

Application of Project Base Learning Learning Model to Increase The Competence of Nursing Students about Pulmonary Tuberculosis Management

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ABSTRACT

Tuberculosis (TB) is still a health problem worldwide with the highest incidence in 6 countries: India, China, Nigeria, Pakistan, Indonesia and South Africa. The role of nurses, lack of health education and poverty are the causes of treatment failure. In-service TB treatment has not shown optimal results so consideration should be given to pre-service efforts by incorporating TB programs into the learning curriculum. TB learning has been carried out conventionally and is more oriented to clinical nursing care. There should be a consideration of actual and comprehensive pulmonary tuberculosis management innovation in the community. The innovation is project based learning (PjBL) and it is expected to create a learning environment that can motivate students to participate which is marked by changes in knowledge, skill and attitude.

This study aims to analyze the application of PjBL learning model to increase the competence of nursing students about pulmonary tuberculosis management. This research specifically tested the effect of the application of PjBL learning model to the improvement of knowledge, attitude, and skill as well as to test student's competence in the treatment group compared to control group.

This research is a quasi-experiment research with non-equivalent control group design with pretest-posttest. The treatment group consisted of 69 people and the control group was 62 people. The samples were chosen in total sampling. The instruments of this study were questionnaires, health education skill assessment sheet, and module. Data analysis was done by T-Test

The implementation of learning model of project based learning on pulmonary tuberculosis management has an effect on increasing: student's knowledge, improvement of student attitude, and health education skill. Besides, the competence of nursing students in the treatment group is better than the control group.

KEYWORDS: project based learning, pulmonary tuberculosis, competence, nursing students.

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Introduction

Tuberculosis (TB) is still a health problem worldwide. TB burdens are increasing as increase in the number of TB cases. In 2013, it was estimated that the incidence of tuberculosis globally reached nine million, with the highest number in six countries namely India, China,

Nigeria, Pakistan, Indonesia and South Africa. The number of pulmonary tuberculosis patients in Indonesia continues to increase, with 460,000 new TB cases with 62,246 deaths. The incidence of a positive tuberculosis of acid-fast bacilli was about 297 per 100,000 population (WHO, 2014).

Case detection rate (CDR) of low TB cases is still a problem in tuberculosis prevention (Nugroho, 2010). The finding of suspected TB should not only be done by passive case finding, but it can be an active case finding that requires coordination between the health sector and community involvement (Budi et al., 2012; Asefa and Teshome, 2014; Hudoyo et al., 2012; Parhusip, 2009). Many tuberculosis patients in Indonesia are too late to be diagnosed due to inappropriate determining drug (Rintiswati et al., 2009; Dooley et al., 2011). The role of nurses, lack of health education and poverty are the main factors for treatment failure. Nurses also have important role in the management of MDR-TB (Palacios et al., 2003; Munir et al., 2012).

Not all pulmonary tuberculosis patients are treated in accordance with the implemented program in DOTS strategy. The mostly people in urban areas prefer hospitals or clinics for the diagnosis and treatment of tuberculosis while people in rural areas prefer private practitioners (Rintiswati et al., 2009). The Basic Health Research Report of Kemenkes R.I, (2013) mentioned that of the entire population diagnosed with pulmonary TB by health workers, only 44.4% were treated with program drugs. In addition, the incidence of drop out is also still a problem so that in-service services have not been able to show optimal results. This is according to the research result by Zulfian (2009) that of TB patients treated, 31% recovered and 69% had drop out (DO). Cory (2009) also explained that there are the number of TB patients who fail (39 people) and drop out (225 people). To overcome the incidence of drop out and non-adherence medication, these TB patients needed to increase the role of nurses comprehensively.

Nurses as one of health workers have a strategic position that is able to contribute in providing TB nursing services. Nursing organization (PPNI) in collaboration with P2TB has issued a national guide module of tuberculosis nursing services in order to provide a reference for nurses to be able to provide comprehensive, integrated and qualified in nursing care services for TB. This is in line with the responsibility of PPNI to support government in health development, including TB control in Indonesia (Kemenkes R.I, 2014).

The role of nurses in tuberculosis control is essential to prevent the spread of disease and ensure patient success in completing treatment (Bell, 2004). Nurses are responsible for improving health, disease prevention, healing and health

recovery. A nurse, in performing his/her roles, functions and duties should refer to the guidelines. Indonesian nurse competence standard is a guide for all nurses in carrying out their professional role in accordance with the needs of the community and other stakeholders. It uses the framework of the International Council of Nurses (ICN) with the necessary adjustments for Indonesians.

Acceleration and expansion of national TB programs face the problem of lack of human resources, both quality and quantity. Increasing human resources is a priority as an appropriate and effective investment effort to reach global targets. However, national TB programs in addressing TB prevention and treatment problems are usually weakened and underfunded (Tsara et al., 2009). Thus, for the efficiency and effectiveness of this program, it is necessary to consider the pre-service training as it has entered the educational curriculum (Yusuf et al., 2005).

Nursing education institutions as professional nurses' professionals have great potential contribution in ensuring the sustainability of tuberculosis prevention programs. Students need to get sufficient knowledge about comprehensive TB handling because most of them work will face tuberculosis case. To fulfill these needs, incorporating national TB program materials in the curriculum of nursing learning is very strategic way.

The learning process of pulmonary tuberculosis management comprehensively requires appropriate methods and strategies in order to achieve maximum learning outcomes. The results of observations of researchers at STIKes Bhamada Slawi Tegal regency are the learning of pulmonary tuberculosis management still looks conventional with two hours of meeting. Students are only directed to provide nursing care of various body systems clinically. A good learning process determines the quality of the mastery of science, the formation of attitudes and skills. Strategy and selection of good learning models is needed to facilitate the achievement of learning objectives. Learning model can be used as a pattern of choice, meaning that lecturers may choose appropriate and efficient learning model to achieve educational objectives (Rusman, 2014; Trianto, 2010).

There are several learning models used to support the achievement of learning objectives, such as conventional learning model, cooperative learning model, student centered learning model, and so on. Conventional learning model is the learning with the lecturer dominate the class (teacher-centered) so that students in learning are

passive students. UNESCO recommends four strategies in the success of learning, namely: 1) learning to know; 2) learning to do; 3) learning to be; and 4) learning to live together (UNESCO, 2004).

Selection of learning models in an effort to improve student competence needs to be done as a step of pre-service innovation. Treatment measures, prevention of transmission and the discovery of suspects have been done by many health workers / nurses, while the role of students as a potential health worker has not been considered. The role of educational institutions is very important to prepare prospective nurses in serving or treating patients with pulmonary tuberculosis in the community properly and correctly. This makes the researcher think and strive to contribute to the treatment of pulmonary tuberculosis based on debriefing candidates / students.

Researcher intends to implement student-centered learning methods with more real cases. Implementation of project based learning in learning is selected on the grounds to improve comprehension of students more comprehensive about the management of pulmonary tuberculosis. This is in line with the direction of curriculum change in 2013, the project-based learning model is one of the learning models recommended to be used in the learning process. The learning process is carried out to achieve three domains of ability, attitude, knowledge and skills (Kemendikbud, 2013).

Some studies on project based learning (PjBL) have shown that PjBL is able to increase knowledge, attitude and skills. Robinson (2012) says that PjBL creates a student-centered learning environment with good motivation and participation characterized by behavioral changes including knowledge, skills and attitudes. Similarly, other researchers suggest the existence of a work-based learning environment to have a positive effect on learning motivation. In PjBL, the role of lecturer is as a good facilitator for the successful implementation of this method. Students who are educated by project-based learning are more successful and have higher attitudes toward the lessons than students who are trained by instruction based on the text-learning module (Helle et al., 2006; Kubiato and Vaculova, 2011; Kelesoglu and Faculty, 2011).

Researcher applies the learning model with KOPEN-I TB project based learning model. KOPEN-I TB stands for Communication, Health education, and Science on pulmonary tuberculosis

management. In Javanese, kopeni means keeping after, so that it means to keep pulmonary tuberculosis patients in order to be obedient to undergo treatment program through mentoring conducted by students' supervision. KOPEN-I TB is an effort to approach the integration of therapeutic communication, health education and knowledge about pulmonary tuberculosis management. By applying this KOPEN-I TB learning model, it is expected that students' competences can be improved, either knowledge, attitude or skill, in managing pulmonary tuberculosis patients in society through bio-psycho-socio-cultural and spiritual approach by instilling caring soul in every action of nursing, either to individuals, families or communities.

Methodology

The research was quantitative research of quasi experiment using the untreated control group design with pretest posttest. The students of treatment group performed the implementation of PjBL model about the management of pulmonary tuberculosis patients while the students of control group used conventional learning. Previously, those students conducted pretest and were continued with posttest after getting PjBL model to assess both groups of knowledge, attitude, and skill competences. There were four stages in this research; 1) development of dissertation product like module; 2) development of assessment instrument of students' competences; 3) implementation of PjBL model; 4) competences assessment of nursing students on the pulmonary tuberculosis management.

A. Population, sample and sampling

The samples were chosen in total sampling. The research sample was nursing students of level III which amounted to 131 people (69 people of STIKes Bhamada and 62 people of Akper Pemkot Tegal) and 36 tuberculosis patients in Puskesmas Tegal Regency.

B. Data collection technique

The data were collected by using primary data and secondary data. Secondary data is the identity of students who are active in the number of educational institutions 69 students. Primary data were also obtained from the questionnaire filling in knowledge and attitude assessment of students by TB patients. Data collection from students and TB patients can be explained as follows:

1. The value of knowledge of pulmonary tuberculosis management was obtained

- based on pretest and posttest of knowledge.
2. The value of student attitudes toward pulmonary tuberculosis patients was obtained based on pretest and posttest outcomes.
 3. The value of pulmonary tuberculosis management skills was obtained based on the pretest and posttest results of health education skills.
 4. The value of patients' knowledge about pulmonary tuberculosis and treatment program was obtained based on pretest and posttest of knowledge.
 5. Assessment of student attitudes by the patients obtained based on the results of attitude values after students do health education

C. Data analysis

Data were analyzed by univariate and bivariate analysis as follows:

1. Univariate analysis was conducted on respondent's characteristic data, and research variables include knowledge, attitude and health education skill for students and knowledge and attitude for patient.
 - a. Characteristics of respondents include age and gender were categorical data, so that those were analyzed by the percentage / proportion size. The characteristic of age was numerical data analyzed by mean value and standard deviation.

- b. The research variables including knowledge, attitude and health education skills were numerical data so that those were analyzed by average size and standard deviation.

2. Bivariate analysis

Based on the result of normality and homogeneity, there was effect of those variables using t-test. The significance level used was $p < 0.05$ and 95% CI.

- a. Test the difference of two paired samples on the score of knowledge, attitude and skills before (pretest) and after learning (posttest)
- b. Differences test of two independent means was normal distribution with Independent sample t-test to determine the difference of students' competence between treatment group and control group before and after getting project based learning TB.

RESULT

A. Univariate Analysis

The analysis of this data was submitted in a sequence covering the description of respondent characteristics which include gender and student age, normality test, homogeneity test and description of knowledge value, attitude, health education skill.

1. Characteristics of research subjects
 - a. Characteristics of research subjects by age

Table 8. Characteristics of study subjects by age
in treatment group and control group

Age	Group			
	Treatment		Control	
	n	%	n	%
19 years	5	7,25	2	3,23
20 years	38	55,07	35	56,45
21 years	18	26,09	21	33,87
22 years	3	4,35	4	6,45
23 years	2	2,90	0	0,00
24 years	3	4,35	0	0,00
Total	69	100	62	100

Source: primary data of research in 2017

- b. Characteristics of research subjects by gender

Table 9. Characteristics of study subjects by gender
in treatment group and control group

Gender	Group	
	Treatment	Control

	n	%	n	%
Man	20	28,99	9	14,52
Woman	49	71,01	53	85,48
Total	69	100	62	100

Source: primary data of research in 2017

c. Number of TB patient respondents

Table 10. Number of TB patient respondents according to puskesmas data

No	Puskesmas	Phase of treatment	Sputum examination	Number
1	Dukuhwaru	Fase intensif	BTA (+)	6
2.	Slawi	Fase intensif	BTA (+)	15
3.	Adiwena	Fase intensif	BTA (+)	15
Jumlah				36

Source: primary data of research in 2017

d. Characteristics of TB patients by gender

Table 11. Characteristics of research subjects by gender in TB patients at three puskesmas

Gender	Puskesmas			Jumlah
	Dukuhwaru N	Slawi n	Adiwerna N	
Man	2	9	5	16
Woman	4	6	10	20
Total	6	15	15	36

Source: primary data of research in 2017

2. Test normality and homogeneity

Test the normality of distribution and homogeneity test used Kolmogorov-Smirnov test and Levene statistic test to find out the variable of knowledge, attitude and skill were normal distribution or not,

and the requirement that the sample represented was fulfilled or not, so that the research could be generalized to the population. The results of the normality and homogeneity test count could be seen in Table 12.

Table 12. The result of normality and homogeneity test

No	Variables	z	P	Data distribution	Levene Sig.	Sig.	Homogeneity of data
1	Knowledge	0,638	0,811	Normal	3,331	0,601	Homogeneity
2	Attitude	0,598	0,867	Normal	1,828	0,057	Homogeneity
3	Skills	0,495	0,967	Normal	4,180	0,313	Homogeneity

3. Description of the value of student knowledge

Table 13. Description of pretest-posttest knowledge value in treatment group students (n = 69)

Result	Minimum	Maksimum	Mean	Std. Deviation
Pretest	50,00	84,21	64,87	9,29
Posttest	60,53	94,74	80,51	7,39

Table 13 showed that the average test value before treatment was 64.87, while after treatment the average value was 80.51. It means that there was a

difference in the rate of increase before and after the treatment of 15.64. The value of pretest-posttest knowledge including the minimum, maximum and mean values

in the treatment group was shown in Figure 4.

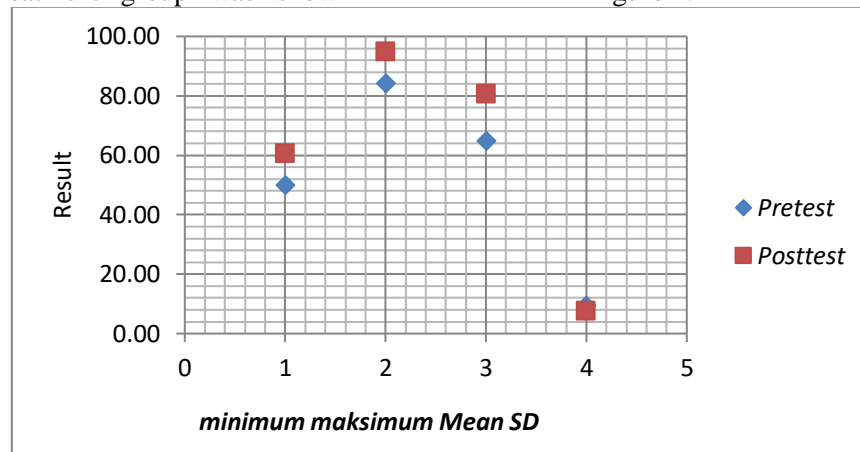


Figure 4. Values of pretest-posttest knowledge at treatment group (n = 69)

4. Description of student attitudes

Table 14. Description of pretest-posttest attitude values at the treatment group students (n = 69)

Result	Minimum	Maximum	Mean	Std. Deviation
Pretest	58,13	81,25	70,55	6,37
Posttest	71,88	90,00	79,90	3,90

Table 14 showed that the average test value before treatment was 70.55, while after treatment the average score was 79.90. It means that there was a difference in the rate of increase before and after the treatment of 9.36.

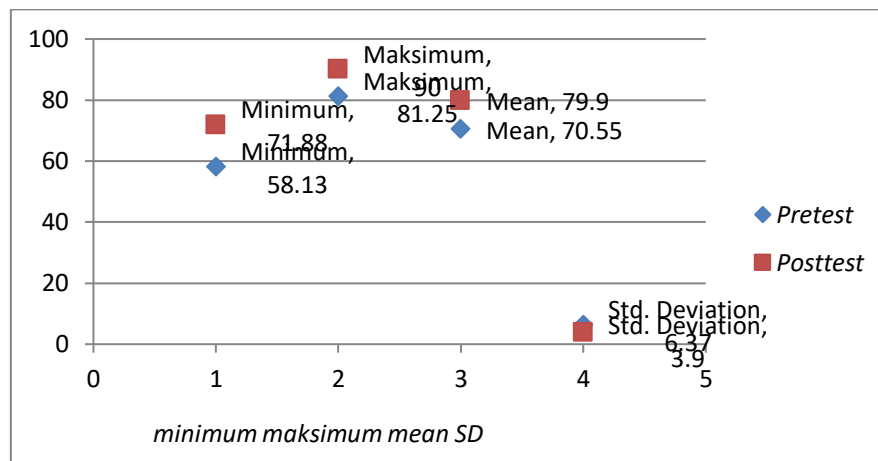


Figure 5. Values of pretest-posttest attitude at treatment group (n = 69)

5. Description of skill values

Table 15. Description of the value of pretest-posttest skills in treatment group students (n = 69)

Result	Minimum	Maximum	Mean	Std. deviation
Pretest	51,30	84,00	68,28	10,23
Posttest	68,67	97,33	80,58	7,46

Table 15 showed that the average test value before treatment was 68.28, whereas after treatment the average value was 80.58. It means that there was a difference in the rate of increase before and after the treatment of 12.30.

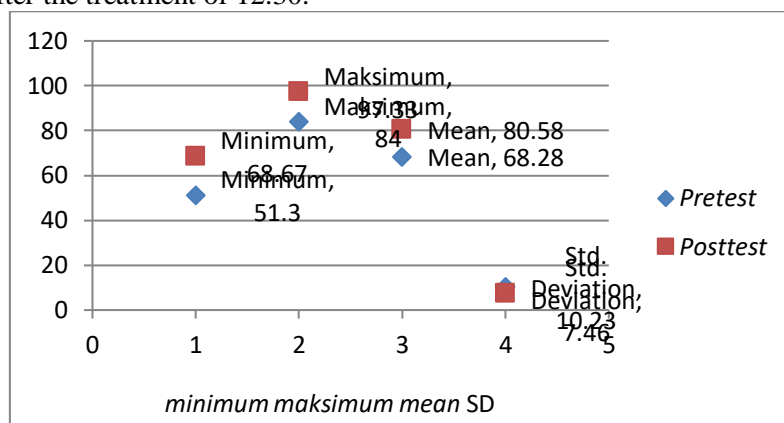


Figure 6. Values of pretest-posttest skill at treatment group (n = 69)

6. Description of the patient's knowledge value

Table 16. Description of pretest-posttest knowledge of the patient (n = 36)

Result	Minimum	Maximum	Mean	Std. Deviation
Pretest	46,67	90,00	66,39	9,84
Posttest	60,00	93,33	78,61	8,89

Table 16 showed that the average test value before treatment was 66.39, while after treatment the average score was 78.61. It means that there was a difference in the rate of increase before and after the treatment of 12.22.

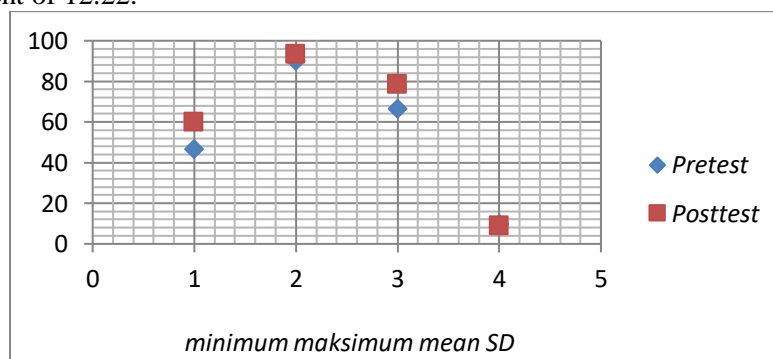


Figure 7. Values of pretest-posttest knowledge atpatient (n = 69)

7. Description of student attitude assessment by patient

Table 17. Description of student attitude assessment by patient

Result	Minimum	Maximum	Mean	Std. deviation
Assessment	60,00	100,00	81,39	11,63

Table 17 showed that the lowest score on the student attitude assessment test was 60.00 and the highest score was 100.00. It showed that TB patients in assessing student attitudes had been good.

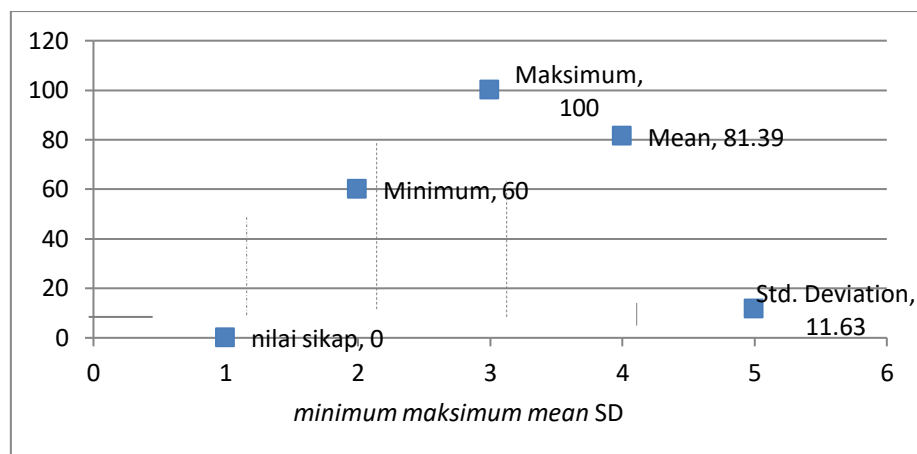


Figure 8. Assessment of student attitudes by patients

B. Bivariate Analysis

The bivariate analysis was conducted by using paired t-test to test the effect of applying PjBL KOPEN-I TB learning to the improvement of knowledge competence,

attitude and health education skills of the students.

1. Test for the effect of the application of learning-based project learning model to increase the knowledge of students who reach the passing limit

Table 18. Score of passed students of knowledge competence in treatment group (n = 69)

	Before Treatment	After treatment	Note
Passed	14	53	39 ^{*)}
Failed	55	16	
Total	69	69	

*) There was enhancement of number of passed students in knowledge competency; those were 39 students.

application of learning project based learning management of pulmonary tuberculosis to increase knowledge

The researcher used a paired sample test to analyze the effect of

Table 19. The result of paired samples test of the students' knowledge

Variable	Knowledge		difference	p-value
	Pretest	Posttest		
	mean±SD	mean±SD		
Group				
a.treatment	63.2±9.1	78.9±6.9	15.7	0.000
b.control	67.7±11.2	74.4±10.8	6,7	

Table 19 showed that the significance of the knowledge value was 0.000 < 0.05, so that H_0 was rejected and it means that there was an effect of

applying learning project based learning of pulmonary tuberculosis to the improvement of students' knowledge competence.

2. Test for the effect of the application of project based learning model to the improvement of student attitudes

Table 20. Score of passed students of attitude competence in treatment group (n = 69)

	Before treatment	After treatment	Note
Passed	22	62	40 ^{*)}
Failed	47	7	

Total	69	69
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*) There was enhancement of number of passed students in attitude competence; those were 40 students.

The researcher used a paired sample test to analyze the effect of application of learning project based learning management of pulmonary tuberculosis on the improvement of attitude.

Table 21. The result of paired samples test of the students' attitude

Group	Attitude		difference	p-value
	Pretest	Posttest		
	mean±SD	mean±SD		
a.treatment	70.7±6.4	82.6±5.1	11.9	0.000
b.control	73.5±4.5	76.3±4.7	2,8	

Table 21 showed that the significance of attitudinal value was 0.000 <0.05, so that Ho was rejected and it means there was an effect of applying learning project based learning of pulmonary

tuberculosis to the improvement of student attitudes.

3. Test for the effect of the application of learning-based project learning model to the improvement of student skills.

Table 22. Score of passed students of skill competency in treatment group (n = 69)

	Before treatment	After treatment	Note
Passed	25	55	30 ^{*)}
Failed	44	14	
Total	69	69	

*) There was enhancement of number of passed students in skill competence; those were 30 students.

The researcher used the test paired sample test to analyze the effect of application of learning project based learning management of pulmonary tuberculosis to improve skills.

Table 23. The result of paired samples test of the students' skill

Group	Skill		difference	p-value
	Pretest	Posttest		
	mean±SD	mean±SD		
a.treatment	68.3±10.2	80.6±7.4	12.3	0.000
b.control	73.2±3.2	75.9±4.4	2.7	

Table 23 showed that the significance of skill score was 0.000 <0.05, so that Ho was rejected and it means that there was an effect of applying

learning project based learning of pulmonary tuberculosis to the improvement of student skill.

4. Difference test

Differences test was conducted to know the difference of knowledge, attitude and skill level in both groups by using independent sample test.

a. Difference test of knowledge

Table 24. The result of the difference test of knowledge

Group	N	Mean	Std. Deviation	Std. Error Mean	p-value
a.treatment	69	80,51	7,39	0,89	0,047
b.control	62	77,17	11,47	1,46	

Based on Table 24 (independent samples test), it was known in equal variance table obtained $p\text{-value} = 0.047 < 0.05$, so that H_0 was rejected and it means that both groups had significant difference of knowledge average. In the output group statistic could know the average value of

knowledge at treatment group 80.51 and control group 77.17. It showed the average value of group treatment better than the control group. There was a difference in mean of knowledge between treatment and control group (mean of treatment group greater than control group)

b. Difference test of attitude

Table 25. The result of the difference test of attitude

Group	n	Mean	Std. Deviation	Std. Error Mean	p-value
a.treatment	69	79,90	3,80	0,46	0,000
b.control	62	76,33	5,54	0,70	

Based on Table 25, Independent samples test was known on equal variance table obtained $p\text{-value} = 0.000 < 0.05$, so that H_0 was rejected and it means that both groups had significant difference of attitude. In group

statistic output could be seen the average attitude of treatment group 79.90 and control group 76.33. It showed the average value of attitude of the treatment group was better than the average value of the control group.

c. Difference test of Skills

Table 26. The result of the difference test of skills

Group	n	Mean	Std. Deviation	Std. Error Mean	p-value
a.treatment	69	80,58	7,46	0,90	0,000
b.control	62	76,60	4,23	0,54	

Based on Table 26 (independent samples test), it was known that the equal variance of assumed table is obtained $p\text{-value} = 0.000 < 0.05$, so that H_0 was rejected and it means that both groups had significantly different skill. In the output

group statistic could be known the average value of the treatment group skills of 80.58 and the control group of 76.60. It showed the average value of higher treatment group skills than the control group.

d. Manova test application of PjBL learning model to increase knowledge, attitude and skill

Table 27. Manova test of application of PjBL learning model to increased knowledge, attitude and skills

Variable	Ketrampilan mean±SD	F	p
a.Knowledge	76,83±9,27	8,304	0,005
b.Attitude	78,39±7,50	68,80	0,000
c.Skills	78,38±6,57	18,25	0,000

Based on Table 27, it could be seen that there were differences in the influence of PjBL on knowledge, attitude and skills. The independent variables (the application of the PjBL learning model) affected all the dependent variables (knowledge, attitude and skill) with a large influence in sequence were 1) attitude, 2) skill, and 3) knowledge.

C. Discussion

Discussion on the evaluation of the implementation of learning project based learning management of pulmonary tuberculosis by using evaluation from Kirkpatrick (1994) which is divided into four levels.

1. Level 1 (reaction evaluation)

Reaction evaluation indicated a student response to the learning of pulmonary

TB Management. Some of the treatment group students stated that PjBL learning and instructional materials were very important in providing more detailed knowledge about the management of pulmonary tuberculosis more clearly in the community. In addition, they considered that learning also provided specific health education skills given to the patients with pulmonary tuberculosis so that the students could conduct health education practices both in the classroom and in the nursing laboratory.

In this study, the researchers and the team as facilitators gave assistance to the students in completing project tasks. Suggestion on the implementation of learning management of pulmonary tuberculosis was obtained from the students for the learning time should be done specifically, that was set scheduling individual learning and the game was still exist so that the students did not get bored.

2. Level 2 (learning evaluation)

The result of this learning evaluation was obtained by doing posttest at the end of learning. The test results were conducted by giving questionnaires in the form of closed questions to assess students' knowledge and attitudes. The result of the students' skill in conducting health education was done by observing students' actions according to skill assessment tool.

Learning evaluation to find out knowledge and attitude was undertaken one day after learning was completed. Evaluation to find out the health education skill was done on the following day and implemented for four hours. Skill assessment was conducted by the researcher and research assistant consisting of three lecturers. A lecturer observes students' health education skill measures of 23 students using the available skill assessment tools.

This level was conducted by pretest and posttest. It caused that the achievement of knowledge, attitudes and skills before and after learning could be measured properly. Based on the answers to the questionnaires, it was known that this learning added to their knowledge and skills. Woldring (2006), stated that the students' perceptions of their abilities were usually different from their actual abilities. The objective way was to do the pretest and posttest. In addition, in adult learning should be anonymous, because adults basically do not like to be tested, but they

learn when they need (Kirkpatrick, 1994). In this study, on the answer sheet, the students were asked to write their names anonymously. Previously, the researcher have explained the importance of this evaluation as an input for learning organizers about the achievements obtained by students from the learning given, and it was expected to be an improvement for subsequent learning. By having the explanation, it was expected to be able to minimize students' feelings being tested.

3. Level 3 (behavioral evaluation)

This evaluation looked for the students' changes in the achievement of competencies gained because of learning activities. This level was important in showing the meaning of learning and its possibilities, as well as retention (Woldring, 2006). The students' satisfaction with learning, knowledge improvement, attitudes and skills were not always followed by changes in individual behavior (Cook et al., 2009).

The study discussed about the results of the evaluation of learning on the students' competence achievement after getting learning PjBL KOPEN-I TB. This research could state that the learning of project based learning model had an effect on the competence of nursing students. It could be seen from the improvement of knowledge, attitude and the students' skills in giving health education after having the learning activities of project based learning management of pulmonary tuberculosis. Students who were competent, were followed by implementing health education directly to TB patients. Some students who were not competent, were given a short re-learning (remedy partial process) by researcher and research assistants. This treatment was done and adjusted to the aspect of the material that has not passed, so that the student can achieve the limits of the competency value that has been set.

Prior to using project based learning model, lecturers and researcher team discussed about lesson planning using project based learning model, including stages of components that must be conducted by lecturer and student team, time allocation, concept related to project based learning model, and learning objectives. At the first meeting, the lecturer team gave explanation to the students about the project based learning model procedure used. It was intended to students gained an understanding of the

technique so that its implementation did not deviate from the goal to be achieved. In this research, the lecturer team acted as a motivator and facilitator for all groups of students if there was something from the process of teaching and learning activities that have not been understood by the students, so that each group got the solution of the problem in finishing the task. The lecturer team was not totally a person who gave the material from beginning to end as some of the previous lecturers did in giving lectures to students. This is similar to that proposed by Rais (2010), that the role of lecturers in teaching, among others, facilitators, mentors and organizers. Lecturers should be able to encourage students to be active. One of the efforts of lecturers to encourage students to be active and increase their knowledge is learning based project learning.

In this study, treatment group students using project based learning model had higher average knowledge than control group students using conventional learning. Learning in the treatment group encourages students to work together in groups. In group work, students who are weak in understanding can be helped by their peers in understanding the concept of learning materials and assigned tasks.

Students in the group try to solve common problems that will encourage creative thinking in solving problems that occur in the environment around them. In the process of solving problems students can interact and discuss with friends of a group. In the learning model of project based learning also requires students to dare to present the task given by the group in front of other groups. In the process of presentation, other groups are also active in responding to the results of group assignments that present the outcomes of their tasks. Some of the above have a positive impact on students. This can be seen in the improvement of student's competency achievement after following project based learning activity.

There is a difference between conventional learning and project based learning. Conventional learning in the control group, liveliness lies in the team of lecturers and students more listening (learning by listening). In this method of learning, students are less motivated in teaching and learning process material presented by the team of

lecturers. Learning PjBL in the control group, liveliness lies in students and groups. Students do more activities in completing learning tasks more creative and independent, so that learning is more centered on student (student center learning). In this method of learning, students are more active and motivated to explore themselves in the learning process activities. The results showed that the application of learning project based learning can improve knowledge, attitude and skills in doing health education.

4. Student knowledge

The result of the analysis shows that the learning of PjBL has an effect on the increase of the students' knowledge about the management of pulmonary tuberculosis in the treatment group. The results of the analysis also illustrate the improvement of the average knowledge of the students with the average score of knowledge difference is different between the treatment group and the control. The improvement of students' knowledge scores on pulmonary tuberculosis management has been shown to be influenced by the PjBL learning that has been followed. Prior to following the learning, the score of student knowledge is lower than the score after the learning. This study is in line with Robertson et al. (2009) which states that there has been a significant increase in knowledge after being given ergonomic training to employees in the public sector in America. Learning proved to increase participants' knowledge on the treatment group.

Increased knowledge of students about pulmonary TB management after learning PjBL can be supported by several factors that determine, such as the support of the institution and the availability of adequate facilities, in addition to various matters relating to the teaching-learning process. This is in accordance with Kirkpatrick's (1994) opinion that factors to consider in order to improve the effectiveness of a program include required teaching materials, competent teachers, effective teaching methods, adequate facilities, appropriate schedules, effective tools and coordination, as well as efforts to improve the program.

Improving student knowledge about pulmonary TB management can be caused by the use of one of the methods of role play. This is as stated by Legowo (2007) that role play method can encourage students to hone

their own learning ability (individual or group) and can help the students to appreciate their knowledge, whether in small discussion (group) or openly. This shows that the role play method used in learning plays a role in improving students' knowledge about pulmonary TB management. Students carry out role play directly by acting as nurse, client and family accompanied by researcher and TB officer.

The provision of learning modules also contributes in influencing the increase in the value of students' knowledge. Musfiquon (2012) said that learning is a communication process that requires a means of conveying messages (media). Learning using media results will be better because learning media is an integral part of learning.

5. Student attitude towards pulmonary tuberculosis management

Based on the results of statistical test analysis showed that PjBL learning had a significant effect on the improvement of student attitudes toward pulmonary tuberculosis management in the treatment group. There was a greater increase in mean score in the attitude of the treatment group students.

The average increase in attitude values in the treatment group can be attributed to the use of learning methods with role play methods. This is in accordance with the opinion Tjitarsa (1992) states that by using role play methods, nurses have helped mothers change their attitudes and learn new skills in communicating with others. Thus, the PjBL method can contribute considerably in improving students' attitudes towards pulmonary tuberculosis management, including how to communicate well to treatment group students.

The influence of learning module also supports the improvement of students' attitude value because in the learning process, the absorptive power of senses in helping one's learning process is not the same. The highest ability to receive messages is the sense of sight (82%) and hearing (11%), while the feel (3.5%), flavor (2.5%), and olfaction (1%). Wiroatmodjo and Sasonohardjo (2002) stated that if the delivery of the material more use of the sense of vision will obtain the highest results, especially if combined with the sense of hearing and pronunciation through

communication then the results are more leverage.

The results of this study relate to research Elmi (2006) which states that therapeutic communication has a significant influence on the improvement of nurse attitude to perform therapeutic communication in providing nursing service. The difference with this research lies in the given material but there is no difference in the outcome.

6. Skills of students in health education

The result of the analysis shows that the learning of PjBL has an effect on the improvement of students' skill value in conducting health education in the treatment group. In addition, there is an increase in the average score of student skills after the learning with the average score of skills difference in the treatment group is greater than the control group.

Increasing the value of student skills can be caused by the use of role play method because this method of learning can encourage learners to play a role related to the subject of the study, either social or scientific or exact sciences. Implementation steps of this method include planning, role play in the classroom and evaluation. Role play method is commonly used in non-exact learning because it requires students to be able to play a social role (Legowo, 2007).

The use of learning methods with the provision of learning modules also contribute in influencing the increase in student skills. According to the results of research related to the use of the senses it is said that a person who learns by listening (15%), hears and sees (35-55%), while listening, seeing, doing alone and thinking (80-90%).

The results of this study are in accordance with the results of Ischak (2004) research that there is a therapeutic communication influence by using lectures and role plays on skills after nursing therapeutic communication education. The difference with this research lies in the material and learning method but there is similarity of research result, that is improvement of student skill.

The results of Elmi (2006) showed that therapeutic communication has a significant influence on the improvement of nursing skills after education to conduct therapeutic communication in providing nursing service.

Learning based project learning can encourage students to be critical with the basis of scientific argument in accordance with the knowledge constructed from other supporting courses. Students can play a role as a component of any community should know the social background of the community played, so knowing the true benefits and consequences (Legowo, 2007).

An increase in the posttest value of health education skills after the learning in the treatment group could be due to the result of the training process in health education simulation and the presence of the module. Implementation of health education skills undertaken by students to TB patients also provides improved knowledge of TB patients after posttest. This means that the ability of students in providing health education can be categorized well. This is possible because students conduct health education is based on a good level of knowledge, so that health education is also done optimally. This is in accordance with the opinion of Notoatmodjo (2012) which states that behavior based on knowledge will be more lasting than behavior that is not based on knowledge. Another opinion expressed by Billings et al. (2001) stating that distance learning provides an opportunity for nurses to seek continuation or continuous improvement in professional development.

Conclusion

Based on the research result and data analysis, it could be concluded that:

1. The application of project based learning model improved the nursing students' knowledge on pulmonary tuberculosis management.
2. The application of project based learning model enhanced the students; attitude on pulmonary tuberculosis management.
3. The application of project based learning model improved the nursing students' skill on pulmonary tuberculosis management.
4. Nursing students' competences of treatment group were better than control group. It was showed by significance value 0.002 for knowledge and 0.000 for attitude and skill; those were less than 0.05.
5. Implementation of the students' skill in health education improved patient's knowledge about pulmonary tuberculosis and its treatment program;
6. Patient gave good assessment to the students' attitude during interaction, after student doing health education

Suggestion

Based on the result and discussion, it gives some suggestion as follows:

1. Educational institution can correct the learning pattern by improving the knowledge and comprehension of lecturers' learning method. It can improve students' motivation and interest so that the final result can enhance the students' competences.
2. The research is an effort of pre-service tuberculosis and can give contribution for department of public health on pulmonary tuberculosis management. Therefore, it is expected getting cooperation intensively with educational institution so that the students directly guard the successful of pulmonary tuberculosis treatment in the society.
3. The patients/communities: Good patient knowledge of pulmonary tuberculosis and treatment is expected to enable the patient to remember and understand it continuously, thereby fostering good attitudes and behaviors in the treatment of compliance and completion during the treatment period. Thus, TB patient's recovery rate can be achieved according to the established program plan.
4. Another researchers: a) Further research can add other variables related to students' competences in order to provide a broader idea of factors that affect students' competences; b) The student's competence variable is still limited to the competence of knowledge, attitude, skill and on the management of pulmonary tuberculosis. It needs consideration for the development of other students' competencies and on different lecture materials; c) Expected in subsequent research to use the college and other materials as the object of research, so that it will be obtained comparison of the application of PjBL.

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