Available online at TARBIYA: Journal of Education in Muslim Society Website:
http://journal.uinjkt.ac.id/index.php/tarbiya

TARBIYA: Journal of Education in Muslim Society, 3(1), 2016, 121-130

THE ASSESSMENT OF STUDENT PERFORMANCE IN THE PRACTICUM ACTIVITY OF BASIC PHYSICS COURSE

Yuberti[1], Diana Nomida[2], Tuti Nuriah[3]
[1]State Islamic Institute (IAIN) of Lampung, Indonesia
[2, 3]State University of Jakarta, Indonesia
E-mail: yuberti_iain@yahoo.co.id

Received: 27th March 2016; Revised: 15th April 2016; Accepted: 23th May 2016

Abstract

This study was aimed at obtaining factual information on 1) the assessment of Basic Physics course learning achievement of Physics Education students of the Tarbiyah and Teacher Training Faculty of IAIN Raden Intan Lampung that includes process and product assessment and 2) the results of the implementation of assessment on student performance during the practicum component of the course. The study employed Elliot's Model of Action Research Study, which is a mixed method in nature. It focused on improving instructional condition as the responsibility of the respective lecturer to make it more responsive to the existing needs .Indeed, it requires commitment of all parties involved in the instructional process to participate and collaborate for improved learning achievement, particularly of the Basic Physics course, to be obtained. In conclusion, based on the process and findings of the action research study, the implementation of performance assessment has significantly improved student learning achievement in the Basic Physics course.

Keywords: assessment, performance, achievement

Abstrak

Penelitian ini bertujuan untuk mendpatkan informasi faktual mengenai 1) penilaian hasil belajar Fisika Dasar Pendidikan Fisika Fakultas Tarbiyah dan Keguruan IAIN Raden Intan Lampung yang meliputi penilaian proses dan kinerja, dan 2) hasil implementasi penilaian prestasi mahasiswa selama praktikum. Penelitian menggunakan Penelitian Tindakan Kelas Model Elliot, yang merupakan metode campuran. Penelitian fokus kepada peningkatan kondisi pembelajaran sebagai tanggungjawab dosen yang bersangkutan untuk membuatnya lebih responsif dengan kebutuhan yang ada. Tentunya, hal ini membutuhkan komitmen dari seluruh pihak terkait dalam proses pembelajaran untuk berpartisipasi dan berkolaborasi untuk peningkatan hasil pembelajaran, khususnya mata kuliah Fisika Dasar. Dapat disimpulkan, berdasarkan proses dan temuan penelitian tindakan kelas, penerapan penilaian kinerja secara signifikan meningkatkan prestasi belajar mahasiswa pada mata kuliah Fisika Dasar.

Kata kunci: *penilaian, kinerja, prestasi*

How to Cite: Yuberti, Nomida, D., Nuriah, T. (2016). The Assessment of Student Performance in the Practicum Activity of Basic Physics Course. *TARBIYA: Journal Of Education In Muslim Society, 3*(1), 121-130 doi:10.15408/tjems.v3i1.3397.

Permalink/DOI: http://dx.doi.org/10.15408/tjems.v2i1.3397

P-ISSN: 2356-1416, E-ISSN: 2442-9848

Introduction

State Islamic Institute Raden Intan Lampung is one of the religious-based university consisting of four faculties, one of which is the Faculty of Education and Teaching. Distribution of subjects presented at the Faculty of Education and Teacher Training courses include Theory and Practice moreover science courses such as Physics Education Study Program. In practical courses that are practiced as subjects Physics, has long carried out, only in practice, most professors do not use assessment instruments that should be done.

Performing practicum in the laboratory is an indispensable activity of the Basic Physics course. To get an objective assessment result of it, all aspects of student achievement should be taken into account. Performance Assessment (PA), a kind of authentic assessment, is a good alternative of assessment to utilize in the practicum program of the course.

With the use of PA, student achievement can be measured along the learning process without having to wait until the end of the lesson. It is supported by Zainul (2001: 10) stating that PA allows the improvement of learning process as it helps teacher make decisions during the lesson. Further, PA emphasizes on the students involvement showing their interim understanding and the reality as Burke (2009: 8) asserts: "Performance Assessments are highly engaging for students because they connect their content knowledge with the processes they will use in the real world". It is in line with the statement of Muchtar (2010: 73) that performance-based assessment is a hands-on assessment measuring a certain actual performance in which students are assigned to carry out valuable and authentic tasks in the real world or authentic contexts. Authentic assessment is also called realistic assessment which is generally associated with the implementation in the real life. Campbell (2006: 67) states that if we use the physics-related real occurences for the practical applications, the basics of physics are becoming more relevant and meaningful.

One of the objectives of conducting an assessment is to find out the learning process effectiveness and students' achievement. For this purpose, the assessment tool should be able to disclose the entire student learning achievement. By using PA, students' true responses become observable as suggested by Linn & Baker:

Performance assessment as a formal assessment method in which a student's skill in carrying out an activity and producing a product is observed and judged (e.g., contruction of a woodworking project; completion of an essay in English, research report in history or laboratory in science.(Reynolds et.al., 2009: 245-246)

PA requires students to show up their competences instead of merely choosing simple answer of several available options. Danilelson (2000: 24) says: "Performance assessment means any assessment of student learning that requires the evaluation of student writing, product, or behavior. That is, it includes all assessment with the exception of multiple choice, matching, true or false testing, or problem with a single correct answer".

In addition, the strengths of PA include its ability to reveal students' potencies in solving problems, reasoning, and communicating orally or in written form. To apply PA, there must be observable and real assignment done by students. They are required to perform their understanding and competencies as the actualization of their knowledge and skills. In other words, they are expected to perform authentic responses in the form of observable activities (Reynolds et.al., 2009: 248).

Performing an assignment is quite complex involving, at least, two observable aspects: 1)

Procedure, skills or technical matters, and 2) Product or output. If the assessment is on the procedure, it means that the examiner is determining how skillful the examinee is in performing the expected procedure; whereas if the product is being assessed, it highlights the quality of the end result only. Stiggins (2007: 186) asserts: "Performance assessment is complex. It requires users to prepare and conduct their assessment in a thoughtful and rigorous manner. Those unwilling to invest the necessary time and energy will place their student directly in herm's way".

Performance of practicum in the laboratory is a complex process of activity involving plenty of elements, among others, understanding of the nature of practicum itself, utilization of materials and equipment, observation skill, and active participation as Gardner (2003: 274) suggests that students should be able to explain objects and phenomena found in the real life, aside from the the objects exposed in the physics laboratory. Thus, it is urgent for lecturer of science, particularly Basic Physics subject, to conduct PA in order to recognize the students' achievement of the learning objectives indicated by their specific behaviors throughout the activity.

This kind of assessment is believed to be more accountable than using written test since it is dealing with the activity where the students are expected to perform a certain assignment given by the lecturer in the laboratory. Using PA, the lecturer can accurately decide whether or not the students are able to perform the given task appropriately. It can reflect the true competency of students in performing the task of practicum in the laboratory.

This kind of research, focusing on analyzing the implementation of PA, is rarely done in Indonesia. Mostly, research carried out was more emphasized on more general perspectives of assessment, instead of on the practical matters. As such, the standardized instrument, even the very general one, to measure students' achievement in performing task of practicum in the laboratory does not exist yet.

Relating to the practical use of PA, Faculty of Tarbiyah and Teacher Training as an institution which produces teachers ideally has already applied performance-based assessment to measure students' conceptual understanding actualized in the experimental activities. By referring to the characteristics of the learning objectives of the Basic Physics course, in terms of the basic competencies, expected skills and achievement, it is obvious that the assessment system should be able to reveal all those necessary aspects.

The understanding of process skill by implementing PA is very limited. It may happen due to the misconception occuring among them. It is believed that having good mastery of concepts of physics only is sufficient without having to acquire the mastery of process skill which demands the use of PA. Also, students are not demanded because there are no questions related to the process skill in national exam.

Based on the observation at the Science Major of Tarbiyah and Teacher Training Faculty, it was found out that the process of assessment carried out only aimed at measuring conceptual understanding through objective and subjective tests, the instructional activity was generally focused on explaining the learning materials and excessively exploiting the textbooks/modules. As a result, students tended to only memorize the lesson for the exam. As Basic Physics is a course with practicum activity, the learning output is the combination of process and product assessment. Nevertheless, during the practicum activity, process assessment was never carried out. It was because of the inexistence of manual of PA implementation. This is in line with the statement of Baedhowi (2006: 63) that

it is not easy to apply assessment tapping the three domains of learning: cognitive, affective and psychomotor due to such factors as (1) low commitment, (2) inadequate knowledge and competence, (3) lack of facilities, (4) unavailability of political will of government and campus management, and (5) ineffective information dissemination.

Result of interview with four lecturers of courses with practicum activity showed that the practicum activity was carried out 8 up to 12 times per semester, yet, PA to measure the process aspect of the activity was not executed. Furthermore, based on the result of interview and observation, it was found out that there was an inconsistency between the learning objectives and the techniques of assessment. Consequently, students' learning achievement was inaccurately measured.

In addition to interview and observation result, the document of Basic Physics student score obviously indicated that process assessment in the form of PA of students in carrying out practicum was not carried out. Student final score was the accumulation of score of attendance, assignment, mid-test, final test and practicum. The score of practicum was the average score of several practicum scores taken by analyzing students report submitted a week after the practicum activity. It means that the practicum score did not definitely reflect their true competence in carrying out the practicum activity.

This condition shows clearly that there is a gap between the learning objective and the technique of assessment. The technique of assessment employed by the lecturer could only figure out student mastery of conceptual understanding. Therefore, a better assessment technique which can disclose the whole aspects of student competencies including process and product is highly needed, in this case by using PA.

This research was intended to describe and analyze: 1). The improvement of student performance score per cycle, 2). The hindrances faced by lecturers in applying PA.

Method

This research belongs to Action Research (AR) with model of Elliot and using mixed method data analysis. It was used by considering that the data gathered consisted of two different kinds of data, qualitative and quantitative, with the strategy of sequential exploratory design.

According to Cresswell (2003: 213), the strategy can be described by Figure 1.

Sources of data included students and lecturers of Physics Education Study Program. Data sources, kinds and collecting techniques are displayed in the following Table 1.

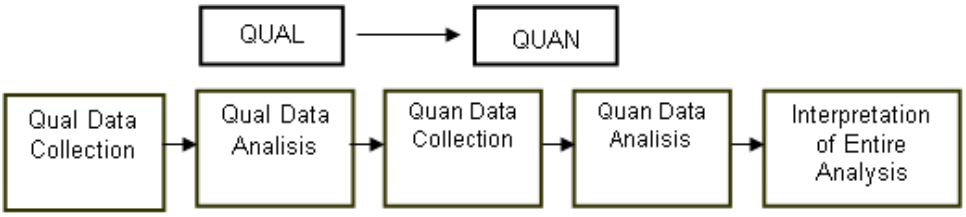


Figure 1. Strategy of Sequential Exploratory Design

Table 1. Data sources, kinds and collecting techniques

No.	Source of Data	Kinds of data	Data Collecting Techniques	Remarks
1	Lecturers	Responses upon the use of PA	- interview	- interview guidelines
2	Students	Activities during the implementation of PA	- observation - field notes	- observation sheet
3	Students	Responses upon the use of PA	- questionnaire - field notes	- questionnaire guidelines

Table 2. Blue Print of Observation Sheet

No.	Aspect	Sub-Aspect	Number of items	Item	Score		
					3	2	1
1	Preparation (1)	Recognizing the tools and materials used	1	1a			
		The tools and materials matched with the objective of experiment	1	1b			
		The accuracy of tool selection	1	1c			
		The accuracy of tool usage	1	1d			
		The ability to read various kinds of tool of measurement	1	1e			
		Assiduousness in using measured data	1	1f			
2	Equipment Assembling (2)	Assembling equipment by the book	1	2a			
		Collaboration among group members	1	2b			
		Discussion within group	1	2c			
		Accuracy of time	1	2d			
3	Data Collection (3)	Recording data of experiment	1	3a			
		Calculating data of experiment	1	3b			
		Logical data	1	3c			
		Drawing conclusion from collected data	1	3d			
4	Final Activity (4)	The ability to explain the meaning of collected data	1	4a			
		Discipline in cleaning up the tools and materials	1	4b			
		Discipline in putting away the tools and materials	1	4c			
5	Reporting (5)	Punctuality of submission	1	5a			
		Completeness of content	1	5b			
		Logical content (the promptness of theoretical concept and practical product)	1	5c			

Blue Print of Observation Sheet of Student Performance

The score on the observation sheet of student performance comprises score 3, 2 and 1. Score 3 is given if the descriptor is observable with good product, score 2 if the descriptor is observable, but with bad product, while score 1 is for the unobservable decriptor. The observed items include such aspects as 1) Preparation, 2) Equipment Assembling, 3) Data Collection, 4) Final Activity, and 5) Reporting.

For the sake of objectivity of scoring, the use of a rigid and comprehensive scoring norm is a must. As such, whoever takes the score of similar performance will not be too much different.

Procedure of Action Research

The research design is presented in the scheme of Figure 2.

Table 3. Observation Guidelines

No	Aspect	Indicator	Descriptor observable with good product (3)	Scoring Descriptor Descriptor observable with bad product (2)	Descriptor unobservable (1)
1	Preparation	Recognizing the tools and materials used	Students can recognize well the tools and materials used	Students can recognize well the tools and materials used after explained by the lecturer	Students cannot recognize well the tools and materials used
		The tools and materials matched with the objective of experiment	By referring to the manual of practicum, students can choose the tools and materials matched with the objective of experiment by their own	Students can choose the tools and materials matched with the objective of experiment by asking the lecturer	Students cannot choose the tools and materials matched with the objective of experiment
		The accuracy of tool selection	Of the varied available tools, students can choose the right one accurately	Of the varied available tools, students can choose the right one accurately with the help of others	Of the varied available tools, students cannot choose the right one accurately
		The accuracy of tool usage	Students can use the tool accurately without help from others	Students can use the tool accurately with help from others	Students cannot use the tool accurately
		The ability to read various kinds of tool of measurement	Students can clearly show the readability of the tool of measurement used	Students can clearly show the readability of the tool of measurement used with the help of friend in group	Students cannot show the readability of the tool of measurement used
		Assiduousness in using measured data	Students can analyze well the data of experiment	Students can analyze well the data of experiment with the help of friend in group	Students cannot analyze well the data of experiment
2	Equipment Assembling	Assembling equipment by the book	By referring to the manual of practicum, students can assemble the equipment by themselves	By referring to the manual of practicum, students can assemble the equipment with the help of others	By referring to the manual of practicum, students cannot assemble the equipment
		Collaboration among group members	There is good collaboration among group members to assemble the equipment	There is bad collaboration among group members to assemble the equipment	There is no collaboration among group members to assemble the equipment
		Discussion within group	Discussion within group happens	Discussion within group happens but not running well	Discussion within group does not happen
		Accuracy of time	Accuracy of time to assemble equipment with good result	Accuracy of time to assemble equipment with bad result	Inaccuracy of time to assemble equipment
3	Data Collection	Recording data of experiment	Recording thoroughly data of experiment	Recording data of experiment, but not thoroughly	Not recording data of experiment
		Calculating data of experiment	Calculating accurately data of experiment	Calculating data of experiment, but not accurately	Not calculating data of experiment
		Logical data	Logical data acquired	Data acquired need further analysis	Illogical data acquired
		Drawing conclusion from collected data	Data collected from experiment are well-interpreted and concluded	Data collected from experiment are well interpreted, but not well-concluded	Data collected from experiment are not well-interpreted and concluded
4	Final Activity	The ability to explain the meaning of collected data	Able to explain the meaning of the collected data	With help from others, able to explain the meaning of the collected data	Unable to explain the meaning of the collected data
		Discipline in cleaning up the tools and materials	Showing discipline in cleaning up the tools and materials	Lack of discipline in cleaning up the tools and materials	Showing indiscipline in cleaning up the tools and materials
		Discipline in putting away the tools and materials	Showing discipline in putting away the tools and materials	Lack of discipline in putting away the tools and materials	Showing indiscipline in putting away the tools and materials
5	Reporting	Punctuality of submission	Punctual in submitting the report	Not punctual in submitting the report	Not submitting the report
		Completeness of content	Report is totally complete covering title, abstract, introduction, theoretical framework, procedure of experiment, analysis/discussion, conclusion and references	Report content is partly complete covering title, abstract, introduction, theoretical framework, procedure of experiment, analysis/discussion, conclusion and references	Report content is incomplete to cover title, abstract, introduction, theoretical framework, procedure of experiment, analysis/discussion, conclusion and references
		Logical content (the promptness of theoretical concept and practical product)	Content of report is logical (the promptness of theoretical concept and practical product)	Content of report is logical, but some data are not well-interpreted	Content of report is illogical (there in no promptness of theoretical concept and practical product)

Model of Action

Model of action to be applied is referring to model of Elliot.

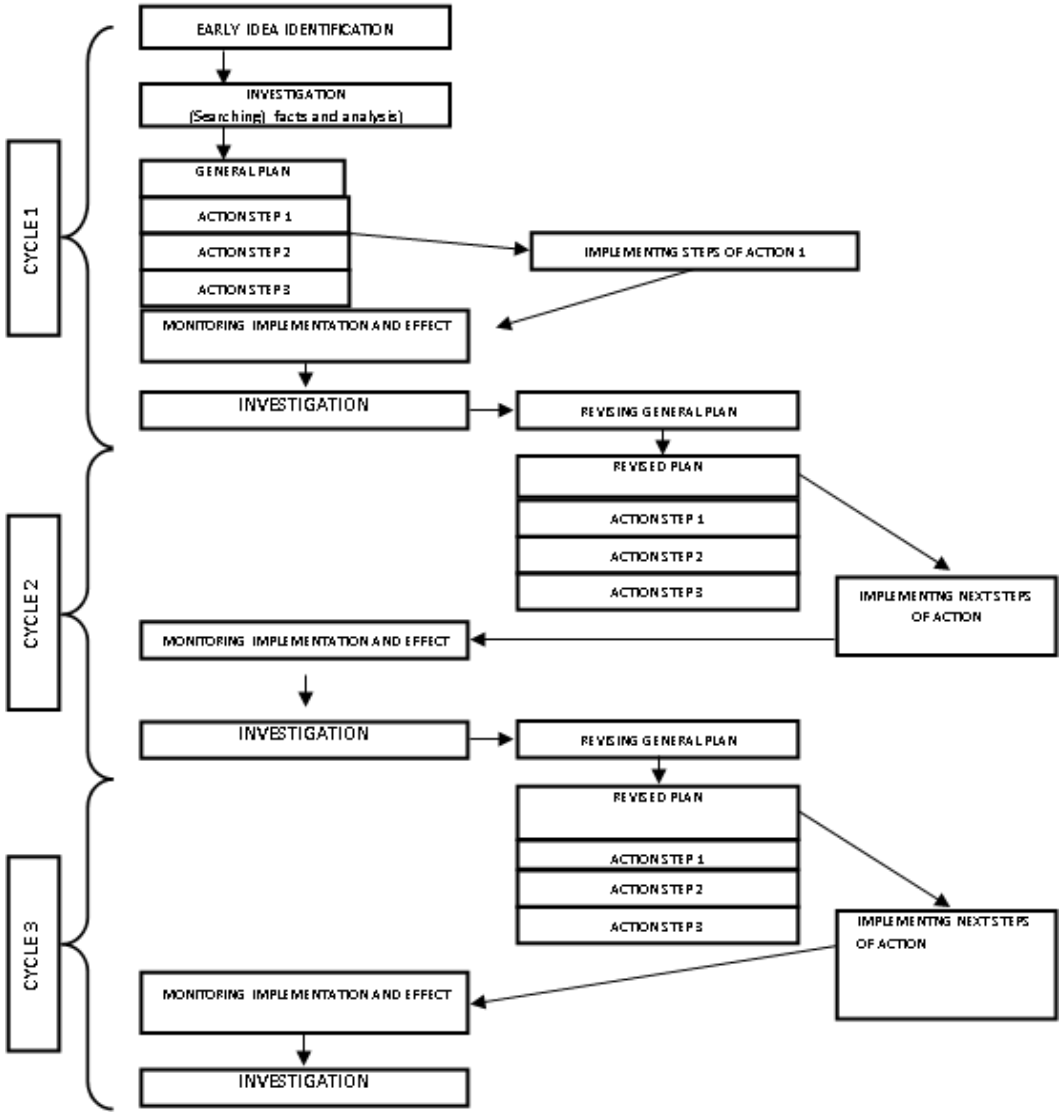


Figure 3. Model of Elliot's Action Research
Source: David Hopkins, *A Teacher's Guide to Classroom Research*, ed.4. New York: McGraw Hill-Open University Press. 2008, p.93

Findings and Discussion

Result of Performance Per Cycle

Based on the observation checklist for three experimentations in cycle I, it can be seen the number of students with the category of "poor", "good", and "very good". The following table shows the percentage of each category.

Table 4. Category of PA Result in Cycle I

Range	Category	Number	Percentage
60 - 99	Poor	18	22.50%
100 - 139	Good	42	52.50%
140 - 179	Very Good	20	25.00%

It is displayed in the table 4 above that as many as 22.50% or 18 students showed poor

performance during the practicum activity, 52.50% or 42 students did good performance, while 25.00% or 20 students demonstrated very good performance. The percentage of the category indicated that the student performance in the practicum activity was normally distributed. Then, to get the improvement of student performance in the practicum activity, the second cycle was carried out.

In the second cycle, just like the first one three experimentations were done to investigate student performance. The categories of student performance were the same as the previous ones: "poor", "good", and "very good". The result of the second cycle can be seen in the following table.

Table 5. Category of PA Result in Cycle II

Range	Category	Number	Percentage
60 - 99	Poor	12	15.00%
100 - 139	Good	37	46.25%
140 - 179	Very Good	31	38.75%

It is informed in the table above that there were as many as 15.00% or 12 students showed poor performance, 46.25% or 37 students demonstrated good performance, while 38.75% or 31 students did very good performance in the practicum activity of the second cycle.

It points out that there was an increase in each category. For the category of poor performance, the improvement reached 7.5%; for good performance was 6.25%; and for very good performance amounted 13.75%. Despite the fact that there was improvement of student performance in carrying out the practicum activity as indicated in the calculation, the figure of improvement as a whole had not reached 85% of the total number of students. Therefore, this action research proceeded to the third cycle.

In the third cycle, the intervention of the practicum activity was different from the previous cycles. In this cycle, there were four experimentations i.e. the 7th until the 10th experimentation about refraction, induction I, electromagnetic induction II, and electromagnetic wave respectively. The score range was automatically different too, the lowest score 80 and the highest score 240. The score range for the three categories was as follows: range 80 – 133 for poor performance, range 134 – 187 for good performance, and range 188 – 241 for very good one. The result of observation was displayed in the table below.

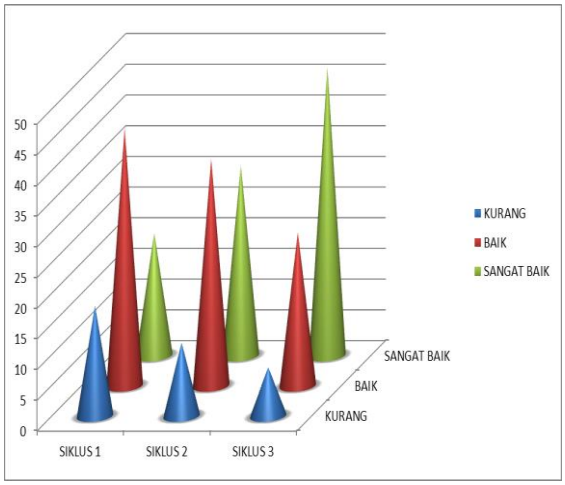
Table 6. Category of PA Result in Cycle III

Range	Category	Number	Percentage
80 - 133	Not Good	7	8.75%
134 - 187	Good	26	32.50%
188 - 241	Very Good	47	58.75%

It was illustrated in the table above that there were as many as 8.75% or 7 students showed poor performance, 32.50% or 26 students did good performance, while 58.75% or 47 students demonstrated very good performance in carrying the practicum activity. Again, improvement of student performance occurred in this cycle for each category.

Result of Performance between Cycle

There was improvement of performance from cycle I to cycle II as well as from cycle II to cycle III. The average score of cycle I was 42.508 and cycle II 45.088 indicating that there was improvement of the average score. Then, the average score of cycle II was 45.088 and cycle III 47.816, again, indicating the improvement of the average score. The following graph displays the improvement more clearly.



Graph 1. The Improvement of Performance in Cycles 1, 2 and 3

The graph illustrates the score improvement of student performance in carrying out practicum activity in the three cycles e.g. for the category of "very good" in cycle I was 25%, in cycle II 38.75%, and in cycle III 58.75%. Meanwhile, the number of students who belonged to the category of "not good" was decreasing in each cycle which meant that there was an increase in quality, in cycle I 22.50%, in cycle II 15.00%, and in cycle III 8.75%. Finally there were only 8.75% students who were categorized "not good" and 91.25% students demonstrated "very good" performance. Thus, the action was stopped up to the third cycle.

Conclusions

There was improvement of student performance as described below.

1. In cycle I, 22.50% of all students were categorized "not good", 52.50% "good" and 25.00% "very good" in performing the practicum activity.
2. In cycle II, 15.00% students fell under the category of "not good", 46.25% "good", and 38.75% "very good" in performing the practicum activity.
3. In cycle III, there were as many as 8.75% students considered "not good", 33.75% "good", and 57.50% "very good" in performing the practicum activity.

The obstacles found in the implementation of PA in the practicum activity included: (a). Unfamiliarity with the implementation of PA, (b). Limited number of lecturers and their time constraint, (c). Lack of knowledge and understanding of the basic concept of PA, and (d). Apathy of new kind of assessment system.

References

Baedhowi. *"Kebijakan Assessment Dalam Kurikulum Tingkat Satuan Pendidikan (KTSP)." www.depdiknas.go.id/publikasi/balitbang/jurnal pendidikan dan kebudayaan/Volume 63 05*, accessed on 12 June 2011.

Burke, Kay. (2009). *How to Assess Authentic Learning.* Fifth Edition. New Delhi. Mathura Road.

Campbell, Bruce. Linda Campbell dan Dee Dickinson. (2006). *Teaching and Learning Through Multiple Intellegence.* Rucson: Zephyr Press.

Cresswel, John. W. (2003). Research Design: *Qualitatif, Quantitatif, And Mix Method Approach.* 2nd Edition. California : Sage Publications, Inc.

Danilelson, Charlote, S, *"A Collection of Performance Task and Rubriks; Middle School Mathematics". http//www.assesment.com/Danilso* (accessed on 10 March 2011).

Gardner, Howard. (2003). *Multiple Intellegences. (Terjemahan) Alexander Sindoro, Batam Centre.*

Hopkins, David. (2002). *A Teacher's Guide to Classroom Research*, third edition. Buckingham-Open University Press.

Muchtar, Hartati. "*Penerapan Penilaian Autentik dalam upaya Peningkatan Mutu Pendidikan*. Jurnal Pendidikan Penabur – No.14/Tahun ke-9/Juni 2010. http://www.bkppenabur.or.id/files/Hal.%2068-%20penerapan%20penilaian%20autentik.pdf (accessed on 20 September 2010).

Reynolds, Cecil R. (2009). Ronald B. Livingston, and Victor Willson, *Measurement and Assessment in Education*. Second Edition. Upper Saddle River, New Jersey Columbus, Ohio.

Stiggins, Richard J. (2007). *Conquering the Formatif Assessment Frontier; Formatif Classroom Assessment,* editing by: James H.McMillan. New York: Teachers College Press.

Zainul, Asnawi. (2001). *Alternative Assessment Applied Approach mengajar di perguruan Tinggi buku 2.09*. Pusat antar universitas untuk peningkatan dan pengembangan aktivitas instruksional. Dirjen Dikti Depdiknas. Jakarta.

