Development of performance assessment instrument based contextual learning for measuring students laboratory skills

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Development of performance assessment instrument based contextual learning for measuring students laboratory skills

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Abstract. The assessment of laboratory skill in general hasn't specific guideline in assessment, while the individual assessment of students during a performance and skill in performing laboratory is still not been observed and measured properly. Alternative assessment that can be used to measure student laboratory skill is use performance assessment. The purpose of this study was to determine whether the performance assessment instrument that the result of research can be used to assess basic skills student laboratory. This research was conducted by the Research and Development. The result of the data analysis performance assessment instruments developed feasible to implement and validation result 62.5 with very good categories for observation sheets laboratory skills and all of the components with the very good category. The procedure is the preliminary stages of research and development stages. Preliminary stages are divided in two, namely the field studies and literature studies. The development stages are divided into several parts, namely 1) development of the type instrument, 2) validation by an expert, 3) a limited scale trial, 4) large-scale trials and 5) implementation of the product. The instrument included in the category of effective because 26 from 29 students have very high laboratory skill and high laboratory skill. The research of performance assessment instrument is standard and can be used to assess basic skill student laboratory.

1. Introduction

Assessment is a process document through a measurements, knowledge, skills, and attitude students. Assessment, in other words, is the activities systematic to obtain information about what is known, done, and worked by students. Assessment is seen as the particular characteristic and determination of value or the value of an object [1]. Performance assessment can be regarded as a test action, in this assessment, students are expected to practice and to implement of activities and assessed students based on a guided assessment. Performance assessment lab work pharmacy is assessment who asked students did some performance in lab work pharmacy. Performance assessment is reviewed some aspects of assessment, the result and lab work. The assessment had a role as program assessment process, the advancement of learning and result student learning [2].

Assessment is very important to use in the learning process, as written by Adiguzel [3] "The increased use of approaches used for assessment along the importance of knowing and boosting the academic progress of student". Definition of performance assessment has been defined by several figures. One of them by Atac [4] "performance assessments call upon the examinee to demonstrate specific skills and competencies, that is, to apply the skills and knowledge they have mastered".

The tendency of current learning back to the idea that children would be better if the environment is created naturally. Learn to be more meaningful if the students are experiencing what they are learned. Learning that oriented mastery of material proved successful in short-term given the competition but failed to provide children solve problems in the long term life. Contextual learning is the concept of learning which helps the teacher link the matter between the real world situation students. Contextual learning encourages students to make the connection between their knowledge and application in their life as members of the family and society. The concept of contextual learning expected more meaningful for students.

The problem that has been happened students are not able to do lab work independently and didn't understand lab work matter. One of the causes of the problem that students have not mastered the skills of performance for pharmacy lab work, so the teacher only regard based on the result and cognitive value only. Performance skills are very important in lab work pharmaceutical to grow confidence in learning pharmaceutical critically and creatively. The success of laboratory skills depends on the quality of training and assessment program. Instrument performance assessment is needed to resolve the problem.

Performance assessment provides some benefits on the assessment process objective, measurable, and comprehensive on the ability of the end student learning [5]. Other research from Izza [6] showed that performance assessment had been analyzed can be used to assess basic skills laboratory. Research conducted by Ardli [2] regarding the implementation of performance assessment, obtained the conclusion that the development of performance assessment improve students interest in practical activities, motivate students in learning and effectively help teachers measure skills and attitude students. Research conducted by Puspitasari [7] concluded that lab work with performance assessment rubric could achieve mastery learning, students character can be built for practical activities include discipline, honesty, independence, responsible and cooperate. Another research conducted by Oktriawan [8] about developing of performance assessment instruments. Results of the development have characteristics consist of instrument performance assessment, assessment rubric is simple, and has level legibility and excellent construction.

The result of observations in several pharmacy schools in Rembang obtained that during the lab work held, the teacher already has practical assessment guidelines that apply nationally, but the assessment has not been developed and only apply for some materials as science lab recipes. One material lab work has not assessment guide is Pharmacognosy. Assessment of the student skills while still carried with an estimated, it makes difficulty in assessing because there is no assessment guide in this aspect.

Respons to the problems and research has been conducted by experts, it is necessary to research and development that related assessment instrument with the title "Development of performance assessment instrument based contextual learning for measuring students laboratory skills" has purpose to facilitate teachers to assess students ability so that advances the ability of students can be seen clearly and accurately. Problem formulation in this research is: Is performance assessment feasible and effective in measuring students laboratory skills. Purpose of the research: obtain an instrument performance assessment appropriate and effective to measure students laboratory skills.

2. Methods

This research was conducted at SMK Kesehatan Bina Mandiri dan SMK Avicenna Lasem. This research uses Research and Development Methode (R & D). Development research not using general population, but only using limited subject. The subject is students of pharmacy grade X academic year 2015/2016. Schools are intended to test small class, large scale to the implementation of developed performance assessment instruments. The subject research at small scale test amounted ten students.The subject

research at large scale test amounted 26 students and the subject research at implementation amounted 29 students.

This research uses Research and Development (R&D) method. R & D research method has three stages of development that includes defining, design, and develop (**Figure 1**). Define phase is to identify potential problems that cover analytical instruments used in schools and pharmaceutical process analysis lab performed. After identifying the problem and formulate issues and gather information. The design phase is compiling the design of instrument performance assessment to measure students' laboratory skills current pharmacy lab work followed with expert validation and performance assessment instrument design revisions. Develop phase is testing instruments, namely the first stage of small-scale testing and revision of assessment instruments. Then followed the second phase of testing instruments with large-scale test and revision of assessment instruments. After the third stage carried out an assessment instrument is ready to implement. Research and Development (R&D) method used to produce a product, and testing the effectiveness the products [9]. This research needs analysis and tes the effectiveness of product development required to produce a particular product.

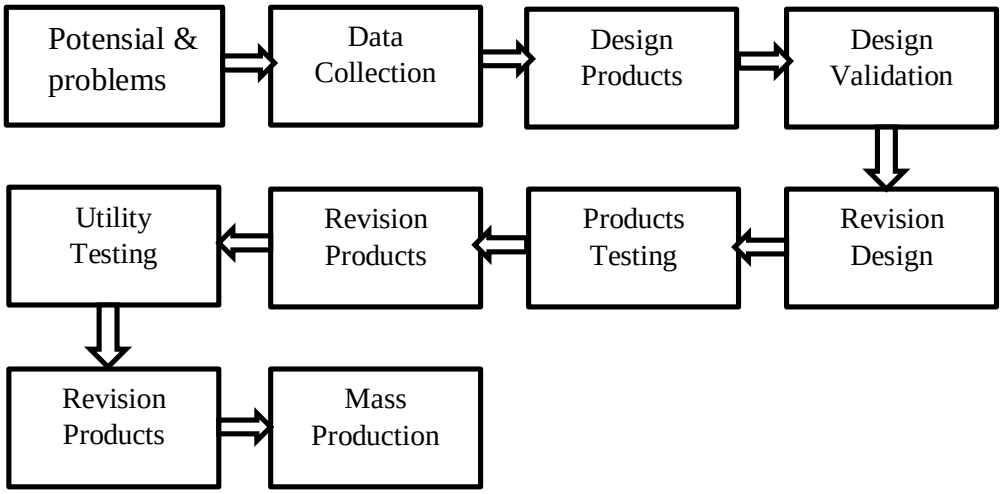

Figure 1. Step of Research and Development (R&D) method

Instrument reliability assessment process on observation sheet student lab skills assessments was analyzed using inter-rater reliability. Inter-rater reliability formula to analyze the reliability of laboratory skills assessment observation sheet on this below:

$$r_{11} = \frac{V_p \_ Ve}{V_p + (k+1)V_e}$$

Reliability item questionnaire can be measured by using Alpha Cronbach. Instrument reliability calculation of questionnaire sheet conducted on the small-scale test, large-scale test, and implementation. Instrument said reliable if score $\propto \geq 0.70$. Alpha Cronbach formula uses to analyze the reliability of the questionnaire sheet on this below:

$$\propto = \frac{k}{k-1}\left(1 - \frac{\sum {\sigma^2}_b}{{\sigma_t}^2}\right)$$

The effectiveness of assessment instrument determines achievement of developing performance assessment instrument. Determining the effectiveness instruments carried out by calculating the proportion of students who have laboratory skill of high and very high from a total number of all students, can also percentage achievement of all students for each item, then inserted using the formula below:

$$K = \frac{\sum ni}{N} \times 100\%$$

Methods of data collection were conducted by interview and observation method. The interview used to take document or data that supports research. Observation methods used to see raters understanding. The validity of instrument calculated from expert judgement. Assessment instrument is said to be effective if 75% of the students are in the criteria high laboratory skills and very high laboratory skills.

3. Results and discussion

Assessment instrument that used in this research is performance assessments instrument for measuring laboratory skills students. Instrument considered valid if the result means score by expert judgements achieve good and very good categories. During process validation instrument repairs for obtaining performance assessment instrument better. Detail of the analysis expert for validation performance assessment instrument can be seen in Table 1.

Table 1. Detailed Results Analysis Instrument Validation for performance Assessment Instrument

No	Validator	Score	Category
1	Syllabus	28	Very Good
2	Interview Sheet	29,5	Very Good
3	Questionnaire Responses and Users Sheet	29	Very Good
4	Observation Students Lab Skills Assessment Sheet	62.5	Very Good

Table 1 shows the average score obtained by each instrument achieve very good category. Performance assessment instrument and the other instrument that supports valid and feasible to use [6]. The result of the validation instruments appropriates with the opinions [10] the validity with good categories if coefficients categories ranged between good and very good.

Validation results by four validators concluded that instrument performance assessment dan and supporting instruments be valid. Instrument performance assessment and developed supporting instruments eligible for use in the research process. Improvement performance assessment instrument conducted during the validation process by an expert to get a good instrument, valid and feasible for use. Summary of revision developing performance assessment instrument can be seen in Table 2.

Table 2. Summary of revision developing performance assessment instrument

No	Instrument	Improvement Notes
1	Interview Sheet	Using standard sentence for each item
2	Observation sheet, rubric and procedure laboratory skills instrument	Observation sheet made more detail discussion section Rubric aspect on 15. 15. 17 replaced with indicator of laboratory skills Scoring column in merge cell Improvement the rubric and made in context
3	Questionnaire responses of teacher, observer, and student sheet	Using standard sentence for each item

Small-scale test conducted to determine deficiencies and legibility or the instruments. The subject of the small-scale test is ten students with nine female students and one male student class X F 1 SMK Kesehatan Bina Mandiri Rembang. The process of small-scale test carried out on active learning hours. The calculation result of the data analysis of laboratory skills assessment obtained reliability 0.833. Observation sheet laboratory skills of the students said to be reliable because of more than 0.70.

Large-scale test with some subject 26 students. The subject from class X F 2 SMK Avicenna Lasem. The process of large-scale test performed on active learning hours. The calculation result of the data analysis of laboratory skills assessment obtained reliability 0.887. Observation sheet laboratory skills of the students said to be reliable because of more than 0.70.

Implementation phase with some subject 29 students. The subject from class X F 1 SMK Avicenna Lasem. The process of large-scale test performed on active learning hours. The calculation result of the data analysis of laboratory skills assessment obtained reliability 0.903. Observation sheet laboratory skills of the students said to be reliable because of more than 0.70.

Improvement performance assessment instrument was conducted during the validation process by an expert to get a good instrument, valid and feasible for use. Improvement after small-scale test, the base for instruments to be tested again on a large scale. Data obtained and analyzed for reliability. Detailed result reliability observation sheet laboratory skill students can be seen in Table 3.

Table 3. Detailed result reliability observation sheet laboratory skill students

No	Stage of Development	Reliability	Description
1	Small Scale Test	0.833	Reliable
2	Large Scale Test	0.877	Reliable
3	Implementation	0.903	Reliable

Table 3 show that observation sheet laboratory skills of students stated reliable because of the value of the reliability more than 0.70. Instruments that valid and reliable can be used to assist and motivate students more excited to improve their skill in practical competence [1]. Assessment instrument is valid and reliable highly effective for measuring result student learning [11].

Questionnaire responses teacher, observer and students are also required in development this research to determine the criteria assessment instruments developed. Analysis results show that performance assessment instrument developed has very good criteria. The result of the analysis questionnaire of teacher, observer, and student about developing of performance assessment instrument can be seen in Table 4.

Table 4. Data Result Questionnaire Response Develop of Performance Assessment instrument

No	Instrument	Reliability		Description
		Students Questionnaire	Teacher Questionnaire	
1	Small Scale Test	0.758	0.803	Reliable
2	Large Scale Test	0.807	0.828	Reliable
3	Implementations	0.815	0.835	Reliable

The effectiveness of an assessment sheet determining achievement of performance assessment instrument development. How to determine the effectiveness of assessment instruments to the assessment done by calculating the proportion of the number of students who have the skills of the high and very high laboratory of the total number of students there, and can by the percentage achievement of all students on each item. Assessment instrument is said to be effective if 75% of the students are on the criteria of laboratory skills of high and very high. The effectiveness of developing performance assessment instrument can be seen in Figure 1.

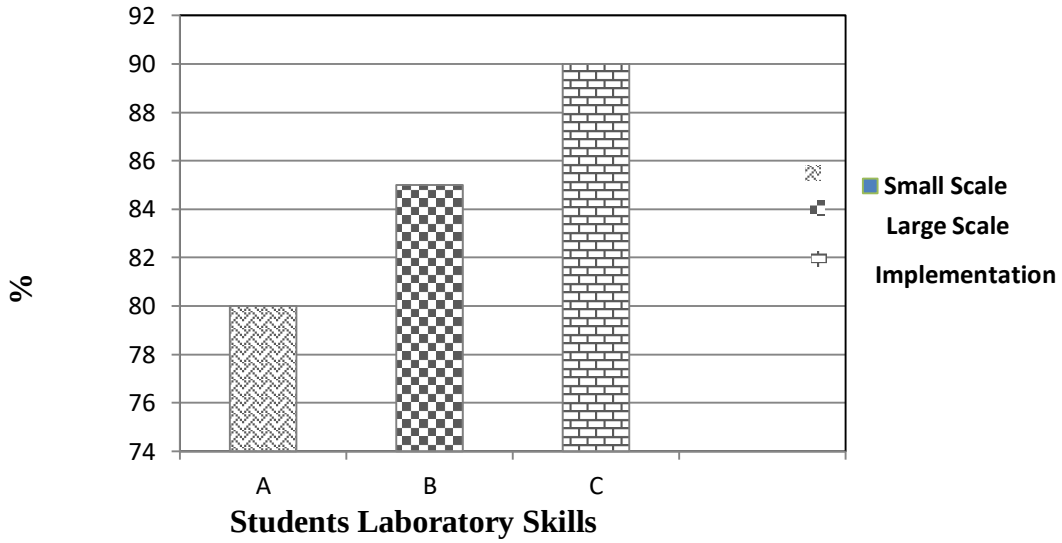

Figure 2 Percentage of Students Laboratory Skills Assessment in Development Phase

Figure 2 shows that in the small scale test around 80% of students or 8 from 10 students have high minimum laboratory skills. The large-scale test showed that 84.61% or 22 of 26 students have high minimum laboratory skills. Implementation phase showed that 89.65% or 26 of 29 students have high minimum laboratory skills.

Practicality instruments are obtained through the spreadsheet questionnaire on teachers, and the student observer at the trial stage until the implementation. The results of the analysis of students' responses to the instrument performance assessment showed that students responded positively to the instruments developed. The response of students to the instruments during the test to meet the criteria of the practical implementation phase. Students are interested and agreed to carry out practical Pharmacognosy using performance assessment instruments.

The result of the teacher and observer feedback on performance assessment developed indicates that the user has to provide an assessment with practical until very practical category with score range between 42-53. The questionnaire results showed that instruments developed in general have practical qualification level. The result consistent with research Haksani [10] devices developed get a positive response by the user with questionnaire responses, so the device developed stated practically.

The assessment activities in the lab can help the teacher to determine laboratory skills of the students. Authentic assessment intended to measure laboratory skills of the students with actual. Authentic assessment can be held in various ways either by using a performance assessment. Implementation using performance assessment can be held during a lab work in pharmaceutical laboratories to measure students laboratory skills. Performance assessment instrument directed during lab work proses that are currently observing, analyzing, interpreting data and accumulated during the lab work process. The material had been obtained students during learning pharmacognosy materials can be used in social life.

The result of developing has increased teacher task when the lab work held. The teacher should explain the matter and observe all of the students to assess their skills laboratory. This obstacle can be overcome by companion assessment techniques, self-assessment by the student's peer assessment can also be used to overcome this problem. Performance assessment instrument is also still to be developed by the creativity and needs, so the teacher can easily record the student's ability to achieve educational goals.

4. Conclusion

Based on this research performance assessment instrument feasible to implement and validation result is 62.5 with very good categories for observation sheet, and all of the support instrument has very good categories. The instrument is included in the category of effective because 26 from 29 students have very high laboratory skill and high laboratory skill. The research of performance assessment instrument is standard, and it can be used to assess basic skill student laboratory.

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