Blended Learning based on Problem Based Learning to Improve Critical Thinking Ability of Prospective Counselors

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Abstract. This study determines the effectiveness of the application of blended learning with problem-based learning methods to improve the critical thinking skills of prospective counselors. The subjects chosen were 40 guidance and counseling students taking counselor personal development courses. I conducted the study through a true experimental design with one experimental class and one control class containing 20 students each. The t-test result of students’ critical thinking skills resulted in the t count of 2.41> t table of 2.03. This shows that the students’ critical thinking skills taught using PBL-based blended learning are better than those taught with conventional PBL. Therefore, we can conclude that Blended Learning based on Problem Based Learning is effective for Improving the Critical Thinking Skills of Prospective Counselors.

1. Introduction

Since childhood, basically, humans already have the tendency and ability to think critically. As a rational being, humans are always motivated to think about the things surrounding them. Human’s tendency to give meaning to various things and events around him is an indication of his ability to think [1]. This tendency can be identified in a student who looks at various objects around him curiously. By paying attention to it, we can gain an understanding on the way students think and give meaning to their environment. Look at the way they try everything that provokes their curiosity and then draw conclusions from the things they have discovered[2] [3].

With an understanding on the cognitive conditions of students and their high learning ability, it can be concluded that education for critical thinking should have been provided to students since they are very young [4]. In addition to preparing them for their adulthood later, it also makes them accustomed to openness to various information since early stage. Lack of critical thinking education can lead students to the habit of doing various activities without knowing what the purpose is and understanding why they are doing them. This habit is often seen in students who lack or even do not get the critical thinking education.

Schoenfeld [5] reported an experiment on elementary school students. These students were given the question “If there are 26 sheep and 10 goats in a ship, how old is the captain of the ship?” The results were ‘amazing’. Among 97 students, 76 of them ‘solved’ this problem by adding, subtracting, multiplying or dividing these numbers. They felt that they were required to solve the problem as soon as possible so that they did not attempt to understand the problems they faced. In the world of education that still adheres to many orthodox ways that require students only to swallow what the teachers or parents have conveyed to them, it is indeed difficult to expect individuals to be able to
propose their own thoughts, let alone the unique ones. They tend to appear as individuals who are automatic, doing the things they are accustomed to doing. That also applies in Indonesia [6].

This way of learning and thinking is totally not suitable for the present situation, especially if our nation does not want to be a follower only [7]. It is a pity if in a world the boundaries of which has increasingly thinned out, Indonesia only becomes the executor of the commands of people from other countries, even in its own country, whereas the decision making is held by people from other countries who have been prepared better beforehand. To avoid such conditions, some efforts need to be taken to develop students’ initiative and thinking abilities that will eventually lead them to become people who are able to make decisions, think and produce new products. Businesses that are in accordance with the current problems and conditions are teaching them to think critically. Critical thinking ability can assist people make the right decisions based on careful, systematic, logical efforts and consider various points of view. Teaching skills is not the only thing that is essential to do, but teaching traits, attitudes, values and characters are also important to support critical thinking. This means that students need to be educated to think critically [8].

Many parents lately have a fear that their students will be affected by various negative things. Rapidly developing information technology gives birth to millions of information every day, most of which contain information that may adversely affect students negatively. It is not possible and unwise, however, to isolate students from various information. What is required to do to protect students from variety of bad influences is to build adequate information processing capabilities and make them as people who are able to examine and choose information that is good for themselves [9]. Educating them to think critically can help parents avoid students from the possibility of using inappropriate information. Educating students in critical thinking will help them to build their own self-defense actively against information attacks around them.

Training students to think critically since young age is possible, of course by considering their stages of development. This can be carried out by preparing a critical thinking-based education curriculum. Cromwell [10] proposes teaching strategies that develop dialogic and dialectical thinking abilities. Consequently, students will be accustomed to using their critical thinking on everything, including on themselves. In addition, to be able to practice critical thinking skills in students naturally requires parents and teachers who have the ability to think critically as well. Thus, it should be the adults, who are expected to help students to utilize their thinking skills, learn humbly, train and develop their critical thinking skills.

Critical thinking is not the same as argumentative attitude or criticizing others. Critical thinking is neutral, objective, and not biased. Although critical thinking can be utilized to show mistakes or bad reasoning, it can play an important role in the cooperation to find the right reasons and perform constructive tasks [11]. Critical thinkers are able to introspect about possible biases in the reasons that he puts forward [4]. In accordance with the understanding of critical thinking skills above, it can be said that critical thinking skills are those that involve cognitive processes and invite students to think reflectively on problems.

Counselor is one of the assisting professions that, according to Law Number 20 of 2003 concerning the National Education System, is part of educators the task of whom is to build superior human resources by prioritizing the development of learners’ potentials to achieve a prosperous, happy and useful life for the homeland and the nation as stated in the objective of national education. Counselors are produced through academic education from completing undergraduate study programs of guidance and counseling and taking professional guidance and counseling teacher/counselor education (Permendikbud Nomor 111 Tahun 2014). This explains that the counselor profession is an educated and skilled profession because it has a scientifically mature academic education and skills through practice-oriented professional education.

The learning method that is considered most relevant in shaping these skills is Problem Based Learning. Problem Based Learning (PBL) is a teaching method characterized by the existence of real problems as a context for students to learn critical thinking and problem solving skills, and gain knowledge. As technology advances, the combination of face-to-face meetings and online learning...
(blended) is the most rational alternative for overcoming time and space limitations [12]. This model really allows students to explore knowledge while elaborating their affective and psychomotor aspects in solving available problems. This ability is certainly required very much by prospective counselors, especially in sharpening the ability to think, respond and act primarily in realizing the attitudes and behaviors that respect and uphold values of humanity. The results showed that blended learning allowed students to assimilate, accommodate and implement convergent learning styles. The results revealed that students’ views on mixed learning methods and their use were quite positive [13].

Blended learning has the capability to create an unusual learning atmosphere, which allows students to explore various information and references through the environment without being limited by space and time [14], [15]. This type of environment is important to develop and arouse the desire to learn more deeply on the contents of learning that have been implemented. The application of problem based learning in the learning process will help students to improve their cognitive activities that are able to hone their critical thinking skills [16]. In the long run, problem based learning will increase students’ autonomous thinking [17].

The factual conditions at this time show that there is not even a book available that specifically addresses the personal development of counselors that was developed fundamentally in the Minister of National Education Regulation Number 27 of 2008 concerning Academic Qualification and Competency Standards of Counselors (SKAKK). The available books are more partial in several reference sources that still use foreign languages. In addition, the available teaching materials have not been compiled in a basic way to the rules and steps of implementing problem based learning strategies, either. Problem-based learning is designed in a learning procedure that begins with a problem and uses the instructor as a metacognitive trainer. There is a fundamental difference between problem solving and problem based learning. In learning with problem solving strategies as most teachers do today, students are provided with problems after they are presented with information about the teaching materials (facts, concepts, principles, laws, etc.), and they do not know why they should learn those teaching materials. On the other hand, in the Problem Based Learning procedure, the initial setting is the presentation of the problem. The learning process begins after students are confronted with the structure of real problems so that students know why they have to learn those teaching materials. The information they will collect and analyze comes from the teaching material units that they study with the aim of being able to solve the problems they face. The problems presented should also be able to bring up concepts and principles that are relevant to the content domain. Through problem based learning, students will learn how to use an interactive process in evaluating what they know, identifying what they need to know, gathering information, and collaborating in evaluating a hypothesis on the basis of the data they have collected. Meanwhile, lecturers play a role more as a tutor and facilitator in exploring and finding hypotheses, and in drawing conclusions.

According to these descriptions, the authors attempt to describe the results of research on the application of blended learning with blended learning strategies to improve the critical thinking of prospective counselor students.

2. Method
The research method used is true experiment where the population is guidance and counseling students of Muria Kudus University who were taking the counselor’s personal development course. In the second semester of 2018/2019, there were two study groups, each of which consisted of 20 students. Both classes were then designated as the experimental group and the control group where class A was the experimental group and class B became the control group.

The determined indicators related to this critical thinking ability are as follow: 1) Interpretation (Indicator 1) is understanding and expressing the meaning or significance of various kinds of experiences, situations, data, events, judgments, habits or customs, beliefs, rules, procedures or criteria; 2) Analysis (Indicator 2) is identifying the intended and actual inferential relationships between statements, questions, concepts, and descriptions; 3) Evaluation (Indicator 3) is assessing the credibility of statements or representations which come in the form of reports or descriptions of
perceptions, experiences, judgments, opinions and assessing the logical strength of inferential or intended relationships among statements, descriptions, questions or other forms of representation; 4) Inference (Indicator 4) is identifying and obtaining elements that make sense, making guesses and hypotheses, and inferring the consequences of data; 5) Explanation (Indicator 5) refers to the ability to state the results of one’s explanation and present one’s reasoning in the form of strong arguments; 6) Self-regulation (Indicator 6) means to monitor one’s cognitive activities consciously, the elements used in these activities and the results obtained, especially by applying the skills in analysis and evaluation for inferential assessment research itself by considering the question, confirmation, validity or correcting either the reasoning or the results.

The instrument used was a critical thinking ability test that was developed based on the indicators and substance of the counselor’s personal development course material. Previously, construct validation was carried out by involving two (2) validators and factual validation by testing it to 20 guidance and counseling students. The results of the validity and bias tests can be observed in Table 1 and Table 1:

| Table 1. Factor Analysis KMO and Bartlett's Test Results |
|---------------------------------------------------------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy.         | .767 |
| Approx. Chi-Square                                      | 114.882 |
| Bartlett's Test of Sphericity                           | df 21 |
| Sig.                                                    | .000 |

Based on table 1, KMO and Bartlett’s Test values for the desired correlation between variables are > 0.5. The significance of the study was 0.05. From the above results, it obtained the KMO value of 0.767, which is greater than 0.5. Meanwhile, the significance generated from Bartlett’s Test of Sphericity is 0.000 (Santoso, 2006: 22). With the above results, it can be concluded that the variables and samples used were valid for further analysis.

Instrument reliability test aims to measure the consistency of the instrument. The instrument reliability test refers to the consistency of responses given to the question items that measure the Construct Theory. Measurement reliability indicates the extent to which these measurements are not biased and ensures that the measurements are consistent across the time and across a variety of questions. The reliability test of skill scale for career decision making is carried out using SPSS 22. The results are as follows:

| Table 2. Reliability Analysis Results |
|---------------------------------------|
| Cronbach's Alpha                      | N of Items |
| .952                                  | 2 |

If the value of alpha is > 0.7, it means that reliability is sufficient (sufficient reliability). Meanwhile, if alpha is > 0.80, it suggests that the entire reliable items and all tests are internally consistent because they have strong reliability. The reliability test results showed the number of 0.952 (according to Table 2). This means that the alpha value of 0.952 is > 0.7, which means that this instrument is reliable. The validity and reliability tests of this instrument underlie the researchers to use the instrument in the designed research.

3. Results and Discussion
After performing the pretest and posttest to the research subjects, the results obtained are displayed in table 3:

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Table 3. Difference Test Results of Posttest Means

| Variation | Control Class | Experimental Class |
|-----------|---------------|--------------------|
| Mean      | 81.22         | 86.02              |
| dk        | 36            | 36                 |
| t_count   | 2.41          |                    |
| t_table   | 2.03          |                    |
| Criteria  | The critical thinking ability of the experimental class is better than the control class. |

The t-test data analysis results of critical thinking are shown in Table 4.

Table 4. T-test results of critical thinking

| Variation | Control class | Experimental Class |
|-----------|---------------|--------------------|
| Mean      | 74            | 84                 |
| Dk        | 36            | 36                 |
| t_count   | 2.721         |                    |
| t_table   | 2.03          |                    |
| Criteria  | The mean of critical thinking for experimental class is better than that of critical thinking for the control class |

The results of the data analysis test of the increase in critical thinking gain are indicated in Table 5.

Table 5. Critical thinking gain test results

|        | Pretest | Posttest | Gain   | Criteria |
|--------|---------|----------|--------|----------|
| Experiment | 64      | 78       | 0.49   | average  |
| Control   | 65      | 75       | 0.23   | low      |

Based on Table 3, the results achieved in the study of critical thinking resulted in t count of 2.41> t table of 2.03; hence, the critical thinking of students taught by PBL-based blended learning was better than critical thinking of students taught with ordinary blended learning. The procedure of collecting data during the research observation was the validation of Problem-Based Learning based blended learning, written tests, and task-based interviews. The validation performed by the validator was content and construct validation. Meanwhile, the empirical validation is when there are students who have the level of critical thinking skills (TKBK). Problem-Based Learning-based Blended Learning is a tool for levelling critical thinking skills in solving mathematical problems [18], [19]. The learning in the pre-research class consisted of choosing the concept material and function continuity theorem while in the research class, the learning came in the form of selecting the concept material and function derivation theorem [20], [21]. The learning ended with a written test in the form of a description. In order for the data obtained in accordance with what is expected, before the data collection was executed, written test questions were validated by the validators. This written test contained mathematical problem resolutions and was used to investigate the level of critical thinking skills of students. Interviews were required to obtain in-depth information and supported what was obtained from written tests. During the interviews, a tape recorder was utilized to record all information [22]–[24]. After determining two (2) subjects for each level of critical thinking skills (TKBK), an interview was held on the subject. Interviews were conducted on research subjects from the pre-research classes and research classes.

Critical thinking is an ongoing ability that must continue to be sharpened through exercises that allow the whole sufficient cognitive activity in students [25]. Blended learning uses a problem based
learning approach to sharpen the ability of students to interpret, analyze, evaluate and inference problems that are presented to be later explored in depth with studies through scientific references such as scientific journals, proceedings and other references that reinforce the new arguments of students [26], [27][28], [29]. In addition, the disposition of ways of thinking through the problems presented and the interpretation is one of the expected forms of critical thinking skills [4], [30]. Blended learning is identified in the relationship between instructors, students, and classrooms located in two or more locations the distance of which is more than 100 km [31]. This definitely is able to overcome the various shortcomings of the learning process, especially the business of lecturers in performing tri dharma at once.

4. Conclusion
Blended learning is one of the options of learning models that can be applied to students. The implementation of problem based learning increasingly complements the reliability of blended learning. Research shows that blended learning based on problem based learning can improve students’ critical thinking skills, especially the ability to interpret, analyze, evaluate and inference the problems based on what is faced by students, especially prospective counselors who continue to hone their problem-solving abilities in helping their counselees. For further research, it is expected that there will be a refinement on the implementation procedures of blended learning with other learning models that are considered to be more easily applied and allow for the cognitive, affective and psychomotor activities of students.

5. References
[1] E. Krupat, J. M. Sprague, D. Wolpaw, P. Haidet, D. Hatem, and B. O’Brien, “Thinking critically about critical thinking: Ability, disposition or both?,” Med. Educ., vol. 45, no. 6, pp. 625–635, 2011.
[2] Y. W. Kwan and A. F. L. Wong, “The constructivist classroom learning environment and its associations with critical thinking ability of secondary school students in Liberal Studies,” Learn. Environ. Res., vol. 17, no. 2, pp. 191–207, 2014.
[3] Y. W. Kwan and A. F. L. Wong, “Effects of the constructivist learning environment on students’ critical thinking ability: Cognitive and motivational variables as mediators,” Int. J. Educ. Res., vol. 70, pp. 68–79, 2015.
[4] R. Macpherson and K. E. Stanovich, “Cognitive ability, thinking dispositions, and instructional set as predictors of critical thinking,” Learn. Individ. Differ., vol. 17, no. 2, pp. 115–127, 2007.
[5] R. Schoenfeld, “Say It in English, Please!,” Angew. Chemie Int. Ed. English, vol. 27, no. 8, pp. 1050–1057, 1988.
[6] E. Nour Mohammadi, F. Heidari, and N. Dehghan Niry, “The Relationship between Critical Thinking Ability and Reading Strategies used by Iranian EFL Learners,” English Lang. Teach., vol. 5, no. 10, pp. 192–201, 2012.
[7] R. McCuen, “Cultural psychology: A once and future discipline?,” JAWRA J. Am. Water Resour. Assoc., vol. 48, no. 5, pp. 1071–1073, 2012.
[8] C. A. Barnes, “Critical Thinking Revisited: Its Past, Present, and Future,” NEW Dir. COMMUNITY Coll., no. 130, pp. 5–13, 2005.
[9] G. Kokebayeva and Y. Kartabayeva, “Application of Case-technology for Development of Critical Thinking Ability of Students,” Procedia - Soc. Behav. Sci., vol. 171, no. 727, pp. 284–288, 2015.
[10] L. S. Cromwell, “Assessing critical thinking,” New Dir. Community Coll., vol. 1992, no. 77, pp. 37–50, 1992.
[11] P. C. Farley, N. Magan, C. L. Charron, N. I. Broomfield, and A. F. Farley, “You be the examiner!,” Biochem. Mol. Biol. Educ., vol. 35, no. 6, pp. 392–396, 2007.
[12] J. Gálvez, E. Guzmán, and R. Conejo, “A blended E-learning experience in a course of object oriented programming fundamentals,” Knowledge-Based Syst., vol. 22, no. 4, pp. 279–286.
2009.

[13] B. Uğur, B. Akkoyunlu, and S. Kurbanoğlu, “Students’ opinions on blended learning and its implementation in terms of their learning styles,” Educ. Inf. Technol., vol. 16, no. 1, pp. 5–23, 2011.

[14] D. Pérez-Marín and I. Pascual-Nieto, “A Case Study on the Use of Blended Learning to Encourage Computer Science Students to Study,” J. Sci. Educ. Technol., vol. 21, no. 1, pp. 74–82, 2012.

[15] V. Chandra and D. L. Fisher, “Students’ perceptions of a blended web-based learning environment,” Learn. Environ. Res., vol. 12, no. 1, pp. 31–44, 2009.

[16] N. J. Spalding and A. Killett, “An Evaluation of a Problem-Based Learning Experience in an Occupational Therapy Curriculum in the UK,” Occup. Ther. Int., vol. 17, no. 2, pp. 64–73, 2010.

[17] M. H. Bidokht and A. Assareh, “Life-long learners through problem-based and self directed learning,” Procedia Comput. Sci., vol. 3, pp. 1446–1453, 2011.

[18] H. Abdalla Jr., A. J. M. Soares, D. Garrosini, and L. F. Molinaro, “Experiences of applying a ‘blended’ learning approach to client-based student projects,” Proc. Int. Conf. e-Learning, ICEL, vol. 49, no. 2, pp. 170–176, 2012.

[19] S. Dakduk, Z. Santalla-Banderali, and D. van der Woude, “Acceptance of Blended Learning in Executive Education,” SAGE Open, vol. 8, no. 3, 2018.

[20] M. OLIVER and K. TRIGWELL, “Can ‘Blended Learning’ Be Redeemed?,” E-Learning, vol. 2, no. 1, p. 17, 2005.

[21] W. Heikoop, “Blended identities: Identity work, equity and marginalization in blended learning,” E-Learning Digit. Media, vol. 10, no. 1, pp. 53–67, 2013.

[22] A. Poncela, “A blended learning approach for an electronic instrumentation course,” Int. J. Electr. Eng. Educ., vol. 50, no. 1, pp. 1–18, 2013.

[23] D. E. Sims, S. Burke, D. S. Metcalf, and E. Salas, “Research-Based Guidelines for Designing Blended Learning,” ERGONOMICS DESIGN, vol. 18, no. 2, 2008.

[24] A. Ghareeb, H. Han, K. Delfino, and F. Taylor, “Blended Learning in Obstetrics and Gynecology Resident Education: Impact on Resident Clinical Performance,” J. Med. Educ. Curric. Dev., vol. 3, p. JMECD.S40598, 2016.

[25] S. G. Forneris, “Self-report questionnaires of nurses in Taiwan reveal that critical thinking ability and nursing competence are both at the middle level and there is a correlation between the two,” Evid. Based. Nurs., vol. 15, no. 3, pp. 74–75, 2012.

[26] A. Henrich and S. Sieber, “Blended learning and pure e-learning concepts for information retrieval: Experiences and future directions,” Inf. Retr. Boston., vol. 12, no. 2, pp. 117–147, 2009.

[27] L. L. Hsu and S. I. Hsieh, “Effects of a blended learning module on self-reported learning performances in baccalaureate nursing students,” J. Adv. Nurs., vol. 67, no. 11, pp. 2435–2444, 2011.

[28] D. T. Tempelaar, B. Rienties, and B. Giesbers, “Who Profits Most from Blended Learning?,” Ind. High. Educ., vol. 23, no. 4, pp. 285–292, 2009.

[29] S. Yusoff, R. Yusoff, and N. H. Md Noh, “Blended Learning Approach for Less Proficient Students,” SAGE Open, vol. 7, no. 3, pp. 1–8, 2017.

[30] P. Lameras, P. Levy, I. Paraskakis, and S. Webber, “Blended university teaching using virtual learning environments: Conceptions and approaches,” Instr. Sci., vol. 40, no. 1, pp. 141–157, 2012.

[31] G. R. Parslow, “Multimedia in biochemistry and molecular biology education,” Biochem. Mol. Biol. Educ., vol. 38, no. 2, pp. 122–124, 2010.
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