

Training on Making Geography Problems Using Taxonomy of Spatial Thinking

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ABSTRACT

Community service activities about training in making geography problems using taxonomy of spatial thinking at the high school education level are based on the lack of implementation of taxonomy of spatial thinking in the learning implementation plan and test problems. This makes the analysis of problem solving low, whereas the analysis of problem solving is the spatial ability of geography. This activity is not limited to training in making geography problems only, but also the application of spatial thinking problems up to evaluation and follow-up how the process has been done. In addition, the science and technology used to support this activity is the activity team will evaluate the problems commonly used by teachers at the time of the test, to then analyze how far the problems contain taxonomy of spatial thinking.

Keywords: problem; taxonomy; spatial thinking; training; geography

INTRODUCTION

The learning process activities in the classroom in formal education refer to the rules of the government in the form of a curriculum. The curriculum, in its role as a reference for formal education, begins with the establishment of graduate competency standards. Graduate competency standards in this curriculum are unique objectives in the curriculum to set rules for achieving student learning success at certain levels of education (Selfiardy et al, 2017). To meet the achievements targeted at graduate competency standards, there are content standards, process standards, and assessment standards. Content standards contain teaching materials and levels of competence that must be achieved at certain levels of education. Process standards are planning the learning process to be effective and efficient to achieve graduate competence. After the learning process takes place, then the assessment standard has a role to evaluate the learning process with appropriate instruments to measure certain levels of competence.

Evaluation of teaching and learning activities using standard assessment guidelines can be done at the time when the teaching and learning process takes place, usually to assess student participation during teaching and learning activities, and also carried out after the teaching and learning process. Assessment after the teaching and learning process is called assessment to measure students' understanding of the material they obtain during the learning process. Assessment of the learning process must use appropriate test instruments so that the evaluation results represent the state assessed against the reference value (Jo et al, 2010; Bednarz & Lee, 2011; Lee & Bednarz, 2012; Selfiardy, 2022). A commonly used assessment instrument is a test.

This test can be in the form of questions that students do, can be in the form of objective (multiple choice) and subjective (essay) tests.

The preparation of test questions must be based on basic competencies and indicators of competency achievement, whose activities are carried out during the learning process (Jo et al, 2010). This is stated in the lesson implementation plan (RPP) that subject teachers have made before carrying out learning activities. In the process of making lesson plans, teachers always use operational verbs (KKO), which are useful as a description of learning process activities and levels of evaluation question forms. The KKO commonly used by teachers is an adaptation of Bloom's taxonomy. This taxonomy according to Naryatmojo (2018) aims to classify the material or purpose of education based on the domain (cognitive, affective, and psychomotor domains). This taxonomic level consists of six levels, namely remembering, understanding, applying, analyzing, evaluating, creating. The level of remembering and understanding is often referred to as the low taxonomic level, while applying, analyzing, evaluating, and creating is referred to as the medium to high taxonomic level. This taxonomic level classification reflects how complex learning activities are to achieve certain competencies, and how complex the problem instruments are that will measure students' understanding of certain matters. High taxonomic levels are often used to create instruments for high order thinking skills (HOTS). High-level thinking problems are made by teachers because to do these problems requires high-level analysis. Thus, HOTS questions require students as evaluation subjects to be accustomed to reasoning, not just remembering.

In evaluating geography ability, teachers use Bloom's taxonomy to compile question instruments as a measure of student competence achievement. In fact, regardless of whether the question instrument used uses low or high level analysis, there is something more crucial than reasoning, namely spatial ability as a form of achieving students' geography abilities. Evaluation questions that are commonly used require students to think at a higher level only, not to think spatially (Jo, 2009; Scholz, 2014; Ridha, 2019). Though spatial ability is the most essential way of solving problems to overcome spatial problems. The taxonomy of spatial thinking is designed to be implemented into activity and learning planning and evaluation tools. It is expected that evaluation tools or student competency measurement tools not only require students to think higher-order, but also use spatial skills in higher-order thinking skills.

METHOD

Training on making questions using taxonomy of spatial thinking for geography teachers at SMAN 1 Tomohon in 2021 will be carried out by the research team with details of the implementation method as follows.

1. Programs agreed upon by the service team and partner schools:
 - a. Activity 1. Introduction to the Taxonomy of Spatial Thinking. This activity begins with the presentation of taxonomic functions in education. It is then linked to Bloom's taxonomy and its position in the curriculum. Followed by an introduction to spatial thinking taxonomy and taxonomic suggestions in education.
 - b. Activity 2. Making Test Questions. The method of implementation of this activity is classical. In this activity, there will be a session on adjusting RPP and spatial thinking-based questions.
 - c. Activity 3. Evaluation and follow-up. The team will evaluate the planned activities and make a follow-up plan according to the results of the evaluation carried out. In this case, the team distributed survey questionnaires to geography teachers.

RESULTS AND DISCUSSION

The results of the PKM community service program entitled "Training on Making Geography Problems Using Taxonomy of Spatial Thinking at SMAN 1 Tomohon" showed quite good results covering several components as follows.

1. Achievement of training objectives
2. Achievement of planned material targets
3. Participants' ability to master the material
4. Achievement of taxonomic validation survey

The achievement of the training objectives of making geography questions using the taxonomy of spatial thinking is generally good, but the limited time provided has resulted in this problem-making training activity cannot be related to the realm of geography literacy and global perspective material for geography education. However, judging from the results of the training, the participants understood the material and made questions, it can be concluded that the purpose of this activity has been achieved.

The material achievement in this activity is good. The mentoring materials that have been delivered are:

1. Types of questions (low order thinking skill and high order thinking skill)
2. Taxonomy of spatial thinking
3. Evaluation of taxonomy-based spatial thinking questions
4. Suggestions for taxonomy applications

The ability of participants to understand the taxonomy of spatial thinking and its application in making problems is quite good. It can be seen in the interaction of trainers with participants, they already understand the levels in spatial thinking taxonomy and its application in problem making. The interaction process during the training also occurred an evaluation of questions that participants had used as a cognitive measurement tool for students whether they had entered the category of spatial or non-spatial questions.

The taxonomic validation survey in this activity was successfully carried out, so that the trainer had the results of the participants' opinions regarding the appearance and content of spatial thinking taxonomy. The purpose of the taxonomy validation survey is to achieve display validity and content validity for the taxonomy of the participants as teachers. The taxonomy validation survey used nine questions on a Likert scale of 5. From the survey results, it is known that the answers of participants as respondents show the mode number on a scale of 5, which is very agree. It can be concluded that broadly speaking, participants strongly agree on the taxonomy of spatial thinking both in terms of content and appearance.

Overall, this training activity for making geography problems using spatial thinking taxonomy can be said to be successful. This success, in addition to being measured by the four components above, can also be seen from the satisfaction feedback and feedback of participants during and after participating in the activity. The benefit obtained by teachers is that they can compile questions using spatial-based problems using spatial thinking taxonomy, so that evaluation tools to determine the cognitive level of students in geography subjects are loaded with spatial-based questions. This is of course a concrete step where geography which is a spatial science is evaluated with the right evaluation tools.

CONCLUSION

With the community service activities of the PKM program for Fiscal Year 2021, the problems faced by partners can be resolved immediately in order to improve services to school partners. In this PKM activity, quite good results were obtained, including: 1) Geography teachers at SMAN 1 Tomohon have new knowledge about spatial thinking taxonomy which can be used next as a tool to measure students' geography learning ability as well as a tool to determine geography learning resources. 2) The response from teachers to the existence of spatial thinking taxonomy is very good, which is evident in the results of the taxonomy validation survey.

In the activities that have been carried out, the service team suggested to geography teachers there to start routinely using spatial thinking taxonomy in teaching and learning activities. This will certainly bring students' spatial thinking skills to be honed and increase students' sensitivity to the surrounding space.

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