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Implementation of Problem Based Method to Improve Students' Critical Thinking In Learning Medical Surgical Nursing I

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Abstract – This research aims to improve critical thinking skills and learning outcomes in Learning Medical Surgical Nursing I learning material on physiological changes with or without organ structure disorders through the application of the Problem-Based Learning (PBL) model. This research was classroom action research. The research subject was Akper Kesdam I/BB Padang semester III of the 2022/2023 academic year. Data collection used the observation method with checklist instruments and performance tests. The subjects of this research were third semester students with a total of 39 students. The results of this research showed that students' critical thinking becomes better through the application of the Problem Based Method and their grades improve. The conclusion in cycle I was that the critical thinking skills aspect of students was still lacking and the increase in grades has not been significant, seen from the total achievement score of 68.4%. Based on these results, improvements and improvements need to be made in the implementation of PBL in the implementation of cycle II. The results of the implementation of cycle II in the aspect of critical thinking skills showed improvement. Obtaining a score of 583 from a supposed score of 729, the percentage of students' critical thinking skills was 80.4%. Based on the score obtained above, it showed that the success criteria have been achieved. The assessment results show increased assessment in aspects that were previously lacking. Based on data recapitulation, the highest value was 88.28, the lowest value was 82.65, the average value was 83.2. The number of students who achieved the minimum completeness criteria score was 38 out of 39 students (97.43%).

Keywords: Problem-Based Learning (PBL) model, Critical thinking, learning outcomes

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1. INTRODUCTION

Education is an important aspect in facing the era of globalization which is full of challenges and changes, with education it is hoped that it can form the character of the nation's future generations who are innovative, skilled and creative. To develop students' creativity, in the learning process the ability to think critically is one of the important things, because by thinking critically students will use the potential of their minds to the maximum to solve problems they face in everyday life. Apart from that, critical thinking is also important for students to reflect on themselves so that students get used to being trained to think. Critical thinking abilities will emerge in students if during the learning process in the classroom, lecturers build interaction and communication patterns that place more emphasis on the process of actively forming knowledge by students. The more frequently the lecturer provides feedback to students, the more students' abilities will develop in asking questions, arguing, and answering questions from the lecturer (Darmawan, 2010). According to Tamarli (2017), the more often students are trained to think critically during the learning process in class, the more students' knowledge and experience will increase in solving problems inside and outside the classroom. Therefore, it is the duty of lecturers to be able to improve critical thinking skills in the learning process they lead. To provide critical thinking skills to students, it is not taught specifically as a subject. However, in every subject taught by lecturers, critical thinking skills should have a primary place. Because by thinking critically, you can grow and improve understanding. Sulistiani and Masrukan (2016) stated that students' understanding, understanding and skills in solving problems in their daily lives. So, here lecturers need to continue to explore students' thinking abilities, considering that critical thinking skills are very necessary for students in the learning process. Medical Surgical Nursing I is a course that discusses health problems that commonly occur in adults, both acute and chronic, which include disorders of body function in the respiratory, cardiovascular, digestive and sensory systems with various pathological causes such as inflammation/infection, congenital, neoplasm. and trauma. Students will receive material about the medical-surgical nursing perspective so that they understand the role and function of a nurse in the field of medical-surgical nursing. The learning process is focused on discussions and lectures in class and practical learning experiences in the laboratory. Individual and group assignments in the form of seminars and reporting on practicums.

Learning activities at universities are general educational activities that will lead students to a better situation. Education at universities cannot be separated from the role of lecturers as facilitators in delivering material. The professionalism of a lecturer is needed to create an atmosphere for an efficient and effective teaching and learning process in developing students with diverse abilities. Learning is basically an interaction between students and their environment, so that changes in behavior occur for the better (Wahyuningsih, 2009). Furthermore, learning activities at universities today focus more not only on achieving high quality learning outcomes but also improving critical thinking skills. Producing high quality learning outcomes is one of the educational goals implemented at Akper Kesdam I/BB Padang. The learning process refers to what UNESCO recommends that the learning model that is really needed in vocational education should be learning to know, learning to do, learning to be, and learning to live together, so

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students must be empowered so they can enrich their learning experience (learning to do). All of these things can be done with a process of acquiring knowledge that is carried out consciously and is obtained based on findings experienced by students (inquiry learning). The acquisition of knowledge that occurs based on students' learning experiences means that knowledge is not just obtained but can be used throughout life (long life study). Students' interaction with the environment requires them to understand knowledge about the surrounding environment (learning to know) so that students can build their identity (learning to be). The ability to interact with a variety of individuals or groups will shape students' personalities to respond positively (learning to live together).

Furthermore, the Medical Surgical Nursing I course discusses the concepts and principles of Medical Surgical nursing to meet the needs of adult clients who experience physiological changes with or without organ structure disorders. The competency that students must achieve in this course is being able to understand the concepts and principles of pre-, peri- and post-operative problems. Students are also expected to understand the concepts of treating clients with shock, malignancy, psychosocial, chronic illness, and rehabilitation programs, as well as appreciate a professional attitude in carrying out treatment. Thus, learning is not enough just to memorize ready-made facts and concepts, but it is also required to discover these facts and concepts through developing thinking and problem-solving abilities. Through learning, students are actively involved in exploring nature.

Medical Surgical Nursing learning at Akper Kesdam I/BB Padang is carried out in the form of team teaching taught by several lecturers and then the learning results are an accumulation of several lecturers. Based on data on student learning outcomes in the academic field, of the 39 students, 4.68% had an A grade in the Medical Surgical Nursing I subject and 37.5% had a B grade, while 57.81% had a C grade. Based on this data, it can be concluded that more than 50% of students are categorized as having low knowledge in this course. Based on the results of lecturer analysis and interviews with students who got high scores, information was obtained that the cause of students' low knowledge was due to several things, one of which was the learning method applied in the learning process. The learning method used is basically to make students become independent learners, namely learning from their own abilities, but without realizing it, students' heterogeneous abilities make this kind of learning process only effective for a small number of students.

From the facts above, it can be concluded that in implementing learning methods, lecturers must be able to analyze students' conditions so that the method can work and produce maximum learning results. Learning methods are one very important component in the learning system. Without a learning method, the learning process will not be able to take place optimally because learning methods are an integral component of the learning system. In terms of improving the quality of learning, educators must be able to find learning strategies or approaches that are effective, enjoyable and empower students' potential. Next, learning methods are described into learning techniques and styles. Thus, learning techniques can be interpreted as the way a person implements a specific method. For example, using the lecture method in a class with a relatively large number of students requires its own technique, which of course will technically be

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different from using the lecture method in a class with a limited number of students. Likewise, when using the discussion method, it is necessary to use different techniques in classes where the students are classified as active compared to classes where the students are classified as passive.

Talking about methods, Strobel, J., & van Barneveld, A. (2019) state that a method is a way that has been arranged and thought well to achieve a purpose in science. Meanwhile, learning methods can be interpreted as the methods used to implement plans that have been prepared in the form of real and practical activities to achieve learning goals. To be able to build critical thinking skills, teachers can provide learning experiences by designing the learning process. Lecturers design learning by providing problems that involve students' thinking skills and involve an analysis process based on actual problems. One learning model that can be applied is Problem Based Learning (PBL) or problem-based learning. According to Wijnen, et.al (2017) stated that PBL emphasizes learning as a process that involves problem solving and critical thinking in real contexts. Wijnen further stated that PBL provides opportunities for students to learn broader things that focus on preparing students to become active and responsible citizens. Through PBL students gain experience in dealing with realistic problems, and emphasize the use of communication, collaboration, and existing resources to formulate ideas and develop reasoning skills. The research results of Hung, W. (2016) state that the PBL model can improve student learning outcomes in cognitive, affective and psychomotor aspects. The research results of Oon-Seng Tan (2008) stated that PBL can lead students to solve life problems through the process of discovering, learning and thinking independently. Looking at the characteristics of PBL, this learning model is suitable if applied to KMB learning. I. Wang (2017) revealed that in critical thinking there are skills to apply, analyze, synthesize, evaluate the information obtained and generalize the results obtained from observation, experience, reflection, reasoning , or communication. Critical thinking is not necessarily inherent in a person from birth. However, critical thinking is a skill that can be developed through students' direct experience in dealing with problems. So, if students are accustomed to using the skills above, critical thinking skills will be able to develop. The task of lecturers in order to improve students' critical thinking skills is to provide a learning environment that can encourage students to use thinking skills. The PBL learning model is a learning model that can provide a learning environment that supports critical thinking. PBL is based on problematic and confusing situations so that it will arouse students' curiosity so that students are interested in investigating the problem. When students carry out investigations, students use critical thinking stages to investigate problems, analyze based on evidence and make decisions based on the results of the investigation.

In the results of research from Alsaleh (2020), according to lecturers' perceptions, the learning models that are seen to be able to contribute to developing critical thinking skills are contextual learning, problem-based learning (PBL) models, problem solving models, community science and technology models, learning cycle models and learning models. portfolio assessment based. Solomon (2020), states that there is a positive relationship between the application of PBL and the critical thinking skills of nursing students. But it needs to be tightened in the use of PBL to evaluate critical thinking.

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Problem Based Learning is a set of teaching models that use problems as a focus for developing problem solving, material and self-regulation skills (Razak, et. al, 2022). PBL is a learning approach that uses real world problems as a context for students to learn critical thinking and problem solving skills, as well as to gain essential knowledge and concepts from the subject matter. PBL is learning based on cognitive theory which includes constructivist learning theory. According to constructivism theory, thinking and problem solving skills can be developed if students do it themselves, discover and transfer the complexity of existing knowledge. Anita Woolfolk (2007:352) says "The goals of problem based learning are to help students develop flexible knowl- edge that can be applied in many situations, in contrast to inert knowledge. ....other goals of problem based learning are to enhance intrinsic motivation and skills in problem solving, collaboration, and self directed lifelong learning".

According to Arends (2008:55), there are 5 steps in implementing PBL, namely (1) orienting students to the problem; (2) organizing students to research; (3) assisting independent and group investigations; (4) develop and present work results; (5) analyzing and evaluating the problem solving process. The problems used in PBL are problems faced in the real world. Even though individual abilities are required for each student, in the learning process in PBL students study in groups to understand the problems they face. Then students study individually to obtain additional information related to problem solving. The teacher's role in PBL is as a facilitator in the learning process. The relationship between PBL and Learning Outcomes (Gao, et.al, 2022), states that the PBL model has a positive impact on student academic achievement and student attitudes towards science. In implementing PBL in health schools, PBL has a positive impact on nursing competency in social and cognitive dimensions (Gerald Choon-Huat Koh, Hoon Eng Khoo, Mee Lian Wong & David Koh, 2008). In research conducted by Hasrul Bakri (2009), it shows that the application of PBL in nursing in practical learning can increase students' interest and practical abilities in understanding the physiology of the human body. Research by Ade Gafar Abdullah and Taufik Ridwan (2008) states that in implementing PBL there is an increase in student learning outcomes.

2. METHODOLOGY

The research method used was classroom action research (PTK). The PTK design in this research uses the model proposed by Kemmis and Mc Taggart (Mc Taggart, 1983: 4), which consists of 4 stages, namely planning, implementation, observation and reflection. The PTK model is spiral shaped and sustainable. If the target results of the actions taken have not been achieved then it continues with the next cycle. Kemmis and Mc Taggart model PTK design. This research involved a collaborator, namely a KMB II lecturer. Collaborators were tasked with assisting researchers in implementing PBL learning and observing students during learning. This research procedure, in one cycle consists of 4 stages, namely planning, implementation, observation and reflection. At this planning stage, an action plan was prepared to improve critical thinking skills and student learning outcomes through the application of the PBL model. Action planning consists of preparing a PBL learning schedule, lesson plans, PBL learning tools, preparing practical equipment and materials, learning media used, socializing PBL learning to students and

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preparing research instruments. At this stage the researcher carried out the planned learning. Lecturers carried out learning in collaboration with collaborators in implementing the PBL model. In PBL there are 5 phases that must be carried out depending on the activities of lecturers and students. The details are presented in table 1.

Table 1 PBL Phases

Phases of PBL	Lecturer's action
Phase 1 Provide orientation about the problem to students	Lecturers discuss learning objectives, describe important logistical requirements, and motivate students to engage in problem-solving activities
Phase 2 Organizing students to research	Lecturers help students to define and organize learning tasks related to their problems
Phase 3 Assist with independent and group investigations	Lecturers encourage students to get the right information, carry out experiments, and look for explanations and solutions
Phase 4 Develop and present artifacts/exhibits	Lecturers help students in planning and preparing appropriate artifacts such as reports, video recordings, and models that help them to convey them to others.
Phase 5 Analyze and evaluate the problem solving process	Lecturers help students to reflect on their investigations and the processes they use.

The observation stage was carried out by researchers in collaboration with collaborators to observe directly during the learning process. Researcher acted as lecturers assisted by collaborators. The observation aimed to determine whether or not there are changes that occur with the implementation of the actions being implemented, namely the implementation of the PBL model. The action reflection stage was evaluating the results of implementing the action. Reflection was based on data collected in the form of observations and assessments. The results of the reflection were used as a basis for determining whether or not to carry out action in the next cycle. The data obtained in this research was quantitative data in the form of observations of lecturers' and students' activities in PBL, students' critical thinking skills, and students' learning outcomes on physiological changes with or without organ structure disorders. The data collection technique used was observation using checklist instruments and performance tests. Class action research is case research in a class whose results are not to be generalized, so data analysis is sufficient to describe the collected data. The statistical technique used is descriptive statistics. Each research variable is analyzed with reference to established criteria.

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3. RESULTS

The procedure for research carried out using classroom action research procedures from Kemmis and Mc Taggart (1995) consists of the stages of planning, implementation, observation and reflection. At each stage of the activity, researchers always work together with collaborators, namely Medical Surgical Nursing lecturers. Collaborators act as a team in learning with PBL and also assist in classroom observation activities. The classroom action research that was carried out consisted of 2 cycles. The action provided is in the form of applying the PBL model in the process of learning material on physiological changes with or without organ structure disorders. PBL learning is carried out through 5 phases consisting of (1) Phase 1: Providing orientation about problems to students; (2) Phase2: Organizing students to research; (3) Phase3: Assisting independent and group investigations; (4) Phase 4: Develop and present work results; and (5) Phase 5: Analyze and evaluate the problem solving process. In PBL learning, students are divided into 6 groups and each group consists of 5 students who have different academic abilities. Each group was given one problem related to physiological changes with or without organ structure disorders to be solved through the stages of PBL. The results of the analysis in cases of physiological changes with or without organ structure disorders are presented in a problem solving sheet and presented. Below is presented the research data

a. Cycle I

1) Lecturer's Activities in PBL

Lecturer activity data is obtained by observation during learning. The data is presented in table 2. Based on table 2, the score obtained for lecturer activities is 16 from the score that should be 16. This shows that lecturer activities in PBL have been maximized.

Table 2. Lecturer's activities cycle I

No	Indicators	Number of items	Score
1	Provide orientation about problems to students	4	4
2	Organizing students to research	3	3
3	Assist with independent and group investigations	5	5
4	Develop and present the results of thoughts	2	2
5	Analyze and evaluate the problem solving process.	2	2
	Total	**16**	**16**

2) Student activities in PBL

Table 3. Cycle I student activity observation data

No	Indicators	Number of items	Score
1	Learn in a group environment	1	26
2	Collaborate in defining the problem of physiological changes with or without organ structure disorders	2	46

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3	Involved in experiments to solve the problem of physiological changes with or without organ structure disorders	1	20
4	Looking for the right information	2	36
5	Make conclusions	2	32
6	Prepare reports and presentations	1	22
7	Presenting experimental results	1	12
	Total	**10**	**194**

Data on students' activities in PBL is presented in table 3. Based on table 3 above, the student activity score is 194 from a score that should be 390. The percentage of student activity score in implementing PBL is 49.74%. This percentage shows that student activities in implementing PBL have not run optimally. The table shows that the score for each indicator has not reached the target, so it can be concluded that learning has not taken place optimally. The activity scores obtained for each student in PBL are presented in Table 4.

Table 4. Categories of Student Activities in PBL Cycle I

Students' score	Category	Frequency	Frequency relative %
X ≥ 6,7	Very High	12	30.76%
6,7 > X ≥ 5	High	11	28.20%
5 > X ≥ 3,3	Low	11	28.20%
X< 3,3	Very low	5	12.82%
Total		39	100%

Based on table 4, it can be analyzed that student activity in PBL in the very high category is 30.76% (12), in the high category 28.20% (11), in the low category 28.20% (11) and in the very low category 12.82% (5). So it can be concluded that students who have implemented PBL well or are in the high category are 23 students (58.97%). These results indicate that the implementation of PBL has not been running optimally so it needs to be improved.

3) Students' critical thinking skills result

The result of students' critical thinking skills can be seen on following table:

Table 5. Students' Critical Thinking Skills Data for Cycle I

No	Indicators	Number of items	Score
1	The questions are clear, careful and accurate regarding the problem of physiological changes with or without organ	2	41

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	structure disorders		
2	Collect, investigate, assess and process relevant and valuable information	8	118
3	Reflective thinking/analogy	3	79
4	Make logical (reasonable), broad and deep conclusions	3	52
5	Open minded	5	98
6	Able to communicate the results of thoughts, solutions to problems and suggestions	4	53
	Total	**24**	**441**

Data from observations of students' critical thinking skills in cycle I are presented in table 5. The critical thinking skills score was 441 from the supposed score of 729, the percentage of students' critical thinking skills was 60.49%. These data show that the achievement of the critical thinking skills indicator score does not meet the criteria set at 80%. Students' critical thinking skills are categorized into 4 categories, namely very high, high, low and very low. Categories of students' critical thinking skills are presented in table 6.

Table 6. Category of Critical Thinking Skills for Cycle I Students

Students' score	Category	Frequency	Frequency Relative %
X ≥16,7	Very High	16	41.02%
16,7 > X ≥ 12,5	High	14	35.89%
12,5 > X ≥ 8,3	Low	9	23.07%
X < 8,3	Very low	0	0
Total		**39**	**100%**

Table 6 data shows that students' critical thinking skills are in the very high category, namely 16 students (41.02%), in the high category 14 students (35.89%), in the low category, namely 9 students (23.07%) and in the very low category, namely 0 students (0%). The success criteria that have been determined in this research are 35.89% or 14 students in the high category. From the table data, 16 students are included in the very high and high critical thinking skills category, namely 14 students or 69%, so it can be concluded that in the first cycle critical thinking skills have not been achieved. It is necessary to improve the aspects of critical thinking skills above.

4) Student learning outcomes

Data on student learning outcomes are the results of performance assessments. The aspects assessed consist of preparation aspects, work process aspects, work results, work attitudes and time. The highest score was 89.65, the lowest score was 50.50 and the average score was 78.16. Based on the data above, the number of students who completed the KKM was 20 students (51.28%) while the number of students who had not completed the KKM was 19 students (48.71%). In this research, learning with PBL is said to be successful if the success indicator has been achieved, namely 80% of

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students have completed the KKM. The data above shows that students have completed the KKM (68.97%) so there needs to be improvement and improvement in learning and this improvement is carried out in cycle II.

b. Cycle II

1) Lecturer activities in PBL

Lecturer activity data in cycle II is presented in table 7. Table 7 shows the teacher's activities in implementing PBL. The score obtained was 16 out of a score that should have been 16. In implementing learning cycle II, lecturers have implemented all phases of PBL.

Table 7. Lecturer's Activities in cycle II

No	Indicators	Number of items	Score
1	Provide orientation about problems to students	4	4
2	Organizing students to research	3	3
3	Assist with independent and group investigations	5	5
4	Develop and present the results of thoughts	2	2
5	Analyze and evaluate the problem solving process.	2	2
	Total	**16**	**16**

Lecturer activity data is obtained by observation during learning. The data is presented in table 2. Based on table 2, the score obtained for lecturer activities is 16 from the score that should be 16. This shows that lecturer activities in PBL have been maximized.

2) Students' Activities in PBL of Cycle II

Table 8. Cycle II students' activities observation data

No	Indicators	Number of items	Score of Cycle I	Score of Cycle II
1	Learn in a group environment	1	26	32
2	Collaborate in defining the problem of physiological changes with or without organ structure disorders	2	46	72
3	Involved in experiments to solve the problem of physiological changes with or without organ structure disorders	1	20	36
4	Looking for the right information	2	36	62
5	Make conclusions	2	32	64
6	Prepare reports and presentations	1	22	32
7	Presenting experimental results	1	12	31
	Total	**10**	**194**	330

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The student activity score obtained in PBL was 330 from the supposed score of 390. The percentage of student activity score in implementing PBL was 84.61%. This percentage shows that student activity in implementing PBL has improved better than cycle I. Table 8 shows that student activity in PBL learning has shown an increase from cycle I. The score achievement for each student is categorized in Table 9.

Table 9. Categories of Student Activities in PBL Cycle I

Students' score	Category	Frequency	Frequency relative %
X ≥ 6,7	Very High	24	61,53%
6,7 > X ≥ 5	High	15	38,46%
5 > X ≥ 3,3	Low	0	0%
X< 3,3	Very low	0	0%

Table 9 shows that student activity in PBL was in the very high category as many as 24 students (61.53%) and in the high category as many as 15 students (38.46%). In the implementation of cycle II, there were no students included in the low and very low categories.

3) Cycle II students' critical thinking skills

The score for critical thinking skills in cycle II has increased, as can be seen in table 10 below.

Table 10. Students' Critical Thinking Skills Data for Cycle II

No	Indicators	Number of items	Score of cycle I	Score of cycle II
1	The questions are clear, careful and accurate regarding the problem of physiological changes with or without organ structure disorders	2	41	47
2	Collect, investigate, assess and process relevant and valuable information	8	118	174
3	Reflective thinking/analogy	3	79	80
4	Make logical (reasonable), broad and deep conclusions	3	52	65
5	Open minded	5	98	133
6	Able to communicate the results of thoughts, solutions to problems and suggestions	4	53	84
	Total	**25**	**441**	**583**

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Based on table 10, the critical thinking skills score obtained was 583 from the supposed score of 725, the percentage of students' critical thinking skills score was 80.4%. This data shows that the critical thinking skills indicator score has met the criteria, namely 80%. The achievement of each student's critical thinking skills score in session II is then presented in table 11.

Table 11. Category of Students' Critical Thinking Skills for Cycle II

Students' score	Category	Frequency	Frequency Relative %
X ≥16,7	Very High	20	51.28%
16,7 > X ≥ 12,5	High	18	46.15%
12,5 > X ≥ 8,3	Low	1	2,5%
X < 8,3	Very low	0	0
Total		**39**	**100%**

4) Cycle II Learning Outcomes

In cycle II, the highest score was 88.18, the lowest score was 78.38 and the average score was 83.2. Based on the data above, the number of students who completed the KKM was 39 students (100%). In this research, learning with PBL is said to be successful if the success indicator has been achieved, namely 80% of students have completed the KKM. This data shows that the success indicators have been met

Implementation of the problem-based learning model in learning material on physiological changes with or without organ structure disorders. The application of learning using PBL in the matter of physiological changes with or without organ structure disturbance during action research can be said to have run smoothly. The results obtained show that the application of the PBL model in improving critical thinking skills and learning outcomes goes well through improvements in each cycle and can achieve learning objectives. Learning is carried out in two cycles where each cycle consists of five PBL phases. Learning begins with the lecturer explaining the objectives of implementing learning using the PBL model, explaining the tools needed in PBL and the activities that will be carried out by the lecturer and students. The lecturer divides the class into 6 groups. Each group was given the problem of physiological changes with or without disorders of different organ structures. Each group must determine for themselves what learning tasks are needed in order to solve the problem of physiological changes with or without organ structure disorders and also determine what equipment and materials are needed to solve the problem. In this learning, the researcher acts as a lecturer and is assisted by a lecturer who acts as a collaborator. The main role of lecturers in PBL is as a facilitator.

Students learn in a group environment to carry out analysis of the problem of physiological changes with or without organ structure disorders. Each group conducts an investigation into the problem of physiological changes with or without organ structure disturbances starting with identifying symptoms of physiological changes,

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interpreting the symptoms of physiological changes correctly, and formulating the problem of physiological changes with or without organ structure disturbances. In this stage students will learn about various symptoms of organ structure damage, the meaning of symptoms of organ structure damage and steps to resolve them with appropriate nursing care. Students must determine for themselves the problem of changes in organ structure related to physiological changes in their group. The results of the analysis carried out between one group and another are not exactly the same because the problem of physiological changes with or without disruption of the organ structure given really comes from other people who are actually experiencing these problems (real physiological changes). Students must be able to utilize existing reference sources, because each group has been provided with problems of physiological changes with or without organ structure disorders connected to the internet and reference books. So that students gain direct learning experience. PBL learning ends with each group presenting the results of an analysis of the problem of physiological changes with or without organ structure disorders so that other groups can also gain new knowledge from other groups and the possibility of further bad effect on health.

The results of the implementation of cycle I still contain deficiencies in aspects of student activities in PBL that have not yet achieved indicators of success. The lowest indicator of achievement is the activity of presenting experimental results. Students do not dare to express their opinions and thoughts in front of the class. In the activity, it was concluded that student involvement was still lacking, students still relied on other group members if they experienced difficulties and tended to be passive. Indicator 4 relates to students' activeness in using learning resources to solve problems. In this case, students tend to wait for an answer from the lecturer when they have difficulty interpreting the problem of physiological changes with or without organ structure disorders, even though in PBL learning facilities have been provided to access various information, either books or sources on the internet. In indicators 2 and 3, student involvement in the experiment has also not been met. There are still students who are passive and there is still dominance during practice (not evenly distributed).

The reflection results from cycle I show that learning with PBL has not run optimally even though based on observations the role of the lecturer in implementing each step of PBL has been maximized. Therefore, cycle II was designed by revising cycle I. Cycle II was carried out in three meetings. In learning, implementing the five phases of PBL. So that learning is more optimal, the lecturer explains again the objectives of implementing PBL, the activities that will be carried out by teachers and students. To avoid passive students, the teacher encourages each group leader to always involve his group members in every stage of learning. To encourage students who are still passive in learning and presenting, the lecturer appoints students in each group to be the main presenters in the next presentation so that all students play a role in presenting the results of the experiment and all students get the opportunity to express their thoughts. The results of the implementation of cycle II showed better improvement. Indicators of student activity that previously had not been met have

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increased. The achievement of learning with PBL in cycle II obtained a score of 330 from a score that should have been 390, a success percentage of 85.9%. In summary, data on increasing student activity is presented in table 12.

Table 12. Increased students' activities in PBL

No	Indicators	Cycle I	Cycle II
1	Collaborate in defining the problem of physiological changes with or without organ structure disorders	26	32
2	Involved in experiments to solve the problem of physiological changes with or without organ structure disorders	46	72
3	Looking for the right information	20	36
4	Make conclusions	36	62
5	Prepare reports and presentations	32	64
6	Presenting experimental results	22	32
7	Collaborate in defining the problem of physiological changes with or without organ structure disorders	12	31
	Total	194	330

An illustration of the increase in students' activities in PBL can be seen from diagram 1 below:

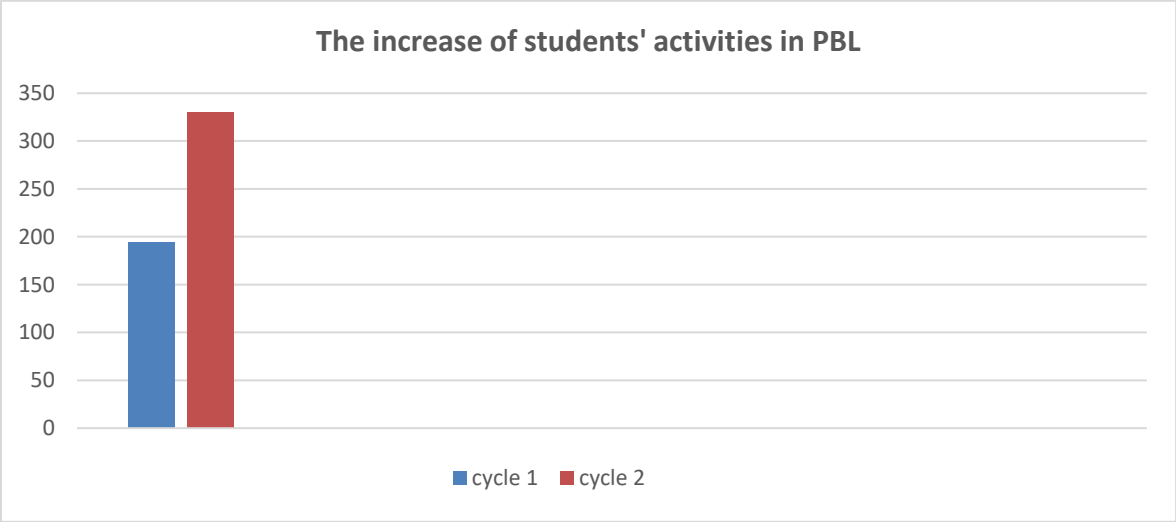

Diagram 1. The increase of students' activities in PBL

The scores obtained by each student in implementing PBL also increased. At the end of cycle II, student activity in implementing PBL was in the high category. Data is shown in table 13.

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Table 13. the increase of students' activities in PBL

Students' score	Category	Cycle I Frequency	Cycle II Frekuency
X ≥ 6,7	Very High	12	24
6,7 > X ≥ 5	High	11	15
5 > X ≥ 3,3	Low	11	0
X< 3,3	Very low	5	0
Total		39	39

Based on table 13 above, it shows that at the end of cycle II, all students had implemented PBL well. This is shown by the achievement of student scores in the high category of 39 students.
An illustration of the increase in student scores in the KMB I course can be seen from diagram 2 below:

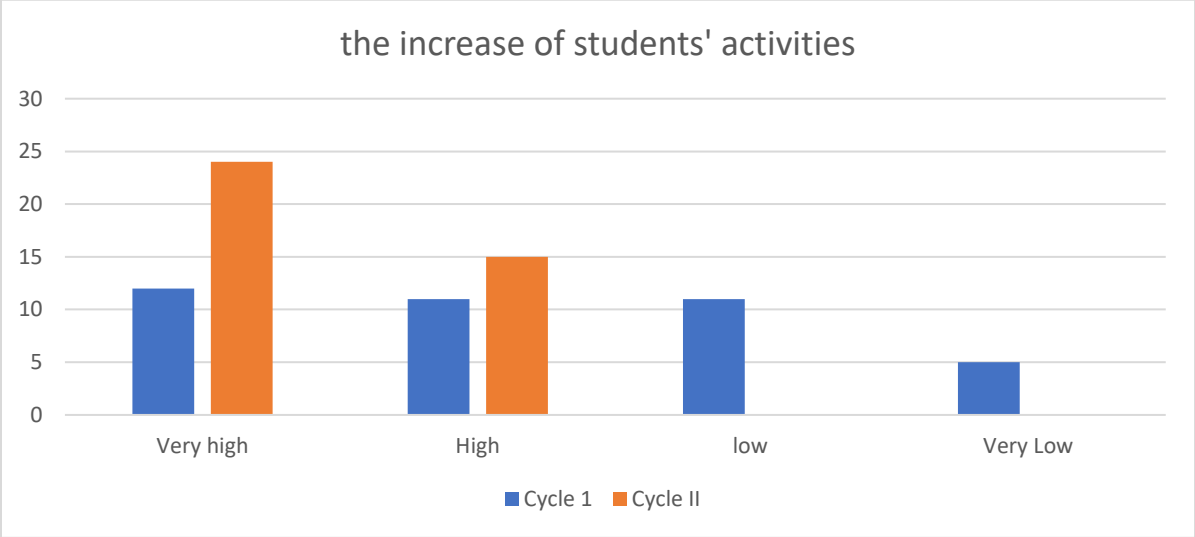

Diagram 2. The increase of students' activities

5) Students' critical thinking skills after implementing the problem-based learning model

Critical thinking skills in this research are skills in using aspects of thinking which consist of 6 indicators, namely Indicator 1. the questions are clear, careful and accurate regarding problems of physiological changes with or without organ structure disorders; indicator 2. collect, investigate, assess and process relevant and valuable information; indicator 3. reflective thinking/analogy; indicator 4. make logical (reasonable), broad and deep conclusions; indicator 5. open minded; indicator 6. able to communicate the results of thoughts, solutions to problems and suggestions. The indicators above are related to the processes studied in the problem of physiological changes with or without organ structure disorders. In order for nursing care solutions to be planned appropriately,

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students must be able to see the problems of physiological changes with or without organ structure disturbances in detail regarding the symptoms of damage accurately, identify them broadly and deeply, and process information on physiological change problems with or without organ structure disturbances correctly. so that appropriate corrective steps can be formulated.

Implementation of PBL to improve critical thinking skills in research cycle I data shows that several indicators are still not met or the score obtained is still lacking. Achievement of indicator 1. clear, careful and accurate questions problems of physiological changes with or without organ structure disorders was 41 (70.7%); indicator 2. collecting, investigating, assessing and processing relevant and valuable information was 159 (68.5%); indicator 3. reflective/analogical thinking was 66 (75.8%); indicator 4. making logical (reasonable), broad and deep conclusions was 52 (59.8%); indicator 5. open minded was 108 (74.5%); and indicator 6. able to communicate the results of thoughts, solutions to problems and suggestions 73 (62.9%). Based on the data above, the score was 499 from the supposed score of 729, the percentage of students' critical thinking skills was 68.4%. This data shows that the achievement of the critical thinking skills indicator score does not meet the criteria, namely 80%. Judging from the scores obtained by each student, students' critical thinking skills are in the very high category, namely 16 students (55%), in the high category, 4 students (14%), in the low category, namely 9 students (31%) and in the very low category, namely 0. students (0%). The success criteria that have been determined in this research are 80% or 23 students in the high category. It can be concluded that in the first cycle the success criteria for critical thinking skills had not been achieved.

Critical thinking skills applied in learning material on physiological change problems with or without organ structure disturbances actually help students in solving problems of physiological changes with or without organ structure disturbances. To be able to formulate corrective solutions and conclusions, it must begin by identifying by asking the right questions such as: what pathophysiological aspects can be analyzed?; Are there many abnormalities?; and other questions that lead to appropriate investigations. Starting from the right questions asked will be a guide for students in carrying out the next steps of the investigation. In the implementation of the observation data, it shows that in starting the analysis of the problem of physiological changes with or without organ structure disorders, students have not been able to ask the right questions and have not been able to identify them in depth. Furthermore, in terms of the indicators of collecting, investigating, assessing and processing relevant and valuable information, students have not been able to accurately assess the information on the problem of physiological changes with or without organ structure disorders that arise because there was an initial error in the identification process so that the information obtained was not correct. What is no less important as an indicator of critical thinking skills is that students are able to communicate the results of their thoughts, solutions to problems of physiological changes with or without disruption of the organ structures that have been obtained. On this indicator, the score achieved is still relatively low. Students still do not dare to express their thoughts in front of other people, because they are worried about making mistakes. The conclusion in cycle I is that the critical thinking skills aspect of students is still lacking,

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seen from the total achievement score of 68.4%. Based on these results, improvements and improvements need to be made in the implementation of PBL in the implementation of cycle II. Implementation in cycle II, lecturers focus on increasing the achievement of the indicators above but still improving the indicators that have been met.

In implementing cycle II, lecturers and collaborators increased their role as facilitators. The lecturer helps groups who are having difficulty by asking questions that can stimulate other investigative processes. Give an example of how to logically link the presence of symptoms of physiological changes with or without organ structure disorders with the continuation of other investigations. Through this, students are encouraged to use skills in logically linking existing damage symptoms. Apart from that, if there are students or groups who ask questions or experience difficulties, the lecturer directs the students to look for appropriate reference sources and assists them in the search. Furthermore, so that all students are involved in communicating the results of their thoughts, during the presentation the teacher asks questions to encourage students who are not yet active to be able to communicate and explain the results of their thoughts regarding the analysis of the problem of physiological changes with or without disruption of the organ structure that has been carried out.

The results of the implementation of cycle II in the aspect of critical thinking skills showed improvement. Obtaining a score of 583 from a supposed score of 729, the percentage of students' critical thinking skills was 80.4%. Based on the above scores, it shows that the success criteria have been achieved. Each indicator of critical thinking skills has increased. Data on improving students' critical thinking skills is presented in table 14.

Table 14. Improvement of Students' Critical Thinking Skills for Each Indicator

No	Indicators	Cycle I	Cycle II
1	The questions are clear, careful and accurate regarding the problem of physiological changes with or without organ structure disorders	41	47
2	Collect, investigate, assess and process relevant and valuable information	118	174
3	Reflective thinking/analogy	79	80
4	Make logical (reasonable), broad and deep conclusions	52	65
5	Open minded	98	133
6	Able to communicate the results of thoughts, solutions to problems and suggestions	53	84
Skor Total		**441**	**583**

Each student's critical thinking skills acquisition score has increased. At the end of cycle II the critical thinking skills category experienced an increase. The critical thinking

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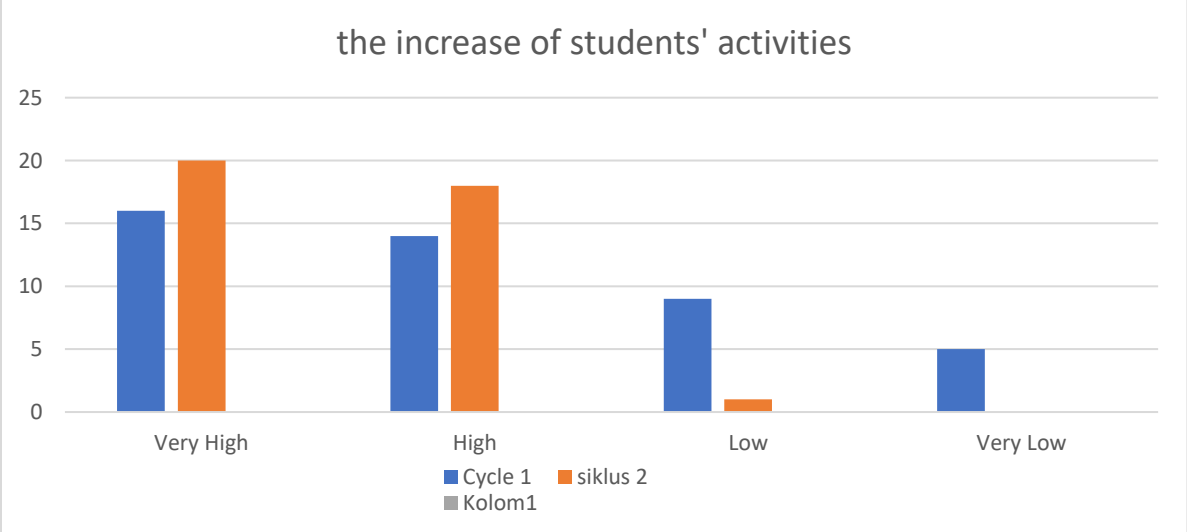
skills of students in the very high category were 20 students (51.28%), in the high category there were 18 students (46.15%), in the low category there were 1 student (2.5%), in the very low category there were 0 students (0%). Students who have achieved high category critical thinking skills are 37 students (97.43%), in other words the success criteria in cycle II have been achieved. Data on improving each student's critical thinking skills is presented in table 15.

Table 15. Increase in Students' Critical Thinking Skills Scores

Students' category	Category	Frequency Cycle I	Frequency Cycle II
X ≥16,7	Very High	16	20
16,7 > X ≥ 12,5	High	14	18
12,5 > X ≥ 8,3	Low	9	1
X < 8,3	Very Low	0	0
Total		**39**	**39**

An illustration of the increase in students' critical thinking skills scores in the KMB I course can be seen from diagram 2 below:



The increasing number of students included in the high category is because students have been able to apply the stages of critical thinking through PBL. Through the problems presented in PBL, students can be more involved in solving problems and are involved in using critical thinking skills.

6) Students' learning outcomes after implementing the problem based learning model

The success or failure of learning using the PBL model for students is analyzed by looking at the test results. At the end of implementing PBL, a performance test is carried

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out to find out whether the learning material can be absorbed. The performance test is carried out twice, namely at the end of cycle I and at the end of cycle II. The performance test is a test to see the student's performance in carrying out the stages in the problem of physiological changes with or without organ structure disorders. The tests are carried out individually so that teachers can find out which students have not been able to absorb the material, and can see in detail which aspects are still lacking.

The assessment results in cycle I showed that the highest score was 89.65, the lowest score was 50.50, the average score was 78.16. The number of students who completed the KKM was 21 students (68.97%) and 9 students who had not completed the KKM (31.03%). Judging from the recapitulation of scores for each performance indicator, there are still students who get a score of zero (0) in the aspects of work attitude, work results and time. This is because there are students who during the performance assessment do not apply their knowledge of human body anatomy properly. This error caused the analysis related to the etiology of the disease which led to medical surgical nursing care to be unable to be completed because time had run out so that the components for assessing work results and time also received a value of zero (0).

Considering the results of the cycle I performance assessment, the lecturer then explains to the students the importance of implementing work safety during practice for the safety and security of equipment and themselves. So that students in solving problems of physiological changes with or without organ structure disorders can utilize the time provided, the lecturer motivates students to use techniques in critical thinking skills so that they can focus on completing repairs according to precise and accurate identification results.

The assessment results show increased assessment in aspects that were previously lacking. Based on data recapitulation, the highest value was 88.28, the lowest value was 82.65, the average value was 83.2. The number of students who achieved the KKM score was 38 out of 39 students (97.43%). Data on increasing learning outcome scores and average scores are presented in table 16.

Table 16. Improvement in Student Learning Outcomes

No	Information	Cycle I	Cycle II
1	The highest score	82,65	88,28
2	Lowest Value	50,50	78,38
3	Average	78,16	83,2
4	Complete (N ≥75)	21 (53.84%)	38 (97.43%)
5	Incompleted (N<75)	18 (46.15%)	2.56 (0%)

The increase in student learning outcomes in cycle II is related to the increasing mastery of students in the steps to analyze problems of physiological changes with or without organ structure disorders using critical thinking skills through the application of PBL. Apart from that, in cycle II students try to increase their involvement in PBL learning in experiments looking for solutions to problems of physiological changes with or without organ structure disorders. Students have also been able to take advantage of reference

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sources that will help in solving problems of physiological changes with or without organ structure disorders. Increasing student activity in learning makes students' knowledge increase so that when solving problems of physiological changes with or without organ structure disturbances, students can apply the stages to carry out solutions to physiological change problems with or without organ structure disturbances.

4. CONCLUSION

Based on the research results and discussion results, several conclusions can be drawn, namely that the use of the Problem Based Learning method improves results students' learning in environmental pollution material, the use of the Problem Based Learning method can help make it easier for students to remember the learning material, because it directly addresses the problem, the use of the Problem Based Learning method can generate activity, motivation and creativity, students in learning, and the classroom atmosphere becomes fun, and use the Problem Based Learning method in KMB I learning on the subject of physiological changes with or without organ structure disturbances improved student learning outcomes and was said to be successful because each cycle experienced an increase in learning outcomes, namely Cycle I 53.84% and Cycle II 97.43%. Through the application of the problem based learning model in learning material regarding physiological changes with or without organ structure disturbances in this research, it can improve students' critical thinking skills in learning. Through the application of the problem based learning model in learning material on the problem of physiological changes with or without organ structure disorders in this research, student learning outcomes can be improved. The PBL method is an effective way to provide education that requires theory and skills in a coherent and integrated manner, and provides various advantages and added value for students compared to traditional teaching methods. PBL is based on the principles of adult learning theory, including motivating and encouraging students to develop and set learning goals, as well as providing opportunities for students to play a role in making decisions that have an impact on their learning process. To be able to build critical thinking skills, lecturers can provide learning experiences by designing the learning proces.

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