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Online based performance assessment for general chemistry laboratory

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Abstract. The purpose of this study is to describe the stages of making the performance assessment instrument and analyzing the results of the feasibility test of the online-based performance assessment instrument on the Basic Chemistry practicum. The method used is research and development. The results show that research phases include chemical material analysis, making performance assessment instruments, website creation, validation and limited trials. Validation is done to material and media expert validators, limited trials conducted to students and assistants of Basic Chemistry practicum. Validation of making of performance assessment instrument has value of r_{count} 0,95, while result of validation of making website of instrument of performance assessment has value of r_{count} 0,84. It shows that online-based performance assessment instrument on Basic Chemistry practicum interpretation is valid and has high feasibility of assessment of expert validator. The results show that the feasibility test based on a limited trial give good response with an average of 97.5% and 98.8%. The result of the percentage of the feasibility test indicates that the online-based performance assessment instrument on the Basic Chemistry practicum is eligible for use. Making this website is expected to facilitate lecturers in conducting the assessment of the performance of students at the time of practicum.

1. Introduction

Assessment is one part of the learning process since measurement and assessment factors play a very important role in the learning process [1]. Assessment usually used to assess student ability in discussions, solving problems, using laboratory tools and other observable activities [2]. According to Firman, to assess psychomotor aspects in the form of students' actions, then a suitable assessment used that is performance assessment [3, 4].

Performance assessment is a type of assessment that asks students to demonstrate performance that demonstrates essential skills and essential knowledge to accomplish a specific task [5]. Completion of a task or a job cannot be separated from the use of technology [6]. The convenience provided by advances in technology and information can be utilized to facilitate the learning process [7]. For example, make website-based performance assessment. Previously, research on the development of website-based performance assessment on integrated science courses by Lesmono [8]. Based on the



results of research Lesmono obtained results of student response data on website-based performance assessment instruments is quite positive. The results of Arhin research show that students' attitudes and knowledge using performance-based judgments provide a positive response [9]. The same is done by Back, that performance-based assessment gives positive results in teaching and learning process [10].

Based on the above description, the purpose of this study is to describe the stage of making the performance assessment instrument and the result of feasibility test of the online-based performance assessment instrument on the Basic Chemistry practicum.

2. Method

The method used were research and development [11] with a 4D model those were analysis, design, development, and dissemination [12]. Stage of analysis is done by analyzing the existing performance in every chemical concept in the practicum. So, the next stage of performance assessment instruments includes the creation of performance assessment instruments and website creation of performance assessment instruments, then the making of flowcharts and story boards on the website of performance assessment instruments. The next stage was the third stage of development of the model (instrument), at this stage includes the validation and feasibility test of the product. The feasibility test phase includes a limited trial of 10 Chemistry Education students and 10 Basic Chemistry II practicum assistants.

3. Results and discussion

The making of performance assessment instrument begins by analyzing syllabus and module of Basic Chemistry II, Syllabus and Basic Chemistry practicum module which is analyzed is syllabus and practicum module which is used in Basic Chemistry II practicum course in Chemical Educational Program of UIN Sunan Gunung Djati Bandung. This analysis is used to obtain the descriptions, references and references used to create performance indicators and performance assessment aspects. After the syllabus and practice module analysis is done, the next stage is making performance indicator, performance indicator is made to determine the performance aspect which is achieved by student in using the tools and materials in laboratory.

Performance indicators that have been made are then downgraded to the skills students develop in using tools and materials. The next stage is the creation of performance assessment instruments made in accordance with the experimental procedure on the Basic Chemistry II practicum module. The performance assessment instrument made must be adapted to the Basic Chemistry II module, namely: electrical conductivity, chemical balance, acidity level of a solution, voltaic cell, electrolysis and Colloid. The performance assessment instrument is detailed in its assessment aspect, detailed preparation is intended to enable the performance assessment instrument to provide clear information to students in using the tools and materials in the laboratory in accordance with existing theories, in addition to the detailed performance assessment instruments that will be useful as assessment tools of Performance assessment instruments that assist in the learning process.

The next stage is making the website of performance assessment instrument. The website is used as a tool to operate the performance assessment instruments that have been created. The first stage in making the website performance assessment instrument that is making website design first. Therefore, it is necessary to have flowchart and story board. Flowchart and story board used as a reference in making website performance assessment instrument. This explains that the storyboard is a description of a flow that has been designed in the form of a flowchart that is used as a reference in the process of making a website performance assessment instrument [2].

Website performance assessment instrument has two different views, first on the student website display and second on Admin website. Display menu on student website includes menu entry/list of new student accounts, home, practicum module, practicum values, upload reports, about the menu and menu exit. Display menu of student's website can be seen in Figure 1 below:

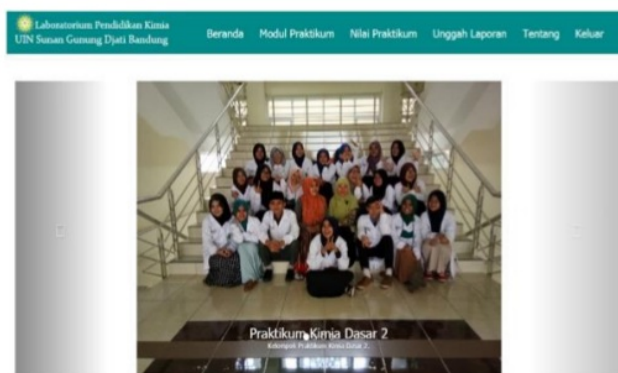


Figure 1. Display of student menu website.

The student's practicum score menu view is divided into journal practicum score, report, performance, attitude and final exam of semester. The practicum score menu is a score menu that students use to see the results of their grades on a Basic Chemistry practicum. The performance score menu displayed on the student website contains student identity, and the title of the practicum, can be seen in Figure 2.

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NILAI KINERJA PRAKTIKUM		
Name	Sisca Ayu Verawati	
NIM	1132080076	
SEMESTER	SEMESTER 2	
NO	Judul Praktikum	Nilai
1	Daya Hantar Listrik	90
2	Keseimbangan Kimia	85
3	Tingkat Keasaman Suatu Larutan	100
4	Sel Volta	90
5	Elektrolisis	100
6	Koloid	95

Figure 2. Display menu of score performance of students' website.

Display menu on the admin (lecturer/laboratory assistant) website includes the home menu, data menu, data module menu, score data menu and reports data menu. Contains admin data that includes name, registration number, sex, address, phone, username and admin password.

The performance score menu displayed on the Admin website menu can be seen in Figure 3. The result of making a performance assessment instrument is incorporated into the performance score menu in the website, so performance assessment by means of checklist list techniques can be directly used in the website.

No	Nama Mahasiswa	NIM	Semester	Judul Praktikum	Nilai	Hapus
1	Agil Ahmad Fauzi	1162080004	Semester 2	Daya Hantar Listrik	95	Hapus
2	Muhamad Saepul Anwar	1162080044	Semester 2	Daya Hantar Listrik	90	Hapus
3	Robiah Siti Hanifah	1162080061	Semester 2	Daya Hantar Listrik	80	Hapus
4	Ryzhaima	1162080064	Semester 2	Daya Hantar Listrik	75	Hapus
5	Sindy Arliyanti	1162080068	Semester 2	Daya Hantar Listrik	77	Hapus
6	Sidiq Abdul Rouf	1162080067	Semester 2	Daya Hantar Listrik	88	Hapus
7	Siti Hanifah	1162080071	Semester 2	Daya Hantar Listrik	87	Hapus
8	Qutholina Dewi Kulum	1162080073	Semester 2	Daya Hantar Listrik	90	Hapus
9	Syfa Sultan	1162080076	Semester 2	Daya Hantar Listrik	100	Hapus

CETAK FILE

Figure 3. Display menu of performance score of admin (student/laboratory assistant) website.

After the stage of making a website-based performance assessment instrument is completed, the next step is to conduct a feasibility test to expert and media validators. The feasibility test by the validator is done in two tests namely the feasibility test to validate the performance assessment instrument and the feasibility test to validate the website of the performance assessment instrument. The feasibility test is conducted to obtain an assessment of the making of performance assessment instruments and the making of a performance assessment website. Feasibility test to validate instrument performance assessment and website performance assessment is done by comparing the value of eligibility (r_{count}) of an instrument with the predetermined value of $r_{critical}$ [13], generally $r_{critical}$ is used to define the limits of the validity of an instrument, whose value is set at $r_{critical} = 0.3$.

At the feasibility test stage to validate the performance assessment instrument there are several aspects that are assessed are linguistic aspect, construction aspect, objective aspect, systematic aspect and practical aspect. While in the stage of feasibility test to validate the making of website performance assessment instrument there are some aspects that are assessed are design and visual aspect, navigation aspect, content and language aspect, and information quality aspect. The validation result of feasibility test of making performance assessment instrument can be seen in table 1.

Table 1. Result of feasibility test of performance assessment instrument making.

Indicator observed	Value r_{count}	Value of $r_{critical}$	Results
Aspects of language	0.93	0.3	Valid
Aspects of construction	0.93	0.3	Valid
The objective aspect	1.00	0.3	Valid
Systematic aspects	0.93	0.3	Valid
Aspect of Practical	0.97	0.3	Valid
Average r_{count}	0.95	0.3	Valid

Results r_{count} based on the table have an average of 0.95 and has a range of values of r_{count} at 0.93 to 1.00 for each indicator in aspects of evaluation. The indicator that has the highest value of r_{count} of 1.00 is in the objective aspect. While the lowest r_{count} is 0.93. The results of validation of performance

assessment instruments in accordance with the theory stated by Sugiyono [13] which mentions the instrument is said to be valid with the value of r_{count} above r_{critical} is 0.30. Arikunto [1] also mentions r_{count} with a value of $0.80 \geq 1, 00$ is said to be valid with a high feasibility interpretation. So that all indicators of each aspect of assessment of performance assessment instruments are feasible to use and can be said valid with a high feasibility interpretation because it has a value of r_{count} of 0.95.

Performance assessment instrument is valid because the performance assessment aspect has been made in detail, so it can measure the skill developed by the students in using the tools and materials in the laboratory. In addition, performance assessment instruments that have been made are suitable for use in assessing student performance using laboratory tools and materials [14], this is because there are performance indicators that can be developed by students so that students can evaluate their own work in the laboratory.

The next stage is a feasibility test to validate the website performance assessment instrument. Validation is done to determine the quality of the website performance assessment instrument that has been completed. Validation is done to three validator/expert lecturer that is one validator of media (website) expert from lecturer of Informatics Engineering and two validators from lecturers of chemical education expert. There are several aspects assessed on the validation of performance assessment instruments: design and visual aspects, navigation aspects, content and language aspects, and aspects of information quality. To find out the validation result of website creation of performance assessment instrument can be seen in table 2.

Table 2. Results of feasibility test of website performance assessment instrument creation.

Indicator observed	Value r_{count}	Value of r_{critical}	Results
Aspects of design and visual	0.82	0.3	Valid
Aspects of navigation	0.83	0.3	Valid
Aspects of content and language	0.86	0.3	Valid
Aspects of quality information	0.85	0.3	Valid
average r_{count}	0.84	0.3	Valid

The r_{count} based on the table has a value of 0.84. The result of validation of performance assessment instrument in general on every aspect that is assessed has a feasibility value with r_{count} amounted to 0.84 or declared valid. The highest eligibility value of 0.86 is in the content and language aspects in the content indicator free of rough and vulgar elements, while the lowest value of r_{count} is 0.82 in the design and visual aspects.

Overall all indicators of every aspect are valid. This suggests that web-based performance assessment instruments valid with high feasibility interpretation because it has value r_{count} at 0.84. Website performance assessment instruments made can be said to be valid because the website performance assessment instrument can show the assessment process to the students clearly, so that students can know the value of the Basic Chemistry II Practicum clearly and in process, this is proved by validity value above 0.30 and reinforced with the statement of Suryandari [15] which states that the appropriate website-based performance assessment instrument is capable of measuring the students' ability to perform the assigned tasks and can result in process assessments to measure students' skills in using tools and materials.

Furthermore, a limited trial was conducted. A limited trial was conducted by distributing a questionnaire on the assessment of a website-based performance assessment instrument to 10 students and 10 assistant of practicum laboratories of Basic Chemistry II. Questionnaires are completed after students and laboratory assistants use the website directly through the validation stage. The questionnaire distribution to students and laboratory assistants is intended to obtain an assessment of the website performance assessment instrument. To find out the results of limited trials to students can be seen in table 3.

Table 3. Limited trial results of website performance assessment instrument for students.

Statement	Yes (%)
Aspects of design and visual	97%
Aspects of content and language	95.5%
Aspects of quality information	100%
Average percentage (%)	97.5%

From the table shows that the average percentage of responses from 10 students for the results of the feasibility test of the performance assessment tool based on the website as much as 97.5% agree and the rest that is as much as 1.5% states disagree. This indicates that a website-based performance assessment instrument is eligible to use because according to Sudjana [16] the percentage of 90-100% has qualified eligible criteria to be used, so the quality of the website-based performance assessment instrument is eligible to be used based on the results of a limited trial of 10 people college student. While the test results of the test results are limited to the students can be seen in table 4.

Table 4. Limited trial results of website performance assessment instrument making to laboratory assistant.

Statement	Yes (%)
Aspects of design and visual	97%
Aspects of content and language	95.5%
Aspects of quality information	100%
Average percentage (%)	97.5%

From the table shows that the average percentage of responses from 10 laboratory assistants for the results of the feasibility test of the *website*-based performance assessment tool 98.8% agree and 1.2% stated disagree. This indicates that the website-based performance assessment instrument is eligible to use because according to Sudjana [16] the percentage of 90-100% has qualified eligible criteria to be used, so the quality of this website-based performance assessment instrument is feasible to use based on the results of a limited trial of 10 laboratory assistants.

The lowest percentage results based on trial results are limited to students who disagree on the content and language aspects. Respondents from students revealed that there are still some shortcomings in the command line contained in the website. Therefore, the command phrase in the website is improved so that the sentence in the website can be more detailed and clear. This is in accordance with Zitler at al statement [17] which states that the quality of a website can be known from the aspect of content and website design, from that aspect we can evaluate a learning website whether it is feasible or not to be used.

The lowest percentage of 20% who stated disagree based on the results of a limited trial to the laboratory assistant in the content and language aspects. Respondents from laboratory assistants revealed that the website is still unable to assist the laboratory assistant in recording the value because the recap value system in *the* performance assessment website could not recycle in its entirety so that it could only recap the value based on each practicum title from each journal value, the reporting value, performance score, value of attitude and value of final test. Therefore, it is done improvements on the menu in order to produce a website that can facilitate laboratory assistant in recording the value of Basic Chemistry II practicum.

This is reinforced by Wahyuningsih statement [18] which states that online-based Performance assessment that produces good assessment instruments will benefit the lecturers and students. One of the benefits for lecturers and students is to know the level of success achieved by students in learning with the actual information and can facilitate lecturers or laboratory assistants in recording the value automatically.

Overall the result of the trial is limited to the students and the laboratory assistant is valid and has a very high feasibility value with the percentage of 97.5% and 98.8% respectively. So, the results of the research the website-based performance assessment instruments are declared eligible to use.

4. Conclusion

The creation of a website-based performance assessment instrument includes the analysis of the Basic Chemistry II syllabus, the analysis of the Basic Chemistry laboratory II module, and creating performance indicators. The creation of webs item of performance assessment instruments, validation tests and limited trials. The result of the feasibility test of making the performance assessment instrument shows that the instrument of website-based performance assessment on the Basic Chemistry II practicum is valid and has a high feasibility interpretation from the expert validator assessment. The results of the feasibility test based on limited trials to 10 students and 10 practicum laboratory assistants of Basic Chemistry II gave a good response, this shows that the online performance-based assessment instruments on the Basic Chemistry practicum is worth to use.

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