USERS' RESPONSES OF THE AUTHENTIC ASSESSMENT INSTRUMENT DEVELOPED TO ASSESS PROBLEM-SOLVING SKILLS OF PROSPECTIVE BIOLOGY TEACHERS IN FIELD PRACTICE ACTIVITIES

YUSUF IBRAHIM, CARTONO, CITA TRESNAWATI, & NIA NURDIANI

Biology Education Study Program,
Faculty of Teacher Training and Educational Sciences,
Pasundan University
e-mail: yusuf_ibrahim63@yahoo.com

Abstract

This study is the final stage of study designed by using the method of Educational Research and Development (R & D) to generate a tested authentic assessment instrument model so thatit can be used to assess problem-solving skills of prospective biology teachers in field practice activities. The assessment instruments, that have been developed and tested on limited audiences in the earlier study stage, have very high validity and reliability for measuring learning outcomes in the cognitive domains (0.877 and 0.949), have high validity and reliability in assessing observing skills (0.776 and 0.866), communication skills (0.665 and 0.581), developing proposals (0.854 and 0.884) and collecting specimens (0.676 and 0.400), but only until sufficient and medium categories for the skill measurement of taking notes of process (0.607 and 0.153), and making report of the result of field practice (0.607 and 0.153). The instruments also have sufficient validity (0.589) and high reliability (0.75) for the measurement of scientific attitude. At the final stage of this study, the instrument was then used by the 10 supervisors to assess the field practice activities involving 120 students of prospective biology teachers from a private university in Bandung, Indonesia. Each supervisor assessed footages of 5 students. The result of the study shows that the supervisors who are the assessment instrument users give good responses evenly ($\overline{X}$ = 3,58 ± 0,12) on questions with following indicators: The result shows that the supervisors who are the assessment instrument users give good responses evenly (x = 3.58 ± 0.12) to questions with following indicators: the suitability of the instruments with the needs in the field, the suitability of the instruments with their columns, instrument effectiveness in the assessment, as well as ease of use of the instrument. The participating students of field practice who are assessed state that in-advance explanation about techniques and aspects of the assessment before the implementation of the field practice can encourage them to conduct the field practice much better, in order to obtain higher learning outcomes.Making improvements and conducting further tests on the authentic assessment instrument developed in this study are suggested so that the instrument can become a measuring tool of learning outcome which has higher reliability and validity.

Keywords*:* authentic assessment, problem-solving skill, integrated field practice, prospective biology teachers

1. Introduction

The study is the final stage of three series of studies about the development of authentic assessment instrument model in assessing problem-solving skills in field practice activities. The study was conducted as an answer of the lack of the

standard and tested authentic assessment model which has been an obstacle of the implementation of science learningwhich is scientific-inquiry oriented and centered on students' activities. By far, teachers or lecturers tend to conduct science learning theoretically presented in clasrooms by using methods which do not really provide experiences for students to practice thinking and problem-solving skills, supported by the lack of assessment in assessing students' learning activities, so that inquiry-oriented science learning seems to be meaningless.

Science learning (including biology) is generally aimed at explaining natural phenomena. Therefore, students who learn science need to do direct observation which will encourage them to always want to know further about whatever happens in nature.One of effective activities in conducting observations directly is field practice. In this activity, students are encouraged to think and solve problems they deal with in the field.

As in general learning process, students' achievements and acquisitions of learning they do need continuous assessments so improvements can be done that learning objectives can be achieved as expected. Representative assessment tools which can assess problem-solving skills accurately are needed in this assessment process. The presence of accurate authentic assessment which is done along field practice is expected to identify students' individual profiles in solving problems. In time, improvements for stundents whose assessments are in low category can be done immediately so that personalities of students—who have high problem-solving skills and are ready to face real challenges in the execution of their duties in the future-- are expected to appear at the end of the study.

2. Theoretical Background

Field practice is defined as a trip designed by a school and implemented for educational aims. Students go somewhere so that the subject matters can be observed and examined directly in the settings according to their own functions. Field practicesare done based on these following reasons: a) to obtain direct experience; b) to stimulate interest and motivation toward science; c) to give meaning to learning; d) to enhance the skills of observation and perception of the

participants; e) to affect social development personally (Patrick, 2010).There are many things that students can gain through a field practice if the activity is managed effectively. The chance of direct learning in that field can improve students' problem-solving and crtical thinking skills. In addition, field practices can help students understand concepts and develop researching skills on the level that cannot be achieved through the combination of lectures and laboratorium activities.

Field practice has been an important part of learning in long history of education. Field practice is aimed at improving thinking skills, interest and suceess rates of science education. Field practice gives a chance to students to gain concrete experiences through: a) a transition of learning stage from a simple concept to a complex concept; b) a direct experience with real phenomena and matters; and c)the occurrence of hands-on activities to construct and reinforce abstract concepts (Tal, 2004).

Field practice needs a unique assessment, because assessments with conventional approach are hard to implement. Powell *et al.* (2010) describes several ways of effective and fair assessments of field practice, namely students' journals, field-based quizzes, and level of participation. Lei (2010) proposes several assessments to assess students' learning and acquisition in the field in the form of formal assessments which include presence, participation, learning journal or reflective, field practice, portfolio, research report, research project, oral presentation and poster, self assessment, and peer assessment. Those assessment methods are likely to lead to general skills assessment that someone must own, while the literature regarding the assessment that assesses problem-solving skills is still rare.This becomes a stimulant of the realization of the authentic assessment instrument model in assessing problem-solving skills in field practice activities which are done in this study series.

Needs analysis had been done in the first stage of the study through interviews with 30 students participating a field practice and 5 supervisors. The result shows that the field practice activities have not had any authentic assessment process yet due to limited number of assessors and the lack of of relevant and

flexible standard instruments.Based on the needs analysis, model design and authentic assessment instrument were developed which then were validated through experts' judgemenents and trials on limited audiences.

In the second stage of the study, instrument implementation had been done and it was meant to assess a field practice attended by 30 students of prospective biology teachers from a private university in Bandung. The result shows that authentic assessment in integrated field practice activities is able to measure directly knowledge, skills, and scientific attitude of the practicing students at a time. The advanced explanation about techniques and assessment aspects before the field practice may encourage the students to do the field practive better, so that the learning result will be higher. Authentic assessment instruments developed in this study has very high validity and reliability to assess the learning result in congnitive field (0.877 and 0.949), high in assessing observing skills (0.776 dan 0.866), communicating (0.665 dan 0.581), arranging proposals (0.854 dan 0.884)and collecting specimen (0.676 dan 0.400), but it is sufficient and medium for skills of note-taking (0.607 and 0.153) and compiling the result of field practice (0.607 dan 0,153).

The result shows that authentic assessment in integrated field practice activities is able to measure directly knowledge, skills, and scientific attitude of the practicing students at a time. The advanced explanation about techniques and assessment aspects before the field practice may encourage the students to do the field practive better, so that the learning result will be higher. Authentic assessment instruments developed in this study has very high validity and reliability to assess the learning result in congnitive field (0.877 and 0.949), high in assessing observing skills (0.776 dan 0.866), communicating (0.665 dan 0.581), arranging proposals (0.854 dan 0.884)and collecting specimen (0.676 dan 0.400), but it is sufficient and medium for skills of note-taking (0.607 and 0.153) and compiling the result of field practice (0.607 dan 0,153). These instruments also has sufficient validity (0.589) and high reliability (0.75) for the measurement of scientific attitude of the practicing students.

The core activity of the study conducted in this third stage is the implementation of the use of the instruments in the assessment of field practice activities based on problem-solving skills of students/prospective biology teachers on wider audiences, in attempt togain responses of field practice supervisors as the users and the students of prospective biology teachers as the subjects of the study. Moreover, it is expected to obtain an overview of learning process and students' acquisition in the field, while provide learning for students/prospective biology teachers about assessment model development for field practice activites, so that they have someday have sufficient knowledge in the execution of their duties.

3. Method

This study was conducted with Educational Research and Development (R & D) which is modified based on the needs. Gall et al. (2003) saw Educational R & D as a process used to develop and validate product in education field. Sugiyono (2012) stated that products produced through Educational R & D hopefully can increase the productivity of education. This study was conducted to produce a product in the form of authentic assesment model that is valid and reliable to score the problem solving skill of students/prospective biology teachers in field practice.

On its process, this study was designed to be conducted in three grand steps, which are Plan, Development, and Dissemination. Each step is done in effectiveconsecutive years during three years. The Plan step which generates Authentic Assessment Instrument and Model to Score Problem Solving Skill in Field Practice has been done in the first year (2014/2015). The Development step has also been done in the second year (2015/2016) by implementing instrument aimed to score the field practice activity of 30 students/prospective biology teachersfrom a private university in Bandung that generates the category of validity level and instrument reliability in scoring the students' skill in cognitive field and their scientific attitude.

In this third step of the study, the researcher applied the use of authentic assessment instrument which is the result of the development of second step/year

research in a wider circle, which is in the field practice programmed in the curriculum of Biology Education Study Program in a private LPTK in Bandung. This third step was done with the aim of testing the effectivity, and detecting the important roles of authentic assessment instrument as a result of this study's development in scoring the process and the result of students in their field practice. Besides, in this third step of research, the researcher compiled the views of lecturers who supervise the field practice toward the aspects of the suitability of instrument with the needs in field, the suitability of instrument with its rubric, the effectivity of instrument in scoring, and its easiness for the users, gathered from the implementation of the instrument. The view of students who are the field practice's participants as a subject scored by the instrument is also compiled to support the conviction of the scoring effectivity toward the increase of studying result.

Field practice which became the mode of this research is a field practice activity integrating invertebrata zoology field discussion, animal ecology, cryptogamae botany, and phanerogamae botany, and was done in Karapyak Beach, Pangandaran. The participants of the field practice consist of 120 students/prospective biology teachers, and involve 10 supervising lecturers. Authentic assessment instrument which is the result of this research development is used by supervising lecturers in scoring cognitive aspect, skill, portofolio, and students' affective during the field practice.

The variables measured in this third step/third year consist of: 1) The scoring of the activity of students' field practice with authentic assessment instrument as a result of development, 2). Lecturers' response/views in using authentic assessment guidance, 3). Students' response/views toward authentic assessment application.

4. Result and Discussion

4.1 The Scoring of Field Practice with Authentic Assessment Instrument

The data of cognitive field scoring of field practice students with authentic assessment instrument that has been developed is displayed in a form of graphic in Picture 4.1 below:

Picture 4.1 Graphic of the scoring result of biology-teacher-to-be students's field practice with authentic assessment instrument as development result.

Based on the compiled data, it can be seen that 10 supervising lecturers can do the scoring process and students' studying result in the field practice activity by using authentic assessment instrument developed in this study. The result shows that the field practice participants can conduct their field practice with very good criteria.

4.2 Response of Field Practice Supervising Lecturers in Using Authentic Assessment Instrument

Generally, response given by field practice supervising lecturers towards the usage of developed authentic assessment in this study include instrument's suitability with fields' needs, instrument's conformity with its rubric, instrument's effectiveness in assessment, and its ease of use. Those aspects are explained in indicators that also become questions and statements in provided response questionnaire. The answers of those questions are converted to scores which categories are listed in the questionnaire. Besides, respondents are also asked for their reactions in the form of description.

Table 4.1. General Score and Responses of General Practice Supervising Lecturer as Users of Study Developed Authentic Assessment Instrument

No	Question/Statement	Score Mean	Criteria	General Responses
1	Authentic assessment instrument suitability with field requirement	3.5 ± 0,53	Good	Suitable with integrated field practice activity
2	Instrument suitability with field requirement	1.8 ± 0,42	Very good	The point regarding instrument has shown integration in field practice activity so that this authentic

				assessment instrument could be used as guidance in assessing integrated field course
3	Instrument suitability in cognitive field with assessment rubric	3.5 ± 0,53	Good	Assessment instrument is more flexible in following development in practice, the item is too general
4	Cognitive field assessment result after using authentic assessment instrument	3.6 ± 0,52	Very good	Very good
5	Suitability of creativity instrument with assessment rubric	3.5 ± 0,53	Very good	Suitable with requirements in field
6	Result of assessment in creativity/psychomotor field after using authentic assessment instrument	3.6 ± 0,52	Very good	In attachment
7	Suitability of portfolio instrument with assessment rubric	3.7 ± 0,48	Very good	Suitable with requirements in field
8	Portfolio assessment result after using authentic assessment instrument	3.5 ± 0,53	Good	In attachment
9	Suitability of affective instrument with assessment rubric	3.6 ± 0,52	Very good	Suitable with expected attitude that has to be developed
10	Result of affective assessment after using authentic assessment instrument	3.4 ± 0,67	Good	In attachment
11	Effectiveness of authentic instrument in assessing integrated field practice	3.7 ± 0,48	Very good	Effective in assessing integrated field practice
Average score		3,57 ± 021	Good	

Field practice activity is purposed to train students to think and solve problems found in field based on knowledge they gain in classes. Like any other learning process in general, student's achievement and gain of what they have learned need sustainable assessment in order to improve it so that learning goals can be achieved according to expectation. In this assessment process, representative assessment instrument that is able to assess problem solving creativity accurately is needed.

The observation in the study shown that all respondents who consist of 10 field practice supervising lecturers responds positively to the authentic assessment instrument developed in this study with their willingness to use it as assessing instrument for students' learning process and result during field practice activity. It

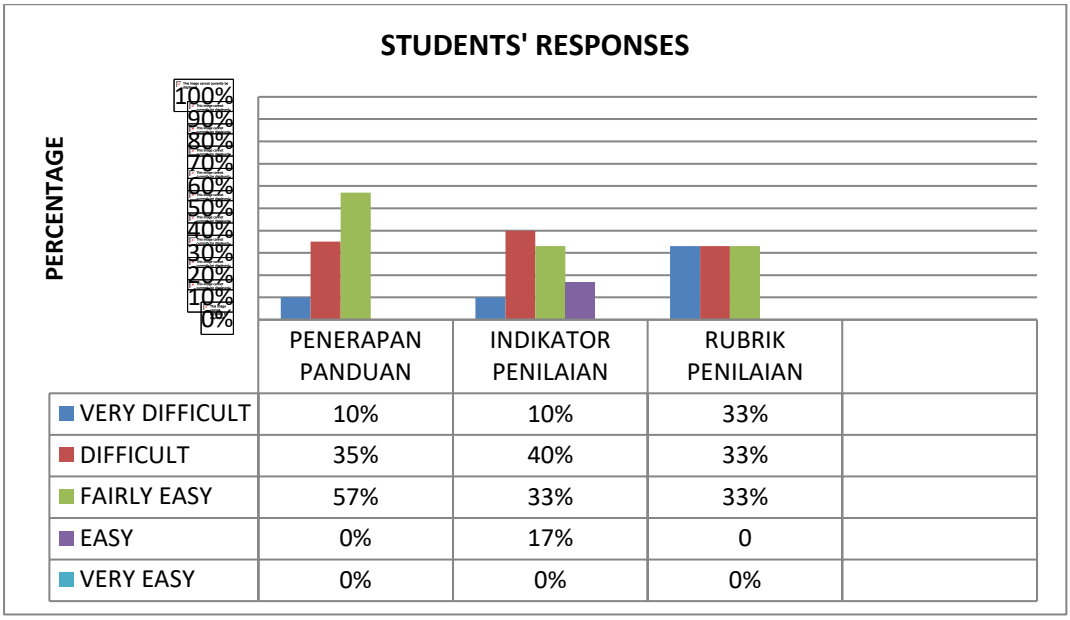
could be understood since as explained in previous chapter, based on direct observation in field and interview to practice lecturers and students in previous field practice activity, there was no standardized authentic assessment instrument in the field practice activity, neither in the process nor in the resulted product. Therefore, the value of usefulness of authentic assessment instrument developed in this study is obviously measurable through responses given by field practice supervising lecturers who used this instrument. Respondents also stated that the existence of this instrument make it easier for lecturers to assess students' field practice creativity authentically and objectively, so it is easier to determine further supervising action to be taken.

Generally, practice supervising lecturer respondents as users of this instrument gave good responses toward the contents available in the instrument as indicators which include instrument's suitability aspects with the requirements in the field, instrument's suitability with its rubric, its effectiveness in assessing, as well as its easiness of use (responses' average score of 3,57 ± 021). Respondents stated that this instrument is very suitable with field requirement (average score of 3,8 ± 0,42; criteria: very good). Description of general response shown that instrument problem points has shown integration with field practice activity so that this instrument could be used as guide to assess, even to direct integrated field practice performance. It corresponds to Mueller's (2008, in Abidin, 2012) statement which said that authentic assessment instrument which includes learning process and result components which needs to be assessed at once can be used as direction guide for learning process to achieve the goals. In a learning process, authentic assessment measures, monitors, and assesses all learning result aspects (included in cognitive, affective, and psychomotor domain), whether they are visible as the final result of a learning process, or as changes and developments of activity, and learning gain during learning process. This statement became the base in designing and developing authentic assessment instrument in this research. Developed authentic assessment instrument are purposed to be able to measure students' competency in the term of knowledge, creativity, and attitude during the field

practice activity. Assessing their knowledge is purposed to see their creativity in solving problems found during integrated field practice, with assessment aspects that include problem identification ability, problem formulation ability, solution designing ability, hypothesis creating ability, information-gaining ability, information associating ability, and conclusion making ability. Assessing their creativity is designed to be done through work-show with assessment aspects that include science process and portfolio with products in form of proposal, notes in field practice activity process, field practice result report, and collection of specimens resulted from field practice. Assessing their attitude is designed to assess students' scientific attitude during field practice activity which includes curiosity, inventive, critical thinking, stance firmness, realizing the limitations, appreciation evidences, sincerity, objectiveness, willingness to change their opinions, open-minded, willingness to co-working, as well as willingness and ability to ask questions.

4.3 Students' Responses toward the Implementation of Authentic Assessment

Questions in the questionnaire used to draw responses/ feedback of the students participating in the field practice toward the implementation of authentic assessment instruments in the integrated field practice are summarized in three statements about the implemementation of authentic assessment instruments, assessment indicators rubrics whose answers are compiled in categories of very difficult, difficult, fairly easy, and very easy. The percentage of answers of the questions are as shown on the following graphic in Figure 4.2.



	PENERAPAN PANDUAN	INDIKATOR PENILAIAN	RUBRIK PENILAIAN	
VERY DIFFICULT	10%	10%	33%	
DIFFICULT	35%	40%	33%	
FAIRLY EASY	57%	33%	33%	
EASY	0%	17%	0	
VERY EASY	0%	0%	0%	

Figure 4.2 The percentage of student responses to the questions in the authentic assessment instruments which is the development results of the study

Based on the graphic in Figure 4.2, 57% of students/field practice participants state that questions or statements in authentic assessment intruments developed in this study are quiet easy to apply, though 40% of the students state that it is difficult to fulfill the assessment indicators, while each 33% of the students state that it is very difficult, difficult, and fairly east to apply the assessment rubrics. However, the result of structured interview with open answers shows students' reseponses which propose their opinios about the assessment aspects and indicators measured during field practice activities toward the improvement of the quality of their knowledge, performance and scientific attitude. After receiving socialization about the assessment aspects and indicators as mentioned in the assessment instruments before the implementation of field practice, students are challenged to show their best performance. They want to explore the knowledge by themselves and want to show their scientific attitude more during the practice field activities.

5. Conclusion and Suggestions

Based on the results of the third stage/year of the study, it can be conluded as follows.

1) The implementation of authentic assessment developed in the study is able to assess and record students/prospective biology teachers' profiles in solving problem in integrated field practices.
2) The existence of authentic assessment instruments of the development result in the study has an important role as tools and guides of learning process in field practice activities in attempt to improve the graduate quality of biology teacher education
3) The practicum supervisors as the instrument users give good responses to the content of the authentic assessment instruments which is the development result in the study with the indicators covering aspects of the suitability of the instruments with the needs in the field, the suitability of the instruments with their columns, the effectiveness of the instruments in the assessment, as well as the ease of use (average score of response of3,57 ± 021).The existence of the instruments facilitates the supervisor to determine to determine achievement of students' learning objective and determine the kind of action for further guidances.
4) For students/prospective biology teachers/field practice participants, the impelementation of authentic assessment instruments which is the development result of the study gives impacts toward the quality improvement of knowledge, performance, and their scientific attitude. Socialization of aspects and indicators of the assessment as mentioned in assessment instruments before field practice gives challenges to show participants' best performances, to explore knowledge by themselves, and to behave more scientific during the field practice activities.

Departing from results of this study, suggestions can be propopsed so that the implementation of field practice can always be planned carefully in accordance with the learning objectives that will be achieved.As a measurement device of learning

process and results in field practice activities which have been examined by methods that can be accounted for, as well as the test results which showhigh validity and reliability, the authentic assessment instrument which is the development result of the study can be used as one of reference models or even it can be used directly as a assessment tool of similar field practice activities.Aside from being assessment tools, the contents in this instrument can also be used as guidancein determining the direction of the goal of field practice implementation.

References

Abidin, Yunus. (2012). Model Penilaian Autentik Dalam Pembelajaran Membaca Pemahaman Berorientasi Pendidikan Karakter. *Jurnal Pendidikan Karakter*, Tahun II, No. 2, Juni 2012.

Gall, Meredith. D., Joice P. Gall, Walter R. Borg. 2003. Educatinal Research: an Introduction. 7th Ed. Pearson Education, Inc.Boston, New York, San Francisco, Mexico City, Montreal, Toronto, Madris, Munich, Paris, Hongkong, Singapore, Toko, Cape Town, Sidney.

Patrick, A.O. (2010). *Effect of Field Study on Learning Outcome in Biology*. J.Hum.Ecol.,31/33:171-177.

Powell, L.A., A. J. Tyre, S. E. Hygnstorm, D. A. Wedin, P. R. Hanson,M. S. Kuzila, J. B. Swinerhar. (2010). *Wilderness Serendipity:Planning and Assessing Learning During an Experiental Field Course.* NACTA.

Sugiyono. 2008. *Metode Penelitian Kuantitatif, Kualitatif dan R & D*. Cet-5. Bandung: CV Alfabeta.

Tal, R.T., (2004). Using a Fieldtrip to a Wetland as a Guide for Conceptual Understanding in Environmental Education- a Case Study of A Pre Service Teacher Research.*Chemistry Educ. : Research and Practice.* 5. (2). pp.127-142.