

# The analysis of physics learning in senior high school of Semarang based on the scientific approach and assessment

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## The analysis of physics learning in senior high school of Semarang based on the scientific approach and assessment

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**Abstract.** Physics Learning in Curriculum of 2013 is closely related to the implementation of scientific approach and authentic assessment in learning. This study aims to analyze the implementation of scientific approaches and authentic assessment in physics learning, as well as to analyze the constraints of scientific approach and authentic assessment in physics learning. The data collection techniques used in this study are questionnaires, observations, interviews, and documentation. The calculation results used are percentage techniques and analyzed by using qualitative descriptive approach. Based on the results of research and discussion, the implementation of physics learning based on the scientific approach goes well with the percentage of 84.60%. Physical learning activity based on authentic assessment also goes well with the percentage of 88%. The results of the percentage of scientific approaches and authentic assessment approaches are less than 100%. It shows that there are obstacles to the implementation of the scientific approach and the constraints of authentic assessment. The obstacles to the implementation of scientific approach include time, heavy load of material, input or ability of learners, the willingness of learners in asking questions, laboratory support, and the ability of students to process data. While the obstacles to the implementation of authentic assessment include the limited time for carrying out of authentic assessment, the components of the criteria in carrying out the authentic assessment, the lack of discipline in administering the administration, the difficulty of changing habits in carrying out the assessment from traditional assessment to the authentic assessment, the obstacle to process the score in accordance with the format Curriculum of 2013.

### 2 Introduction

Education is essentially a conscious and planned effort to create an atmosphere of learning and learning process so that students actively develop their potential to have spiritual, religious, self-control, personality, intelligence, noble character and skills needed by themselves, society, nation, and state [1-5].

The growing awareness of people about education in Indonesia, certainly raises many positive things, including with the reimplementation of the curriculum of 2013 nationally in Indonesia starting in the academic year of 2016/2017. The new version of curriculum of 2013 is not the same as the previous curriculum of 2008. The new version of curriculum of 2013 is a revised version of the old curriculum of 2013 by the Ministry of Education and Culture. The curriculum of 2013 that considered



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to be burdensome in the past, has been revised, so it is no longer burdensome, and every school can apply it in the academic year of 2016/2017.

The revisions of the new curriculum of 2013 include; (1) the name of the curriculum does not change into the National Curriculum, but uses the name of the Curriculum of 2013 Revised Edition which is implemented nationally; (2) simplification of aspects of student assessment by teachers; (3) the absence of restrictions on student processes; (4) application of Observing, Questioning, Associating, Experimenting, and Networking level theory; (5) the subject structure and duration of schooling are not changed; (6) using active learning method; (7) improving the relationship of Core Competence and Basic Competence; (8) attitude assessment of Core Competencies 1 & Core Competencies 2 have been eliminated in every subject, only in religion and civic education lesson. However, the Core Competency remains included in the writing of the Lesson Plan; (9) the rating scale becomes 1-100 and in the attitude assessment given the form of predicate and description; (10) the remedial is given for the less, but the student is given a re-learning, then the remedial value is listed in the results [6].

The curriculum of 2013 is implemented to all level of schools. They are elementary school, junior high school, and high school. All levels of school use the Scientific Approach. The term of the Scientific Approach in the implementation of Curriculum of 2013 becomes an interesting discussion especially among the educators, because it is not only emphasizes the formation of student competence, but also emphasizes the formation of the character of the learners which will become a combination of knowledge, skills and attitude that can be demonstrated by the students as a form of understanding of the concept that the students have studied contextually in the learning process [7].

The Scientific Approach has learning steps that include observing, questioning, associating, experimenting, networking. In carrying out the process, teachers are required to have the professionalism of educators, so that the teachers should be able to condition the learning process, still apply the scientific properties, and avoid the properties of non-scientific. Teachers' duty in the scientific approach is to direct the learning process done by the students and to give correction to the concepts and principles that students get [8].

The next emphasis on the curriculum of 2013 is the authentic assessment. A research reveals that through the curriculum of 2013, the authentic assessment becomes a serious emphasis in which teachers must apply authentic assessment in every learning process [9]. It also reveals that the assessment aims to measure the success of learning conducted by teachers and simultaneously measure the success of students in the control of the competencies that have been determined. Teachers can reflect and evaluate the quality of learning that has been done through assessment activities [9].

Authentic assessment in Physics learning in the curriculum of 2013 is a comprehensive assessment to assess from learning input, learning process, and learning output, which includes the attitude, the knowledge, and the skills. Authentic assessment assesses the readiness of learners, as well as the process and learning outcomes as a whole. The integration of the assessment of the three components (input-process-output) will describe the capacity, style, and learning outcomes of learners, even able to produce instructional effects and nurturant effect of learning [10]. The national examination is one of the types of government-administered learning outcomes to measure the success of learners who have completed the education level of the school [11]. Based on data from the Education Office of Central Java Province, it is known that the results of the National Examination of each school have differences. For example, it is caused by differences in the implementation of teaching and learning activities as a result of the implementation of the curriculum of 2013 and the obstacles to implementation of the curriculum of 2013.

Some high schools in Semarang city such as High School of 1 Semarang, High School of 6 Semarang, High School of Ksatrian 2 Semarang, and High School of Nasima are the High Schools that implemented the curriculum of 2013 in physics learning. The results of the national examination of

those schools also vary, depending on the learning activities and the implementation of the curriculum of 2013 in the school.

Based on the problem above, the researcher conducted a study entitled "The Analysis of Physics Learning in Senior High school of Semarang Based on The Scientific Approach and Assessment". The purpose of this research is to analyze how the implementation of scientific approach and authentic assessment in physics learning in High School in Semarang and to analyze the obstacles of scientific approach and authentic assessment of physics learning in High School in Semarang.

## 2. Methods

This type of this research is descriptive qualitative research. The goal is to find out the implementation of scientific approach and authentic assessment in High School in Semarang. Descriptive research is a research method that is intended to describe the phenomena that exist at present or the past. This study does not hold data manipulation but in accordance with the phenomenon experienced by the subject of research. Researchers also position themselves as the main instrument for obtaining research results, perform descriptive analysis, and ensure the validity of data [12].

The research has been conducted at Public and Private High School of Semarang City. The population in this study are all physics teachers who teach classes X and XI in 57 SMA Semarang City and considered homogeneous [13]. Research sample in this research is taken through several stages of sampling. The first phase is obtaining the sample from the school using purposive sampling and obtained 4 research schools that are High school of 1 Semarang, High school of 6 Semarang, High school of Ksatrian 2 Semarang, and High school of Nasima Semarang. Second sampling phase is the sampling phase of obtaining the sample of the teachers. The sample is the physics teacher from each school with purposive sampling and obtained 7 teachers from those school.

The procedures in this study are the preparation stage of research, the stage of research implementation, the data processing stage, and the stage of conclusion. The data are collected using a questionnaire about the implementation of the scientific approach and the authentic assessment given to the teacher, the observation sheet of the scientific approach and the authentic assessment given to the observer, the teacher interview, and the documentation analysis to see the implementation of the scientific approach and authentic assessment in terms of planning. As well as data on the tendency of national examination of physics to support the implementation of physics learning based on scientific approach and authentic assessment.

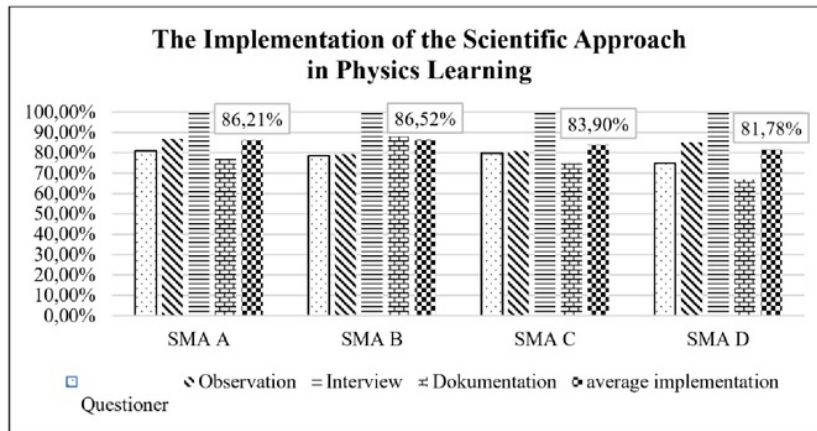
Miles Huberman said that the steps of data analysis are data reduction, presentation of data by presenting the percentage of implementation, performing qualitative descriptive analysis, and drawing conclusions from the research.

## 3. Result and Discussion

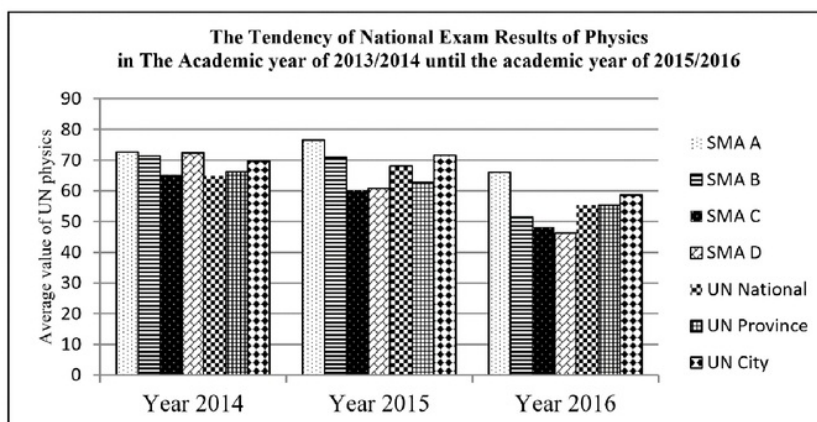
There are some data in this research, including data of the scientific approach in physics study, data of the authentic assessment in physics study, data of implementation of scientific approach in physics learning, and data of obstacle of authentic assessment in physics learning. All data are analyzed using questionnaires, observation, interviews, documentation and also supported from the data of the tendency of national exam results of physics of the academic year of 2013/2014 until the academic year of 2015/2016 which are presented as follows.

### 3.1. The Implementation of the Scientific Approach to Physics Learning

Overall, the implementation of the scientific approach to physics learning has been well implemented in accordance with the objectives of the curriculum of 2013 as well as the objectives and principles of learning with a scientific approach. The implementation of the scientific approach has been analyzed using questionnaires, observation, interviews, and documentation and also supported from the data of the tendency of national exam results of physics which is presented in Figure 1 and Figure 2.



**Figure 1.** The chart of the implementation of the scientific approach in physics learning



**Figure 2.** The chart of the tendency of national exam results of physics of the academic year of 2013/2014 until the academic year of 2015/2016

On the whole, the implementation of the scientific approach in physics learning in high school in Semarang is very good with the percentage of 84.60%, so it can be concluded that high school in Semarang has conducted scientific approach in physics learning with a very good category. The data is supported by the questionnaire that has been filled by the teachers. The result of the questionnaire indicates that the teachers have performed physics learning with a scientific approach step. Observation of learning in the classroom also shows that the teachers have done the active learning by scientific approach step, so that student's enthusiasm increase in accepting teacher's learning. Interviews with teachers show that physics teachers can explain and have carried out all scientific learning steps in physics learning.

Documentation of the lesson plan also shows that physics teachers have done the physics learning with a scientific approach. It can be seen from the teacher's lesson plan that has been in accordance with the format of lesson plan of the Curriculum of 2013. Based on the research results, it can be seen that physics teacher in high school in Semarang can be a role model of physics learning with the scientific approach for other senior high schools.

The implementation of a scientific approach that is less than 100% indicates that a scientific approach has been implemented, but not yet optimal because of the obstacles to the implementation of a scientific approach. The quality of the program could not be separated from the quality of educators. So, the quality of the assessment program in the learning process depends on the quality of a teacher. The extent to which a biology teacher conducts assessments according to the curriculum's mandate depends on the extent to which the teacher understands the rules in the Curriculum of 2013.

Research about the implementation of physics learning based on scientific approach also has been conducted and this research shows that the implementation of the scientific approach at High School 1 Kasihan in Bantul District has a percentage between 70.83% and 100% [14]. These percentages are included in good results.

The results of interviews with the seven teachers of high schools in Semarang also revealed the obstacles in carrying out a scientific approach. These obstacles such as the limited time to teach by using a scientific approach, heavy load material, input or the ability of learners, learners' readiness, the willingness of learners in asking, laboratory support, and the ability of students to process data. Based on the research of the obstacles of scientific approach in physics learning, the government is expected to be able to rearrange the weight of physics lesson that is adjusted with the material, also, the school should cooperate with the government to provide facilities and infrastructures that can support physics learning with the scientific approach.

### 3.2. Implementation of Authentic Assessment in Physics Learning

After knowing the implementation of the scientific approach in physics learning, the next analysis is the analysis of authentic assessment of the implementation in physics learning. Overall, authentic assessment of physics has been well implemented in line with the objectives of the Curriculum of 2013, the objectives and principles of learning with authentic assessment. Implementation of authentic assessment is analyzed using questionnaire, observation, interview, and documentation and also supported from the data of the tendency of national exam results of physics which is presented in Figure 2 and Figure 3.

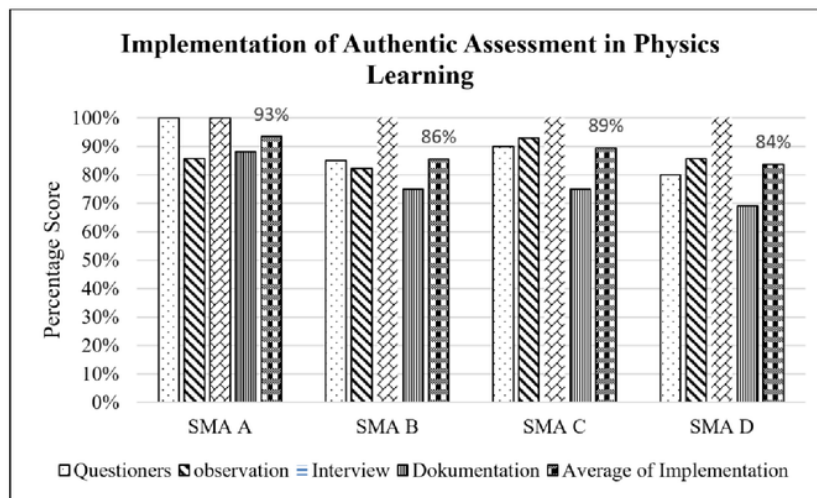


Figure 3. The chart of the implementation of authentic assessment in physics learning

Overall, the implementation of authentic assessment in physics learning at high school in Semarang is very good with the percentage of 88%. It can be concluded that high school in Semarang has carried out the authentic assessment in physics learning very well. The data is supported by a questionnaire that has been filled by the teacher. The results show that the teacher has performed physics lessons with authentic assessment steps. Classroom observation also indicates that the teacher has performed physics learning with a scientific approach and its assessment uses authentic assessment. Interviews with teachers also show that physics teachers can explain and have carried out all authentic assessment steps in physics learning. The documentation of the lesson plan also shows that the teacher has performed physics lessons with authentic assessment. It is shown by teacher learning plans that are in accordance with the format of the 2013 curriculum lesson plan and completed with an authentic assessment scheme.

The results of this authentic assessment study show that the format of the authentic assessment that has been conducted by the high school physics teachers in Semarang can be used as a format of authentic assessment nationally. If the authentic assessment is less than 100%, it indicates that a scientific approach has been implemented, but not yet optimal because of the constraints of implementing a scientific approach. Sulistyaningsih *et al.* stated that the quality of the program could not be separated from the quality of educators [15]. So the quality of the assessment program in the learning process depends on the quality of a teacher. How a biology teacher conducts assessments according to the curriculum's mandate depends on the teacher's understanding of the rules applicable in the Curriculum of 2013.

The results of interviews with the seven high school teachers in Semarang also revealed the obstacles to the implementation of authentic assessment. The obstacles are the limited carrying out of authentic assessment, the many components of the criteria in carrying out the authentic assessment, the lack of discipline in administering the administration, the difficulty of changing habits in carrying out the assessment from traditional assessment to the authentic assessment, the obstacle to process the score, because the scoring format of KTSP (the curriculum before the curriculum of 2013 implemented) is different from the authentic assessment of the Curriculum of 2013.

The obstacles in the implementation of authentic assessment that occurred in this study are the same with the obstacles of authentic assessment of the implementation that occurred in research that has been conducted [16-20]. She stated that the obstacles to the implementation of authentic assessment in the subjects of first year in biology subject in high school in Sleman because there are too many instruments and assessment techniques to be applied, and there are many components of the assessment, especially difficulty in assessing aspects of attitude, type of material, teacher ability, students' input, facilities, and infrastructure. Based on the results of the study of the obstacles of authentic assessment in physics learning, the Government is expected to conduct national training to physics teachers on how to fill in the score according to the format of Curriculum of 2013. In addition, it is expected that teachers also change the pattern of thinking in performing KTSP assessment into an authentic assessment.

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#### 4. Conclusion

Based on the results and discussion above, the conclusions of this research are the implementation of scientific approach in high school in Semarang obtained an average of 84.60%. It can be concluded that high school in Semarang has conducted scientific approach in physics learning with the very good category.

The implementation of authentic assessment in high school in Semarang also obtained an average of 88%. This means that high school in Semarang has conducted an authentic assessment in physics learning with the very good category.



The obstacles that occur in the implementation of scientific approaches in Physics lesson is the time to teach with a scientific approach, heavy load of material, input or ability of learners, willingness of learners in asking questions, laboratory support, and the ability of students to process data.

The obstacles in the implementation of authentic assessment in Physics learning are the limited time for carrying out of authentic assessment, the many components of the criteria in carrying out the authentic assessment, the lack of discipline in administering the administration, the difficulty of changing habits in carrying out the assessment from traditional assessment to the authentic assessment, the obstacle to process the score, because the scoring format of KTSP is different from the authentic assessment of the Curriculum of 2013.

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