



### THE DEVELOPMENT OF ALTERNATIVE ASSESSMENT INSTRUMENT IN WEB - BASED SCIENTIFIC COMMUNICATION SKILL IN SCIENCE EDUCATION SEMINAR COURSE

**R. D. Hardianti\*, M. Taufiq, S. D. Pamelasari**

Department of Integrated Science, Faculty of Mathematics and Natural Sciences,  
Universitas Negeri Semarang, Indonesia

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#### ABSTRACT

Science Education Seminar course aims to develop the communication skill of students. The materials and assignments are given to train how to communicate effectively both written and orally. The tasks consist of the scientific papers analysis, conceptual article draft, and other assignments. It took longer time to assess those assignments with only pencil and paper methods therefore a web-based alternative assessment was designed to assess the assignments. Web-based alternative assessment (e-assessment) can facilitate students and lecturer in the process of collecting and assessing tasks. The validation score by the assessment expert of the four aspects resulted 94,64%, 92,86%, 91,07%, and 92,86% meanwhile the score of expert information systems was 90, 63%. Thus the product can be said as valid in very feasible category with the average score of 81.5%. The percentage of positive responses of students was 84,43% that indicates the product is effective to help students and lecturers in the assessing students' assignment and performance. Therefore, it can be said that the research has met the indicator of feasibility to result a valid and effective product.

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**Keywords:** web-based alternative assessment; e-assessment; scientific communication skill

#### INTRODUCTION

Developing skill nowadays has become a course that must exist in the university curriculum. In certain courses, some skills or competencies could be developed like soft skill and hard skill. Soft skill development is highly needed better than a hard skill. Ghautam (2014) explained that hard skill only gives 15% contribution towards someone success. The fact expressed by Ghautam (2014) is one of the considerations for the university to supply their students some competencies so that they could compete in ASEAN Economy Society (AES) or other globalization. So, learning that focuses on solving actual problems need to be designed through a model,

learning media, and right assessment to facilitate the activities connecting the concept and real life (Taufik et al., 2016).

Communication skill is an important skill for teacher candidates. Blandhol (2012) explained that communication is said as effective if it can fulfill someone need. That need could be reached through two ways: with or without paying attention to the needs or other interest. This point is what becomes reference where the appropriate communication is seen from one's need without breaking its relation to another. In integrated science curriculum, one of the competencies that students must have is able to communicate effectively their information, idea, analysis and arguments in many media to the society based on the result study/research in the science field. The course supporting this competence is

\*Alamat korespondensi:

E-mail: risadwita@mail.unnes.ac.id

Science Education Seminar. In Science Education Seminar class, students are obligated not only to understand and write analysis paper but also present it as well as seminar demands. Students get a daily score, mid-term test, and final test by searching analysis papers and analyze them, try to write analysis papers, and present it. Thus, students communication skill either oral or written could be developed in Science Education Seminar course. It is in agreement with Brownel et al., (2013) who explained that communication skill needs to be taught if the purpose is to equip future scientists with communication skill either written or oral. Some researches conducted by Klein & Carney (2014), Jones & Seybold (2014), Stewart et al. (2015), dan Chan (2010) also mentioned that written and oral communication skill are a skill that students of the university must have to prepare their career.

The methods used in Science Education Seminar are a discussion, presentation, and portfolio. The assessment done when students are doing presentation or seminar is peer-assessment. Portfolio assessment is taken from structured assignments given by the lecturer in each meeting to develop students' understanding of analysis paper and its kinds. Assessing those assignments is usually done manually by using assessment rubric. Many assignments submitted by students cause lecturer to spend much time to assess. It is obviously less efficient for lecturer work so that some development need to be done to make ease during the assessment of portfolio assignments. Assessment instrument that can ease lecturer in assessing is the web, technology, and information based assessment.

Dahalan & Hussain (2011) defined web-based assessment as the assessment that uses computer application and internet in the learning process. Wusqo et al., (2015), Kay (2014), Muñoz-Cristóbal (2014), Chen (2013), dan Wang et al. (2004), explained that web and technology and information nowadays become tools that are variously used in learning process since they are

cheap and easy to access.

The assessment done through the web (e-assessment) will help lecturer to assess quickly and objectively. From conservation side, web-based assessment in the portfolio will support the less-paper policy because students do not need to print their papers and submit to the lecturer. All assignments will be uploaded, corrected, and assessed by the system so that the result of learning can be seen quickly without leaving many papers.

## METHODS

This research used Research and Development (R & D) approach. R & D research is a basic activity to get needed information, then it is developed to create a product. According to Borg & Gall in Sugiyono (2010), research and development is a method used to develop or validate products that are used in education and learning. The steps of research and development are shown in Figure 1.

The subjects of this research were students of UNNES Science department semester 5 chosen with purposive sampling. The students were limited to those who were taking Science Education Seminar. This research would be conducted in Department of Integrated Science, Faculty of Mathematics and Science, Unnes.

## RESULTS AND DISCUSSION

The methods in this research used nine steps of R and D from Borg and Gall. Those steps were: 1) analyzing potential and problem; 2) collecting information and literature study; 3) designing product; 4) revising design; 5) small scale test; 6) revising product; 7) big scale test; 8) revising product; 9) mass production. The ninth step was not used in this research.

### Analyzing potential and problem

All assignments of Seminar course were still submitted in hard file. Those assignments in-

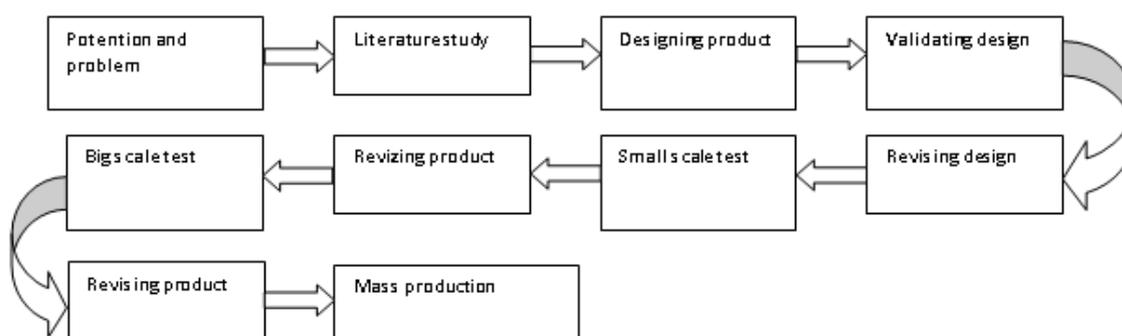


Figure 1. The steps of Research R and D (adapted from Sugiyono, 2011)

cluded analysis papers, making popular articles, and making conceptual articles. Those three tasks were printed and cost many papers. It was against one of Unnes principles, conservation. The Web would become a solution in submitting students tasks. By uploading files to web system, students no longer printed tasks which cost many papers. Every classroom was facilitated with wifi to access the internet so the use of e-assessment could be done during class.

### Collecting information and literature study

In this step, the writer analyzed the curriculum of Science Education Seminar. The tasks that would be given to students were adapted with course goals, expected achievements, and course description. The process of developing the web referred to the relevant researchers. Information sources were taken mostly from research articles in latest seven years, so they were still relevant to be used.

### Designing product

Product design had to fulfill the assessment criteria and presentation criteria. In this step, e-assessment in the form of the web was begun to design either from its layout or content. Researcher team formulated web layout and content. It was done by considering some factors like the curriculum of Science Education Seminar, the ease of using the web by students and lecturer, given tasks, score reference and feedback that would be run on the system. Viberg et al. (2015), Taufiq et al. (2014), Tarhini (2013), Saadé & Galloway (2005) explained that the design of digital application for learning should consider: i) easy use and system usefulness; ii) social norm and work quality; iii) frequency of application use by students when doing individual task; iv) training to use the application for students is necessary to do. During small scale test, students were supposed to train using web e-assessment first with lecturer instruction. those factors according to Motaghian (2013) were not only for students or users but also for web admin/instructor.

Web assessment program could be accessed online on <http://www.e-assessment.web.id>. The lecturer could log in by typing his username and password. The lecturer run as an administrator who could control the whole system. Admin menu available were posting, a final score, students list, add a user, they could be seen in Figure 2.



Figure 2. Admin menu in web e-assessment.

### Validating design

All assessments were: An analysis papers assessment (94,64%), B writing analysis papers (92,86%), C writing popular analysis papers (91,07%), and D performance in Seminar (92,86%) were categorized as very appropriate with the percentage of  $\geq 81,25\%$ . So, the assessment has become appropriate to assess the assignments of Science Education Seminar course.

Web e-assessment program was validated by the expert of an information system from web layout, program, and linguistic. The result of expert evaluation towards e-assessment program could be seen in Table 2. E-assessment program was categorized as very appropriate (90, 63%) with percentage  $\geq 81,25\%$ . So, e-assessment has been appropriate to use for assessing the assignments of Science Education Seminar course online.

### Revising design

Design revision was done based on suggestions from assessment expert and information system expert. The weaknesses found was then tested and reduced by repairing the system. The suggestions from assessment expert were: 1) in assessing the abstract of paper analysis the maximum amounts of words should be mentioned; 2) assessment points should be written objectively, not subjectively.

Assessment descriptions given by information system expert were: 1) searching column did not work, if it is not used, it is better to omit; 2) value 0 (zero) could not be input. The range should be from 0 to 100; 3) there is no confirmation in deleting data, it is directly executed. It could make the data suddenly disappear. The existence of confirmation could be used as a warning before deleting data for sure; 4) edit button should not be active when there is no data to input.

**Table 1.** Recapitulation of Assessment Expert Result

Assessment Aspects	Task			
	A	B	C	D
Assessment rubric format				
1.The format is clear to ease the assessment	4	4	4	4
2.The format is appropriate to measure students analysis paper.	4	3	3	4
Content				
1.The measurement is developed based on the purpose of Science Education Seminar Course	3	3	3	3
2.Formulated clearly	4	4	4	3
3.Formulated specificly	3	4	3	3
4.Operational so that it is easy to measure	4	4	4	4
5.Every aspect can be measured objectively	4	3	3	3
6.Can be implemented on web system	4	4	4	4
Language and writing				
1.Use language with correct grammatical and structural Bahasa	4	4	4	4
2.The language is communicative	4	4	4	4
3.The language can be understood easily	3	4	4	4
4.The punctuation is correct	4	3	3	4
Rubric advantages and students' task measurement				
1.Can be used as assessment reference	4	4	4	4
2.Can be used to assess the success of learning process	4	4	4	4
Total	53	52	51	52

**Table 2.** The assessment of e-assessment program by information system expert

Assessment Aspect	Score
The ease of use	
Web e-assessment page could be accessed	4
E-assessment program could be run without any problem	3
The instructions could be understood	3
The program could be easily used	3
Layout	
Design/layout is interesting	3
There are layout consistency, navigation, text, background	4
Font, size, and color of words are appropriate (easy and clear to read)	4
Operating buttons are complete	3
Language and writing	
Use language with correct grammatical structure of Bahasa Indonesia	4
The language is communicative	4
The language can be understood easily	3
The punctuation is correct	4
Total	58

**Small scale test**

After revising the design, next step was small scale test. The product was tested on 5 students. They tried to log into the e-assessment web then upload the file. The lecturer downloaded the file then corrected, gave a score, and gave feed-

back by using menu available on the web. The students then refreshed or re-logged into the program and checked the score and feedback given by the lecturer.

In this small scale test, some weaknesses were still found; 1) there was a student who could

**Table 3.** Recapitulation of students statements (n = 25)

Statements	VA	A	LA	D
I understand all assignments given by the lecturer in Science Education Seminar Course	7	17	1	0
Assignments from the lecturer are very useful in developing written communication skill	19	6	0	0
Assignments from the lecturer are very useful to improve oral communication skill	15	10	0	0
All assignments from lecturer are as I expect in Science Education Seminar course	7	17	1	0
I try to finish all assignments from the lecturer maximally	17	8	0	0
I have followed all rules n doing the assignments of Science Education Seminar course	16	9	0	0
I do not find any difficulty in doing all the assignments of Science Education Seminar	2	21	2	0
I am optimist to get the maximum score because I have done my best in doing the assignments of Science Education Seminar	15	10	0	0
In the future, I will use the knowledge and skill I got from Science Education Seminar in writing or presenting article/analysis paper	17	8	0	0
I recommend uploading all assignments of Science Education Seminar to the web (e-assessment)	13	11	1	0
E-assessment web page is easy to remember	9	13	1	2
E-assessment web program runs well without any problem	1	18	4	2
E-assessment eases me to submit all assignments whenever and wherever without seeing the lecturer	13	10	2	0
I can easily how to use e-assessment	5	19	1	0
I can easily understand the language, instruction, or feedback available on e-assessment web	6	18	1	0
In my opinion, text or writing (font, size, and color) are clear and easy to read	12	12	1	0
In my opinion, e-assessment layout is interesting	11	12	2	0
Feedback in e-assessment motivates me to repair the assignments of Science Education Seminar	14	10	1	0
All feedbacks given by the lecturer really help me repair the assignments of Science Education Seminar	10	15	0	0
Scores given for the assignments of Science Education Seminar are objective	12	12	1	0
I agree if e-assessment is applied in other courses.	8	14	2	1
Total	229	270	21	5

not log in because there was a mistake in inputting students numbers by administrator; 2) the mistake on typing student's name, and 3) students could not upload a file more than 2 MB.

### Revising product

Based on the findings in the small-scale test, the product was revised. The revision included: 1) re-checking data input so that all students numbers were correct and they could log in; 2) correcting students' name; 3) students should compress the file before uploading.

### Big scale test

In this step, there were 25 students using the same e-assessment web like in small scale test. After using the e-assessment web, the students answered the questionnaire was given which consisted of 21 question related to Science Education Seminar and the use of the e-assessment web by giving scores to each question: 4 for very agree, 3 for agree, 2 for less agree, and 1 for disagree. Table 3 showed the recapitulation of questions total in each peace in the questionnaire.

There were 25 respondents (students) fil-

ling the questionnaire. 14 students stated “very agree” and 10 students said “agree” in question number 18 which was the feedback given by the lecturer could motivate students to repair their assignments. Direct feedback on e-assessment web system influenced the quality of assignments submitted by students especially in sharpening their scientific communication skill. It was supported by Ruskanda (2015) who stated that giving feedback on online time kit web-influenced positively to improve students’ interpersonal skill. In question number 13, which was the use of e-assessment to submit students’ tasks and their assessment, was responded positively by 13 students by saying “agree.” They suggested that the use of e-assessment should make students download the assignments without seeing the lecturer in time work. By uploading assignments via online, students no longer printed them and cost less money and paper. Using computer could save half operational cost compared to using printed paper as counted by Miskiyah (2014) who developed the program of assessment simulation on a computer. Miskiyah (2014) further explained the benefits of computer assessment: 1) ease teachers in giving a score; 2) ease teachers in correcting the assignments. The percentage of positive responses by students towards assignment and assessment in Science Education Seminar was (84,43%)  $\geq$  81,25% categorized as “very good” which meant that the use of e-assessment in Science Education Seminar had fulfilled the criteria of product effectiveness. It was in agreement with Bollen et al., (2015) who said that developed digital assessment got positive responses from students and Rahimi et al., (2015) who explained that the use of web could help students construct their assignments and smooth the communication with the lecturer.

### Revising product

Revising this product was done if in the real condition there were deficiency and redundancy. In big scale test, the product was still revised especially its deficiency. Based on the result of observation, students had understood how to use e-assessment web well starting from login to seeing the assessment and feedback given after they did and uploaded the assignments of Science Education Seminar. The weaknesses found was the absence of the timer in uploading the assignments so that the students could still upload even though the deadline was over.

### CONCLUSION

Alternative assessment to measure scienti-

fic communication skill in Science Education Seminar course fulfilled the criteria of “appropriate” to be used with scores from assessment expert towards four assessments of Science Education Seminar: 94,64%, 92,86%; 91,07%; dan 92,86%. E-assessment web program was very appropriate to use with a score from information system expert: 90,63%.

The percentage of students’ positive responses was 84,43% categorized as very good. It showed that e-assessment program was effective to use because it had fulfilled the effectiveness criteria with good responses from students.

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