

DO TEACHERS GIVE DIAGNOSTIC ASSESSMENT TO MEASURE STUDENTS' MISCONCEPTION?

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Abstract

The importance of diagnostic assessment should be realized by teachers. This paper presents the results of a qualitative study on teachers' perspective about diagnostic assessment. This research is a qualitative study with a phenomenological approach. Teachers were interviewed about their perspective regarding the importance of giving diagnostic assessment to measure students' misconception and also the implementation of diagnostic assessment using open-ended question. The results of this study show that teachers do not conduct diagnostic tests as they should. Teachers do not make diagnostic test instruments and only rely on oral questions to diagnose their students' misconceptions.. Thus, the government can give socialization about diagnostic testing to the teachers so that teachers will be more aware in utilizing diagnostic testing to measure students' misconception.

Keywords: diagnostic assessment, misconception, mathematics, high school

APAKAH GURU MELAKUKAN ASESMEN DIAGNOSTIK UNTUK MENGUKUR Miskonsepsi SISWA?

Abstrak

Pentingnya penilaian diagnostik harus disadari oleh guru. Makalah ini menyajikan hasil studi kualitatif tentang perspektif guru tentang penilaian diagnostik. Penelitian ini merupakan penelitian kualitatif dengan pendekatan fenomenologi. Guru diwawancarai mengenai perspektif mereka mengenai pentingnya memberikan penilaian diagnostik untuk mengukur miskonsepsi siswa dan juga pelaksanaan penilaian diagnostik menggunakan pertanyaan terbuka. Hasil penelitian ini menunjukkan bahwa guru tidak melakukan tes diagnostik sebagaimana mestinya. Guru tidak membuat instrumen tes diagnostik dan hanya mengandalkan pertanyaan lisan untuk mendiagnosis miskonsepsi siswanya. Oleh karena itu, pemerintah dapat memberikan sosialisasi mengenai tes diagnostik kepada guru agar guru lebih sadar dalam memanfaatkan tes diagnostik untuk mengukur miskonsepsi siswa.

Kata Kunci: asesmen diagnostik, miskonsepsi, matematika, sekolah menengah

1. Introduction

Assessment is essential for evaluating the learning process. Soleh, Khumaedi, & Pramono (2017) highlight that teachers need to be adept in assessment to determine learning outcomes effectively. Richardson (2022) describes assessment as the process of collecting information that influences decisions about students, curriculum, programs, and school policies. Pandra, Sugiman, & Mardapi (2017) point out that assessment's goal is to track student learning progress, the learning process, and to enhance learning outcomes. The assessment's purpose

is to gauge students' mastery of knowledge, values, attitudes, and skills, thereby improving education (Fulton et al., 2021; Koretsky et al., 2022; Tarmo & Kimaro, 2021). However, its role in educational improvement is often overlooked by teachers, who may focus solely on its administrative functions. In essence, assessment is a tool for gathering detailed information about student learning outcomes and processes, which is crucial for planning future learning.

Tests are the most frequently used instruments in assessment. Holmes & Brian (2019) define a test as a means to identify an

individual's abilities, symptoms, and character. Dersch, Heydel, & Eitel (2022) emphasize that the quality of a test is vital as it measures student achievement and impacts results. Akib & Ghafar (2015) note that tests assess students' cognitive abilities, determining their readiness for graduation. Thus, the test has an important function in determining the mastery of students' knowledge. Tests are instrumental in diagnosing students' difficulties or misconceptions, especially in mathematics. Diagnostic tests shed light on students' knowledge mastery and misconceptions (Santrock, 2018; Shim et al., 2017). They are characterized by their ability to pinpoint students' strengths and weaknesses, provide timely feedback, and guide further instruction (Ayieko et al., 2022). Implementing improvements based on diagnostic test results is crucial.

Learning is an ongoing process that demands active student participation. Piaget (1972), contends that knowledge is formed through the amalgamation of experience and new information. Mathematics learning is cumulative, building on existing knowledge (Roselizawati et al., 2014). A failure to integrate old and new knowledge can lead to gaps and misconceptions.

Misconceptions, defined as misunderstandings due to gaps between new and old knowledge, are barriers to learning new concepts (Bütüner & Filiz, 2016). Factors leading to misconceptions include daily experiences, language barriers, and instructional materials (Widyatmoko & Shimizu, 2018). Lowe (2015) suggests that insufficient teacher feedback can exacerbate misconceptions. Mohyuddin & Khalil (2016) argue that misconceptions in mathematics hinder concept comprehension and lower learning outcomes.

Misconceptions are particularly prevalent in mathematics due to the sequential and interconnected nature of the subject matter. To address misconceptions, teachers must develop appropriate diagnostic instruments. These tests are conducted to identify learning difficulties and are defined as a critical analysis of a student's understanding.

In Indonesia, the implementation of diagnostic tests in the classroom plays a pivotal role in the assessment and enhancement of students' mathematical

abilities. The Indonesian government has been prioritizing the improvement of students' higher-order thinking skills through initiatives such as the Minimum Competency Assessment (AKM) (Meryansumayeka et al., 2022). Such assessments are designed to evaluate and enhance students' mathematical readiness and skills, thereby ensuring a solid foundation for future learning (Mejias et al., 2019). Another research has demonstrated that early interventions and assessments, such as parent-child number activities and math readiness assessments, can predict and influence children's math trajectories from preschool to primary school (Zhang et al., 2020). The incorporation of diagnostic tests at an early stage allows educators to identify areas requiring improvement and provide targeted support to students, thereby fostering continuous growth in mathematical skills (Zhang et al., 2020). However, research on the implementation of diagnostic assessments by teachers in the classroom is limited.

The significance of diagnostic assessment is widely recognized. However, its actual implementation in classrooms remains unclear. Therefore, this study aims to explore the implementation of diagnostic assessments conducted by teachers in the classroom to overcome misconceptions.

2. Methods

This study used qualitative research as the design. Since there are some kinds of qualitative research, phenomenology becomes the suitable design for this study. Phenomenology is the design where the purpose is to find the description of someone's experience (Tracy, 2020). In this case, the description of the teacher's experience in carrying out the diagnostic assessment in the classroom needs to be known.

The participants in the study were three mathematics teachers who teach in public schools in Sleman Regency. Participants in this study were selected using purposive sampling technique. The participants were chosen by following some criteria. The criteria that should be fulfilled are teachers who have been taught a mathematics subject for five to ten years, both male and female and must possess an educational background majoring in mathematics.

The qualitative data was obtained from interviews. The researcher came to each participant to hold an interview. They asked to be recorded first. Then, there are some open-ended questions related to the research which were asked to the participants. Pertanyaan wawancara menggunakan pertanyaan terbuka. Pertanyaan terbuka digunakan untuk menggali praktek asesmen diagnostik yang dilakukan oleh partisipan selama ini. Participants are free to answer because their data is safe. After the interview session, the recording was transcribed. Then, the transcription was given to the participants to make sure that there is no additional and missing information. After the participant agreed, the transcription was coded into some themes namely participant's opinion toward diagnostic measurement and the implementation. After that, the data was arranged into a report.

3. Result and Discussion

This study aimed to explore the implementation of misconception diagnostic tests in the classroom. The results of this research are outlined in the following themes.

The implementation of diagnostic testing in measuring students' misconception

Despite the widespread recognition of the importance of diagnostic testing in educational settings, its implementation in some Indonesian schools remains notably absent. Diagnostic tests serve a critical function beyond mere assessment; they are designed to measure students' abilities and identify specific learning needs. The current practice of using tests solely for evaluative purposes provides limited insights, underscoring the need for a more diagnostic approach to testing.

Interviews with educators reveal a unanimous agreement on the significance of diagnostic testing. Participant 3 employs quizzes to categorize students into three proficiency levels: middle high, middle, and middle low. Similarly, Participant 2 utilizes pre-learning assessments to tailor educational interventions. Participant 1's approach involves using quizzes to probe students' mathematical reasoning, using their responses to detect potential misconceptions. It can be seen below

In the first meeting, I always classify students into three namely middle high, middle, and middle low.

(Participant 3)

I give them a question, the material is the same but the number is different. I classify them based on that.

(Participant 2)

I give them a quiz then I asked about their mathematical argument. If they cannot answer, I assume that there will be a misconception

(Participant 1)

While teachers acknowledge the value of diagnosing students' abilities, there appears to be a disconnect between this recognition and the actual implementation of diagnostic testing. As Shim, Shakawi, & Azizan (2017) highlight, diagnostic tests are instrumental in uncovering not only students' mastery of content but also their misunderstandings. This dual purpose is crucial, as it informs both teaching strategies and student learning processes.

The evidence suggests that while teachers may be diagnosing student ability, they are not employing diagnostic tests in the ideal sense. The distinction lies in the test's design and intent; a true diagnostic test is crafted to elicit detailed information about students' comprehension and misconceptions, thereby guiding subsequent instruction. The findings of this study align with those of previous research, which indicates that Indonesian educators continue to exhibit limitations in their ability to differentiate between various types of educational assessments, including diagnostic, formative, and summative assessments (Wijaya et al., 2019). To bridge this gap, it is imperative that teachers receive training in developing and implementing diagnostic assessments (Lee et al., 2021). Furthermore, educational policy should support the integration of diagnostic testing into regular practice, ensuring that all students benefit from personalized learning experiences (Spillane et al., 2019).

Participants' opinion toward students' misconception

Mathematical misconceptions represent a significant barrier to learning, particularly as students progress to more complex material

(Kurniati et al., 2018). When foundational concepts are misunderstood, students are likely to struggle with subsequent topics, leading to a cumulative deficit in understanding. This issue is not isolated to individual learners but is a systemic challenge that educators must confront. It can be known below.

I give them a mathematical concept, then I observe whether they understand or not. After that I asked them a question including mathematical arguments. If they cannot be responsible for their answer, I assume that they do not understand the whole concept.

(Participant 1)

They don't even understand basic mathematics like addition, subtraction, multiplication, and division. I assume that in elementary school, they do not get the concept so that they cannot even answer the basic mathematical question.

(Participant 2)

Educators have observed that misconceptions can persist into senior high school, as evidenced by Participant 1's method of assessing comprehension through questions that require mathematical arguments. Participant 2 notes a lack of understanding in basic operations such as addition, subtraction, multiplication, and division, suggesting gaps in earlier education levels. The transcriptions provided indicate that misconceptions may originate from inadequate concept mastery in elementary school. This early educational experience sets the stage for future learning, and any gaps can have long-lasting effects. These results are in line with several previous studies (Ndemo & Ndemo, 2023; Owusu et al., 2023) which state that misconceptions often stem from imperfect mastery of basic mathematical concepts at the previous level of education, such as addition, subtraction, multiplication, and division, causing obstacles for students to master more complex material. It is crucial, therefore, to ensure that students grasp basic mathematical concepts before advancing.

The persistence of mathematical misconceptions into senior high school underscores the need for a proactive approach to mathematics education. By prioritizing early diagnosis and intervention, educators can help students build a solid foundation for future learning and prevent the cascade of misunderstanding that hinders academic progress (Shanley et al., 2021): Beside, teachers need to develop the appropriate instrument to reveal students' exact ability (Soeharto, 2021). Generally speaking, the use an appropriate instrument can ease teachers' identification of misconception in students.

4. Conclusion

This study aims to explore the implementation of diagnostic tests conducted by teachers in the classroom. Based on the results of this study, it can be concluded that the implementation of teacher diagnostic tests in the classroom has not been carried out perfectly. This is because teachers still conduct diagnostic assessments orally without a valid and reliable test instrument. The results of this study contribute to the addition of information regarding the implementation of diagnostic assessments by teachers which is still not perfect. Even so, this study still has some limitations in the small number of participants. In addition, the participants still came from one area so further research is expected to have more diverse and larger participants.

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