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Development of assessment instruments for chemistry education seminar course at chemical education program of Makassar State University

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Abstract. Development of assessment instruments has been carried out at chemistry education seminar course in the Chemistry Education Study Program at Makassar State University. The instrument is tool to evaluate students paper. Development of the instruments for chemistry education seminar course was carried out by Research and Development which based on the ADDIE development model. The ADDIE model consists of 5 stages, namely analyzing, designing, developing, implementing and evaluating. The results of the analysis show that the instruments has been valid and practiced. The results of conformity between two expert validators for one paper using an assessment instrument showed a very high correlation coefficient.

1. Introduction

Students as prospective scholars and scientists who will face increasingly heavy competition and challenges need to be prepared not only to become consumers of knowledge but also as producers in the scientific field. Students must not only be able to read and understand the scientific writing, but also must be able to write their own scientific works [1]. Students must continue to hone their skills to master, develop, and disseminate knowledge by improving the skills of writing scientific papers. Besides that, students are also expected to be able to present scientific papers produced orally.

One of the course that must be followed by students of the Chemistry Education Study Program of Mathematic and Natural Science faculty of Universitas Negeri Makassar is the Chemistry Education Seminar. This course is generally intended to equip students to be able to browse literature, find and systematize information about a topic of chemical education and its problems which include learning materials, learning processes, approaches/strategies/methods/models of learning, media and evaluation of learning outcomes, and cognitive development skills, attitudes and values through chemical education written in the form of papers and presented orally [2].

This course is scheduled to be programmed by students in semester VI and VII. This course runs both on odd semester and even semester. Lecturers usually assign students to write a paper which is then presented to the class. The assessment of the success of students in this course is generally based on two main activities, namely: quality of paper made and quality presentation. At this time there is no official method for assessing both activities. Each lecturer will assess based on each selves method. Therefore, the development of assessment instruments for Chemistry Education seminar courses is very important, especially for those activities.



Scientific writing is a product of the activities of the academic community. Based on the variety, scientific works have different concepts from non-scientific works. Scientific work can be interpreted as factual essays that are presented in the form of exposure. The skill to write scientific papers is part of the competence that the scientific community develops. The position of scientific work in universities is very important and is part of formal academic demands [3].

Today, science and technology develops very rapidly, students can access information anywhere, anytime and whatever they need. In these conditions, the lecturer no longer acts as the sole source of learning, but acts as a learning designer. A learning designer is required to be able to design learning by utilizing various types of media and appropriate learning resources so that the learning process takes place effectively and efficiently. The ease can also make students simply take literature without following the rules that apply to scientific writing.

The success of students in joint courses in chemistry education seminars required standard instruments. Especially to assess the scientific work made by students. In lectures on chemistry education seminars course, it is best to assess not only the lecturers who are proficient in the courses but also by students. Assessment by these students can be in the form of peer assessment. Research instruments that need to be developed can be divided into two, namely: assessment instruments by lecturers and assessment instruments by students. This research aims to develop an assessment instrument for Chemistry Education Seminar Courses at the Chemistry Education Program of Chemistry Department of Mathematic and Natural Science Faculty of Makassar State University that is valid, and practically used both by lecture and by student.

2. Research Method

The type of this research is research and development. In this study, the ADDIE development research model was used. The ADDIE model consists of five stages: Analysis, Design, Develop, Implement, and Evaluate. The selection of ADDIE development research model is based on several advantages possessed by this model, namely this model is simple, easy to learn, and its structure is systematic [4]. This research was conducted in the 2017/2018 academic year in the Chemistry Education Study Program, Chemistry Department, Mathematics and Natural Sciences Faculty, Makassar State University, Indonesia.

In the analysis phase, collection initial data are conducted to find out learning problems that occur in chemistry education seminar course, especially the assessment methods conducted by the lecturers. The things that were analyzed were: what goals will be achieved in lectures on the course, what are the general conditions of lectures on the course, what are the characteristics of students, what is needed by students, what are the obstacles experienced by students and lecturers, especially those related to assessment of course.

Then continue to the design phase, the things that need to be considered at the design stage, namely: what kind of product will be developed, what kind of assessment strategy is suitable with the product being developed, how the product format will be developed, what product plans will be developed, how is the design document, and the evaluation design. At the development stage the researcher then creates an assessment instrument that is in accordance with the designs that have been designed previously. The things that need to be considered in developing this assessment instrument are: aspects of the guiding aspects, aspects of quality, and aspects of language. After the creation of a valid assessment instrument, the next step is collecting the response of the lecturer of the chemistry education program and students. In addition, a suitability test was carried out on the results of the use of assessment instruments conducted by two lecturer of the courses. The evaluation phase focuses more on feedback from lecturers and students on the assessment instruments that have been made by giving questionnaires to lecturers and students. From the results of the evaluation, researchers can see the lack of assessment instrument products that have been made and revise the product.

3. Research Results and Discussion

Development of other needs assessment instruments has been done widely [5,6]. The development of assessment instruments to assess student papers is still rare. Therefore, the development of instruments for the evaluation of papers is very important.

Chemistry education seminar courses are subjects that are expected to equip students to be able insight write scientific articles in the form of papers and present it. Papers are made individually and collected before the presentation. At the beginning meeting it was discussed about the mechanism of the lecture including the procedure for assessment. At the initial meeting also discussed the distribution of presentation schedules by students. The method of giving the values carried out by the lecturers of chemistry education seminars has so far varied depending on the lecturers themselves. The method of assessment can be divided into two parts, namely: assessing course without involving students in assessing and assessing course involving students. For the assessment of course who did not involve students, the lecturer directly assessed the students when presenting their papers and assessing the papers collected. For assessments involving students, it usually involves five students to assess papers and presentations. The assessment usually involves four things: originality, performance, mastery of the material, transparent display, and content of the paper. This assessment is very rough because it is not accompanied by an assessment rubric. In addition, assessment is still very general and has not specifically given grades to student papers and presentations. For this reason, an assessment instrument can be developed that can assess student papers and performance when presenting papers in courses. There are eleven aspects included in the assessment instrument developed, namely: writing, originality, title, abstract, introduction, problem statement, goals, benefits, discussion, conclusions, and bibliography. Each aspect is assessed based on the rubric that has been made with the degradation of values ranging from 1 to 4. The results of the assessment of the design of assessment instruments by two validators can be seen in Table 1.

Table 1. Validation Results from two experts on the paper assessment instrument

No	ASPECT	Validator 1	Score		Conc.
			Validator 2	Average	
I					
Guidance					
1	The instructions are clearly stated	4	4	4	V
2	Instructions are easy to understand	5	4	4.5	V
	Average	4.5	4	4.25	V
II					
Assessment Quality					
1	Can validate the paper	4	4	4	V
2	Can be used repeatedly with the same results	4	4		V
3	Can be used practically	4	4	4	V
4	Easy to use	4	4	4	V
5	Contains all aspects in making a paper	4	4	4	V
6	Can give certainty of value	4	4	4	V
	Average	4	4	4	V
III					
Language					
1	Using language in accordance with Indonesian rules	4	4	4	V
2	statements formulated communicatively	4	4	4	V
3	Using simple language, easy to understand and not double meaning	4	5	4.5	V
	Average	4	4.3	4.15	V

GENERAL EVALUATED

- 1 Can be used without revision
- 2 Can be used with minor revisions
- 3 Can be used with major revisions
- 4 Can not be used

Note: V = valid

From Table 1 it can be concluded that of the three aspects (guidance, quality assessment, and language) assessment instruments have been fulfilled because all are in valid categories. Nevertheless there are some suggestions given by the validator to improve the paper assessment instrument, namely: rubric usage instructions are clarified, add a place for suggestions on the assessment sheet, the score sheet is given a score so that enough tick and do not need to write a score. After improvements were made in accordance with the recommendations of the two validators, the paper assessment instrument and the percentage assessment instrument were then given to 23 students to obtain their opinions about the instrument. The results of student opinions can be seen in Table 2.

Table 2. Student Opinions on Assessment Instruments

No	ASPECT	Number of students with a score					Average Score
		1	2	3	4	5	
I GUIDANCE							
1	The instructions are clearly stated	0	0	4	13	6	4.01
2	Instructions are easy to understand	0	0	2	16	5	4.13
II ASSESSMENT QUALITY							
1	Can validate the paper	0	0	3	17	3	4.00
2	Can be used repeatedly with the same results	0	0	5	15	3	3.91
3	Can be used practically	0	0	3	16	4	4.30
4	Easy to use	0	0	3	14	6	4.13
5	Contains all aspects in making a paper	0	0	0	16	7	4.30
6	Can give certainty of value	0	0	2	16	5	4.13
III LANGUAGE ASPECTS							
1	Using language in accordance with Indonesian rules	0	0	2	13	8	4.26
2	statements formulated communicatively	0	0	3	12	8	4.22
3	Using simple language, easy to understand and not double meaning	0	0	1	11	11	4.43

The results of conformity testing (Table 3) results for the use the instrument assessment to a same paper obtained $r = 0.893$ with a very high category. These results indicate that even though it is used by two different people, the level of conformity is high. This assessment instrument can be used with results that are not different between two assessors.

Table 3. Conformity Tests of Two Lectures

		Lecturer 1	Lecturer 2
validator1	Pearson Correlation	1	.893
	Sig. (2-tailed)		.000
	N	11	11
validator2	Pearson Correlation	.893	1
	Sig. (2-tailed)	.000	
	N	11	11

4. Conclusion

From the test it can be concluded that: paper assessment instruments have been valid based on the opinions of two expert validators. The assessment instruments are practically based on student opinions. The results of the conformity test of the assessment of two lecturers to a paper using the assessment instrument that developed shows that conformity with the category is very suitable

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