

INSTRUMENT OF REFLECTIVE THINKING SKILLS OF VOCATIONAL HIGH SCHOOL STUDENT

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ABSTRACT: Reflective thinking skills are one of the skills needed in learning mathematics in vocational high school. The low ability of reflective thinking students shows that students experience difficulties in learning mathematics. The purpose of this study was to obtain information about the difficulties of vocational high school students in Central Lampung District, followed by validating the instruments to measure reflective thinking skills. The research subjects were eleven grade students of SMKN 1 Terbanggi Besar, who were chosen because they could represent vocational high schools in Central Lampung District. Techniques of data collection were observations, interviews, sheet of instrument validation, and testing. From the analysis of the data, be concluded that the materialis largely considered difficult by students was a mathematical logic. Based on the analysis of data validation and tryout, it was concluded that the test instrument can be used to measure students' reflective thinking skills.

Keywords: Instrument, Reflecting Thinking Skills

1. INTRODUCTION

Education has a very decisive role for the development of each individual. One process in education is learning and one of the lessons given at school is learning mathematics. Mathematics is one of the important fields of study in the world of education, because mathematics has a role in answering everyday problems, although not all of these problems include mathematical problems (Sholihah, 2015). The purpose of mathematics learning not only emphasizes on improving student learning outcomes, but also students are expected to have some mathematical abilities. One of the mathematical abilities that are expected to be possessed by every student is the ability to reflective thinking.

In students mathematics studying are required to be able to understand and use mathematical concepts precisely to find answers to various mathematical problems. The activity or thought process that is carried out so that someone is able to solve a mathematical problem that is related to the ability to remember, recognize relation between mathematical concepts, realize the existence of a causal relation, analogy or difference relation, which can then bring up original ideas, and smooth in making decisions or conclusions quickly and accurately (Jaenudin, 2017). Acoording to that, Tisngati (2015) suggests that a high-level thinking process is needed so that each individual can relate one experience to another, including through a reflective thinking process. That is, the ability reflective thinking is one of the abilities needed in learning mathematics.

The ability of reflective thinking is Fuady (2016) a process of linking knowledge that has been acquired and is being studied in analyzing problems, evaluating, concluding and deciding on the

best solution to the problem given. Guroll (2011) states that reflective thinking is a process of directed activity in which individuals can realize, analyze, evaluate, and motivate themselves in their learning process. So it can be concluded that reflective thinking is a process of directed and precise activities in which individuals can understand, analyze, evaluate, and motivate themselves in dealing with the problems given. Thus, the ability of reflective thinking is important to be developed so that students are able to overcome the mathematical problems they get.

So that students become independent and have the ability to think, learning mathematics must be packaged so that abilities can be developed. Students must be familiar with communicating ideas and concepts in learning activities and in the use of mathematics. But in reality, often when students have not been able to give consideration or explanation for the answer when asked by the teacher. This research is a descriptive study conducted to obtain information about the difficulties of eleventh grade students in Central Lampung District City, followed by instrument validation to measure reflective thinking skills.

2. LITERATURE REVIEW AND HYPOTHESIS

Reflective thinking generally refers to the process of reviewing something that has happened. Reflective thinking is a complex mental process that involves the process of thinking critically and creatively in reviewing something that has happened or has been done (Subali, 2017). To be able to measure reflective thinking skills students need appropriate indicators. Ariestyan (2016) reveals reflective thinking indicators, namely: 1) Reacting (reflective thinking for action), 2) Comparing (reflective thinking for evaluation), 3) Contemplating (reflective thinking for critical inquiry). In line with this, indicators of the ability of reflective thinking according to adaptation from Surbeck, Han, and Moyer in Noer (2010) are reacting (reacting to problems given), comparing (evaluating what is believed by comparing reactions and other experiences), and contemplating (describing, informing, and reconstructing problems).

Based on the description above, the indicator of reflective thinking ability used in this study is reacting (reacting to a given problem), comparing (evaluating what is believed by comparing reactions and other experiences), and pondering (explaining, informing, and reconstructing problems). So that the test instruments made contain indicators to measure students' reflective thinking skills.

3. RESEARCH METHODS

The study population was all vocational high schools in Central Lampung District city. The school ranking selected in this study was based on the national exam (UN) acquisition scores in the last 3 years namely in 2015, 2016 and 2017. The sampling was carried out by stratified random sampling, namely by selecting a random sample of schools for each medium qualification that could represent each school. In the sample of this study, data will be sought about students' reflective thinking skills.

This research was conducted to obtain data about difficult materials and use instruments to measure students' reflective thinking skills. For this purpose, the following steps are taken: a) identification of material that is considered difficult by the students, b) instrument validation to measure students' reflective thinking skills. Data about material that is considered difficult by students in vocational high schools. After concluding the learning material, an instrument will be provided that can measure students' reflective thinking skills.

Interview with several students (5 people) to find out where material they find difficult. The results of the observations were analyzed descriptively with mathematical material that was difficult for students to understand. Descriptive analysis is used as a basis for making reflective thinking instruments. In this study, this instrument is feasible to be used to obtain data on students' reflective thinking abilities.

4. DISCUSSIONS AND ANALYSIS OF RESULTS

Based on research conducted at SMKN 1 Terbanggi Besar it is known that when starting the lesson, the teacher gives apperception by reviewing the previous material and supporting material. After that the teacher explains the material, provides an opportunity for students to ask questions, then the teacher gives training to students and students who discuss it to solve problems. Based on interviews conducted with students at SMKN 1 Terbanggi Besar, it was found that most students only memorize formulas without understanding the concept. Difficulties experienced by students are difficulties in modeling the problem of word problems into mathematical forms. Based on the questionnaire given to students it is known that in general students experience difficulties in the mathematical logic. So in SMKN 1 instruments will be used that can measure students' reflective thinking skills.

In this study, item validity was tested to determine items to support the total score. To measure the correlation coefficient between item scores and the total score used the Pearson product moment r_{xy} formula. To test the significance of each correlation coefficient, Sudijono (2005) t -test is used with the following criteria: if $t_{ht} > t_{table}$ at the significance level of $\alpha = 0.05$ and $df = n - 2$, then H_0 is rejected (valid). Otherwise H_0 is accepted (not valid). In this study, test the reliability of the test was also measured to determine the level of reliability of the test. To calculate the reliability coefficient of Cronbach's alpha test using the formula (Ruseffendi, 1992). Interpretation of the test reliability coefficient (R_{11}) uses the following benchmarks: (1) If R_{11} is equal to or greater than 0.70 it means that the test has high reliability, and (2) If R_{11} is less than 0.70 it means that the test does not have high reliability. Calculations about validity, reliability, strength of discrimination, and level of difficulty of the tests are summarized in Table 1.

Table 1. Recapitulation of Reflective Thinking Test

Item	Validity	Reliability	Discrimination Power	Level of Difficulty
1a	Valid	0,71	Less	Difficult
1b	Valid		Good	Difficult
1c	Valid		Good	Difficult
2a	Valid		Good	Easy
2b	Valid		Good	Difficult

Based on the results presented in Table 1, the test instruments have met the standard tests that can be used to measure reflective thinking skills.

5. CONCLUSION

Based on the results of research conducted, it can be concluded that:

- a. Based on students interviews obtained information about the material that is difficult to understand by students, namely the mathematical logic material. So that the instrument used

is an instrument that can measure students' reflective thinking skills on mathematical logic material.

- b. Based on the results of trials in schools, the test can be used to measure students' reflective thinking skills.

6. REFERENCES

- Ariestyan dkk. 2016. *Proses Berpikir Reflektif Siswa dalam Menyelesaikan Soal Matematika Sistem Persamaan Linier Dua Variabel*. Jurnal FKIP Pendidikan Matematika Universitas Jember.
- Fuady, Anies. 2016. *Berpikir Reflektif dalam Pembelajaran Matematika*. Jurnal Ilmiah Pendidikan Matematika Vol 1 No 2.
- Guroll, A. 2011. *Determining The Reflective Thinking Skills of Preservice Teacher in Learning and Teaching Process*. Jurnal Energy Education Science and Technology Part B: Social and Educational Studies Vol 3 No 3.
- Jaenudin dkk. 2017. Analisis Kemampuan Berpikir Reflektif Matematis Siswa Ditinjau dari Gaya Belajar. *Jurnal Pendidikan Matematika Universitas Sultan Agung Tirtayasa*.
- Noer, Sri Hastuti. 2010. *Peningkatan Kemampuan Berpikir Kritis, Kreatif, dan Reflektif (K2R) Matematis Siswa SMP Melalui Pembelajaran Berbasis Masalah*. Disertasi Pendidikan Matematika Sekolah Pasca Sarjana UPI. Tidak diterbitkan.
- Ruseffendi, E.T. 1992. *Pengantar kepada Membantu Guru Mengembangkan Kompetensinya dalam Pengajaran Matematika untuk Meningkatkan CBSA*. Bandung: Tarsito.
- Sholihah dkk. 2015. *Keefektifan Experiential Learning Pembelajaran Matematika MTS Materi Bangun Ruang Sisi Datar*. Jurnal Riset Pendidikan Matematika UNY Vol 2 No 2.
- Subali dkk. 2017. *Berpikir Reflektif sebagai Proses Berpikir Kritis dan Kreatif: Suatu Tinjauan pada Konteks Keterampilan Mahasiswa dalam Proses Penyelesaian Masalah Fisika Matematika*. Makalah Semnas IPA VI.
- Sudijono, A. 2005. *Pengantar Evaluasi Pendidikan*. Jakarta: Raja Grafindo Persada.
- Tisngati, Urip. 2015. *Proses Berpikir Reflektif Mahasiswa dalam Pemecahan Masalah*. Jakarta: Tesis Pendidikan Matematika UNS.