

THE DEVELOPMENT OF AUTHENTIC ASSESSMENT RUBRIC FOR ASSESSING UNDERGRADUATE STUDENTS' LEARNING AND PERFORMANCE

Anna Fitri Hindriana

Department of Biological Education, Postgraduate Studies, Universitas Kuningan, Indonesia
Email: anna@uniku.ac.id

Ina Setiawati

Department of Biological Education, Postgraduate Studies, Universitas Kuningan, Indonesia

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Abstract: Learning achievement that is currently being assessed, generally focusing only on cognitive domain, this is surely contradicted to the term of assessment that should be done in accordance with learning achievement stated in curriculum. Authentic assessment needs right instrument to assess learning achievement. One of the instruments needed is assessment rubric. The rubric that has been used does not have the same standard, which is not accordance with the principals of assessment. Based on that study, the assessment rubric is developed, consisting four components; job description, scale, dimension, and dimension description. The data was descriptively analyzed. Analysis of suitability of developed rubric was empirically tested to 98 students. The result showed validity of rubric using factor analysis is between 0.29 – 0.96, the reliability judgement using Cronbach alfa coefficient is 0.85 for argumentation skill and presentation skill, and 0.86 for problem solving skill and journal analysis.

Keywords: *authentic; rubric; validity; reliability.*

INTRODUCTION

Learning achievement generally is focused only on cognitive domain, and knowledge dimension. The lecturers still have limitation in measuring procedural and metacognitive knowledge dimension. This is because the authentic assessment rubric is needed to assess procedural and metacognitive dimension.

The same thing goes in assessing attitude and skill, the ones that is assessing is while the process of achieving the result still often being neglected. This certainly is contradictory with the assessment that supposed to be done by lecturers where the characteristics of assesment based on Stiggins (1994) goes along with the teaching process, stressing on assessing learning process and result, the lecturers should take students' side in developing potention on knowledge aspects, attitude, and skill, and related to learning achievement that is stated in curriculum.

Nowadays, there is a tendency of people to think that assessment that is done on students suppose to be able to give holistics information about the students. When a students is said to be successful in his learning achievement, then the achievement is supposed to be measured by a measurement that is accordance with the objective or competence that need to be achieved. On the other hand, the information collected from assesment should be comprehensive and has been done in everytime during and after the students learn.

This means the measurement should be done along with the learning process done by students. This is supported by Government regulation that University should publish a letter of supporting certificate besides academic transkript at the graduation. Based on Permendikbud No. 81 Year 2014, SKPI is a document which contains information about

academic achievement or basic qualification of titling high education graduation. It is also used as 'students track record'. Thus, all activities in learning and teaching process can be described by using SKPI.

The track record that describes students' competencies is defined as product, skill, and attitude that are reflected in daily life. The product covers a set of facts, concepts, theory, law, principal and procedure. Skill covers thinking skill, psikomotor skill, social skill (interpersonal skill), process skill (experiment skill, and teaching strategy), and also life-learner skill and life skill. Attitude covers good nature, ethics, and faith to God Almighty. The said learning objective that will be achieved by students is in accordance with universal learning objective by UNESCO that is "Learning to be, learning to know, learning to do, and learning to live together".

Assessment method in quite a long time has been dominated by one test model that is paper and pencil test, which measures student cognitive skill on factual information or basic process skill. Nowadays the demand in developing active role of students in learning has been rapidly developed, It covers the extent of material and the integrated learning objective, for example when the lecturer teach on material that is actually a foundation to solve problem. The Objectives are also covering speaking skill, writing skill, reading skill, critical thinking skill, reasoning skill, and as far as possible related to real world.

METHOD

This study develops authentic assessment rubric for assessing undergraduate students' learning and performance that has been done at Biology Education Study Program, FKIP in Private University in Kuningan with good accreditation rate. The subjects of this study were 97 students in Semester III and V during academic year of 2016-2017. This study used research method and Educational Development (Borg & Gall, 2003) with these following stages:

Stage 1: Introduction study

Literature study

Literature study involves studying former researches that have relevancy with

development of authentic assessment rubric. Since the basic of development of authentic assessment rubric process needs a strategy that can facilitate students in developing their potential according their decided learning objective. In other the other hand, it is important to study about the pattern of development of authentic assessment rubric, because in assessing students' performance and learning achievement it is needed to gather information as much and as accurate as possible so the lecturer can be responsible about the decision they make related to students' performance and learning achievement.

Field study

Field study is a study activity that is descriptive, that aims to gather information related to the application of authentic assessment in a study program, the hardship from lecturer in doing authentic assessment, the result of authentic assessment rubric they had been done by lecturers, and the result of students' performance and learning achievement assessed by lecturers.

Stage 2: Designing

Designing authentic assessment rubric for assessing undergraduate students' learning and performance

Based on the analysis on gathered information, the researchers designed the authentic assessment rubric. On the preparation stage of designing authentic assessment rubric, the research started it by deciding the aims, and components needed to be in the rubric, that is actually developed from the previous pre-study. The components in authentic assessment design that are being developed including: 1) making requirement on how the authentic assessment rubric can be designed; 2) deciding on authentic assessment that can develop students' potential in hard skill and soft skill; 3) making indicator of the development of authentic assessment rubric that needed in cognitive, psychomotor, and affective domain; 4) deciding strategy of development of authentic assessment rubric on its application in the class.

Validation on the authentic assessment rubric design was done by expert judgement and practitioners. The validation studied about the

compatibility of job description, scale, dimension, and description of the dimensions for assessing students' performance in cognitive, psychomotor, and affective domain. Furthermore, the validation includes the use of good Indonesian language, the terms, the clarity, and the right way of the used language.

Making research instrument

Research instrument was made to evaluate effectivity of the developed rubric. The instruments cover the Likert scale questionnaire to gather information from lectures in implementing the developed rubric, observation to test the effectivity of developed rubric, and students' respond questionnaire to gather information about students' respond of the developed rubric. Before the research instrument is used, the instrument was first being validated by expertise. The study for Semester II is divided into two stages:

Stage 3: Development

The development stage is a validation stage in the field on the authentic assessment rubric and the research instrument. Validation was done three times: Trial I, validation was done to analyse rubric accuracy in assessing performance and learning achievement of the students. The Students' performance and

learning achievement involved were the performance in learning process that possibly develops students' potential in cognitive, psychomotor, and affective domain. Trial II, validation was done to analyse the effectivity of authentic assessment rubric in training students' hard skill and soft skill based on outcome number 6 on KKN Curriculum.

Stage 4: Implementation

Implementation program was done through survey and observation in class that implementing student centred learning. The implementation was begun by implementing authentic assessment rubric then analysing the ongoing assessment on students, and doing research in time series to observe the development of students' potential along with the use of authentic assessment rubric. The aim of using this design is to test the developed rubric validity conceptual rubric that was empirically obtained.

RESULTS AND DISCUSSION

Validity and reliability of argumentation and presentation skill rubric

Validity test using KMO and Bartlett's test and Pearson correlation is described below:

Table 1. Result of validity test onthe rubric using KMO and Bartlett's test

	Component	
	1	2
AR	.936	.178
PS	.879	-.281
PJ	.857	-.010
PB	.831	-.108
PJP	.858	.209
PM	.685	.579
PD	-.522	.762

Based on Table 1, by analyzing the matrix component it shows that the whole items involving AR, PS, PJ, PB, PJP, PM and

PD have big loading factor which is above 0.50. Thus, it can be proven that the 5 items are valid.

Table 2. Result of validity test of component matrix using Pearson correlation

Indicator	Component	
	1	2
AR	.936	.178
PS	.879	-.281
PJ	.857	-.010
PB	.831	-.108
PJP	.858	.209
PM	.685	.579
PD	-.522	.762

Based on Table 2, the result of factor analysis on variable in argumentation and presentation skill rubric obtaining loading factor value and each indicator in the table on component Matrix column 1 shows that the value of loading factor > 0.5, thus it can be concluded that AR, PS, PJ, PB, PJP, and PM are the valid indicators on presentation skill variable, beside the PD factor that is stated as not valid.

Reliability test on the argumentation and presentation skill rubric is developed using Cronbach alpha: reliability is stated as adequate when the coefficient of *alpha Cronbach* is greater than or equal to 0.70. Meanwhile the result of the test shows that the coefficient of alpha Cronbach is 0.853. Thus, it can be concluded that the variable of argumentation and presentation skill are stated as valid.

Table 3. Reliability of argumentation and presentation skill

cronbach's alpha	n of items
.853	7

Validity and reliability of problem solving and journal analysis skill rubric

Validity test using MKO and Bartlett's test and Pearson correlation is described in Table 4. As it can be seen in Table 4, by analysing the component matrix, item of validity

involving IM, KT, AM, and HP have big loading factor which are above 0.50. Thus, it can be proven that four items are valid, while KMM has low validity which is 0.293 (0.293 < 0.50).

Table 4. Result of validity test onthe rubric using KMO and Bartlett's test

	Component	
	1	2
IM	.962	-.195
KT	.962	-.195
AM	.964	-.073
HP	.871	.195
KMM	.293	.942

Table 5. Result of validity test of component matrix using Pearson correlation

Indicator	Component	
	1	2
IM	.965	-.192
KT	.965	-.192
AM	.965	-.051
HP	.870	.247
KMM	.213	.962

Based on Table 5 the output of factor analysis above on variable in data 2, it is obtained the loading factor value and each indicator in the table on component matrix in column 1 shows loading factor > 0.5. Thus it can be concluded that IM, KT, AM, and HP

are the indicators in variable data 2 that stated as valid. While KKM is stated as less valid.

Reliability test on developed problem solving and journal analysis skill rubric using *Cronbach's Alpha* is described as below:

Table 6. Reliability of problem solving and journal analysis skill

cronbach's alpha	n of items
.856	5

Reliability is stated as adequate when the coefficient of alpha Cronbach is greater than or equal to 0.70. Meanwhile the result of the

test shows that the coefficient of alpha Cronbach is 0.856. Thus, it can be concluded that the variable of problem solving and

journal analysis skill in this rubric are stated as valid.

Assessing learning process is like two faced- coin that cannot be separated from each other, the learning process is said as well-running when students can be appreciated based on their performance. The implementation of authentic assessment in class has consequences to develop assessment rubric, this is related with authentic assessment principal which is stated that performance assessment is a test involves actual demonstration of knowledge and skill in real life (Feuer & Fulton, 1992; Hambleton, 1996; in Slavin, 2000). Based on Arends (2001) performance assessment is a test that demands the students to demonstrate their performance on specific task, for example: writing essay, doing experiment, solving problem, etc. Meanwhile Depdiknas (2000) authentic assessment is a test used for practical activity related to certain competence, for example laboratory practicum. Based on Stiggins (1994), authentic assessment involves students in activities to show certain skills or create specific product. Fuchs (Viyanti, 2009) moreover stated that performance assessment could rectify learning process, because performance assessment helps educators to make decisions based on going learning process.

Based on the statement above, it is clear that students' performance must be in accordance with the assessment. Because of that, developing the rubric could improve learning process. The rubric is used to comprehensively assess the quality of students' performance. The rubric also enables students to assess their own performance, in self-assessment session, after finishing some products or doing some performances by referred assessment tool. Students can decide on how their performances are scored in quality continuum.

The developed rubric in this study consists of rubric for presentation skill, argumentation skill, problem solving skill, and journal analysis skill. These four skills are needed to improve 1) High order thinking skill, 2) material organizing skill to make logic representation, 3) Reasoning skill, 4)

Presentation skill, 5) Cooperation skill, 6) specific knowledge skill, 6) Attitude.

Rubric of presentation skill consists of five dimensions; knowledge, way of thinking, communication, use of media, and attitude when doing presentation. The measurement of knowledge dimension aims to analyse students' concept mastery and relate it with facts and data that they had contextually gathered, thus knowledge dimension can measure high order thinking skill and reasoning skill because students need to elaborate their knowledge with facts and data and making conclusion. Elaboration skill is one of the aspects in critical thinking that stated by Norris Ennis (Fahim & Eslamdoost, 2004).

The second dimension is way of thinking that aims to analyse students' argumentation and theory that support the argument. Way of thinking dimension can measure students' high order thinking skill and way of organizing material into logic representation. This is because by way of thinking, the lecturer can analyse on how students' express their arguments in which argumentation needs decision making skill that comes from alignment of information they have gathered and support it with theory that they have learned or are learning. Decision making is one of dimension from high order thinking skill (Ahmed & Omotunde 2012). Besides, students must arrange their verbal argument so it is systematic and easy to understand to make it logically acceptable.

The third dimension is communication skill that aims to analyse on how students delivering their ideas, this communication skill can measure presentation skill, cooperation skill, and specific knowledge skill. This is because when students communicate, we can analyse how they present their result and deliver their ideas with supporting theory, fact, and data so it produces an idea that is acceptable and gives accurate information for other students. Communication skill also can show cooperation skill, because when they communicate it can be seen on how they interact with the group and express idea and opinion with respect to their group mates' knowledge and feeling.

The fourth dimension is the use of media, this dimension can show students' skill in organizing material into logic representation. When using media, students are needed to express their ideas with varied representations that can be understood by other students. The use of media demands students to translate verbal representation into pictorial, graphical, and audio-visual representation.

The fifth dimension is presentation skill that shows students' skill in improving their attitude. Dimension of presentation can facilitate lecturer to assess how students deliver their ideas in clear and loud voice so it can be well heard, right intonation, with eye contact, and interesting gesture to attract attention. The attitude is needed to train students to do presentation in class when they become teacher in the future.

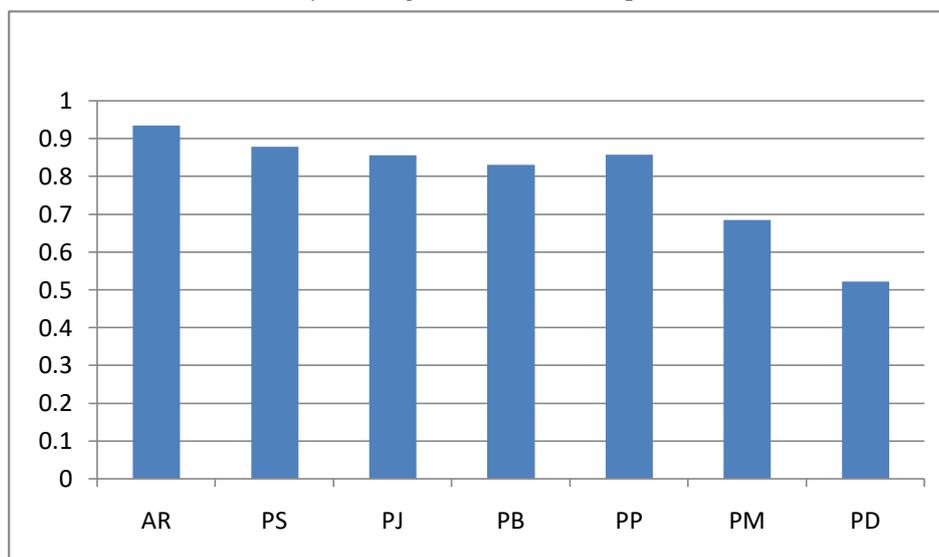
The rubric that is being developed in this study was empirically and theoretically validated. Theoretic validation was done by two lecturers from biology education, while the empiric validation was based on test on biology education students in fifth semester. The result of theoretic validation shows that the rubric is adequate to be used for assessing students' performance and also precisely and accurately discriminating students' skill. Thus, the rubric was accordance with the statement

from Allen (2011), Kaba and Sengil (2016), Furze, J, *et al.* (2015) that a good rubric can make assessing process easier and faster and produce assessing result that is more accurate, unbiased, and consistent. These impression were perceived by the lecturers that used the rubric, because students can do on going self-assessment and measure their own skill by setting eyes on the scale they achieved, on the other hand students can compare their own skill with their peers.

The result of empiric validation covers the result of construct validity analyzation from the developed instrument which shows the loading factor out of 12 indicators, 11 indicators have correlation coefficient > 0.3 means that 11 indicators from the developed rubric have high validity. The reliability test of instrument that was measured using *alpha Cronbach* shows reliability > 0.5 means that the whole developed instrument has high reliability value.

Validation of argumentation skill shows high validity means that four argumentation dimension are adequate to measure students' skill when delivering opinion with supporting facts, data, and theory to strengthen their argument. Meanwhile, validation of presentation skill has five aspects highly valid and one aspect invalid.

Table 7. *Validity on argumentation and presentation skill*

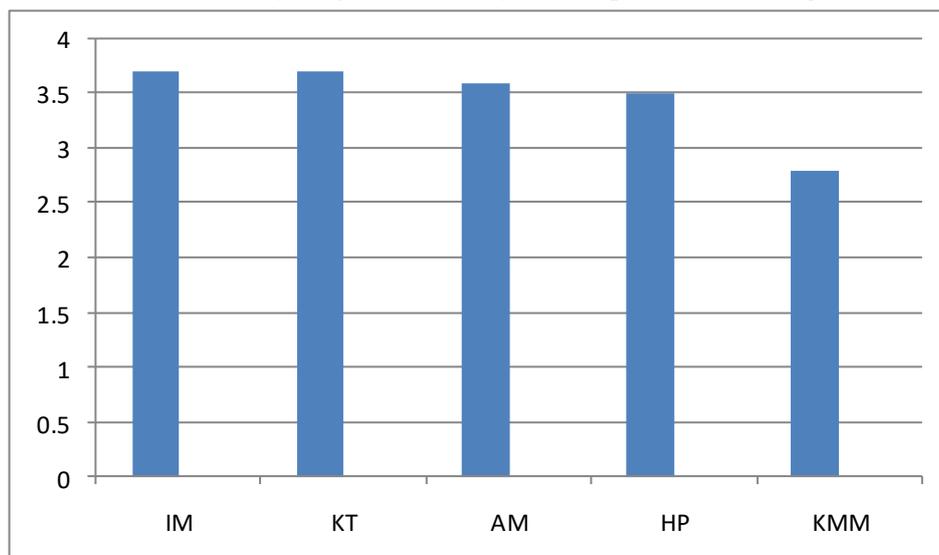


Based on table 7, the validity of argumentation (AR) shows the highest validity meanwhile out of six dimensions for presentation skill show high validity except one dimension which is presentation time (PD) that valued smaller than 0.5 and stated as low validity. This is caused by the good time management by all students during presentation with decided time allocation.

The reliability for argumentation and presentation skill shows high validity with value 0.853, this means the rubric for argumentation and presentation skill has high constancy. Validity of problem solving skill has high validity value, means the four

dimensions that have been decided prior are able to measure high order thinking skill. High order thinking skill in this study is started by how students understand a problem from material that they learn, henceforth they identify the problem through proof finding in form of facts and data and relate them with theory that they discuss. The next step is making alternative solution in solving problem and choosing the alternative solution based on the chance to implement the strategy from solution and also to have the lowest risk to gain new problem. Meanwhile, validity of journal analysis skill has high validity which can be seen on the following table.

Table 8. *Validity on journal analysis and problem solving skill*



The validity of journal analysis skill consists of four dimensions, which are problem identification (IM), basic theory (KT), method analysis (AM), and result from the research (HP), and all of dimension were stated as valid means each of the four dimension supports journal analysis skill. Students are able to analyse the result from research or finding when they are able to do identify a problem, study the relevance theory and analyse a method from one research journal. This statement is in accordance with statement from Hindriana (2016) who stated that complex thinking is a thinking pattern that constructed based on the result of assimilation and accommodation so that it can achieve balance and in the end constructs stabile

cognitive structure. The reliability test for journal analysis and problem solving skill shows high reliability with value of 0.856, this means the rubric of journal analysis and problem solving skill has high constancy.

CONCLUSION

Based on the study, the assessment rubric is developed, consisting four components; job description, scale, dimension, and dimension description. The data was descriptively analyzed. Analysis of suitability of developed rubric was empirically tested to 98 students. Finally, the result showed validity of rubric using factor analysis is between 0.29 – 0.96, the reliability judgement using Cronbach alfa coefficient is 0.85 for argumentation skill and presentation skill, and 0.86 for problem solving skill and journal analysis.

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