THE IDENTIFICATION OF STUDENTS' UNDERSTANDING OF QUANTITIES AND UNITS CONCEPTS THROUGH MADURA LOCAL WISDOM PROBLEMS

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Abstract. This research focuses on identifying students' understanding of quantities and units concepts. Concept understanding indicators include interpreting, exemplifying, classifying, comparing, explaining, and inferring. This quantitative descriptive research involved 19 students of class VII MTs. Tanwirul Hija, Sumenep. Data on students' understanding of concepts was obtained through a test on quantities and units material presented through problems with the context of Madura's local wisdom. Data analysis used descriptive statistics in the form of percentages and averages. The results showed that the average student's conceptual understanding was 44.21, with a moderate category. The very high category of concept understanding was 15.8%, the high category was 5.3%, the moderate category was 52.6%, the low category was 10.5%, and the very low category was 15.8%. The average concept understanding score is highest achieved on the explaining indicator, while the lowest on the inferring indicator.

Keywords: Concept Understanding, Quantities, Units, Madura Local Wisdom.

INTRODUCTION

Natural Sciences is one of the compulsory subjects in junior high school. Natural science is closely related to finding out about the universe and the relationship between facts about humans (Insani, 2016). Natural science is related to how to find out about nature systematically through a process of discovery so that science is not just a collection of knowledge in the form of concepts and facts (Wiyono & Budhi, 2018). Thus, science learning has a close relationship with everyday life. Concerning daily life, science learning can be integrated with the local wisdom of an area. The integration of local wisdom positively impacts the science learning process (Indrawan & Mahendra, 2021; Jufrida et al., 2020)

One of Indonesia's islands rich in local wisdom and specific characteristics is Madura. Batik, traditional weapons, culinary, *karapan sapi*, and also traditional games that are currently still being preserved are forms of various Madura cultural values. Madura has four districts, each of which has its cultural characteristics. Madura traditional games are of various types, and each type has different names, rules, and unique game tools in each region (Adhani & Nazarullail, 2020). One of the traditional games connected with the concept of learning is the *pesapean* game. *Pesapean* is a form of a mini replica of *karapan sapi* culture in Madura. This game is full of science concepts, one of which is the concept of quantities and units.

Quantity can be defined as everything that can be measured and expressed by numbers, while a unit is a comparison in a measurement of quantity. The concepts of quantity that can be found in *pesapean* include length, time, mass, velocity, acceleration, force, and work. Thus, *pesapean* can be a context for scientific problems related to quantities and units. Science problems with *a pesapean* context are expected to make it easier for students to understand science concepts.

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Understanding the concept of science is one of the crucial things that have a role in achieving student learning outcomes. Concepts understanding is the basic understanding of the principles and theories studied (Diana et al., 2020). Students who understand a learning concept will be able to re-explain the learning material that has been learned according to their understanding, making learning meaningful (Nahdi et al., 2018). Research by Febriyana et al. (2021) found that understanding the concept of junior high school students in the solar system material is sufficient. The research of Pratama et al. (2021) found that the understanding of the concept of junior high school students in the reproductive system material still needs to be improved. These results align with the identification of concepts understanding the temperature and heat of MTs. Agung Mulya Pamekasan students (Iswanto et al., 2021).

This study aims to identify students' understanding of quantities and units concepts using problems with *a pesapean* context. Research by Jannah et al. (2022) also used problems with *a pesapean* context to identify students' understanding of concepts, but the concept raised is the frictional force. The results of identifying the understanding of this concept can later be used as material for developing contextual science learning designs that integrate Madura's local wisdom.

RESEARCH METHOD

This research is a quantitative descriptive study involving 19 students of class VII Mts. Tanwirul Hija Sumenep. The sampling technique in this study used *purposive sampling* techniques with the criterion that the subjects had studied material of quantities and units. The data was obtained through a two-tier diagnostic test. The test consists of 10 questions with a cognitive realm range of C2-C5. Indicators of concept understanding include interpreting, exemplifying, classifying, comparing, explaining, and inferring. Before use, the test was validated by experts and obtained a validity score of 0.98 with very valid criteria.

Analysis of concept understanding data is calculated using the formula:

$$S = \frac{P}{MS} \times 100$$

Information:
S = Test Scores
P = Number of points earned
MS = Maximum Score

Furthermore, students' concept understanding scores can be classified according to the criteria in table 1.

Table 1. Concept Understanding Level Criteria

Score	Level
$0 < S < 20$	Very Low
$20 < S < 40$	Low
$40 < S < 60$	Moderate
$60 < S < 80$	High
$80 < S < 100$	Very High

RESULT AND ANALYSIS

The research has been completed smoothly. Students were asked to observe the traditional game *of pesapean* and were allowed to explore the concept of quantities and units in the game. Furthermore, students were asked to answer 10 questions on the conceptual understanding test for 60 minutes. The results of the descriptive statistical analysis of students' concept comprehension scores are presented in table 2.

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Table 2. Descriptive Statistics of Concept Comprehension Test Results

Statistics	Result
Mean	44.21
Median	40
Mode	40
Standard Deviation	26.31
Range	100
Minimum	0
Maximum	100

The percentage of students at each level is presented in table 3.

Table 3. Percentage of Students' Concept Comprehension Level

Level	The Number of subjects	Percentage (%)
Very Low	3	15.8
Low	2	10.5
Moderate	10	52.6
High	1	5.3
Very High	3	15.8

Based on table 2, it can be seen that the average student's concept understanding score is 44.21. If it is classified according to table 1, the average level of students' concepts understanding is moderate. Based on table 3, most students have a moderate concept understanding of the at a moderate level. These results align with Jannah et al. (2022) research on the profile of students' understanding of concepts in friction force material using *the pesapean* context. In the study, it was stated that the average student concept understanding score was 42. Thus, the level of understanding of students' concepts in solving science problems in the context of *pesapean* is moderate. The highest score obtained by a student is 100, which means that the student answered correctly on all questions. The lowest score obtained by students is 0, which means that students are wrong in answering all questions.

The test used in this study consists of 6 indicators, namely interpreting, exemplifying, classifying, comparing, explaining, and inferring. The results of the test for conceptual understanding in the *pesapean* context of each indicator are presented in table 4.

Table 4. Average concept understanding score per indicator

Indicator	Average Score	Level
Interpreting	57.89	Moderate
Exemplifying	65.79	High
Classifying	33.33	Low
Comparing	31.58	Low
Explaining	73.68	High

Inferring	23.69	Low

The average student's score on the explaining indicator is at a high level. This score shows that students can explain a system by knowing the cause or effect. For example, students can explain why the velocity at the *pesapean* is said to be a derivative quantity. Exemplifying is an indicator of conceptual understanding that are also at a high level. Students can achieve exemplifying indicators if they can exemplify and illustrate a concept learned (Ulfia & Irwandani, 2019). For example, students can give examples of measuring instruments used in *pesapean*.

The only indicator of conceptual understanding that is at a moderate level is interpreting. This indicator relates to the student's ability to change from one form of information to another. For example, students can turn the information they have obtained by looking at graphs or pictures into their own words. Instead, students convert the information into sentences into a graph or images. On this indicator, some students still need help changing the form of information from one form to another, indicated by classifying, paraphrasing, and interpreting a concept.

The average student's concept understanding score on the classifying indicator still needs to be higher. Classifying indicator is a cognitive process of students that complements the process of exemplifying, whereas classifying starts with an example and requires students to find principles or concepts (Khotimah & Yanto, 2018). Although in the indicator of giving an example, the average score of understanding concepts at a high level is obtained, the indicator of classifying students' ability is relatively low. Students tend to give examples of quantities easily but need clarification when asked to group several sizes according to the characteristics of the quantities. An indicator that is also included at a low level is comparing. Comparing is the ability to detect differences and similarities shared by two ideas, situations, or objects. Students' ability in this indicator is relatively low because the comparing indicator requires high comprehension skills to distinguish concepts associated with the context of students' daily lives (Fahrudhin, Zuliana, & Bintoro, 2018). The indicator with the lowest average score is inferring. Inferring is the ability to deduce a concept with logical language from the information that has been received. Students can achieve interesting indicators of inference if they have abstracted a concept or a principle that explains an example or activity by looking at its characteristics and can draw relationships between the characteristics of the series of activities or examples. Most students still need help inferring, which includes finding patterns in several existing examples.

According to Fatimah (2017), factors that affect the understanding of concepts in the learning process are internal and external. Internal factors include attitudes toward learning, student character, learning motivation, study concentration, study habits, and self-confidence, while external factors include teachers, friends, models, methods, and learning media. One of the learning methods that can be used to increase the understanding of the concept of quantities and units is the practicum method (Afifah et al., 2021). Quantities and units are materials related to the surrounding environment. Students' understanding of concepts can be obtained by relating learning materials through direct observation of *pesapean* games. For this reason, the results of this identification can be used as a consideration for teachers in designing science learning that is more contextual and meaningful.

Vygotsky's theory of constructivism holds that knowledge is built by a collaboration between one individual and another, which will then be adjusted to the circumstances. In the conditioning process, intellectual adjustments are made to socio-cultural conditions (Muhibbin & Hidayatullah, 2020). Contextual learning will emphasize the relationship between learning materials and real student life so students can connect and apply the learning obtained in everyday life (Primayana et al., 2019). Learning that uses a contextual approach is designed to combine knowledge with action, where learning becomes more concrete, natural, fun, and meaningful (Parhan & Sutedja, 2019). Meaningful learning invites students to connect newly acquired knowledge with previously acquired knowledge (Muamanah & Suyadi, 2020). In the learning process, students are not just memorizing material but must understand the concepts given. Learning by memorization will make students quickly forget the concepts of the studied material (Eliyawati et al., 2020).

CONCLUSION

Identification of students' understanding of concepts using a diagnostic test in the context of traditional games resulted in data that the average student understanding score on the concept of quantities and units was 44.21. This result shows that students' conceptual understanding is at a moderate level. The results also showed that 15.8% of the study subjects were at a very high level of understanding, 5.3% were at a high level, 52.6 were at a moderate level, 10.5% were at a low level, and 15.8% were at a very low level. The average concept understanding score on the explaining and exemplifying indicators reaches a high level, the interpreting indicator reaches a moderate level, while the classifying, comparing, and inferring indicators are still low. The identification of understanding this concept can be used as a consideration for teachers in designing science learning that is more contextual and meaningful through integration with local wisdom.

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