Implementation of Quantum Teaching Method with TANDUR Techniques on Learning Physics Student Result Class XI IPA SMA PPM Al-Ikhlas

Ummu Kalum² and Fadhila¹
¹Physics Education Study Program, University of West Sulawesi, West Sulawesi, Indonesia
kalsumtomalolo@gmail.com

Abstract. This research is a pre-experiment research that aims to: (1) Know the result of physics learning of class XI IPA SMA PPM AL-IKHLAS academic year 2016/2017 after being taught by quantum teaching method with TANDUR technique from cognitive aspect. (2) To know whether the average result of physics learning after being taught through quantum teaching method with TANDUR technique has reached the criteria of classical completeness. This research variable consists of quantum teaching method with TANDUR technique as independent variable and student physics learning result as dependent variable. The design used in this research is One-Shot Case Study Design. The subjects of the study were all students of IX IPA SMA PPM AL-IKHLAS academic year 2016/2017 with 25 students. The result of deksriptif analysis shows that the result of cognitive learning of physics students after being taught through quantum teaching method with TANDUR technique is in high category. When compared with the value of KKM (Criteria completeness minimum), it is obtained that the percentage mastery learning students by 88%. The result of inferential analysis shows that the application of quantum teaching method of TANDUR has fulfilled the predetermined standard of classical completeness to the achievement of students’ cognitive learning outcomes

1. Introduction
1.1. Background
Learning is a process of change either in the form of behavioral changes or the paradigm of thinking as a result of environment interaction. In classroom teaching practice, a successful student defines if he has reached the expected standard. In this case the standard of achievement is the minimum completeness criteria (KKM). According to Trianto [1], each student is said to be complete in learning if the proportion of correct answers of students ≥ 75%, and a class is said to be complete in learning (classical completeness) if the class is ≥ 85% of students have completed in learning.

Physics teacher of SMA PPM AL-IKHLAS revealed that the minimum completeness criteria for physics subject is 75 and 85% classically, but there are still students who get score of learning result under that standard that is about 68%.

Basically in applying a learning method required a learning technique. In the quantum teaching method, the learning technique used is TANDUR technique. TANDUR is an acronym of the word grow, experience, named, demonstrate, repeat and celebrate. In more detail the row of acronyms
TANDUR is intended as follows: 1) Grow, cultivate interest in student learning. 2) Experience, create or bring about common experiences that all learners can understand. 3) Name, name all learning concepts. 4) Demonstrate, with the intent that children better understand the lesson. 5) Repeat, the more repeated the stronger the lesson is attached. 6) Celebrate to anyone who managed to do well, give appreciation [2].

1.2. Problems of the Research
1) How is the result of physics learning of XI IPA class SMA PPM AL-IKHLAS academic year 2016/2017 after being taught through quantum teaching method with TANDUR technique in terms of cognitive aspect?
2) Is the average student physics learning outcomes after being taught through quantum teaching method with TANDUR technique has reached the criteria of classical completeness criteria?

2. Literature Review
2.1. Learning Quantum teaching with TANDUR technique
Create fun or exciting learning atmosphere do not mean creating a noisy atmosphere and rah-rah. It has nothing to do with frivolous pleasure and superficial excitement. The joy here means the rise of interest, the full involvement, the creation of meaning, the understanding (mastery over the matter learned) and the happy value of the learner. The environment and the atmosphere of learning thus will encourage the emergence of positive suggestions that become light that can become a “locomotive” that can generate energy learning. [3].

There are also stages in the technique TANDUR described as follows [2]:
1) Grow
2) Natural
3) Name
4) Demonstrate
5) Repeat
6) Celebrate

2.2. The results of physics learning
According Hamalik (2004: 27) states learning is a modification or reinforce behavior through experience. In the same sense, Suryabrata (2004: 232) states that "learning brings change (in the sense of behavioral change, actual or potential). The change is in essence the acquisition of new skills (in the sense of Kenntnis and Fertigkeit). The change happens because of effort (on purpose)".

Based on the theory of Bloom's Taxonomy the learning outcomes in the framework of the study are achieved through three categories of domains, among others, as follows [4]:
1) The cognitive domain
2) Affective sphere
3) Psychomotor sphere

2.3. Minimum Exhaustiveness Criteria (KKM)
Minimum Passing Criteria (KKM) is guided by three considerations, namely: the ability of each learner is different; the facilities (facilities) of each school are different; and the carrying capacity of each school is different. From these assumptions, the determination of KKM is guided by four criteria; (1) essential level (importance); (2) the level of complexity (difficulty and complexity); (3) students' average level of intake; and (4) the capability of supporting resources. Thus each school and each subject has a KKM that can be different from other schools [1]. In SMA PPM Al-Ikhlas, the minimum score for the criteria for grade XI is 75, with classical completeness of 85% of students reaching KKM.

3. Research Methods
3.1. Types and Subjects of Research
This type of research is pre-experimental research. Subjects of the study population are all students of IX IPA SMA PPM AL-IKHLAS academic year 2016/2017 consisting of 1 class with 25 students. Sampling is done by pointing directly.

3.2. Research sites
The research location is located at SMA PPM AL-IKHLAS: Jl. Majene Shaft Km. 27 Lampoko Kec. Campalagian, Kab. Polewali Mandar

3.3. Research variable
1) Independent variable: Learning with quantum teaching method with TANDUR technique.
2) The dependent variable: the learning outcomes of physics from the cognitive aspect

3.4. Research design
The research design used is "One-Shot Case Study Design". In this design the subject is placed on an experimental class by means of direct appointment to be treated which is then given a post-test. With the image of research design as follows [5].

\[ X \quad O \]

**Figure 3.1 One-Shot Case Study Design**

Note:
X: Learning with Quantum Teaching method with TANDUR technique
O: The learning outcomes of the cognitive aspects of the physics subject

3.5. Variable Operational Definition
In this study there are two variables with the details of operational definition as follows:

a. Quantum Teaching Method with TANDUR technique is a method of learning that makes students find the concept of learning materials through their learning experience. The teacher fosters motivation by giving the AMBAK questions, then the students demonstrate the results obtained from their learning experiences.

b. Students’ physics learning outcomes in the cognitive aspect is the score achieved by the students after following the learning of Quantum Teaching method with TANDUR technique, measured through Physics learning test result in multiple choice form. Next compares it to KKM standards of 75.

3.6. Research Stage

3.6.1. Preparatory stage
Activities undertaken at this stage are:

a. consulted the principal and senior high school physics teacher PPM AL-IKHLAS to request permission to carry out the research.

b. determine the material to be used as research material.

c. preparing the Lesson Plans (RPP).

d. preparing the research instrument.

In this study only use one type of instrument in the form of cognitive learning test results. The steps taken in developing the test are as follows:

1. The first stage
   Compile test items of physics learning outcomes in multiple choice form.

2. The second stage
   All items that have been compiled are tested on the students of class XII IPA SMA PPM AL-IKHLAS in order to determine the validity of the instrument items.

Determination of item validity used by Suharsimi Arikunto [6] as follows:

\[ \gamma_{phio} = \frac{M_p - M_i}{S_i} \sqrt{\frac{p}{q}} \]
With:
\( \gamma_{pbi} \) = coefficient of correlation biseral
\( M_p \) = the average score of the subjects who answered correctly for the item sought
\( M_t \) = average total score
\( S_t \) = standard deviation from total score
\( p \) = the proportion of students who answered correctly
\( q \) = the proportion of students who answered incorrectly \( (q = 1 - p) \)
The validity of the item \( i \) is shown by comparing the value with the \( \alpha \) value of \( r_{table} \) significant level criteria:
if: \( \geq r_{table} \) value, item declared valid
value < \( r_{table} \), item is declared invalid

3. third phase
To calculate the reliability of physics learning test result used Kuder-Richardson 20 (KR-20) formula as follows:
\[
 r_{ii} = \left( \frac{n}{n-1} \right) \left( \frac{S^2 - \sum pq}{S^2} \right)
\]
With:
\( r_{ii} \) = instrument reliability
\( p \) = Proportion of subjects who answered the item correctly
\( q \) = The proportion of subjects who answered the item correctly
\( \Sigma pq \) = Number of multiplication products between \( p \) and \( q \)
\( n \) = Many items
\( S \) = Standard deviation

3.6.2. Implementation phase of the research
At this stage carried out the learning process through the application of quantum teaching methods with techniques TANDUR in class XI IPA SMA PPM AL-IKLHAS.

3.6.3. Data collection phase
At this stage posttest is given to get data about the results of physics learning. The data management obtained using descriptive analysis technique and inferential analysis.

a) Descriptive analysis
Descriptive analysis is used to describe students’ physics learning after following the subject matter. It is intended to know the sample condition in the form of highest value, lowest value, ideal value, average, standard deviation and variance. To know the value obtained by the student, then the score is converted into value form using the following formula:
\[
 N = \frac{SS}{SI} \times 1001
\]
Information:
\( N \) = Student score
\( SS \) = Score of student learning outcomes
\( SI \) = Ideal score

b) Inferential analysis
a. Normality test
Normality test is intended whether the data used begins from a normally distributed population. According to Sudjana [7], the normality test using the chi-square formula is expressed:

$$\chi^2_{\text{hitung}} = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i}$$

Information:
- $\chi^2_{\text{count}} = \text{value of chi - squared count}$
- $O_i = \text{frequency of observations}$
- $E_i = \text{frequency of expectation}$
- $k = \text{number of classes}$

b. Hypothesis test

After testing the normality, followed by testing the hypothesis that is intended to answer the hypothesis that has been proposed. The statistical hypothesis formulation used is (Sudjana, 2005):

$$H_0 : \pi = \pi_0$$
$$H_1 : \pi > \pi_0$$

Table 1. Category assessment of physics learning outcomes of class XI IPA SMA PPM AL-IKHLAS

| Interval Score | Category   |
|---------------|------------|
| 0-4           | Very low   |
| 5-9           | Low        |
| 10-14         | Average    |
| 15-19         | Height     |
| 20-24         | Very High  |

Source: [8]

4. Results and Discussion

After the final test obtained data about student learning outcomes that include the cognitive domain.

4.1. Descriptive Analysis Result

Based on the results of descriptive analysis obtained a description of students' physics learning outcomes from the cognitive aspect as seen in the following 5.1 table.

Table 2. The statistics of physics learning outcomes in the cognitive domain

| Criteria    | Value  |
|-------------|--------|
| Maximum     | 91     |
| Min         | 70     |
| Average     | 82.68  |
| Standard dev. | 5.558 |

Based on the above table 2 shows the average grade value after the learning method is 82.68 with the highest value is 91 and the lowest score 70. The average value achieved is 82.68 with the standard deviation of 5.558. The following table presents the percentage of students' learning mastery on cognitive aspects.

Table 3. Percentage Completed Learning Cognitive Aspects

| Category   | Frequency | Percentage (%) |
|------------|-----------|----------------|
| Complete   | 22        | 88             |
| Not complete | 3        | 12             |
From the table above can be seen that the students' learning mastery is as much as 22 students with 88% percentage while the unfinished frequency in the learning is as much as 3 students with 12% percentage.

After being given treatment in the form of application of Quantum teaching method with TANDUR technique obtained the percentage of learning result score with the category as shown in Table 4 below:

| Interval Score | Score category result | Frequency | Percentage (%) |
|----------------|------------------------|-----------|----------------|
| 0-4            | Very low               | 0         | 0              |
| 5-9            | Low                    | 0         | 0              |
| 10-14          | Being                  | 0         | 0              |
| 15-19          | High                   | 16        | 64             |
| 20-24          | Very high              | 9         | 36             |
| Total          |                        | 25        | 100            |

Based on Table 4 above shows that after students are given treatment, there are no students who have learning outcomes in very low, low, and medium category. The highest percentage of student learning outcomes in the high category with a total of 16 students, while 9 others are in very high category.

4.2. Inferential Statistic Analysis Results

4.2.1. Normality test
Result of normality test by using Chi-square formula, score of student's learning result in cognitive domain obtained value $\chi^2_{\text{count}} = 1.44$. While the value of $\chi^2_{\text{table}}$ with significance level $\alpha = 0.05$ and $df = 5$ is 11.1. Because $\chi^2_{\text{count}} < \chi^2_{\text{table}}$, it can be concluded that the data of student learning outcomes in the cognitive domain of class XI IPA SMA PPM AL-Ikhlas comes from a population that is normally distributed. The full test can be seen in the appendix.

4.2.2. Hypothesis testing
The result of hypothesis testing by using the z-test, the average value of student learning outcomes on cognitive aspects obtained price $z_{\text{count}} = 0.428$. This value is smaller than the $z_{\text{table}}$ price at the level of significance $\alpha = 0.05$ is 0.3289. Thus $H_1$ is accepted and $H_0$ is rejected ($z_{\text{count}} = 0.428 > z_{\text{table}} = 0.3289$). Thus the hypothesis stating that the application of Quantum Teaching methods TANDUR technique has met the classical completion standard that has been set against the achievement of physics learning outcomes of grade XI IPA SMA PPM AL-IKHLAS accepted.

The successful achievement of KKM value fulfillment for physics subject and the achievement of student learning result in high category is caused by the impact of the application of quantum teaching method with TANDUR technique. This is seen in the learning process where almost all students pay attention to the information given, discuss with the group, actively involved in task work. Especially for the experiment activities all students enthusiastically follow this activity. In addition, posting affirmative posters in the classroom gives positive energy for students to keep their passion in learning. The music that is included during the process of making the matter relaxed students but still serious in working on the problem. With the support of the factors that have been described above then certainly affect the student's physics learning outcomes.

5. Conclusions and Suggestions

5.1. Conclusion
Based on the results and discussion, the following conclusions are obtained:

1) Physics learning outcomes of class XI IPA SMA PPM AL-IKHLAS academic year 2016/2017 after teaching through quantum teaching method with TANDUR technique in terms of
cognitive aspects are in high category.
2) Average student physics learning outcomes after being taught through quantum teaching method with TANDUR technique has reached the criteria of classical completeness

5.2. Suggestions
1) Preferably in the implementation of further research to 3 aspects of education can be examined further, not only on the aspects of cognitive but also affective and psychomotor aspects.
2) Other methods can be used so that the results of the method can be compared with those of the research methods that have been used.
3) Encourage students to be more active in learning.

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