

Analysis of STEM-Based Learning Evaluation (Case Study on Economics Subjects in East Java)

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ABSTRACT

Evaluation activities should not only be based on administrative activities but evaluation activities should be interpreted to maintain the quality of the implementation of learning activities. Various problems with education are actually one of the causes is from the development of inappropriate learning evaluation instruments. Whereas the essence of the learning evaluation activity is to see if the goals of learning that have been structured are well achieved. This research has the objectives: 1) to analyze the evaluation of learning that has been done in high school economics subjects in East Java and 2) to analyze the effectiveness of developing stem-based learning evaluations. The method used in this study is to use a descriptive method with a form of survey research. The survey was conducted with Google Form and took 656 students from high school in East Java. The result of this survey is that the evaluation is appropriate and the evaluation of STEM-based learning is effective to improve the quality of learning.

Keywords: Learning evaluation, STEM.

1. INTRODUCTION

The quality of learning needs to be achieved through the right learning evaluation instrument. In line with [1] mentioned that efforts to improve the quality of education can be achieved through improving the quality of learning and the quality of the assessment system. Because various kinds of problem in education is actually one of the causes is the development of inappropriate learning evaluation instruments. The evaluation of learning conducted in schools should not only focus on administrative needs and requirements, but the evaluation of learning made must be following the learning objectives that are to be achieved and also adapted to educate students to think critically in the face of a problem so that students are better prepared to face life in the Future.

Because it is now entering the era of disruption in the 21st century, and educational institutions including schools and higher education are required to be able to print a quality generation that can adapt to various challenges in this era of disruption [2], therefore, the importance in learning activities to implement problem-solving-based learning to make students more critical. It

is also under the 2013 Curriculum to implement authentic assessments and requires students to have skills in the 4.0 era, where the learning that supports the 2013 curriculum is STEM learning. Where STEM is used to improve the quality of student teaching and learning so that students are better prepared for future situations. STEM-based learning can train students in applying their knowledge to create designs as a form of environmental problem solving by utilizing technology [3].

The evaluation of learning must also be appropriate and STEM-based. As a growing trend in education, STEM is used to address real-world situations through a problem-solving process-based design like the one used by engineers and scientists [4]. In stem-based learning, teachers will not only provide knowledge to students, but teachers will also allow students to apply and discover their ideas for solving a problem [5].

With learning to be adapted to the 2013 curriculum, schools must also use STEM-based learning. Therefore, this study has the goal: (1) to analyze the evaluation of learning that has been done in high school economics subjects in East Java and (2) to analyze the effectiveness of developing stem-based learning evaluation.

2. METHOD

The method used in this study is qualitative descriptive research that studies existing problems as well as existing circumstances. The goal is to describe what is happening today. This study focuses on STEM Based Learning Evaluation Analysis that exists in High School in 3 regions, namely Jombang, Kediri, and Batu

City. The respondents in this study consisted of 656 Students. The technique of data retrieval is done with the technique of the survey. The survey is conducted by using a Google form that contains questions according to the context of the topic. The research framework refers to figure 1 below which contains research objects as well as measuring instruments performed and technical research.

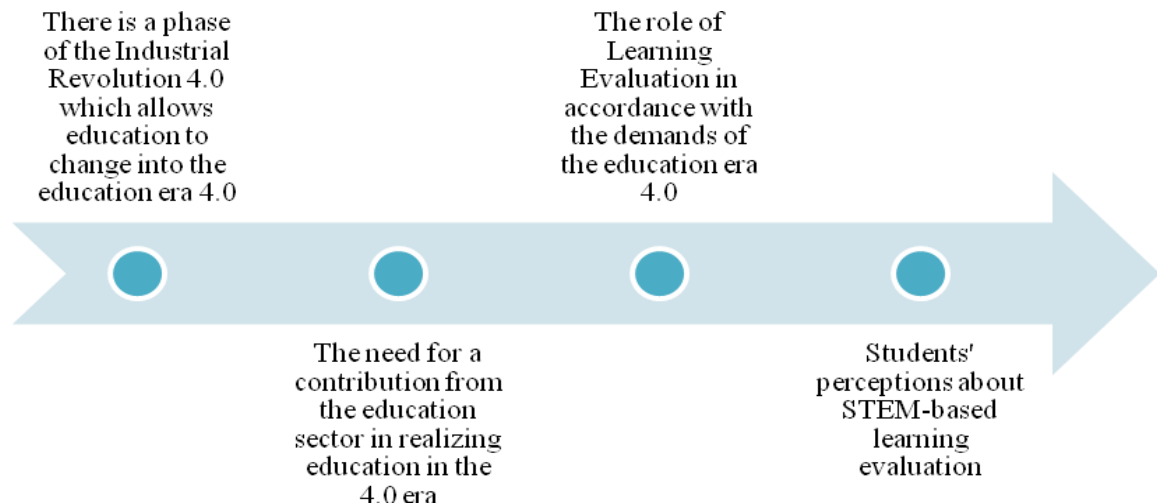


Figure 1 Research frame of thought

The following will also be explained the stages performed in the qualitative research in figure 2 below:

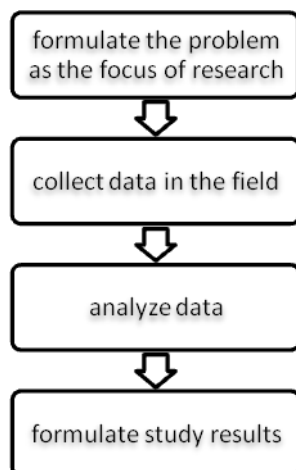


Figure 2 Qualitative research stages

Based on the picture two stages of the study consist of 4 steps that are formulating problems as the focus of research, collecting data in the field, analyzing data, and formulating the results of the study.

3. RESULTS AND DISCUSSION

The results of this study can be explained in the description below. The respondents sampled in this study consisted of 656 respondents.

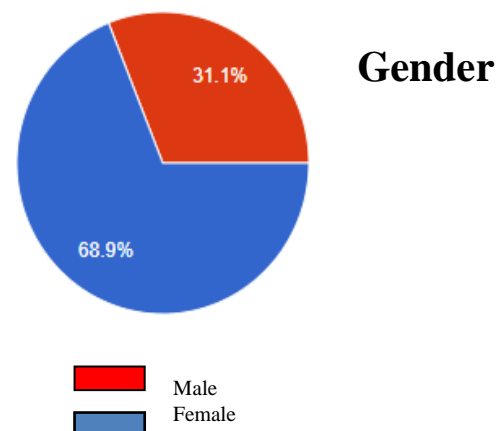


Figure 3 Research respondent

The STEM-based defense evaluation research poll was filled by 656 respondents who were 68.9% female students and 31.1% were male students

3.1. Evaluation of Learning that has been done on Economics Subjects in high school

To see the evaluation of learning that has been done in Economics Subjects in high school in East Java can be seen in the explanation below:

- (1) Evaluation of Learning at the end of each lesson Based on the results of the research survey 32.4% of students answered that teachers always do evaluation of learning at the end of each learning.
- (2) The evaluation of learning is by Kompetensi Inti (KI)/ core competencies, Kompetensi Dasar (KD)/ basic competencies, indicators, and learning objectives. The results of the research survey, 49.5% of students answered that the evaluation was under KI, KD, indicators, and learning objectives
- (3) Assessment principles are oriented towards a sustainable learning process. Based on the results of the research survey, 38.6% of students responded that the assessment was oriented towards a sustainable learning process and that the learning results reflected the ability of students during the learning process
- (4) Evaluation serves to improve planning and learning. Based on the results of the research survey 59% of students answered that the evaluation conducted by the teacher is used to improve the learning and learning methods so that students achieve more learning competencies.
- (5) Evaluation of learning under clear procedures and criteria. Based on the results of the research survey 63.7% of students answered that the evaluation conducted by the teacher was under the procedures that have been submitted and agreed upon together at the beginning of the semester
- (6) Evaluation of inseparable parts of the learning process. Based on the results of the research survey 46.7% of students answered that evaluation is an integral part of the learning process.
- (7) Evaluations made reflect real-world problems. Based on the results of the research survey 37.8% of students answered that the evaluation made by the teacher already reflects real-world problems.
- (8) Evaluation using various sizes, methods, and criteria that fit the characteristics and essence of the learning experience. Based on the results of the research survey 42.1% of students answered that the evaluation given by the teacher uses various measures, methods, and criteria that correspond to the characteristics and essence of the learning experience.
- (9) The assessment stage was presented at the beginning of the meeting. Based on the results of the assessment survey 93.2% answered that the assessment stage had been submitted by the teacher at the beginning of the meeting and had been agreed upon by the students, while the remaining 6.8% of teachers had not delivered the assessment stage at the beginning of the meeting.
- (10) The evaluation provided is relevant to the learning resources submitted. Based on the results of the research survey 37.8% of students answered strongly agreed that the evaluation given was relevant to the learning resources submitted, and 37.9% answered agreed. That means more than 50% of teachers have given relevant evaluations with relevant learning resources.
- (11) Learning evaluations tailored to real conditions. Based on the results of the survey, 33.6% answered strongly and 30.9% agreed that the evaluation given by the teacher was adjusted to real-life conditions that could change at any time.
- (12) Assessment form conducted by the teacher. Based on the results of the research survey 62.6% of students answered that the assessment was given by the teacher in the form of Tests and Non-tests. 28.8% of teachers gave test assessments and the remaining 8.6% gave non-test assessments.
- (13) Assessment Form. Based on the results of the research survey 86.3% of students answered that the assessment was conducted by the teacher in the form of a writing test, the rest in the form of oral tests (interviews), performance tests (rallies), and other tests.
- (14) The difficulty level of writing test item. Based on the results of the research survey 47.8% of students answered that the questions given by teachers are relatively easy with understanding, 44.1% difficult questions, 39% case questions/analysis, 33% about the application.
- (15) Non-test assessment. Based on the results of the research survey 57.9% of students answered teachers gave non-test assessments in the form of tasks independent, 39.3% activeness in group discussions, 38% group assignments, 30.5% mastery of the material in discussions.
- (16) Non-Test Assessment Form. Based on the results of the research survey 60.3% of students answered that the non-test assessment form conducted by the teacher was to do portfolio tasks, 35% Analyzed certain cases, 21.7% created a project, and 15.9% of other assessment forms.
- (17) Frequent assignments of individuals in economic learning. Based on the results of the research survey 63% of students answered that teachers often give tasks in the form of doing questions, 30.7% of tasks make summaries, and the rest of the tasks are others.

Table 1. Evaluation of learning on East Java

No	Indicator	Percentage	Description
1	Evaluation of Learning at the end of each lesson	32,4%	It's done
2	Evaluation of Learning conducted by KI, KD, indicators and Learning Objectives	49,5%	Appropriate
3	Assessment is oriented towards the continuous learning process and learning outcomes which are the abilities of students during the learning process	38,6%	Appropriate
4	Evaluation serves to improve planning and learning, as well as achieve learning competencies	59%	Appropriate
5	Evaluation results are based on clear procedures and criteria, agreed upon at the beginning of the semester, and understood by students	63,7%	Appropriate
6	Evaluation is an integral part of the learning process	46,7%	Appropriate
7	Evaluation is real world problem, not a type of school work problem	37,8%	Appropriate
8	Evaluation uses measures, methods and indicators that are in accordance with the characteristics and content of the learning experience	42,1%	Appropriate
9	The implementation of the assessment is informed at the beginning of the meeting and agreed by the students	93,2%	It's done
10	Evaluations conducted in learning are relevant to the learning resources submitted	37,8%	Appropriate
11	Evaluation in learning adapts to real conditions which can change at any time	33,6 %	Appropriate
12	Assessment form that is often done by The Teacher (Test and Non-Test)	62,6 %	Appropriate
13	Writing Test Assessment Form	86,3%	There are Variations in Assessment stipulated by teachers
14	Difficulty Level Item about Writing Test (Easy questions related to understanding)	44,1%	There Is a Variation in Difficulty Level
15	Non-Test assessment form	57,9%	There are variations in non-test assessments
16	Portfolio Tasks	60,3%	There are variations in non-test assessment types
17	Frequent assignments of individuals in economic learning	63%	There are Variations of Tasks given by teachers

From table 1 above it can be known that the evaluation of learning given by the teacher to the student at the end of each learning is appropriate, this is under the teacher always assessing the student at the end of each lesson in the form of a test or non-test. Besides, the evaluation of learning is also by KI, KD, indicators, and learning objectives, so that the evaluation of the learning given is very precise and appropriate. The principle of the assessment conducted by teachers is oriented towards continuous learning proses so that the assessment is not only done at the end of the learning, but the assessment is also carried out during the learning process.

So that the assessment conducted by the teacher is more complete not only focused on cognitive assessment but also includes an affective and psychomotor assessment. This is under the Assessment in the 2013 curriculum which emphasizes that assessment of the knowledge, attitude, and skills must be balanced. Based on changes to the standard element of assessment, which is a balanced assessment process

between knowledge, attitude, and skill, an authentic assessment system is implemented. According to [6] authentic assessment is a form of assessment in which students are asked to perform real-world tasks that demonstrate meaningful application of essential knowledge and skills". It is also by the results of the study [7] which says that students' cognitive abilities achieve good criteria, with the highest achievement on indicators of ability to view information from different points of view. The evaluation of learning conducted by the teacher serves to improve the planning and way of learning to be more suitable to achieve the competencies and objectives of learning because without the evaluation the teacher will never know the advantages and disadvantages of the learning process that has been done.

The evaluation given by the teacher is also under the clear procedures and criteria that have been agreed upon at the beginning of the semester and human rights by students, thus making students better understand the learning goals that must be achieved in one semester.

Evaluation is an integral part of the learning process because in learning activities teaching teachers always provide evaluations to know students' understanding of the materials that have been taught. Because, in the absence of evaluation the Teacher does not know the extent to which the Student level of understanding of the material that has been submitted, and the teacher never knows the way of thinking of the student.

3.2. Evaluation of Learning that has been done on Economics Subjects in high school

To find out the effectiveness of using STEM-based learning evaluation in High School in East Java can be seen in the table below:

Table 2. STEM Based Learning Evaluation

No	Indicator	Percentage	Description
1	The evaluation that has been done by your Teacher can help students in obtaining, changing, or developing skills, attitudes, ideals (ideals), appreciations (awards), and knowledge (knowledge)	38,2%	It's Appropriate
2	STEM-based evaluation (Science, Technology, Engineering, Mathematics) is suitable for economic learning	28,9%	It's Appropriate
3	Stem-based economic learning evaluation (Science, Technology, Engineering, and Mathematics) is suitable to be applied in the era of RI 4.0	27,2%	It's Appropriate
4	STEM-based evaluations (Science, Technology, Engineering, Mathematics) need to emphasize aspects to develop and use	30,3%	It's appropriate
5	One aspect of stem-based economic learning evaluation (Science, Technology, Engineering, Mathematics) is to ask science questions that are integrated into economic topics	26,4%	Already integrated
6	The activity of analyzing and researching related data in economic topics is an aspect that exists in the evaluation of STEM-based learning (Science, Technology, Engineering, Mathematics)	27,7%	Appropriate
7	Technology integration in evaluation activities is required in STEM-based learning (Science, Technology, Engineering, Mathematics)	32%	Already integrated

From table 2 above it can be known that STEM-based Learning Evaluation is appropriate and conducted by teachers in high school in East Java. Implementation of evaluations that have been done by teachers is appropriate and can help students to develop skills, attitudes, ideals (ideals), appreciations (awards), and knowledge (knowledge). STEM-based evaluation (Science, Technology, Engineering, Mathematics) is very suitable to be applied to economic learning because the utilization of Technology will make teachers more creative to improve students' knowledge of economic materials.

After all, teachers will not only teach knowledge to students, but students are also invited to think and pour their creative ideas in the face of things. This is in line with research conducted by [8] which says that STEM can help teachers to improve students' knowledge and understanding. Economics subjects are not subjects that contain only theories described by teachers are sufficient, economic learning materials also contain things that require critical thinking therefore STEM-based learning is very suitable and very effective to use in economic learning.

Besides, STEM-based learning evaluation is also very suitable if implemented in the era of RI 4.0, because it will help to improve the quality of teaching and learning of students. After all, STEM-based evaluation will teach students to always think critically and be taught how to solve problems, as students will become accustomed to dealing with a problem that will occur in the future.

Besides, STEM-based learning evaluation is also very useful for future lives. This is according said by [9] who said that STEM-based learning is one of the forms of future learning needed to address the challenges of changing times because the day is increasingly the day of the changing times is growing so rapidly, that everyone is required to be ready in the face of the changing times, including students. Students are the younger generation who will be the successors of the nation, where the successor of this nation must be the next generation of creative, and ready to face any problems that occur in the future, and that will never happen if not prepared from now on, therefore the importance of using STEM-based learning or evaluation to train students to think critically and creatively. STEM

is also very important to prepare students into the workforce needed in the future. Therefore, STEM-based evaluations need to develop learning models used in learning to create students who have critical thinking and skills to be better prepared for the world, as students will be taught to solve problems. According to the results of the study [10] saying that STEM-based learning can improve students' thinking skills.

STEM-based learning evaluations are perfect for use in learning to teach economics, as students will be more creative in thinking about problem-solving in their daily lives. This is in keeping with what it says [11] that STEM-based learning is indeed used to develop students' creativity through the process of problem-solving in daily life. This aspect of STEM is a matching pair capable of creating an active and cohesive learning system because all four aspects are needed simultaneously to solve problems [12]. The evaluation of STEM-based learning in economics lessons will help students think critically, be able to solve problems, be creative, innovative, and be able to communicate well, skilled using media, technology, information, and communication that will be useful in the future to face the global economy.

4. CONCLUSION

From the results of the study can be concluded that the evaluation conducted is appropriate and the evaluation of STEM-based learning is effective to improve the quality of learning because students not only gain knowledge but students can think critically.

AUTHORS' CONTRIBUTIONS

The articles of this study consisted of five people, each of whom has a different and complementary role. The first author is the co-author as well as the main author of the article, the second author is a complement to the theoretical study, the third author describes the results, discusses and completes the article, the fourth author provides input and revisions. The fifth author provides reviews and additions to the article.

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