

Development of patient safety learning module based on problem based learning for nursing students at the College of Health Sciences



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ABSTRACT

Background: Media education as a means of improving the quality of education is very important in the learning process. The patient safety module learning media is not widely available in accordance with the conditions of field practice used by students as a learning guide for patient safety courses. This study aims to develop a patient safety learning module based on problem-based learning.

Methods: The model used in this development is the ADDIE model. The validity test was evaluated by 3 media experts and 3 content experts. The field test was carried out at STIKES Wira Medika involving 3 student learners one to one, 9 small groups. The effectiveness test uses a quasi-experimental design, non-equivalent pretest and post-test control group design, which were selected purposely involving 2 classes of students, 1 class each as the experimental group and 1 group as the control class.

Results: The media expert test, content expert, learner and design expert were in the valid category. The mean score of the small group trial results was 0.94 in the good range. There was a difference in the ability to implement ($p = 0.0001$), pre-test of critical thinking skills ($p = 0.003$), post-test critical thinking skills ($p = 0.001$) and learning outcomes ($p = 0.0001$).

Conclusion: The learning module developed has high validity and is effectively used in patient safety learning, so it is recommended to use this learning module in patient safety courses.

Keywords: learning module, problem-based, patient safety.

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INTRODUCTION

Higher education institutions have a responsibility to develop intellectual intelligence, noble character and skills of students. In fulfilling this responsibility, the college of health science must always be guided by a curriculum of nursing education with the provision of adequate learning facilities. Education is not only proposed to teach intellectual abilities, but also to teach how to improve individuals emotionally and spiritually. Those three are the pillars of education globally.¹

Educational media as an instrument to improve the quality of education is very important in the learning process. Use of educational media can help students in teaching and learning process, hence can improve their learning outcomes. Benefits of module learning media can motivate students to independent, creative, effective and efficient learning. In addition, module

learning media can alleviate boredom as so far they mostly did face-to-face learning process which was boring.²

Patient safety education is a process to gain knowledge about patient safety to prevent threats to the safety of patients who come to hospital. In fact, health education related to patient safety courses has not all been used as a main course. That was still included in the Basic Concept of Nursing course and now included in the Nursing Management course. Therefore, it is necessary to create a learning module that refers to a well-structured curriculum and adapted to national competencies. WHO develops a multi-professional patient safety guide curriculum in the form of education that collaborates patient safety in education programs.³

Patient safety learning has been implemented in many countries. A study in UK describing patient safety learning experience in health care found the impact

of patient safety teaching, learning and training in academic, organizational and practice contexts.⁴ Crosetta et al suggested that education program about patient safety and education quality improvement for aspiring care professional are the ideal solution for any healthcare professional who wants to get a brief concise education on quality and patient safety.⁵ Pelzang & Hutchinson explored the understanding of patient safety in 94 healthcare professionals and found diverse understanding about patient safety among them. Some respondents understand that patient safety is fundamentally about not harming or reducing the risk of injury to patients. To improve patient safety, continuous patient safety training and education should be provided for all categories of healthcare professionals.⁶

Nursing students need to improve their clinical competency, especially in the implementation of patient safety. It is

due to the risk of incidence against patient safety that can occur in daily practice. This study aimed to develop a patient safety learning module based on problem-based learning, to assess validity of developed module, and to evaluate the module towards ability to implement, critical thinking skills, and learning outcomes of nursing students.

METHODS

Study Design

This is a research and development study. Development research carried out is for developing a patient safety module based on problem-based learning which will be used as a learning guide for students of the College of Health Science. This study used the development research model ADDIE (Analysis, Design, Development, Implementation, Evaluation). Subject of the module validity test consisted of 3 content experts, 3 design and media experts, 3 students for one to one lecturer trial and 9 students for small groups. Detailed descriptions of the design listed on [Table 1](#). Quantitative and qualitative data were collected. Quasi experimental method, pre- and post-test control group design was used to assess the effectiveness of the developed module.

Module Development Procedure

Patient safety learning module is a module designed in the form of a problem-based learning module text book and is used as a guide and resource for teaching and learning activities in patient safety courses. The development of the learning module in this study is based on problem based learning using the stages in the ADDIE model development.

Analysis

At the analysis stage, field observations were done, particularly on patient safety courses, to find out what was needed to support the implementation of this development research, especially basic matters that were closely related to the patient safety learning module. It consists of analysis of necessity, curriculum analysis, character analysis of students, and analysis of the learning environment.

Design

At the design stage, selection of the form of message delivery is carried out, followed by making instructional strategies, mapping the elements of the learning modules that will be used, compiling a systematic patient safety learning module, and designing assessments and evaluation instruments.

Development

At the development stage, an expert team of patient safety course lecturers validated the material through evaluation in the form of a questionnaire using a Likert scale (1-5). Validation was also carried out by media experts ([Table 2](#)). Further validation was assessed by individual students ([Table 3](#)) and small groups using a questionnaire ([Table 4](#)).

Implementation

It is implemented by using learning modules in the learning process or being tested directly on the trial respondents. The trial was carried out by filling out a questionnaire instrument regarding the assessment of the module that had been developed. The organization of the learning environment took place on STIKES WIRA MEDIKA Bali. The modules are implemented with PBL learning method in the field. Furthermore, the learning outcomes

that had been implemented during field practice are observed and evaluated. Direct observation were conducted while the students were in field practicing including the implementation of patient identification, effective communication techniques, high alert drug management, time out implementation, hand washing, and identifying the risk of falling ([Table 5](#)).

Evaluation

At the evaluation stage, the module effectiveness was tested, including critical thinking skills and learning outcomes testing with field trials using a Quasi experimental pretest posttest control group design. The effectiveness of the module was tested by comparing the class using the patient safety learning module with the class that was not using the module (conventional learning). The research design described in [Figure 1](#).

There were 104 trial students in a total of two classes. One class as the experimental group consisted of 54 students and another class consisted of 50 students as the control group at STIKES WIRA MEDIKA Bali.

Measurement of critical thinking skills and learning outcomes

To obtain data on critical thinking skills and learning outcomes using critical thinking skills tests and learning outcomes

Table 1. Subjects of study.

No	Subject	Total number of persons	Annotation
1	Subjects for module validity	3 content experts, 3 design and media experts, 3 students for one to one lecturer trial, a small group consisted of 9 students.	Questionnaire
2	Subjects for learning outcome and critical thinking skill test instrument validity	80 nursing students who have taken patient safety course.	Test
3	Subjects for test the ability to implement	104 students from 2 class consisted of 54 students in experimental group and 50 students in control group	Checklist
4	Subjects for critical thinking skill test	104 students from 2 class consisted of 54 students in experimental group and 50 students in control group	Test
5	Subjects for learning outcomes test	104 students from 2 class consisted of 54 students in experimental group and 50 students in control group	Test

Table 2. Content expert, design and media expert test questionnaire.

No	Evaluation Stage	Aspect of Information (Indicator)	Item Number
1	One to One Expert		
	Content (Material) Experts	Content (material) compatibility with general and specific instructional objectives	1. Material feasibility 2. Material depth and extent 3. Learning material completeness
		Material completeness	4. Sequence of presentation 5. Exactness of general instructional objectives 6. Exactness of specific instructional objectives 7. Exactness of concepts, definitions and facts 8. Exactness and consistency of symbols and terms 9. Exactness of test or evaluation questions
	Content (Material) Experts	Material Exactness	10. Evaluation contains feedback/reinforcement 11. Reference accuracy 12. Compatibility of material with the development of informatics
		Material recency	13. Examples, figures and illustrations recency 14. Reference recency
	Content (Material) Experts	Suitability with students' life	15. Development and ability of students of health science college 16. Conditions and situations of social environment
		Sensitivity to faculty and university values	17. Sensitivity to college values 18. Encourage curiosity (stimulus) 19. Encourage creativity 20. Improve life skills
	Design / Media Experts	Interactivities (stimulus and response)	21. Satisfaction with provided material 22. Legibility 23. Clarity of information 24. Conformity to Indonesian Language Rules 25. Effective and efficient language use
		Graphics and functions of learning modules	1. Font (type and size) 2. Layout 3. Illustration, graphic, figure and photo 4. Display design

Table 3. One to one lecturer test questionnaire.

No	Questions
1	Is the explanation of the material easy to understand?
2	What do you do if you can not understand the material explanation and which part do you find difficult?
3	Are the provided instructions and examples of questions easy to understand?
4	Are the given questions easy to work on?
5	Does the whole material presented make you understand more?
6	Can the module start the learning on time?
7	Can the module end the learning on time?
8	Do the facilities and infrastructure support the use of modules?
9	Do all components of the learning module support the success of the learning process?

tests. The number of items tested were 40 items which already represented all the learning indicators to be achieved in the learning process. Data that has

been collected through trials on the subjects, then analyzed by using the item discrimination index, item difficulty index, and internal items consistency test.

The internal consistency of the items is assessed using the product moment correlation coefficient. Estimation criteria used is an item-total correlation index above 0.30 which is referred to a high degree of internal consistency of items, while a correlation index in range 0.10-0.30 is recommended for revision.⁷ The reliability test in this study used the Cronbach Alpha formula.

Critical thinking skills are assessed using extended response multiple choice

Table 4. Small group trial test questionnaire in module design aspect.

Subjects	Question items					Total	Score
	1	2	3	4	5		
Student 1							
Student 2							
Student 3							
Student 4							
Student 5							
Student 6							
Student 7							
Student 8							
Student 9							
Mean and Total Score							

Note :

1. The material presented in module is clear and interesting
2. The illustrations that are presented make me understand more
3. The test instructions given are clear and easy to understand
4. Examples of questions given in learning module is easy
5. Exercises in learning module are easy to do

Table 5. Observation grids toward the ability to implement patient safety.

No	Practice	Observation	
		Yes	No
1	Students are able to correctly identify patients		
2	Students are able to perform effective communication with the SBAR (Situation, Background, Assessment, Recommendation) technique		
3	Students are able to mention high alert drugs		
4	Students are able to mention concentrated electrolytes		
5	Students are able to do time out		
6	Students are able to do site marking technique		
7	Students are able to do hand washing steps		
8	Students are able to identify fall risk		
I	O1	X1	O2
II	O3	X2	O4

Figure 1. Field trial design**Note:**

- I : Experimental group
 II : Control group
 O1 : Experimental group pre test
 X1 : Implementation of PBL-based learning modules
 O2 : PBL-based experimental group post test
 O3 : Control group without PBL module pre test
 X2 : Learning without PBL module
 O4 : Control group without PBL module post test

tests with score criteria in Table 6. To measure cognitive learning outcomes of students, detailed according to competency standards based on the curriculum referred to core competencies, basic competencies, subject matter,

indicators, ability levels, and number of questions (Table 7).

Data Analysis

Data analysis of patient safety learning module design in the form of descriptive

analysis. Data analysis of patient safety learning module characteristics is descriptive data. Validity of learning module data is analyzed using the Aitken validity test. Ability to implement learning modules is analyzed using quantitative descriptive data. Critical thinking ability is analyzed using T-test, normality and homogeneity of data was tested before analysis. Analysis of learning outcomes data using T-test which was previously tested for normality and homogeneity.

RESULT**Design of Patient Safety Learning Module Based on Problem-Based Learning**

The design of the patient safety learning module based on problem-based learning in the form of a book has been developed in the form of a learning module book. Module material consists of 5 learning material activities, such as; Learning activity 1: Patient safety standards, each activity contains student worksheets related to patient safety standards, patient safety standard materials, summary, formative test 1. Learning activity 2: Patient safety goals, each activity contains student worksheets related to patient safety goals, patient safety target materials, summary, formative test 2. Learning activities 3: Patient safety steps, student worksheets related to patient safety measures, patient safety measures material, summary, formative test 3. Learning activities 4: Recording and reporting, student worksheets related to recording and reporting, recording and reporting materials, summary, formative test 4. Learning activities 5: Coaching and supervision and evaluation, student worksheets related to coaching and supervision as well as evaluation, coaching and monitoring materials as well as evaluation, summary, formative test 5.

Characteristics of Patient Safety Learning Module based on Problem-Based Learning

A learning module for nursing students was developed and combined with a problem-based learning strategy. Students will be given various problems that often occur in real practice areas in hospitals and tasks in the form of challenging

and impressive activities on students so that it has a positive influence on the understanding and critical thinking skills in the learning process (Table 8).

Validity of Patient Safety Learning Module based on Problem-Based Learning

Content validation was performed by a team of experts through formative evaluation after compiling the learning module. The module design validation has been made through expert considerations to obtain data about the results of the learning module. Content validation by

media experts and design experts used the Aitken test. The results are described in Table 9. The test results of media and design experts are in the valid category since the validity value is 0.95 with a 'very valid category'. Thus, it can be stated that the instrument tested based on the media and design test is in the 'very valid category'.

The test results of the content expert can be observed in Table 10. It was obtained with an average content validity of 0.98. These results indicate that the developed media has very high validity.

The results of one to one learner interviews showed that the learning modules developed were easy to understand, effective and efficient, timely learning and very accommodating, especially during the pandemic. However, some parts were felt to be quite hard for students, especially in sorting incidents based on type and grading. Revisions were conducted in the section on selecting incidents based on the type and grading with the results of the learning modules being developed being easy to understand, timely learning and no module sections being felt quite hard for students.

Subsequent trials were performed in small groups. The test from the module content aspect obtained the average score of the small group test results, which was 0.94, in the 'good' range (Figure 2). Meanwhile, based on the module design aspect, the average score was 0.96, also in the 'good' range (Figure 3).

Table 6. Critical thinking skills score criteria.

Criteria	Score
Did not answered or did not give any solution	0
Answered, but was wrong or not according to the concept	1
Answered correctly, but did not give reason and calculation	2
Answered correctly, gave reason and calculation, but there were some mistakes	3
Answered correctly with correct and complete reason and calculation	4

Table 7. Learning outcome test.

Basic Competencies	Indicators	Number of questions
1. Identify patient safety standard	a. Describe the definition of patient safety b. Describe 7 standards of patient safety c. Explain rights and responsibilities of patients d. Explain methods of performance improvement in patient safety evaluation e. Explain the role of leadership in patient safety programs f. Describe communication as key to patient safety	10
2. Identify patient safety steps	a. Mention 7 steps of patient safety b. Mention ways to build awareness of patient safety values c. Able to integrate risk activities d. Compile reporting system e. Communication with patients f. Understand the learning concept and sharing experiences g. Understand harm prevention through patient safety implementation	7
3. Identify patient safety goals	a. Understand the improvement of patient identification accuracy b. Understand the improvement of effective communication c. Understand the improvement of drug safety d. Understand the certainty of the right location, the right procedure, and right patient for surgery e. Understand about health care-related infection risk reduction f. Explain fall risk reduction	11
4. Identify patient safety incident, analysis and solution	a. Describe the definition of patient safety incident b. Mention 5 kinds of patient safety incident c. Analyze the aims and benefits of incident reports based on examples of patient safety incidents	8
5. Identify coaching, monitoring and solutions	a. Understand the implementation of coaching b. Understand the monitoring and evaluation of patient safety activities c. Understand the role and function of patient safety committee	4
Total		40

Ability to Implement Patient Safety

At the implementation stage, observations were performed on the patient safety conduction in the field when students were practicing clinically. The observed students were 104 consisting of 54 for the experimental group and 50 for the control group. The average result of the ability to implement in the treatment group was 81.8, while the mean control group was 68.4 (Table 11).

Critical Thinking Skills

The module effectiveness was tested by comparing students' critical thinking skills between classes using patient safety learning modules based on problem-based learning and without modules (conventional learning). The effectiveness of the implementation of the PBL-based learning module with the average pretest score in the treatment group was 55.4, while the control group obtained an average of 62.6. The average post-test score in the treatment group was 82.8, while the

control group got an average of 68. The N-Gain results in the treatment group showed 0.59 in the 'medium effectiveness' category, while the control group obtained 0.06 in the 'low' category (Table 12).

Learning Ability Outcomes

The average learning outcomes with the average pretest score in the treatment group were 55.4, while the control group obtained 62.6. The post-test learning outcomes in the treatment group was 87.4, while the control group got 84.03. The N Gain value was acquired in the experimental group with a mean of 0.69, while in the control group, it was 0.51 (Table 13).

The results of the analysis test showed differences in the ability to implement learning using problem-based learning modules and skills without using problem-based learning modules with t value = 7.411 and p-value = 0.0001 ($p < 0.05$). In addition, there are differences in the pre-test results of critical thinking

skills between learning using problem-based learning modules and without using problem-based learning modules with $t = 3.078$ and $p = 0.003$ ($p < 0.05$). The results of the post-test of critical thinking skills between learning using a problem-based learning module and without using a problem-based learning module are also different with the value of $t = 7.813$ and $p = 0.0001$ ($p < 0.05$) (Table 14).

From the aspect of learning outcomes, the pre-test between learning using problem-based learning modules and without using problem-based learning modules with t value = 3.078 and p-value = 0.003 ($p < 0.05$). There is a difference in learning outcomes between learning using a problem-based learning module and without using a problem-based learning module with a value of $t = 4.682$ and $p = 0.0001$ ($p < 0.05$) (Table 14).

DISCUSSION

The learning process cannot be separated from the use of learning media. Lecturers

Table 8. Application of Learning Module based on PBL.

Learning Module Activities based on PBL	Syntax
Pre-learning activities	<ol style="list-style-type: none"> 1. Lecturer prepares syllabus 2. Lecturer prepares real cases that are given to students before learning begins 3. Lecturer prepares PBL – based learning modules 4. Lecturer prepares learning schedules according to the syllabus. (Zoom Link) 5. Lecturer divides the students into several groups 6. Students take the Pretest
Learning Core Activities	<p>For Experimental Groups:</p> <ol style="list-style-type: none"> 1. Lecturer explains PBL learning techniques 2. Lecturer distributes cases to each group that has been divided 3. Students study the cases and prepare materials and look for reference sources from the modules that have been prepared. 4. Lecturer and students communicate about the material 5. Students take part in online learning activities with their respective groups 6. Students reflect on their PBL learning outcomes and attend the zoom room 7. Students take part in filling out the exercises in the module book
End of learning activities	<ol style="list-style-type: none"> 1. Lecturer concludes the learning process 2. Students take the post test

Table 9. Media and design expert rater test results.

No	Expert 1	Expert 2	Expert 3	s1	s2	s3	Σs	V
1	5	5	5	4	4	4	12	1
2	5	5	4	4	4	3	11	0.91
3	5	4	5	4	3	4	11	0.91
4	5	5	5	4	4	4	12	1
Mean								0.95

Table 10. Content expert test results.

No	Expert 1	Expert 2	Expert 3	S1	S2	S3	Σs	V
1	5	5	5	4	4	4	12	1
2	5	5	5	4	4	4	12	1
3	5	5	4	4	4	3	11	0.92
4	5	5	5	4	4	4	12	1
5	5	4	5	4	3	4	11	0.92
6	5	5	5	4	4	4	12	1
7	5	5	5	4	4	4	12	1
8	5	5	5	4	4	4	12	1
9	5	5	5	4	4	4	12	1
10	5	5	5	4	4	4	12	1
11	5	5	5	4	4	4	12	1
12	5	5	5	4	4	4	12	1
13	5	4	5	4	3	4	11	0.92
14	4	4	5	3	3	4	10	0.83
15	5	5	5	4	4	4	12	1
16	5	5	5	4	4	4	12	1
17	5	5	5	4	4	4	12	1
18	5	5	5	4	4	4	12	1
19	5	5	5	4	4	4	12	1
20	5	5	5	4	4	4	12	1
21	5	5	5	4	4	4	12	1
22	5	5	5	4	4	4	12	1
23	5	5	5	4	4	4	12	1
24	5	5	4	4	4	3	11	0.92
25	5	5	5	4	4	4	12	1
26	5	5	5	4	4	4	12	1
Mean								0.98

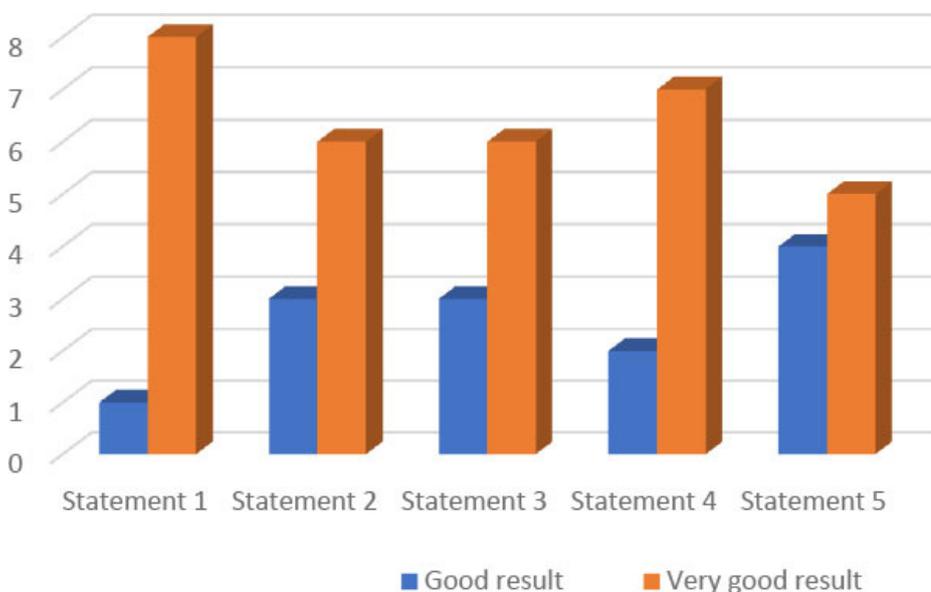


Figure 2. Module content aspect of small group trial test results.

need to be creative in creating ideas to support the learning process that can make students able to achieve the expected learning goals. The research and development phase of learning media can be analyzed from a series of lecturers' tasks in performing their main tasks, starting from designing, implementing to evaluating the learning process.⁸

The ADDIE model (Analysis, Design, Development, Implementation, Evaluation) is a product development paradigm applied to design learning by preparing a learning environment. It can facilitate complex learning by involving the learning environment optimally by responding to many situations, interactions in context, and interactions between contexts.⁹ The ADDIE model was developed by Dick and Carry

(1996). ADDIE is also often used in the research and development of teaching materials such as modules, worksheets and textbooks. Not limited to that, researchers can use this model to develop other products because the core of the product development procedure is already represented here.¹⁰⁻¹²

The learning modules produced in this study are problem-based learning. Problem-based learning is performed through stages by bringing up real problems in practical fields and then discussing them in online classes.

Modules are learning tools in written/ printed form that are systematically arranged. It contains learning materials, methods, learning objectives based on basic competencies or indicators of competency achievement, instructions for self-instructional activities, and provide opportunities for students to test themselves through practice; all presented in the module. Thus, the module functions as an independent learning tool so that students can learn at their own pace.

The Problem-Based Learning module or PBL module is a problem-oriented

module developed as a starting point for learning. The PBL module presents authentic problems that are directly related to everyday life. The problems presented can be in the form of theoretical or practical cases based on laboratory work. It can develop thinking skills (minds-on activity) because students search for, process and conclude themselves on the problems studied.¹³ The basic principle in PBL is that there are problems, questions, or puzzles that make students want to solve them. Learning using PBL is proven to have a positive impact on independence, motivation, interest and strengthening of student concepts in learning.

The module characteristics of the patient safety learning based on problem-based learning for nursing students are modules that are accompanied by real problems and cases in the practice field so that they can provide an overview of what is actually faced during the implementation of patient safety efforts. The patient safety learning module based on problem-based learning for nursing students was developed following theoretical studies and hospital accreditation standards (SNARS) as the basis for developing this learning module. Based on the results of observations, it can be observed that nursing students do not experience significant obstacles during learning. Characteristics of the patient safety learning module based on problem-based learning for nursing students

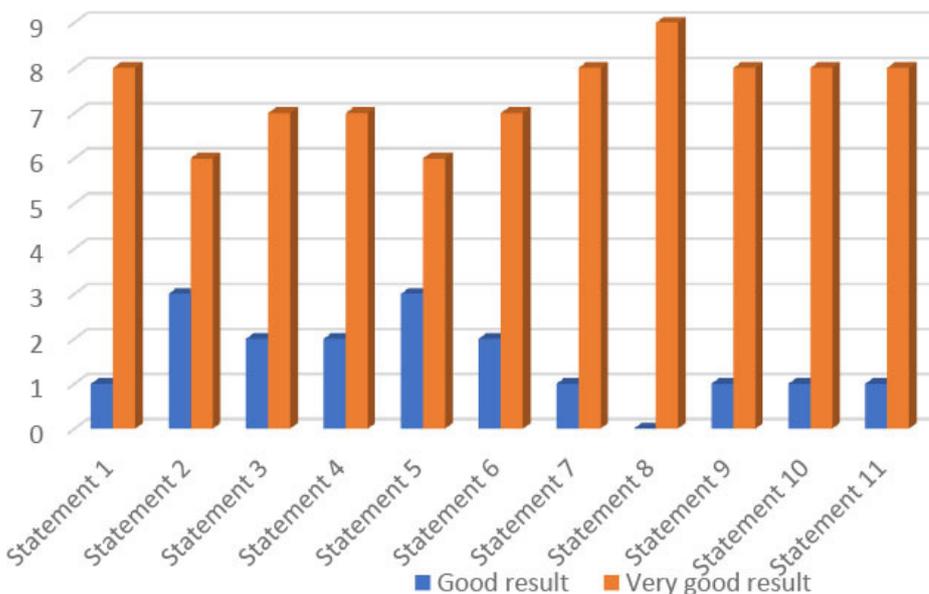


Figure 3. Module design aspect of small group trial test result.

Table 11. Observation results of the ability to implement between the experimental group and the control group.

Variable	Learning with PBL-based Patient Safety Module	Learning without PBL-based Patient Safety Module
Ability to implement patient safety, mean \pm SD	81.8 \pm 9	68.4 \pm 9.3

Table 12. Comparison of N gain critical thinking skills between experiment class and control class.

Variable	Learning with PBL-based Patient Safety Module	Learning without PBL-based Patient Safety Module
Critical thinking skills (pre-test), mean \pm SD	55.4 \pm 11.4	62.6 \pm 12.2
Critical thinking skills (post-test), mean \pm SD	82.8 \pm 9.6	68 \pm 9.6
N Gain	0.59	0.06

Table 13. Comparison of N gain learning result between the experimental group and the control group.

Variables	Learning with PBL-based Patient Safety Module	Learning without PBL-based Patient Safety Module
Pre-test learning results, mean \pm SD	55.4 \pm 11.4	62.6 \pm 12.2
Post-test learning results, mean \pm SD	87.4 \pm 2.2	84 \pm 4.8
N gain	0.69	0.51

Table 14. Hypothesis test results on critical thinking skills ability to implement patient safety and student learning outcomes.

Variables	Learning with PBL-based patient safety module	Learning without PBL-based patient safety module	t-value	p-value
Implementation				
Ability to implement patient safety (post-test), mean \pm SD	81.8 \pm 9	68.4 \pm 9.3	7.813	0.0001
Critical thinking				
Critical thinking skill (pre-test), mean \pm SD	55.4 \pm 11.4	62.6 \pm 12.2	3.078	0.003
Critical thinking skill (post-test), mean \pm SD	82.8 \pm 9.6	68 \pm 9.6	7.813	0.001
Learning outcomes				
Learning outcomes (pre-test), mean \pm SD	55.4 \pm 11.4	62.6 \pm 12.2	3.078	0.003
Learning outcomes (post-test), mean \pm SD	87.4 \pm 2.2	84 \pm 4.8	7.411	0.0001

direct students to solve real problems and followed by explanations in problem-solving. The existence of questions in the module trains students to understand a topic in patient safety learning.

The results of the media test and design experts obtained a validity value of 0.95 with a very high category. The content expert test in this study involved three experts from the scientific field of patient safety, namely the chairman of the quality and patient safety committee, chairman of the patient safety sub-committee and committee staff of patient safety with a doctoral education status. The results of the content expert test were obtained with an average content validity of 0.98. These results indicate that the developed media has very high validity. These results are used as a reference or outline for the next stage, namely the development stage. The results of these expert trials are input for revision so that a valid product will be obtained in the end. The results of this stage are in the form of a patient safety learning module. Products that have passed a series of expert trials are then analyzed and revised before proceeding to the next stage.

This study found differences in the ability to implement learning using a problem-based learning module and skills without using a problem-based learning module. The ability to implement this learning module is based on the results of observing patient safety practices, including patient identification, effective communication, drug precautions, correct surgical procedures, infection prevention

and fall risk prevention.

There are differences in the results of the pre-test of critical thinking skills between learning using a problem-based learning module and without using a problem-based learning-based learning module, as well as the post-test. The results of this study are consistent with Emiliasari's research which states that the problem-based learning process can develop critical thinking skills starting from problem finding, problem analysis and learning problems, discovery and reporting, solution presentation, reflection and overview, integration of evaluation by teachers. The role of the teacher in the PBL class is not actively involved, but the teacher acts to stimulate students and guide them as facilitators.¹⁴

Life skills that need to be developed through the educational process are thinking skills. A person's ability to succeed in life is determined, among other things, by his thinking skills, especially to solve the life problems he faces.¹⁵ Critical thinking can be interpreted as a person's effort to check the truth of information using the availability of evidence, logic, and awareness of bias.¹⁶

This study also found differences in learning outcomes between learning using problem-based learning modules and without using problem-based learning modules. The results of this study are consistent with Winarning's research which found that problem-based learning through lessons had been implemented well, including the completeness of learning tools and preparation of lesson

plans before teaching each teaching material. Based on the results of the implementation of lesson study with a problem-based learning model, it can be concluded that problem-based learning through learning can improve student learning outcomes.¹⁷ Factors that affect learning outcomes are internal factors, which are factors that exist within the individual who is studying and external factors, which are factors outside the individual.¹⁸

This study also has implications for the world of nursing regarding the importance of a guideline in patient safety learning to provide valuable knowledge for students before performing in the field practice at the public health center or hospital. This module can provide valuable knowledge for nursing students when conducting clinical nursing practice in health care settings so that patient safety incidents can be reduced or prevented.

CONCLUSION

Patient safety learning modules have been appropriate to be used as teaching materials for nursing students. This study has implications for patient safety courses for nursing students because it can improve critical thinking skills, implementation abilities and learning outcomes.

CONFLICT OF INTEREST

There is no competing interest regarding the manuscript.

ETHICS CONSIDERATION

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AUTHORS CONTRIBUTION

Conceptualization and methodology, NNG, IMS; design of the study and definition of intellectual content, NNG, IBPA, IGS; literature search, NNG, IMS; experimental studies, NNG, IMS, IBPA, IGS; data acquisition, NNG, IGS; data analysis, NNG, IMS, IBPA; statistical analysis, NNG; manuscript preparation, NNG, IMS, IBPA, IGS; manuscript editing, NNG; manuscript review and guarantor, IMS, IBPA, IGS. All authors have read and agreed to publish the manuscript.

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