The Effect of Problem-Based Learning and Level Intelligence of Students' Critical Thinking on Kalamm Science

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Abstract
This research aim was to figure out the effect of PBL and Level Intelligence of Student's Critical Thinking. The subject matter in this research was Ilmu Kalam. This research was experimental design and used factorial design 2 x 2. The result of this research was: 1) There were differences in average critical thinking skills in the subject of Kalam Science of the group given, the model PBM to Conventional Methods, 2) there was evidence that the PBL model could improve critical thinking skills for students who had high intelligence, 3) The ability of students in critical thinking in that they had low intelligence by using higher PBM model with critical thinking skills of students with lower intelligence levels using conventional models, 4) the interaction effect between PBL and intelligence influential on the level of critical thinking skills of students.

Keywords: PBL, Intelligence, Critical Thinking

Abstrak
Tujuan penelitian ini adalah untuk mengetahui pengaruh PBL dan Tingkat Kecerdasan Berpikir Kritis Mahasiswa. Subyek dalam penelitian ini adalah Ilmu Kalam. Penelitian ini adalah desain eksperimental dan digunakan desain faktorial 2 x 2. Hasil penelitian ini adalah: 1) Ada perbedaan keterampilan berpikir kritis rata-rata di subjek Kalam Ilmu kelompok tertentu, model PBM ke Metode Konvensional, 2) ada bukti bahwa model PBL dapat meningkatkan kemampuan berpikir kritis bagi siswa yang memiliki kecerdasan yang tinggi, 3) kemampuan siswa dalam berpikir kritis dalam bahwa mereka memiliki kecerdasan yang rendah dengan menggunakan model PBM lebih tinggi dengan kemampuan berpikir kritis siswa dengan tingkat kecerdasan yang lebih rendah menggunakan model konvensional, 4) efek interaksi antara PBL dan kecerdasan berpengaruh pada tingkat kemampuan berpikir kritis siswa.

Kata Kunci: PBL, Intelegensi, Berpikir Kritis

Introduction

It was interesting to track the growth history and the born of PTKI as Islam College Education. Philosopically, PTKI Genealogy was begun between Islam people clash of Indonesia and Western sophistcation which raised "new intellectual group" which was often called as "secular intellectuals" (Azra, 2012: 194). This group was often contradicted with theologians' thinking that represented old groups. This group tended to humiliate old intellectuals' thinking which were considered as conservative, rigid, outdated, and only understand religious problem.

The second friction caused some Islam figures to create theologians who did not only understand religious problem after death, but also general sciences as a science on worldliness dimension. Or in other words, according to Azra, so that intellectual and religious theologians could be met in somebody's self (2012: 194). Therefore, the curriculum design on PTKI both state or private to have characteristic specialty if it was compared to other colleges. The courses which were taught were Islamic science. The

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course group was called as Islamic Studies. This knowledge group must be taught in each faculty.

In Faculty of Tarbiyah and Teacher Training (FITK) of Universitas Islam Negeri Raden Fatah Palembang the courses were taught until today, such as: Kalamm Science, Islam Study Methodology (MSI), *Tasawuh, Ushul Figh, Tafsir and Hadits.* There were academic reasons why Kalam Science was required to teach. It could be seen from the history of Kalam Science emergence started from political movement of some groups, among them were Ali bin Abi Thalib, Muawiyah and Khawari to eschatological theological area. Theological, eshcatheological, and prophethood concepts proposed by Kalam theological when discussed those problems did not only base on nash theorem souced to al-qur'an and sunnah, however, it also utilized 'aql theorem or logic such as Mu'tazilah. Based on the kalam science, according to Madjid (1995:203), it was not intended as "dialog" in daily understanding, but it that had logic. It meant that beside teaching taught religious sect, Kalam Science also taught students to use logic or 'aql in understanding religious texts.

Unfortunately, what was discussed by Mutakallimun on theological dimension as taugh on Kalam Science course had some weaknesses. As a thinking and scientific discipline, Kalam Science was considered as a very theoretical and rigid science which regarded practical dimension in daily life. It was revealed by Gusmian (2008: 4) that the weakness was theological and esoteric discussion that was far from humanism value. In fact, Mu'tazillah group that was considered as rationlistic in Kalam sect was to defend the greatness and sanctity of God, not humanism social problems faced at that time.

Enigeer in Soleh (2003: 99) stated that Kalam Science could be seen from two sides, first, more intelectualistic, metaphysic-speculative personality, and second, the closeness of politic theology relation of status quo group. In the reality, classical theory often became legitimazion tools for authority or rezime holder.

Both opinions implied that as a scientific discipline, Kalam science often failed in the function to build thinking paradigm. Kalam Science was seen an instrument to perpetuate rezime authority. It was worsened with the presentation of course at college. As a part of course on Islamic Studies, the weaknesses were first: the low of effectivity and efficiency of learning materials absorbed and its effect (atsar) in their daily attitudes and hebaviors. Second: the rigid learning methodology and approach done by the lecturer in the classroom during the learning process.

Therefore, there were three basic problems that were still faced in the teaching learning process on Kalam Science, such as: 1) The low masterial of Kalam Science course material, 2) this course was normative, high and separated from daily context so that the course did not give effect towards students' behavior, and 3) the lecturers' minimum method and approach in transfering the knowledge. As a consequence, the competence in the of learning result on cognitive domain was knowledge, psychomotric and affective domain as the translating Kalam Science in the form of attitudes and behaviors were materilized. As termed by Freire, most of course systems still follow what was called as "the banking concept of education", in which the lecturer became the singular owner of the science. The lecturer had a role as an active subject, while students became the passive object (Azra, 2012: 198).

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Therefore, it needed reorientation and reformulation in their more friendly, humanism, contextual, interesting and interactive teaching approach and methodology. It became imperative because according to Djamarah (2012: 11), the teaching learning process as educative interaction in which this interaction should draw two-ways active relationship with a number of knowledge as the medium, so that the interaction was meaningful and creative relationship. Zurqoni (2012: 120) added, a teacher (lecturer) who taught warmly, communicatively, and familiar with students will cause students' self confidence. The lesson would be more meaningful and successful if the teaching learning and interaction process, the teacher and lecturer presented were warm, comminicative, and familiar individuals. The lesson became more interesting and not boring if a lecturer did the approach of "humanizing students".

This model was developed based on the constructive learning theory (Rusman, 2010: 231). According to Arends as quoted by Suprahatinigrum, This Problem-Based Learning was one of learning approaches (2013: 10), in which students work on autenthic problem to organize their own knowledge, develop high level inquiry and thinking skill, and develop independence and self-confidence. Which meant that characteristic of PBM was that students were faced with real social problem and had found the solution so that it was expected students are able to think critically and build their own knowledge.

Research Method

The research which entitled "The Effect of Problem Based-Learning and Level Intelligence of Student's Critical Thinking" was quantitative with experimental approach with factorial design 2x2. The populations of this research were all students of FITK UIN Raden Patah in Semester I in Batch 2014/2015. The reason utilized by the resarcher to select them were because the course of Ilmu Kalam on all Study Programs were implemented on the beginning semester when the students were accepted as students at Faculty of Tarbiyah and Teaching Sciences (FITK) of UIN Raden Fatah Palembang.

The sample selection model utilized cluster random sampling in which the researcher took random cluster or class that became experiment and control class. After the sample was found, each group with high and low intelligence would be given two different treatments in which on the first group it would be given Problem-Based Learning method and other group was only given conventional learning method such as lecture and discussion. In each group, there were students who had high and low intelligence level. The proportion of this intelligence was obtained from test result by involving a psychologist. The data collection technique utilized essay learning result test.

Research Findings and Discussion
1. *The Descriptive Analysis of Comparison between Pretest-Post Test Gain Score of Control and Experimental Class*

The comparison analysis towards students' critical thinking of Faculty of Tarbiyah and Teaching Sciences could be seen from their pre-test and post-test score including mean score and standard deviation. The statistic data on the comparison could be seen from the table as follows:

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Table 1: Pre-test and Post-Test Score

Variable	Experimental and Control Class				
	N	stat	Pretest	Postest	Gain
PBM Model and High Intelligence (A1B1)	12	$\overline{X}$	32.92	80.40	0.70
		S	4.98	7.52	
PBM Model and Low Intelligence (A1B2)	12	$\overline{X}$	34.16	58.33	0.,36
		S	5.96	11.34	
Conventional Model and High Intelligence (A2B1)	12	$\overline{X}$	41.62	72.91	0.58
		S	10.51	8.,65	
Conventional Model and Low Intelligence (A2B2)	12	$\overline{X}$	32.08	42.50	0.15
		S	4.98	7.42	

Based on the previous table, it could be explained comprehensively above the comparison of pre-test and post-test on experiment and control class. The comparisons were:

a. Totally the mean ($\overline{X}$) of students' critical thinking that had high intelligence by using PMB model (80.40) higher than students' average critical thinking intelligence that only gained conventional method (72.91). It meant as had been done previous analysis that utilized learning process could improve learning success.

b. Average ($\overline{X}$) of students' critical thinking that had high intelligence by using PMB model (80.40) higher than students' low critical thinking intelligence altough they were given PBM model (58.33). This result was given understanding that both success components in the education and teaching learning process. Both components were based on research result: first, having intelligence level and second, good and appropriate model implementation.

c. Average ($\overline{X}$) of students' competence who were given PBM model with low intelligence had higher critical thinking competence (58.33) on Kalam Science, if it was compared to students' average and low critical thinking competence (42.50). The result of the research revealed that by using learning model could improve students' critical thinking ability. Therefore, teachers and lectures should have knowledge and understand the learning methods.

d. Average ($\overline{X}$) of students' competence who were given conventional method and had higher intelligence (72.91) than the ones who were given PBM model with low intelligence level (58.33). The result of the research were interpreted as what had been explained previously that the students' critical thinking competence level was also determined by the level or competence level that had been possessed by the students. It meant that the intelligence level became the intrinsic motivation factor for them to gain better learning result.

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e.   If seeing change of gain score on pre-test and post-tense score, students gained PBM model and high competence, had bigger change (0.70) in critical thinking competence compared to other groups.

2.   *Hypothesis Test*

a.   Normality Test and Data Homogeneity

Statistical analysis in this research used Anava statistical test 2x2. It was parametric statistic test group. Parametric statistic was statistic test which required some assumption before the analysis was done. The assumption was: 1) the data was formed as interval/ratio, 2) the sample was selected randomly, and 3) the data distribution should be normal and homogeneous.

Based on the previous requirements, the data normality and homogeneity were calculated in test result score of students' critical thinking competence at Faculty of Tarbiyah of UIN Raden Fatah. The calculation result was obtained by using SPSS. It was obtained that of all data group on each cell and column, all data was ditributed normally and homogeneously.

It was the asumption and requirement of parametric statistic using Anava 2x2 test to prove the hypothesis of this research entitled "The effect of Problem Based-Learning and Level Intelligence of Student's Critical Thinking on Students of Tarbiyah Faculty of UIN Raden Fatah" could be continued.

b.   Hypothesis Test

There were four hypotheses proposed in this research in which each hypothesis could be seen as follow:

a.   Ho = There was no difference of critical thinking competence average on Kalam Science course between groups given PBM and Conventional Model or Ho: $\mu_{A1} = \mu_{A2}$

   H1 = There was no difference of critical thinking competence average on Kalam Science course between groups given PBM and Conventionl Model or H1: $\mu_{A1} \neq \mu_{A2}$

b.   Ho = There was difference of critical thinking competence averege between high intelligence groups that utilized PBM and Conventional Method or Ho: $\mu_{A1B1} = \mu_{A1B2}$

   H1 = There was difference of critical thinking competence average between high intelligence groups that utilized PBM and Conventional Method or H1: $\mu_{A1B1} \neq \mu_{A1B2}$

c.   Ho = There was not any difference of critical thinking competence average between low intelligence groups that utilized PBM and Conventional Method or Ho: $\mu_{A2 B1} = \mu_{A2B2}$

   H1 = There was difference of critical thinking competence average between low intelligence group that utilized PBM and Conventional Method or H1: $\mu_{A2 B1} \neq \mu_{A2B2}$

d.   Ho = There was no effect on interaction between a group which was given PBM Model and Conventional Method and intelligence level towards critical thinking competence on Kalam Science course or Ho: A X B = 0

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H1 = There was effect on interaction between a group which was given PBM Model and Conventional Method and intelligence level towards critical thinking competence on Kalam Science course or H1: AXB ≠ 0

In order to test the hypothesis, it was utilized criteria if the probability or coefficient value was significantly lower than alpha 0.05 (sig < 0.05) so Ho was rejected. If the the probability or coefficient value was significantly higher than alpha 0.05, then Ho was rejected. The test could also be done by comparing Fcount with F table, which was Fcount was higher than F_{tabel} ($F_{hit} > F_{tab}$), then Ho was rejected.

The analysis result using two-way Anava could be seen manually as presented here:

Table 2: Anava output Result using SPSS

Source	Type I Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	12130.729[a]	3	4043.576	51.291	.000
Intercept	188125.521	1	188125.521	2386.313	.000
Intelligence	9492.188	1	9492.188	120.405	.000
Learning Model	2200.521	1	2200.521	27.913	.000
Intelligence * Learning Model	438.021	1	438.021	5.556	.023
Error	3468.750	44	78.835		
Total	203725.000	48			
Corrected Total	15599,479	47			

Based on table 2, it presented that the result of Anava count using manual and SPSS was similar, so that the research result coould be concluded from two proposed research hypotheses, which were:

Hypothesis of zero (Ho) stated that there was no average difference between critical thinking competence on kalam science course of students of Tarbiyah and Teacher Training Faculty UIN Raden Patah between the groups who were given PBM and Conventional Model were rejected because the significance coefficient was lower than alpha (0,00 < 0,05) or F_{count} was higher than F_{table} (27,91 > 2,015). Therefore it could be concluded that the difference of critical competence average on Kalam Science course of group which was given PBM model towards Conventional Method.

The analysis was continued with the effect test using t-Dunnet test. This analysis was used to know the difference of mean score of both groups. In other words, t-Dunnet test was utilized to test hypothesis number 3 and 4 as the hypothesis explained previously. In order to test continuing test hypothesis, the criteria when t_{count} and t table when t count was higher than ($t_{countt} > t_{tab}$), so Ho was rejected.

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The t-Dunnet test on each hypothesis could be seen from table 4.7 below:

Table 3: t-Dunnet Continued Test Result

Compared Group	H1	T count	Dk	**T table price (0,05)**	Conclusion
A1B1 – A2B1	μA1B1 > μA1B2	2,07	44	**2,015**	Ho was rejected
A1B2 – A2B2	μA1B2 > μA2B2	5,41	44	**2,015**	Ho was rejected

Based on the table towards continued test to test hypothesis using t-Dunnet test, it was obtained a conclusion that:

Hypothesis of zero (Ho) stated that there was no difference of critical thinking competence average on Kalam science course on students of Tarbiyah Faculty UIN Raden Patah Palembang between the group that was go\iven PBM Model and Conventional Method that had high intelligence leve was rejected because t_{count} was higher than t_{count} on level 5 % (2.07 > 2.15). Therefore, it could be concluded that students who had higher intelligence students with PBM Model had higher critical thinking ability than they who had high critical thinking who used conventional study method. This conclusion was strenghtened with average result data (Ẋ) students' critical thinking competence score using PBM model 80.40 and their score using conventional model 72.91. This conclusion could also be seen on result distribution of pretest and posttest in which their competence using PBM model was 0.70 and conventional model was 0.58.

Hypothesis of zero (Ho) that statet that there was no average difference of critical thinking competence on Kalam science course between the group which that was given Pbm Model and Conventional who had low competence level because t_{count} was higher than t_{table} on percentage 5 % (5.41 > 2.015).Therefore, it could be concluded that students who had low competence level using PMB Model had higher criitical thinking than they who used conventional learning model. This conslusion was strengtened with average result data (Ẋ) of students' critical thinking competence score using PBM Model 58.33 and conventional model, which was 42.50. This difference could be used on score result distribution of pretest and postees gain in which their critical thinking using PBM model was 0.36 and their critical thinking competence using conventional model was 0.15.

Hypothesis of zero stated there was no interaction between group students of Tarbiyah and Teacher Training UIN Raden Patah who were given PBM model and Conventional Method with competence level towards critical thinking competence on Kalam science course was rejected because the significance coefficient was lower than aplha (0.023 < 0.05) or F_{hcount} was higher than F_{table} (5.516 > 2.015). In other words, it coud be concluded that the interaction effect between the group that was given PBM Model and Conventional Method and competence level towards critical thinking competence on Kalam Science course. However, if the interaction occured, it was not significant as explained in below figure:

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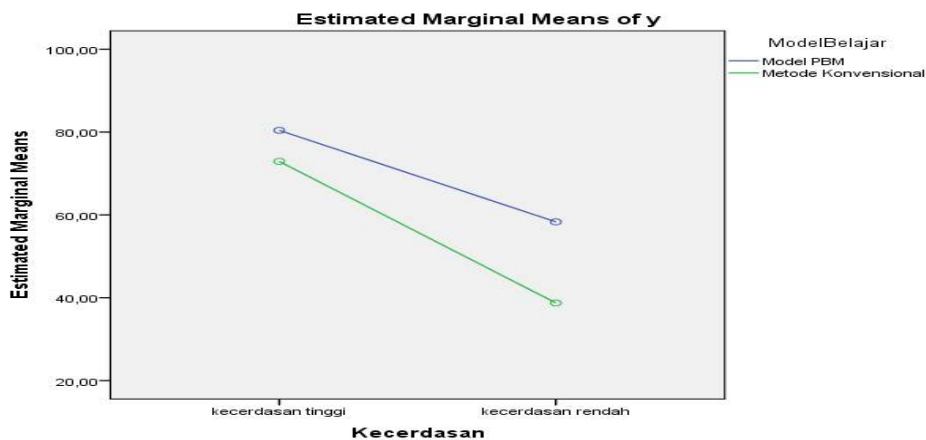of Student' Critical Thingking on Kalamm Science
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Figure 1: Interaction between Study Model and Competence Level

The variant result that had been done in the research of the effect of PBM Model towards critical thinking competence was 27.91 as F*test* and 2.05 as F_{tabel}. By using SPSS output, it was obtained significance level, which was 0.000. Based on both manual and SPSS output result, it could be concluded that Ho was rejected and H1 was accepted. The conclusion obtained was that PBM Model could significantly improve students' critical thinking on Kalam Science that was higher compared to them who used conventional method.

The research result signified that there was a need to use strategy and model of teaching used by a lecturer during the teaching learning process. The strategy used did not only help motivating students in studying and maintaining their focus in the classroom. The use of learning model was able to improve the learning result.

According to Levin (nd:1), "*PBL is an instructional method that encourages learners to apply critical thinking, problem-solving skills, and content knowledge to real-world problems and issues*". Levin's description indicated that PBM Model was a method and approach to develop critical thinking competence, problem solving skill and applied the knowledge in practical world. Sanjaya (2013:221) revealed the same thing, which was the problem solving model could develop critical thinking competence to adapt a new knowledge.

Based on the theory explained previously conducted on students of Tarbiyah and Teaching science Faculty at UIN Raden Fatah Palembang indicated that PBM model on Kalam science was able to construct students' thinking became more critical compared to student group that was not given this model. The observation analysis result which was done by the researcher during this model implementation, classroom became active and creative because each student proposed questions and refutation of problem proposed by the lecturer.

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The variant analysis result conducted on a research on the effect between a group which was given PBM Model and Conventional Method based on intelligence level obtained higher t_{count} than t_{table} (2.07 > 2.015). Based on both manual or SPSS output result, it concluded that Ho was rejected and H1 was accepted. The conclusion obtained that there was an effect between group that was given PBM Model and Conventional Method on Kalam science on students who had higher intelligence level.

This research result was in line with other research such as Yani in Suadnyana Pasek's (2015) thesis that stated IQ was an intelligence required in somebody's success, IQ was influenced by a student's thinking pattern, because it was the first intelligence developed that was able to make students thinking rationally to study accountancy and comprehend it. Dalyono also stated that (2012:158) an individual's intelligence gives a possibility to move and develop in certain field in their lives. The realization of the possibility depended on the individual's willing and opportunity.

The variant analysis result done in the research on the influence between a group that was given PBM and Conventional Method towards students who had low intelligence was obtained higher t_{count} than t_{table} (5.41 > 2.015). Based on the calculation result using T-Dunnet test, it concluded that Ho was rejected and H1 was accepted. The conclusion that was obtained was that there was an influence between a group that was given PBM Model and Conventional Method on Kalam science towards students who had low intelligence.

Conclusion

The conclusions of the research on the effect of Learning Model and Intelligence Level towards Students' Critical thinking Competence at Tarbiyah and Teacher Science Faculty UIN Raden Fatah Palembang, were:

1. There were difference of critical thinking competence average on Kalam Science course between a group that was given PBM model and Conventional Method. This result was indicated from analysis of F_{count} was higher than F_{count} (27.91 > 2.015) or lower significance coefficient than alpha value (0.00 < 0.05).
2. Students' competence in critical thinking who had high intelligence and got PBM Model had difference on students who used conventional model. It meant that, there was sufficient proof that PBM model could improve critical thinking competence for students who had high competence. The result was indicated in which t_{count} was higher than t_{table} (2.07 > 2.015).
3. Students' competence in critical thinking that had low competence taught using PBM Model was higher than them who had low competence level by using conventional model. This analysis result was indicated in which t_{count} was higher than t_{tabel} (5.41 > 2,015).
4. Interaction between PBM Model and competence level influenced students' critical thinking competence on Kalam Science. It meant that there was interaction between PBM model and intelligence level that influenced the high and low students' critical thinking competence on Kalam Science. This result was indicated from analysis where F_{count} was higher thani F_{tabel} (5.516 > 2.015) or the significance coefficient was lower than alpha value (0.023 < 0.05).

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