of safety while providing care to the patient is the most problems faced by students that can cause a danger on patient's life during clinical performance (Shin and Kim, 2013). Also, nursing students should gain good knowledge to assess and clarify the most potential threats that protect patients from injuries, adverse side effects, or events by gaining high self-esteem and confidence. (Jamshidi, Hemmati Maslakpak, and Parizad, 2021)
The challenge that nursing students may face is understanding specific phenomena related to problem solving in the clinical area; this can cause dilemma in performing safe practices during patient care. Shin and Kim (2013) define problem-based learning (PBL) as a style and methodology of teaching and learning that emphasizes good knowledgeable performance, ways to solve problems, and critical-thinking skills domains toward any phenomenal problems. Also, Kumar and Refaei (2017) define problem-based learning as a scientific way in which complicated problems promote and enhance student learning principles by improving critical thinking skills, solving problems abilities, and communication capabilities. 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, collaboration and coordination abilities to be highly interacted in teams, critically identifying the reasons and solutions, and self-evaluation feedback. (Sayyah et al., 2017).

Problem-Based Learning Approach:

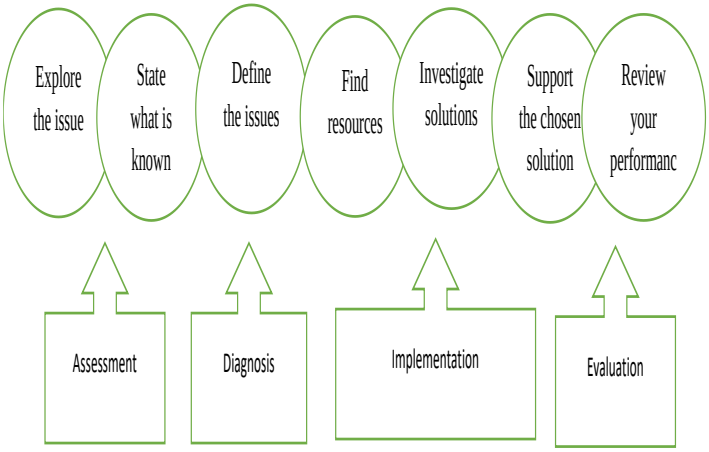
Problem-based learning (PBL) is essential for the learners focused approaches and ways to improve their understanding by using critical thinking skills when solving problems. Many higher education institutions have considered it as a method of transporting education and learning from the educator to the learner. (Kumar and Refaei, 2017). The nursing diagnosis process is explained in four steps as showed in figure (1) 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) (YILDIRIM, ÖZKAHRAMAN 2011). The aim of nursing diagnosis is to have a strong, powerful, and solid knowledge base to promote autonomy and confidence of the students utilize it as a guide for identifying, recognizing, analyzing, and problem-solving related to situation faced. (Sayyah et al., 2017). Sayyah et al. (2017) add that specialized student nurses may ignore the nursing diagnoses process for problem-solving during patient care. There are many criteria for understanding and performing PBL in educational nursing that can support to identify, assess, analyze, and implementation of PBL the students in clinical settings.
In the beginning, exploring the issue and identifying the problem can be done by gathering necessary information; learning new concepts and assumptions, principles, and clarifying the issues about the 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 explain each data identified. (YILDIRIM, ÖZKAHRAMAN 2011). Furthermore, tutors must make observations and differentiate between

relevant and important data. (Sayyah et al., 2017; Steps to a Problem-Based Learning Approach, n.d.)

Second, state what is identified by listing the clear information that is identified and state the areas that need more information and clarification. This can be done by identifying a nursing care plan. The tutor encouraged the student to clarify and explain the assumptions identified by using the North American Nursing Diagnosis Association (NANDA) and to formulate a nursing diagnosis based on the problem identified, analyzed, and discussed. After that, the tutor provides suitable environmental thinking by encouraging the students' to brainstorm to reach with good stage of information analysis and hands-on view on clearer concepts and assumptions that could be applied in the clinical settings for safer patient care. (Steps to a Problem-Based Learning Approach, n.d; YILDIRIM, ÖZKAHRAMAN 2011) Third, define the problems by drawing a concept mapping from problems prioritized that must be solved. Step four, create an argument and final discussion with agreement to plan the care by listing actions for possible problems solving; supported by formulating and testing probable assumptions and concepts. Implementation, the fifth step in the nursing diagnosis, involves implementing a plan of care that is recognized, prioritized, and planned. Step six, present and support the selected solution with back up conclusions with relevant evidence-based. Lastly, step seven, evaluate the performance applied with patient care. In the end, the usefulness of interventions is evaluated by reassessing the care provided. Tutors must encourage nursing students to think critically and perform the nursing diagnosis process. (Steps to a Problem-Based Learning, n.d; YILDIRIM, ÖZKAHRAMAN 2011). Through these steps, students can empower their reasonable thinking abilities and motivate their problem-solving capabilities. Nursing students may struggle with information that has been collected and analyzed as part of the nursing educational development. The reason is that if there is no support, the students can't apply the process safely and effectively. The tutors are the main responsible persons for guiding, supporting, and teaching the students about the effectiveness of the process of critical thinking (Sayyah et al., 2017).

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 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.

Methodology:

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

Result:

The result of the study showed in table (1) that most of the research studies proved and supported the application of PBL is effective for undergraduate nursing students when performing care especially in community health, and students can solve patients' problems by using the PBL method. According to many research studies that

discussed PBL in nursing education, the students understanding is better during care and can solve patient problems systematically.

Other study agreed and supported problem-based learning were correlated to each other and supported the students while performing safe care to the patients in community health settings. Jamshidi, Hemmati Maslakpak, and Parizad (2021) did a randomized, controlled trial study for 78 fourth-year nursing students in two groups taking cases to solve patients' issues, control and experimental groups providing with learning materials about using PBL method. The result showed that the dissimilarity in the results of knowledge, and practice related to patient well-being which was significant between the teams after the PBL educational sessions ($p = 0.001$). The statistical analyses of the knowledge of students and practice of patient well-being and care highly improved in the experimental group than in the control group. Another qualitative, exploratory, descriptive study was done for nursing students as phases to implant 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 community clinical settings; phase two consists of experiences and outcomes of exposed students to PBL study; phase three discusses the recognition and awareness of instructors regarding the application of PBL, and; phase four includes the principles of the guidelines for the application of PBL. The data from phases one, two, and three were used to implement problem-case based study 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 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. (Mogale, 2001).

Also, another research study was done by González Hernando et al. (2014) about students' nurses' satisfaction with problem-based learning, a descriptive transversal study. One hundred thirty-four second-year students conducted the task. The satisfaction scale was administered under PBL implementation. Overall, description by the students 'of the case scenarios as agreeable, effective, pleasant, and varied related to real-life situations. The analyses showed that 55% preferred traditional methodology compared to PBL and 78% enjoyed the new way of teaching. Students' perception of learning by using PBL methodology showed a high level of encouragement, motivation, and joy related to the material, the tutorial process, the instructor, and the student's role, whereas the assignment 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 pre-post-test study about the performance of PBL. This study examines the association between students' degree of satisfaction and the effectiveness of PBL. Convenient sample methods were conducted, and ninety-four third-year students were admired to take place in the study. The information was analyzed using a paired t-test. The outcomes showed significant differences in pre-test and post-test scores $t(93) = -13.70$, $p < 0.001$, also the student's demonstrated degree of satisfaction towards PBL and association with the achievement of PBL.

Dorri et al. (2020) also did a study on experience of learning strategy accepted in nursing care of community adults with a course load of three hundred hours per semester offered in the bachelors of nursing to an average of 40 to 50 students per semester. The study aimed to provide students with scientific organized knowledge about nursing care of adults in community health with medical and surgical situations; each case study was developed over three days, having two times of discussions between big and small groups. The big group discussed the identification, organization, and prioritization of the problems, but small group looked to resolve and evaluate the learning problems. The class was divided to carry out the case studies so the learning problems resolves takes place, incorporating with 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 problem solving. Every group sent their tasks for discussion forums by using online method, and their responses to the case studies were adequately designated. (Dorri et al. ,2020)

Khoiriyah and Husamah (2018) discussed quantitative case studies of PBL, intellectual thinking abilities, solving problems, and outcomes from learning. The problem-solving thinking capabilities details were obtained from the student's assessment workflow sheet, the creative thinking abilities information was identified from conducting grade style, and outcomes from learning were obtained by writing test. The results show that PBL increases the estimation of practicing in solving problems by 27% with an achievement rate of 47%, the average of creative thinking abilities of 11% with an achievement rate of 17.5%, and the average result of the learning of 13% with the achievement rate of 15%.

Kaddoura (2011b) also, discussed 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. 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 showed that the CCTST grades for the students in the PBL course were greater than lecture-based learning (LBL). The mean of the LBL team 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 each subdivision, with those of the PBL much higher. The PBL students performed better in the total and subdivisions like analysis, evaluation, inference, deduction, and induction than the LBL. The T-test was analyzed for significance in the differences of the CCTST and the scores between the teams in the study. The T-test results showed significance for the total CCTST in the PBL courses. The analyses indicate that the PBL participants can have more critical thinking ability 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 ($t = 3.94$, $df = 101$, < 0.001; and deduction ($t = 5.95$, $df = 101$, $p < 0.001$).

Furthermore, Gonzalez et al. (2020b) conducted a randomized control study; the participants were nursing students that intended and randomly placed into eight groups based on thinking abilities, group A – persistence, group B – elasticity, group C – trust and faith, group D – imaginations, group E – curious and prying, group F – reasoning, group G – investigations and group H – intuition. 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 goal. When completing all stages, then a simple evaluation must be filled out and completed to identify their discernment of the effectiveness of the evaluation and intervention. (Gonzalez et al., 2020b)

The quantitative portion results showed no difference in the KCTIT between participated in the intervention and those 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 who participated ($M = 67.88$, $SD = 5.99$) were statistically the same. (Gonzalez et al., 2020b)

On the other hand, the qualitative coding results of the study, 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. (Gonzalez et al., 2020b)

The students perceived the fair skills intervention as an easy way, non-threatening learning environmental surroundings because of the joyful environment, specifically in contrast with different educational styles encountered in the nursing educational program. A safe and powerful atmosphere of the skills fair evaluation intervention permits students to learn in the absence of anxiety and stress. (Gonzalez et al., 2020b, A Brunt ,2005)

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

Table 1: Summary of research study results:

Author and Year	Type of research study	Samples	Methodology of research study	Result of research
Jamshidi, Hemmati Maslakpak, and Parizad (2021)	randomized, controlled trial	78 fourth-year nursing students in two groups	study taking cases to solve patients' issues; control group and experimental group providing learning materials about using the PBL method.	The result showed that the dissimilarity in the results of knowledge, and practice related to patient well-being which was significant between the teams after the PBL educational sessions ($p = 0.001$).
Dorri et al. (2020)	experience of a learning strategy in nursing care of community adults with a course load of three hundred hours per semester.	40 to 50 nursing students per semester	case study 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 small groups looked to resolve and evaluate the learning problems.	their responses to the case studies were adequately designated. The development of case studies considered health care requirements nursing as an assisting and helping method and social aspects of hospitalized individuals.
Gonzalez et al. (2020b)	randomized control study	the participants were nursing students	randomly placed into eight groups based on thinking abilities group A – persistence, group B – elasticity, group C – trust and faith, group D – imaginations, group E – curious and prying, group F – reasoning, group G – investigations and group H – intuition. The participants were rotated between the groups discussing topics related to the fundamental health subject	The quantitative portion results showed no difference in the KCTIT between participated in the intervention and those 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 who participated ($M = 67.88$, $SD = 5.99$) were statistically the same.
Gonzalez et al. (2020b)	Qualitative research	the participants were nursing students	randomly placed into eight groups based on thinking abilities group A – persistence, group B – elasticity, group C – trust and faith, group D – imaginations, group E – curious and prying, group F – reasoning, group G – investigations and group H – intuition. The participants were rotated between the groups discussing topics related to the fundamental health subject	the qualitative coding results of the study, 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.
Khoiriyah and Husamah (2018)	quantitative case studies of PBL, intellectual thinking abilities, solving problems, and outcomes from learning..	Nursing students	The problem-solving thinking capabilities details were obtained from the student assessment workflow sheet, the creative thinking abilities information was identified from conducting grade style, and outcomes from learning were obtained by writing test	The results show that PBL increases the estimation of practicing in solving problems by 27% with an achievement rate of 47%, the average of creative thinking abilities of 11% with an achievement rate of 17.5%, and the average result of the learning of 13% with the achievement rate of 15%.
González Hernando et al. (2014)	A descriptive transversal study	One hundred thirty-four second-year students conducted the task.	The satisfaction scale was administered under PBL implementation Overall, description by the students 'of the case scenarios as agreeable, effective, pleasant, and varied related to real-life situations..	The analyses showed that 55% preferred traditional methodology compared to PBL and 78% enjoyed the new way of teaching. Students' perception of learning by using PBL methodology showed a high level of encouragement, motivation, and joy related to the material, the tutorial

				process, the instructor, and the student's role, whereas the assignment time and the major workload were the least satisfactory for them.
Hamdan et al. (2014)	quasi-experimental pre-tests and post-test studies about performance of PBL	ninety-four third-year students	This study examines the association between students' degree of satisfaction with PBL and the effectiveness of PBL. Convenient sample methods were conducted,	Result showed significant differences in pre-test and post-test scores $t(93) = -13.70$, $p < 0.001$, also the student's demonstrated degree of satisfaction towards PBL is associated and integrated with the achievement of PBL.
Kaddoura (2011b)	comparative descriptive study	one hundred three students; 65 participants from the PBL course and the remaining 38 participants from the lecture-based learning (LBL)course	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 showed that the CCTST grades for the students in the PBL course were greater than lecture-based learning (LBL). The mean of the LBL team was 10.11 with 3.15 of an SD, and the mean was 14.45 for the PBL with an SD of 2.80.
Mogale, (2001)	Qualitative, exploratory, descriptive study	First year nursing students	Study done by phases of implantation of problem-based learning till formulating guidelines for tutors to guide students. The data from phases one, two, and three were used to implement problem-based case study guidelines.	the result showed that in phases one, two, and three, students can use PBL by answering questions related to experience, and there were positive perceptions. So, in phase four, the author encouraged to utilize and implement problem-based learning in the study with a guideline.

Note: This table explaining about the research studies discussing PBL and all the studies supported the importance of application of PBL in nursing education.

Discussion:

The result of this study showed that most of the research studies supported that the application of PBL is effective on undergraduate nursing students, and students can solve patients' problems in a better style by using PBL method. According to many research studies that discussed PBL in nursing education, students got better understanding and solve patient's issues systematically. Also, my research studies aimed that the students effectively apply problem-based-based learning and can solve patient's health issues safely and professionally.

Gonzalez et al. (2020b) discussed that despite the quantitative research appeared no uniformity in the KCTIT scores during the discussion, some students 'allotted this 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. 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 helping them to develop different thinking domains. The final analyses supported Khoiriyah and Husamah (2018) 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 (Papathanasiou et al., 2014: A Brunt, 2005).

The final view from many types of research studies that students who have been in the nursing field and have the basic skills in 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 (2011b).

Moreover, the discussion takes place with the nursing program curriculum that at the time of data collection, the students who were never exposed to PBL throughout their learning and education may face difficulties when they will start their future careers and performing patient care. (Kaddoura, 2011b; Dorri et al. 2020). This could propose that PBL might be a good approach in comparison with a traditional method of delivering knowledge and education to the students, so it's motivation for all instructors and educators through guiding nursing students can improve CT skills by applying PBL in the practical and clinical areas. (Papathanasiou et al., 2014; Kaddoura, 2011b). These researchers agreed that PBL is the most suitable, accurate, and good way to improve students' CT abilities by using PBL methods.

Also, Dorri et al. (2020) explained that students with different learning methodologies in classes could recognize differences. Students who got high marks on PBL can produce unexpected and innovative ideas than the control group. The highest participation scores on PBL showed that students can create a large number of arguments and logical explanations in problem-solving situations and scenario responses. 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 (Dorri et al. ,2020).

PBL enhances the ability of problem-solving approaches and increases the capability of communication and social skills. PBL contributes well to improving aspects of health science attitudes and practices. (Khoiriyah and Husamah, 2018; Shin and Kim, 2013)

Hence, Hamdan et al., (2014) suggested that teaching and learning need to encourage a new instructional methodology in nursing program. Powerful knowledge in nursing practice includes prioritizing actions to be taken that will enhance positive patient results from the service (Hamdan et al., 2014). Administering scenarios to the students and real problem-based cases via PBL requires to apply thinking skills for prioritizing actions and make an appropriate clinical decision, therefore can contribute to a good clinical performance decisions. (Papathanasiou et al., 2014). Students must understand their function as competent professional nurses who will be future care providers that need a powerful knowledge based and the capability to associate and coordinate these knowledge into clinical practice. Nursing programs must contain certain criteria that require nursing students to be independent, self-directed learners to finish the program with a commitment to life-long learning. Also, this can enhance the students toward using PBL methodology by initiation of critical thinking, learning abilities, creativity in knowledge, research skills, personal growth, and neurodevelopmental dimensions that can empower them during performance in the hospitals and community settings. (Hamdan et al., 2014).

Conclusion:

This study identified and explored the effect of problem-based learning in nursing learning and education. Problem-based learning is the core and essential learning and understanding in nursing education, and the students must understand how to use it, especially in the clinical training areas. (Khoiriyah and Husamah, 2018; Shin and Kim, 2013).

The nursing diagnosis process is highly used in nursing education for improving students' theoretical knowledge, understanding application, and integration of nursing concepts in the nursing care plan that will enhance students' performance during the care provided in the clinical settings (Hamdan et al., 2014). Nurse tutors and instructors must focus on application and using intellectual abilities using critical thinking in the nursing diagnosis process in clinical areas to promote intellectual thinking during the problem-based learning steps (Dorri et al. ,2020).

Recommendations:

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

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