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The Development of an Integrated Assessment Instrument for Measuring Analytical Thinking and Science Process Skills

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Abstract. This research aims to develop instrument and determine the characteristics of an integrated assessment instrument. This research uses 4-D model, which includes define, design, develop, and disseminate. The primary product is validated by expert judgment, tested its readability by students, and assessed its feasibility by chemistry teachers. This research involved 246 students of grade XI of four senior high schools in Yogyakarta, Indonesia. Data collection techniques include interview, questionnaire, and test. Data collection instruments include interview guideline, item validation sheet, users' response questionnaire, instrument readability questionnaire, and essay test. The results show that the integrated assessment instrument has Aiken validity value of 0.95. Item reliability was 0.99 and person reliability was 0.69. Teachers' response to the integrated assessment instrument is very good. Therefore, the integrated assessment instrument is feasible to be applied to measure the students' analytical thinking and science process skills.

INTRODUCTION

Assessment is one of important parts of learning process. Assessment relates to the objectives and learning process. A learning process includes planning, implementation of learning process, assessment of learning outcomes, and students follow up assessment [1]. A good learning will not be successful without a good assessment. Assessment is expected to reflect the ability of students as a whole, both in terms of knowledge, attitudes, and skills [2-3] and able to stimulate the students to optimize their potential [4-5]. Therefore, learning process and learning outcomes assessment are two components that cannot be separated.

One of the learning activities which can train the students' ability in developing those three competencies is internship activities in the laboratory [6]. Practical activities in laboratory can motivate students to develop a number of important processes skills. One of the most important skills for students in the 21st century is science process skills [7]. Moreover, in order to acquire laboratorial experience, practical cannot be separated from chemistry learning, investigation experience, improvement attitude toward chemistry, and science process skills [8].

Science process skill is a cognitive skill that can be measured by using written test [9]. This condition arises because science process skills relates to the cognitive domains of the students which includes the analytical thinking ability [10]. One of the assessments which uses written test is essay. The advantage of essay test is that they are capable of measuring various aspects of the science process skills of the students, hence the essay has the potential to be developed as an instrument of science process skills assessment. Achievement test is able to provide information which describes the ability of the students [11].

On the other hand, assessment of the students' learning outcomes on cognitive and psychomotor aspects often presents various problems. One of the problems which often occur is that the teacher chooses the form of classroom assessment without considering of how they assess and what will be assessed [12]. In addition, an assessment of the

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