The development of attitude assessment instrument in STEM learning in fifth grade elementary schools

D A Muiz*, D S Sabillah and K Karlimah
Primary Teacher Education, Indonesian Education University, Bandung, Indonesia

*dindin_a_muiz@upi.edu

Abstract. This research is a developmental study focuses on developing an attitude assessment instrument in STEM (Science, Technology, Engineering, and Mathematics) learning to support the 2013 curriculum implementation in facing the challenges of globalization in real life. This research was motivated by the fact that several schools still had not yet developed an instrument for assessing attitudes in STEM learning and the teacher usually assessed students subjectively. This study aims to develop and describe the design of the attitude assessment instrument in STEM learning. The research design used was the Educational Based Research with the Generic EDR model proposed by Mc Kenney & Reeves which consists of three stages, namely: 1) the analysis and exploration stage; 2) the design and construction stage; and 3) evaluation and reflection stage. The data collection techniques used in this research were literature study, interview, document analysis, and expert judgment.

1. Introduction
The current character development is one of the main concerns of the government. The Regulation of the President of the Republic of Indonesia No. 87 of 2017 is the initial basis for putting character education back in place as the main core of education in Indonesia. The goal of Strengthening Character Education or Penguatan Pendidikan Karakter (PPK) in The Regulation of the President of the Republic of Indonesia Number 87 of 2017 Article 2 is "to build and equip students as the golden generation of Indonesia in 2045 with the spirit of Pancasila and good character education to face the dynamics of change in the future". Harmonization of cultivating the heart, feeling, mind and body needs to be a dimension in every program and activity at school in order to instill goodness so that individuals grow and develop as human beings who are physically, mentally and morally healthy.

The 2013 curriculum, as a reference for conducting the learning process in education institutions, integrates the PPK. This integration is not as an additional or optional program, but as a way of educating and learning for all educational actors in educational institutions. The 2013 curriculum is a core part of strengthening character education. Integrating the implementation of the 2013 curriculum needs to be placed within the framework of forming the character of students with good values which are the implementation of Pancasila values.

The focus of the PPK approach in implementing the 2013 curriculum is class-based character education. Class-based character education is the unity of the teacher and students in the learning process to meet the minimum demands in the agreed curriculum. Class-based character education is about the relationship between teachers and students in the context of formal learning curriculum content.
addition, how teachers integrate character building values in the learning process integrated in the curriculum.

Teachers need to understand how to prepare and integrate PPK in the learning process through choosing a suitable learning methodology, classroom management, and evaluation method. This is an important part that teachers need to understand in order to integrate the strengthening of character education in the 2013 curriculum. Teachers need to design a learning model that is in accordance with the objectives of PPK to build and equip Indonesia's golden generation in 2045.

The STEM learning approach is suitable for integrating the PPK in the 2013 curriculum. STEM stands for Scientific, Technology, Engineering, and Mathematics. STEM integrates science, technology, engineering and mathematics learnings. The integration of these 4 disciplines can develop student creativity and bring out good character in solving everyday problems. Pfeiffer [1] states that in STEM learning, skills and knowledge are used simultaneously by students. STEM learning is an approach by exploring learning by connecting each STEM field in order to improve student learning [2]. STEM learning can develop further if it is related to the environment so that it can create learning that presents the real world that students experience in everyday life [3].

This STEM approach is considered an attractive approach in the world of education. It is necessary to introduce STEM approach from an early age such as elementary school level to make students ready to face the challenges of globalization in real life. Not only a learning approach, assessment is also an important component in learning because through assessment we can determine whether the learning objectives have been achieved.

Attitude assessment is part of the learning assessment. This is in line with Muller's opinion in Gayatri [4] suggesting that "attitude generally means influence or rejection, assessment of likes or dislikes, positivity, and negativity towards a psychological object". This attitude assessment is crucial because it is in accordance with the emphasis of the 2013 curriculum, namely students must get good character education. With the attitude assessment, educators will know the extent of the attitudes that students possess during the learning process.

Attitude assessment must be supported by a tool to control the success rate of learning, one of which is an assessment rubric. The attitude assessment rubric is an assessment framework consisting of several attitude criteria to be assessed during the learning process, assessment indicators, and scores of each assessment indicator. With the attitude assessment rubric, the teacher can measure the extent to which the success of attitudes during the learning process.

Based on the literature study, it was found that the problem related to the attitude assessment was that the teachers still had not optimally implemented attitude assessment in learning. Based on the research regarding the development of attitude assessment on the learning process based on the theme my living areas in STEM-based outdoor learning in elementary schools, it was evident that teachers in the learning process ignore attitude assessment instruments. This is due to several factors one of which the rubric is considered difficult to use, because the teacher has to assess all of his/her students and at the same time he/she has to manage the learning process.

Based on interviews and documentation analysis at SDN 1 Nagarawangi, the attitude assessment that they usually conducted tends to be more focused on all of the students in the classroom. Because teachers thought that they remembered the characters and attitudes of their students. Mostly, assessment focuses on academic achievement only. Therefore, researchers are encouraged to carry out development research using Educational Design Research (EDR) with the title "The Development of Attitude Assessment Instrument in STEM Learning in Fifth Grade Elementary School".

2. Methods

This study focuses on developing an attitude assessment instrument with the Educational Design Research (EDR) research method. The design used in this study is according to McKenney & Reevees [5] model as shown on figure 1 below:
In other words, this research mainly focuses on developing an instrument for assessing student attitudes. This assessment instrument was validated by an expert and then was tested in the fifth grade of an elementary school named SDN 2 Sukaraja. The research sample consisted of 5 students. Data collection was carried out through interviews with the teacher to get information related to the topic. The interviews were conducted twice, that is before making the product design, and then, after the design was made, validated by experts, and tested, the second interview was performed. The validity test of the assessment instrument also consists of an expert validation sheet analysis and Kendall's concordance analysis. The validity test is used to test and determine the validity of an instrument. After consulting with experts, the instrument was tested and analyzed by item analysis. Product analysis was carried out by calculating conformity with the Kendall test. This Kendall test was carried out using the SPSS version 24 program. The Kendall test has a hypothesis where H0 means that there is no agreement or harmony between observers in assessing the attributes, and H1 means that there is agreement or harmony between observers in assessing the attributes. The basis for making a decision is as follows: If probability > 0.05 then H0 is accepted and if probability < 0.05 then H0 is rejected.

3. Results and discussion

The results obtained in the research that has been carried out are:

3.1. Analysis and exploration stage

Based on the results of the literature review, it can be seen that STEM learning is suitable for integrating PPK in the 2013 curriculum. STEM stands for Scientific, Technology, Engineering and Mathematics. STEM integrates science, technology, engineering and mathematics learnings. The integration of these 4 disciplines can develop student creativity and bring out good character in solving everyday problems. Most of elementary schools have not implemented STEM learning, this is due to the lack of knowledge about STEM. In line with that, because STEM learning has not been implemented, the use of attitude assessment in STEM learning cannot be developed by staff to be applied in the learning process.

Based on the results of preliminary studies it was found that the type of assessment that is often used is knowledge assessment, because according to the indicators on basic knowledge competency. Attitude assessment is very important, because if the attitude is excellent it will support other assessments, namely, knowledge and skills. The obstacle in implementing attitude assessment is that the attitude assessment used tends to focus on all students in the classroom.

3.2. Design and construction stage

At this stage, the researchers designed the product. Starting with a review of the 2013 curriculum to determine grades, themes, core competencies, basic competencies, indicators, objectives and content to
be used in learning. Then the researcher determines the dimensions of the attitude that will be developed. The dimensions of attitude developed in this study are discipline, responsibility, meticulousness, diligence, tolerance, curiosity, cooperation, and independence. Then, an attitude assessment instrument was designed. After the instrument design had been made, the instrument design then was validated by an expert and tested.

The following on figure 2 is one of the attitude dimension rubrics that was developed:

| No | Indikator Penilaian | Keterangan |
|----|-------------------|------------|
| 1  | Rasa ingin Tahu   |            |
|    | Antusias menyajab pertanyaan guru |            |
| 2  | Siswa hanya mau menyajab pertanyaan guru saat ditunjuk oleh guru dan dibantu oleh teman-teman | Kegiatan Inti Tahap 2, Tahap 4 |
| 3  | Siswa tidak mau menyajab pertanyaan guru meskipun ditunjuk oleh guru dan dibantu oleh teman-teman |            |

**3.3. Evaluation and reflection stage**

The trial was conducted by involving 6 students of UPI Tasikmalaya Campus and 4 teachers who acted as observers. The trial was conducted on October 13, 2020 for observers who took part in the learning process directly at SDN 2 Sukaraja. And 4 other observers conducted a trial on July 14, 2020 by watching the recording of learning process that had been prepared by the researcher.

Data from the recapitulation of scores given by 10 observers to 5 students is shown on table 1 below.

**Table 1. Data recapitulation scores.**

| Student Names | Asymp. Sig |
|--------------|------------|
| Arya         | 0.002      |
| Keiyza       | 0.001      |
| M Daniel     | 0.017      |
| Nafilah      | 0.002      |
| Rena         | 0.029      |
Based on the results of trials that have been carried out, overall the attitude assessment instrument is good based on the results of the conformity test and interviews with observers. The results of the rubric alignment test show a probability <0.05.

4. Conclusion
The attitude assessment instrument in the form of an assessment rubric developed in this study can be used by teachers for assessing attitude objectively based on each of the existing dimensions and indicators. In addition, students will have a reference about what the teacher expects based on the assessment rubric.

References
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