The development of mini project interactive media on junior statistical materials (developmental research in junior high school)

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Abstract. Assessment is an integral part in the learning process. The process and the result should be in line, regarding to measure the ability of learners. Authentic assessment refers to a form of assessment that measures the competence of attitudes, knowledge, and skills. In fact, many teachers including mathematics teachers who have implemented curriculum based teaching 2013 feel confuse and difficult in mastering the use of authentic assessment instruments. Therefore, it is necessary to design an authentic assessment instrument with an interactive mini media project where teacher can adopt it in the assessment. The type of this research is developmental research. The developmental research refers to the 4D models development, which consist of four stages: define, design, develop and disseminate. The research purpose is to create a valid mini project interactive media on statistical materials in junior high school. The retrieved valid instrument based on expert judgment are 3,1 for eligibility constructions aspect, and 3,2 for eligibility presentation aspect, 3,25 for eligibility contents aspect, and 2,9 for eligibility didactic aspect. The research results obtained interactive mini media projects on statistical materials using Adobe Flash so it can help teachers and students in achieving learning objectives.

1. Introduction

Statistics is one of the most important branches in mathematics. The purpose of teaching this material is to develop students’ mathematical communication level in explaining condition or problem in real life. Based on the score of National Examination (UN) 2016 on PAMER data, the proficiency of students on statistical materials tend to be low than other material. Percentage mastery of statistical matter on National Examination junior high school2016 is 46.73%. It means 53.27% of junior high school students’ in Indonesia has not mastered the statistical material on the National Examination. The percentage is lower than the percentage numbers of mastery, algebra, geometry and measurement. In fact, students tend to difficult in resolving the types of problems related to everyday life, that requires analysis, process, and evaluate the results obtained.

Edwards [1] points out that, “The best method of assessment will by giving students the opportunity to provide evidence of their skill through actually planning investigations that are meaningful to them in the science laboratory or in the field”. Assessment is important when collaborates with learning. In line with the opinion expressed by Hyde [2] that an assessment is indeed
necessary as a whole with the curriculum and learning. Assessment results can be evidence as supporting the achievement of each student over time.

One type of assessment in the 2013 curriculum used in Indonesia is authentic assessment. Authentic assessment as the response of criticism, enhance educators to use paper and pencil mostly in the process of cognitive test. Authentic assessment is an overall comprehensive assessment [3]. The application of authentic assessment as a standard assessment of the 2013 curriculum is expected to have a positive impact to educational system in Indonesia for the future. In fact it gets various perceptions and critiques in its development.

Some researchers have conducted research on authentic assessment instruments. One of them is Rolina A. Ferita & Heri Retnawati entitled “Development of Authentic Assessment Tool for Mathematics Learning in Class VII Semester 1”. The developed product meets reliable and valid criteria based on expert judgment. The development of this research instrument is more oriented towards the implementation of Curriculum 2013. It still in the stage of improvement from the government, so the need for more in-depth studies to support the assessment instrument is flexible with any applicable curriculum [4].

In line with the results of the authors' research on authentic assessment analysis showed that planning and implementation of authentic assessment in the bad category [5]. Teachers who have engaged the authentic assessment is difficult in the selection of assessment techniques and the preparation of the instruments in some of the material in mathematics learning. Based on these research results, it needs to develop instruments of authentic assessment which are contextual, integrated, sustainable, and motivate students to manage the ability in learning of mathematics.

Therefore, this research expected to facilitate the students and teachers to better facilitate teaching and learning. Through mini project interactive media on statistical materials in junior high school, the implementation of learning can be more innovative and creative. This type of research is the developmental research. The development referred in this research is the development of authentic assessment using mini project interactive media instrument. Interactive media instruments used to facilitate students and teachers in the authentic assessment process from planning, implementation, and reporting. Through mini project interactive media on statistical materials in junior high school, the educators and students facilitated to achieve learning objectives.

2. Methods

2.1. Interactive Media
The word media comes from the Latin language and the plural of the word medium which literally means intermediary or introduction [6]. According to Seels and Glasgow in Arsyad [7] suggests that the interactive media is a delivery media system that presents video recording material with computer controls on students who not only hear and see video and sound, but also provides an active response that determines the speed and sequence of presentation. According to Big Indonesian Dictionary (KBBI) interactive media is an intermediary or interconnection tool related to computers, which are mutual action inter-relationship and mutually active. The interactive media has the audio visual elements, called interactive because the media is designed by involving the user's response actively. So it can be said that interactive media is an intermediary tool designed with the utilization of computer software using sound elements, images and texts.

2.2. Authentic Assessment
The term authentic is something real or genuine. When education prepares students for real or genuine tasks, they may encounter in a real-world setting, which considered authentic—or at least more authentic. The term’s ambiguity originates from the actuality that tasks inside the educational setting have varying degrees of replication outside the educational setting. Early uses of the term authentic in education referred to any use of instruction and assessment that mirrored real-world tasks rather than a contrived learning experience of the classroom-based worksheet or test.
According to Uno and Koni [8] say that in general assessment, it can be interpreted as a process to obtain information in any form that can be used for basic decision-making about students, both concerning the curriculum, learning programs, and school climate and school policy.

Authentic assessment according to McMillan [9], “… involves the direct examination of a student’s ability to use knowledge to perform a task that is like what is encountered in real life or in the real world”. Authenticity is judged in terms of the nature of the task completed as well as the context of the task. Like any performance assessment, the students “plan, construct, and deliver an original response, and explain or justify their answers”. Nitko and Brookhart [10] provide the following perspective on authenticity:

“… the ‘authentic’ in authentic assessment usually means presenting students with tasks that are directly meaningful to their education instead of indirectly meaningful. For example, reading several long works and using them to compare and contrast different social viewpoints are directly meaningful because it is the kind of thoughtful reading educated citizens do. Reading short paragraphs and answering questions about the ‘main idea’ or about what the characters in the passage did, on the other hand, is indirectly meaningful because it is only one fragment or component of the ultimate learning target of realistic reading”.

Similarly, Mueller [11] explains that authentic assessment is a form of judgment that requires students to perform real-world tasks that are capable of demonstrating meaningful applications in both knowledge and skills. Authentic assessment provides students with opportunities to link their learning and apply essential knowledge and skills to real-world tasks and problems. Authenticity is the element of every successful assessment that resembles a real-world skill or activity and aligns itself with a learning outcome.

Based on several definitions of authentic assessment, it can be concluded that authentic assessment is a process of gathering information by educators completely, with the development and achievement of competence. It includes the range of attitudes, knowledge, and skills undertaken by learners through various assessment techniques. The various assessment technique are able to reveal, prove or demonstrate appropriate meaningful learning at the same learning objectives which have been achieved.

2.3. Mini Project

There are several types of authentic assessment, i.e. performance assessment, project assessment, portfolio assessment and written assessment. The type of assessment used in this study is project assessment. Uno [8] states that project assessment is an absolute assessment to students within a certain time. Project assessment is used to determine understanding, ability to apply, investigation, and ability to inform thing clearly.

Based on some opinions, it can be concluded that the assessment of the project is an assessment of the tasks that must be completed by students within a certain time. The completion of the task is as investigation by students, starting from planning, data collecting, organizing, processing, analyzing and presenting the data.

According to KBBI mini means small or little. Mini project in this study is a simple project assignment given to junior high school students’ class VIII statistical material. This mini project is aimed at students as a form of assessment that is able to measure their statistical ability.

2.4. Mathematics material on Junior High School

Mathematics as a basic science today which has developed quite rapidly, both material and usefulness. It supports the development of mathematics in schools. According to Erman Suherman [12], some characteristics of learning mathematics in school are: (1) stages math learning, learning materials which taught gradually, from concrete to abstract, simple to complex; (2) the learning of mathematics follows the spiral method, each studied the new material which used to concern in the material that has been studied previously. The new material associated with the material that has been learned. Repetition of materials in teaching materials by extending and deepening is necessary in the
learning of mathematics (spiral widening and pulling); (3) mathematics learning emphasizes the deductive piker pattern, the mathematics is deductive, the mathematics is arranged by the deductive axiomatic. However, an approach should be appropriate to the student's condition; (4) mathematics learning embraces the truth of consistency, the truths in mathematics are basically the truth of consistency, not contradicting the truth of a concept with others. A statement is assumed to be true if it is based on the statement of the foregoing statement which has been accepted for its truth.

Mathematics Junior (SMP) is a math lesson taught in junior high school. The junior high mathematics consists of selected mathematical sections in order to foster capabilities and form personalities and to refer the development of science and technology. One of the materials in junior high school mathematics is statistics. The purpose of teaching this material is to develop students’ mathematical communication level in explaining condition or problem in real life.

2.5 Research Design

This research is one form of research and development or known as Research and Development (R & D). It refers to the 4-D model developed by S. Thiagarajan, et.al. This 4-D model is a research and development model that has four stages arranged in detail, systematic, and organized with clear intent and purpose, i.e. define stage, design stage, develop stage, and disseminate stage. The ongoing research steps are on the third point (develop). The research purpose is to create a valid mini project interactive media on statistical materials in junior high school.

The defining phase includes literature study and field survey. Literature study used to collect the literature needed in conducting the study of theory, with regard to authentic assessment of mathematics learning, especially junior statistics materials. The field survey aims to derive preliminary data on the state of the field, such as an authentic assessment tool on mathematics learning used by teachers.

The second step is the design step. Based on the results of literature study on basic theory and concept of authentic assessment, field survey, and then drafted the initial design of interactive media authentic assessment in the form of mini project on learning junior statistics. The focus of this design step is to plan the development of a form assessment instrument, which is an authentic assessment instrument on mathematics learning. Some of the things had been done in the planning phase were: a) Compile a benchmark reference test kit with a grid and rubric as a first step in designing developed products; b) Chose the right media (according to the characteristics of the material, students, and other learning factors) to assess during the learning process. Assessment is an integral part of learning, so the selection of appropriate media will go hand in hand with the precision in developing the assessment instrument. In this case one of the right media to use is interactive media instrument created using Adobe Flash CS6; c) The selection of the form, content, and overall format of the assessment instrument in accordance with the objectives, content, concepts, and learning media. Assessment instruments used is projects to measure competence skills.

The develop step started by making mini project interactive media on statistical material framework until it is accomplished completely. Valuators will validate the arranged interactive media. The methods used at this step were checklist and questionnaire related to interactive media instrument assessment of the experts. Furthermore, the data obtained through the validation sheet converted to a 4-scale qualitative data. Categories of data conversion carried out based on categories presented in Table 1 [13].

| No. | Interval Score | Category       |
|-----|----------------|----------------|
| 1   | 3.25 < Score ≤ 4.00 | Very Valid    |
| 2   | 2.50 < Score ≤ 3.25 | Valid         |
| 3   | 1.75 < Score ≤ 2.50 | Valid (Enough)|
| 4   | 1.00 < Score ≤ 1.75 | Not Valid     |
3. Results and Discussion

Along with the development of science and technology, the world of education must actively undertake various innovations concerning the content, competence, process, assessment, and various aspects contained in the national standard of education. Aspect of assessment is one of the key that determines the purpose of learning competence. According to Suryo Widodo [14] argued that it is important to apply a comprehensive and holistic assessment and require students to develop responses. It is not just choose the options that have been set. One of the assessments that can show the development of a student learning experience is authentic assessment. Authentic assessment is a form of assessment that requires students to display attitudes, using the knowledge and skills gained from learning in performing tasks in real situations.

Authentic assessment which developed in this research is skill assessment in the form of mini project interactive media. The interactive media includes an authentic assessment instrument on mathematical learning of statistical materials for junior high school students, which consists of an authentic assessment of mathematics for students. The guide for teachers of mathematics authentic assessment consists of indicators, assessment rubrics and assessment development procedure that was developed in the form of interactive media. The types of authentic assessment used consist of project assessments and assignments of instruments.

The products have been prepared through the define, design, and develop phase. The initial products are validated by a validator media and material. The result of validator consideration in terms media and material are analyzed by using the average value of the indicator. The consideration of validator is distinguished into four aspects, i.e. constructions aspect, presentation aspect, contents aspect, and didactic aspect presented through Figure 1. Graph of Validation Results

![Graph of Validation Results](image)

**Figure 1. Graph of Validation Results**

The first validation aspect is construction which is consist of three indicators that are the accuracy of the use of language and sentence; attention to the selection of questions; media has the purpose, benefit and identity of learning. The construction aspect got a score of 3,1 in the valid category. The presentation aspect of the media score 3,2 in the valid category. Contents aspect which includes material suitability with core competencies and basic competencies; material accuracy; systematic presentation of material, obtaining a score of 3,25 in the category of valid. The last aspect is the didactic aspect which is consist of indicators of students' ability, student involvement and activities that stimulate students' activity to obtain a score of 2,9 in valid category.

These results show that the mini project interactive media on statistical materials in junior high school has been compatible with the theoretical review of the development of authentic assessment.
4. Conclusion
The retrieved valid instrument based on expert judgment are 3.1 for eligibility constructions aspect, and 3.2 for eligibility presentation aspect, 3.25 for eligibility contents aspect, and 2.9 for eligibility didactic aspect. The research results obtained interactive mini media projects on statistical materials using Adobe Flash so it can help teachers and students in achieving learning objectives.

The ongoing research steps are on the third point (develop). In the next study, author is going to make depth validation of media (interactive media instrument) as well as material validation and going to complete a step of development, that is disseminate step.

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