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Analysis of Junior High School Students' Misconceptions Using Five Tier Diagnostic Test In The Concept of Living Things Classification

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Abstract

This research aims to describe the percentage of misconception levels of junior high school students using a five tier diagnostic test on the classification of living things. This type of research is a quantitative descriptive with a population of class VII students at SMP Negeri 3 Bangkalan for the 2022/2023 academic year. The samples used in the research were classes VII-A and VII-D based on purposive sampling techniques. Data collection was carried out by administering five tier diagnostic test questions. The research results showed that: 1) Students experienced M (Misconception) 37.73%, SC (Scientific Conception) 17.27%, ASC (Almost Scientific Conception) 2.73%, LK (Lack of Knowledge) 26.64%, NU (No Understanding Conception) 15.18%, and UnC (Un-Code) 0.45%, 2) The percentage of classification of misconception levels based on calculations using standard deviation and the mean of students is in the low misconception category of 27.27%, moderate misconception amounted to 52.73%, and high misconceptions amounted to 20%. Based on the results of the research and data analysis carried out, it can be concluded that the high percentage of students' misconceptions indicates that the concepts on the classification of living things is quite difficult for students at SMP Negeri 3 Bangkalan to understand.

Key words: diagnostic test, five tier, classification of living things, conception, misconceptions.

INTRODUCTION

Science is a learning concept related to natural phenomena that occur in human life (Asmoro & Mukti, 2019). Science develops based on observations of phenomena in the universe and is continuously studied to obtain a scientific concept (Ismiyanti, 2020). Science learning is a science that studies events that occur in nature by observing, experimenting, and summarizing human behavior(Mainam, 2018). Science learning emphasizes a direct experience process that connects previous knowledge with the material being studied. This is because in science learning, one of the things that students must master is the ability to understand a concept (Aen & Kuswendi, 2020).

Understanding concepts is the ability to receive and understand information obtained from a series of events that can be directly seen, heard and stored in the mind and then applied in everyday life. Students are said to be able to understand a concept if they can explain and describe the concept in their own words (Susanti et al., 2021). The understanding of concepts that students have during the learning process will certainly influence learning outcomes (Rahmadani et al., 2022). If the learning outcomes obtained by students are not satisfactory, it is possible that there was a wrong understanding of concepts

during the learning process or what is better known as misconceptions (Hasanti & Zulyusri, 2021).

Misconceptions are errors in understanding a concept where the concept is different from the concept agreed upon by experts (Hasanti & Zulyusri, 2021). Factors that cause misconceptions can originate from teachers, students, textbooks and learning methods (Qadri et al., 2019). Apart from that, teachers do not often measure students' misconceptions in science learning. This is because teachers are more focused on achieving learning indicators, so without realizing it this can cause misconceptions in students (Suharto & Csapó, 2022).

Based on interviews with science teachers at SMP Negeri 3 Bangkalan, one of the misconceptions that occurs among students is in the biology concepts. Misconceptions that occur are caused by students not understanding the concept and also not learning enough. Apart from that, teachers have never measured the misconceptions that occur in students. Misconceptions are discovered accidentally when the teacher asks students to answer or express opinions on the questions asked. According to Jayanti & Susantini (2021)The emergence of misconceptions can be a barrier for students to understand a concept, this is because basically students already have initial knowledge that has been embedded in their memory.

Students' understanding of a concept that is not appropriate and inconsistent with scientific concepts is called a misconception. Misconceptions occur in students who do not understand a concept given during the learning process (Haidar et al., 2020). These misconceptions can hinder students from receiving learning material so that students also experience difficulty in understanding the correct concepts (Soeharto et al., 2019).

One of the science materials that has the potential to experience misconceptions is the classification of living things. Classification of living things is one of the science materials studied in class VII, even semester. Studying concepts on the classification of living things without understanding it, the concept of grouping living things based on characteristics, describing the characteristics of a type of living creature based on their differences will be difficult to understand and will give rise to misconceptions because biological concepts are abstract (Gultom, 2019). Yona & Ilhami (2022) states that there are misconceptions in the material of classification of living things, namely the concept of characteristics of living things by 70.23%, classification of living things by 78.62%, classification by kingdom by 85.4%, changes that occur in living things by 45.7%, and level in living creatures is 81.2%. Rahmadani et al. (2022) also stated that there is a misconception in the concept of kingdom plantae, where the most occurs in the concept of the gymnosperm life cycle at 75%, then research from Agustina & Indana (2022) stated in his research that there were misconceptions about the concept of protists, where the highest misconception was in the concept of grouping fungus-like protists, namely that students considered the characteristics of fungi in the fungal kingdom species to be the same as the

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characteristics of mushroom-like protist species.

Misconceptions will hinder the process of receiving knowledge if they are left to linger and are not immediately corrected (Hasanti & Zulyusri, 2021). The misconceptions experienced by students can be identified through diagnostic tests (Putri et al., 2021). Diagnostic tests are a type of test used to determine students' weaknesses where the results obtained can be used as a follow-up to students who experience misconceptions (Febriyana et al., 2020). This diagnostic test consists of several types, namely a two-tier diagnostic test, a three-tier diagnostic test, a four-tier diagnostic test, and a five-tier diagnostic test (five-tier diagnostic test) (Anam et al., 2019).

Five Tier Diagnostic Test is a development of a four-tier diagnostic test. The development of this four-stage diagnostic test is by adding a tier consisting of answers in the form of pictures or statements to confirm the answers (Sari & Ermawati, 2021). The Five Tier Diagnostic test at the first level contains questions with answer choices, the second level contains students' confidence in answering questions, the third level contains reasons for choosing answers, the fourth level contains students' confidence in choosing reasons for answers, and the fifth level contains additional questions (Putri & Ermawati, 2021). The added fifth level questions aim to facilitate students in expressing their knowledge and re-checking students' understanding of the answers at the first level and the reasons contained at the third level (Qonita & Ermawati, 2020). Therefore, the results of identifying concept levels using the five tier diagnostic test will be more accurate (Sari & Ermawati, 2021).

The five tier diagnostic test instrument was used in this research because it has been proven to be better at identifying student misconceptions because it has five levels. This instrument can also diagnose misconceptions experienced by students in more detail, can identify factors that cause misconceptions, and determine which concepts require strengthening learning (Lim & Poo, 2021).

With this research, it is hoped that it will be possible to determine the percentage and level of misconceptions among students regarding the classification of living things. The contribution of this research is providing a five tier diagnostic test on the classification of living things with the aim of identifying students' misconceptions and can be used as a reference for teachers to improve the subsequent learning process. Based on the description of the problem above, research was conducted to analyze junior high school students' misconceptions using a five tier diagnostic test on the material of the classification of living things. Therefore, this research aims to describe the percentage of misconception levels of junior high school students using a five tier diagnostic test on the classification of living things.

METODE

The research carried out is a type of quantitative descriptive research. Quantitative descriptive is research that

describes and explains a phenomenon with data (numbers) as is without testing a hypothesis (Sulistyawati et al., 2022). The research was conducted at SMP Negeri 3 Bangkalan with a population of all class VII students of SMP Negeri 3 Bangkalan who had studied material on the classification of living things. The research sample was taken using a purposive sampling technique involving 55 students in class VII-A and VII-D based on calculations using the Slovin formula.

The research design used was non-experimental. Non-experiment is research without any treatment of the research subjects (Andrieam & Yati, 2018). The test instrument used in this research is a five tier diagnostic test with material on the classification of living things. This five tier diagnostic test instrument is in the form of multiple choice questions with five levels of questions in the test. The test was carried out to determine students' understanding and misconceptions experienced by students regarding the material on the classification of living creatures. The data collection technique is carried out using tests and documentation.

The test instrument that will be used is validated and reliable first by a validator who is an expert in the field before being tested on students. Instrument validity assessment can use the Aiken validity index formula as follows.

$$V = \frac{\sum s}{[n(C-1)]} \qquad (1)$$

(Nabil et al., 2022)

Note:
V = Aiken index
s = $R - L_0$
R = Score from evaluator
L0 = Low category assessment score
C = High category assessment score
n = Number of evaluators

The results of validity calculations are adjusted to the content validity criteria which can be seen in table 1.

Table 1. Aiken Validity Criteria

Average Index	Criteria
V > 0.8	Very valid
0.4 ≤ V ≤ 0.8	Valid
V < 0.4	Not valid

(Mamonto et al., 2021)

Meanwhile, to calculate the reliability of the test instrument, the Borich formula is used as follows.

$$(R) = \left(1 - \frac{A-B}{A+B}\right) \times 100\% \qquad (2)$$

Information :
R =*Percent agreement*
A = Highest score from the validator
B = Lowest score from the validator

The results of the reliability calculations are adjusted to the reliability assessment criteria which can be seen in table 2.

Table 2. Reliability Assessment Criteria

No.	Percentage	Criteria
1.	75.00% ≤ R ≤ 100%	Very good
2.	50.00% ≤ R < 75%	Good
3.	25.00% ≤ R < 50%	Pretty good
4.	0% ≤ R < 25%	Not good

Based on the results of validity and reliability calculations, the average score for the validity of the five tier diagnostic test instrument was obtained, namely 0.9 with very valid criteria, while the average score for the reliability of the test instrument was 94.78% with very good criteria.

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The results of students' comprehension tests were analyzed quantitatively using a percentage formula to determine the number of students who were SC (Scientific Conception), ASC (Almost Scientific Conception), LK (Lack of Knowledge), M (Misconception), NU (No Understanding Conception), and UnC (Un-Code). The percentage of student understanding can be measured using the following formula.

$$P = \frac{f}{N} \times 100\% \quad (3)$$

(Drastisianti et al., 2018)

Note :
P =Percentage of each level of understanding
FM =Frequency of each level of student understanding
N =Number of students taking the test
100% =Constant number

The percentage of students who experience misconceptions is further categorized into 3 levels, namely high, medium and low misconceptions. These three categories can be calculated using the standard deviation formula as in formula 4.

$$SD = \sqrt{\frac{\sum fx^2}{N}} \quad (4)$$

Note :
SD =Standard deviation
$\sum fx^2$ = The sum of the results of multiplying the frequency of each score and the squared deviation of the score
N =Number of samples

The results of the standard deviation calculation are interpreted as high, medium and low levels of student misconceptions using the criteria in table 3.

Table 3. Interpretation of Misconceptions Levels

Score	Criteria
s ≥ (M + 1 SD)	High
(M – 1 SD) < s < (M + 1 SD)	Moderate
s ≤ (M – 1 SD)	Low

(Rochim et al., 2019)

Note :
S = Student's score
m = Mean
SD =Standard deviation

RESULT AND DISCISSION

The results of the five-tier diagnostic test can be used to measure students' level of understanding of a concept being studied, one of which is the concept of classification of living things. The percentage results of students' level of understanding based on the classical five tier diagnostic test indicators can be seen in table 4.

Table 4. Percentage of Classical Five Tier Diagnostic Test Indicators

5TDT indicator	Percentage (%)
SC (Scientific Conception)	17.27
ASC (Almost Scientific Conception)	2.73
LK (Lack of Knowledge)	26.64
M (Misconceptions)	37.73
NU (No Understanding Concept)	15,18
UnC (Un-Code)	0.45

Based on Table 4, the percentage of classical five tier diagnostic test indicators is that students experience M (Misconception) with a percentage of 37.73%, the percentage of students who experience LK (Lack of Knowledge) is 26.64%, the percentage of students who experience SC (Scientific Conception) was 17.27%, the percentage of students who experienced NU (No Understanding Conception) was 15.18%,

the percentage of students who experienced ASC (Almost Scientific Conception) and UnC (Un-Code) respectively had a percentage of 2, 73% and 0.45%.

The misconceptions experienced by students in each question item are different, where the material for the classification of living things consists of 20 questions with 4 sub-concepts, namely characteristics of living things, taxon levels, scientific nomenclature, and the 5 kingdom system. Misconceptions for each question item and sub-concept can be seen in table 5.

Table 5. Percentage of misconceptions for each question item and sub-concept

Sub-Concepts	Question Items	m		S.C		ASC		LK		NU		UnC	
		∑	%	∑	%	∑	%	∑	%	∑	%	∑	%
Characteristics of living things	1	27	49.09	10	18.18	0	0	14	25.45	4	7.27	0	0
	2	3	5.45	42	76.36	1	1.82	4	7.27	4	7.27	1	1.82
	3	17	30.91	23	41.82	0	0	11	20	3	5.45	1	1.82
	4	17	30.91	5	9.09	6	10.91	22	40	4	7.27	1	1.82
	5	10	18.18	25	45.45	0	0	14	25.45	4	7.27	2	3.64
	Average	74	26.91	105	38.18	7	2.55	65	23.64	19	6.91	5	1.82
Taxon level	6	24	43.64	9	16.36	5	9.09	13	23.64	4	7.27	0	0
	7	16	29.09	6	10.91	0	0	29	52.73	4	7.27	0	0
	Average	40	36.36	15	13.64	5	4.55	42	38.18	8	7.27	0	0
Scientific nomenclature	8	17	30.91	7	12.73	0	0	22	40	9	16.36	0	0
	9	24	43.64	0	0	1	1.82	19	34.55	11	20	0	0
	10	28	50.91	2	3.64	1	1.82	10	18.18	14	25.45	0	0
	Average	69	41.82	9	5.45	2	1.21	51	30.91	34	20.61	0	0
5 kingdom system	11	18	32.73	13	23.64	1	1.82	14	25.45	9	16.36	0	0
	12	22	40	2	3.64	2	3.64	15	27,27	14	25.45	0	0
	13	21	38.18	3	5.45	1	1.82	21	38.18	9	16.36	0	0
	14	29	52.73	0	0	2	3.64	15	27,27	9	16.36	0	0
	15	21	38.18	11	20	1	1.82	18	32.73	4	7.27	0	0
	16	25	45.45	1	1.82	2	3.64	12	21.82	15	27,27	0	0
	17	31	56.36	2	3.64	3	5.45	11	20	8	14.55	0	0
	18	15	27,27	14	25.45	1	1.82	13	23.64	12	21.82	0	0
	19	31	56.36	1	1.82	1	1.82	7	12.73	15	27,27	0	0
	20	19	34.55	14	25.45	2	3.64	9	16.38	11	20	0	0
	Average	232	42.18	61	11.09	6	2.91	135	24.55	106	19.27	0	0

Based on table 5, the highest percentage of misconceptions in each item is in questions number 17 and 19 with a percentage of 56.36%. Meanwhile, based on the average percentage of misconceptions for each sub-concept, it shows that the percentage of misconceptions in the sub-concept of characteristics of living things is 26.91%, in the taxon level sub-concept it is 36.36%, in the scientific nomenclature sub-concept it is 36.36%. 41.82% and in the sub-concept of the 5 kingdom system it was 42.18%. Based on the table data above, the highest percentage of misconceptions is found in the sub-

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concept of the 5 kingdom system, while the lowest percentage is found in the sub-concept of characteristics of living things. The results of the research carried out are the same as relevant research by Yona & Ilhami (2022) that the highest misconception occurs in the sub-concept of classification in the kingdom. The percentage of classification sub-concepts in the kingdom is 85.4% (Yona & Ilhami, 2022). Misconceptions can occur because in the 5 kingdom system material there are many foreign terms. One example is the concept of the animal kingdom which, according to a statement fromJayanti & Susantini (2021) shows that the animal kingdom is biological material which contains many scientific terms and names in each sub-chapter, making it possible for misconceptions to occur.

Misconceptions experienced by students are grouped into 3 categories, namely low misconceptions, medium misconceptions and high misconceptions. The percentage level of misconceptions by category can be seen in table 6.

Table 6. Percentage of misconception level categories

No	Level of Misconceptions	Amount	Percentage (%)
1.	Low Misconceptions	15	27,27
2.	Moderate Misconceptions	29	52.73
3.	High Misconceptions	11	20

Based on table 7, the level of student misconceptions shows that in the material on the classification of living things, there is a low misconception with a percentage of 27.27%, a moderate misconception of 52.73%, and a high misconception of 20%. Based on the percentage obtained, misconceptions in the material on the classification of living things for students at SMP Negeri 3 Bangkalan dominate the moderate misconception category. This shows that the material on the classification of living things is quite difficult for students to understand even though the percentage of misconceptions is at a medium level.

Based on the results of the five tier tests that have been carried out, several misconception profiles can also be identified in each sub-concept of the classification of living things. The highest misconception of the sub-concept of characteristics of living things occurred in item number 1. The sub-concept of taxon level experienced the highest misconception in item number 6. The sub-concept of scientific nomenclature experienced the highest misconception in item number 10. and the highest misconceptions of the 5 kingdom system sub-concepts are found in questions number 17 and 19. The profile of students' misconceptions in each of these sub-concepts can be seen in table 7.

Table 7. Student Misconceptions Profile for Each Sub-Concept

Sub-concept	Misconception Profile	The actual concept
Characteristics of living things	The increase in height experienced by humans shows the characteristics of living creatures	Growth is a quantitative process of increasing size from childhood to

Sub-concept	Misconception Profile	The actual concept
	reproducing.	adulthood (Adi, 2017).
	The increase in height experienced by humans shows the characteristics of living creatures experiencing growth due to the maturation of body cells towards adulthood.	
Taxon level	The levels in the classification of living things are called kingdoms.	Taxons are levels formed from the results of classifying living things (Prakosa, 2018).
Scientific nomenclature	*Panthera pardus* and *Panthera tigris* have taxonomic similarities at the species level.	*Panthera pardus* and *Panthera tigris* have taxonomic similarities to the word Panthera, which indicates the genus level. *Panthera* is a genus of the Felidae family which has 4 species, namely lions, leopards, tigers and jaguars (Anwar & Riminarsih, 2019)
	Panthera pardus and *Panthera tigris* have taxonomic similarities at class level.	
	Panthera pardus and *Panthera tigris* have taxonomic similarities at the order level.	
5 kingdom system	In the kingdom plantae the term open seed plants are called angiosperms.	Plants with open seeds are called gymnosperms. Gymnosperms are plants with seeds that are not protected by protective structures such as fruit flesh (Firdaus & Wisanti, 2021).
	In the kingdom plantae the term open seed plants are called dicotyledonous plants.	
	In the kingdom plantae the term open seed plants are called monocot plants.	
	Monera is also called a group of bacteria which are classified as acellular living things.	Monera is a group of bacteria that has unicellular characteristics, is prokaryotic (does not

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Sub-concept	Misconception Profile	The actual concept
	Monera is also called a group of bacteria belonging to multicellular living creatures.	have a nuclear membrane), lives in colonies, and has a cell wall (Nugroho et al., 2020).
	Monera is also called a group of bacteria which are classified as eukaryotic living things.	

Misconceptions experienced by students in the material on the classification of living things, sub-concept of characteristics of living things, as in misconception profile number 1, students assume that the increase in height experienced by humans shows the characteristics of living things reproducing and there are also those who think that these characteristics experience growth. due to the maturation of body cells towards adulthood. The actual concept is that the increase in height experienced by humans shows the characteristics of living creatures growing, where growth is a quantitative process of increasing size from childhood to adulthood.(Adi, 2017). Students experience misconceptions because students have not been able to build their knowledge resulting from experience in their minds. In line with Piaget's constructivism theory, how each individual builds knowledge from their experiences (Sugrah, 2020). Knowledge is not a collection of concepts, rules or facts to be memorized and memorized. Students must build their own knowledge and understand it through real experiences (Fridyatama et al., 2021).

At the sub-concept taxon level, students experience misconceptions by assuming thatLevels in the classification of living things are called kingdoms. The correct concept is that the levels in the classification of living things are called taxon (Prakosa, 2018). Students have experienced misconceptions caused by conceptions that do not match the actual concept. This can be related to the learning process, the information obtained by students is processed and stored in short-term memory so that if students are asked to remember again, students cannot process the information well. In line with information processing theory, Gagne shows that information processing experienced by students includes processing, storing, recalling information or knowledge from each individual's brain (Qolbiyah & Purnamanita, 2022).

Students also experience misconceptions in the sub-concept of scientific nomenclature, assuming that *Panthera pardus* and *Panthera tigris* have the same taxonomy at the species, class and order levels. This is not in accordance with the actual concept which shows that *Panthera pardus* and *Panthera tigris* have the same taxonomy in the Genus of *Panthera. Panthera* is a genus of the Felidae family which has 4 species, namely lions, leopards, tigers and jaguars (Anwar & Riminarsih, 2019). Based on research from Gultom (2019)

shows that students experience misconceptions in writing scientific nomenclature based on the binomial nomenclature system because students have difficulty understanding the material, where the concept is quite complex and difficult. This could be because students are accustomed to learning by memorizing. This method cannot train students' thinking abilities so that the learning they do is less meaningful. In line with David Ausubel's theory, learning is not just memorizing material, but learning is an activity that connects all the concepts being taught so that students do not forget easily (Darmayanti et al., 2023).

In the sub-concept of the 5 kingdom system, students experience many misconceptions, students assume that in the kingdom plantae the terms open seed plants are called angiosperms, dicots and monocots. This does not match the concept, the actual concept is that plants with open seeds are called gymnosperms. Gymnosperms are plants with seeds that are not protected by protective structures such as fruit flesh (Firdaus & Wisanti, 2021). Apart from that, students also experience misconceptions about the concept of monera, which assume that monera are also called a group of bacteria which are classified as acellular, multicellular and eukaryotic living things. The correct concept is that monera are a group of bacteria that have unicellular characteristics, are prokaryotic (do not have a nuclear membrane), live in colonies, and have cell walls (Nugroho et al., 2020).

Based on research fromFitri et al. (2021) stated that students still have difficulty distinguishing between angiosperms and gymnosperms. This can give rise to misconceptions. Students also still experience misconceptions about the concept of monera which has prokaryotic characteristics. In line with research by Agustina & Indana (2022) states that misconceptions occur because students have not mastered the concepts regarding the meaning of eukaryotic and prokaryotic. This is because some students find it difficult to differentiate between eukaryotic and prokaryotic concepts. Prokaryotic cells do not have a nuclear membrane or nucleus which is scattered in the cytoplasm. Meanwhile, eukaryotic cells have a nucleus because they have a nuclear membrane.

Misconceptions experienced by students cannot be resolved when receiving material in class, so students understand the concept according to what is thought in their minds (Firdaus & Wisanti, 2021). This shows that in the learning process sometimes students experience meaningless learning because students tend to make their own interpretations so that students' knowledge does not match the actual concept. In line with David Ausubel's theory that describing a meaningful learning can occur if new information with relevant concepts is contained in students' cognitive structures (Azizah, 2020).

CONCLUSION

Based on the percentage of students' understanding of the material on the classification of living things using the classical five tier test obtained SC (Scientific Conception) of 17.27%,

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ASC (Almost Scientific Conception) of 2.73%, LK (Lack of Knowledge) of 26.64% , M (Misconception) was 37.73%, NU (No Understanding Conception) was 15.18%, and UnC (Un-Code) was 0.45%. The percentage of student misconceptions that occurred among students at SMP Negeri 3 Bangkalan which involved 55 students in the concept of classification of living things, namely the low level of misconception had a percentage of 27.27%, the medium category was 52.73%, and the high category was 20%.

REFERENCES

Adi, D. P. (2017). *Makhluk hidup*. Yogyakarta : Istana Media.

Aen, R., & Kuswendi, U. (2020). Meningkatkan Pemahaman Konsep IPA Siswa SD Menggunakan Media Visual Berupa Media Gambar Dalam Pembelajaran IPA. *COLLASE (Creative of Learning Students Elementary Education)*, *3*(3), 99–103.

Agustina, L., & Indana, S. (2022). Profil Miskonsepsi Siswa pada Materi Protista Menggunakan Four Tier Test. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, *11*(1), 60–67. https://doi.org/10.26740/bioedu.v11n1.p60-67

Aklimawati, A., Isfayani, E., Listiana, Y., & Wulandari, W. (2022). Pengembangan Learning Management System (LMS) Edmodo Berbasis Android Sebagai Media Pembelajaran Untuk SMA Negeri 7 Lhokseumawe. *Jurnal Matheducation Nusa*, *5*(1), 1–12. http://jurnal.pascaumnaw.ac.id/index.php/JMN/article/view/203

Anam, R. S., Widodo, A., Sopandi, W., & Wu, H. K. (2019). Developing a five-tier diagnostic test to identify students' misconceptions in science: an example of the heat transfer concepts. *Elementary Education Online*, *18*(3), 1014–1029. https://doi.org/10.17051/ilkonline.2019.609690

Andrieam, M. D., & Yati, D. (2018). Hubungan Jumlah Saudara dengan Perilaku Bullying remaja di SMPN 3 Gamping Sleman. *Angewandte Chemie International Edition, 6(11), 951–952.*, *1*(1), 31–41.

Anwar, G. A., & Riminarsih, D. (2019). Klasifikasi Citra Genus Panthera Menggunakan Metode Convolutional Neural Network (Cnn). *Jurnal Ilmiah Informatika Komputer*, *24*(3), 220–228. https://doi.org/10.35760/ik.2019.v24i3.2364

Asmoro, B. P., & Mukti, F. D. (2019). Peningkatan Rasa Ingin Tahu Ilmu Pengetahuan Alam Melalui Model Contextual Teaching and Learning Pada Siswa Kelas Va Sekolah Dasar Negeri Karangroto 02. *Abdau: Jurnal Pendidikan Madrasah Ibtidaiyah*, *2*(1), 115–142. https://doi.org/10.36768/abdau.v2i1.28

Azizah, F. N. (2020). Strategi Meaningfull Learning dalam Proses Belajar Mengajar Pendidikan Agama Islam di Tengah Pandemi Covid-19. *Journal of Islamic Education Research*, *1*(03), 215–224.

Darmayanti, N., Manurung, K. S. B., Hasibuan, H., Puspita, S., Ginting, M. farhan S., & Harahap, M. A. (2023). Pelaksanaan Teori Belajar

Bermakna David Ausubel dalam Pembelajaran Pendidikan Matematika. *Jurnal Pendidikan Dan Konseling*, *5*(1), 3388–3395.

Drastisianti, A., Supartono, Wijayati, N., & Susilaningsih, E. (2018). Identification of Misconceptions on Buffer Material Using Three-Tier Test in the Learning of Multiple Representation. *Journal of Innovative Science Education*, *7*(1), 95–100. http://journal.unnes.ac.id/sju/index.php/jise

Febriyana, S. A., Liliawati, W., & Kaniawati, I. (2020). Identifikasi Miskonsepsi Dan Penyebabnya Pada Materi Gelombang Stasioner Kelas Xi Menggunakan Five-Tier Diagnostic Test. *Konstan - Jurnal Fisika Dan Pendidikan Fisika*, *5*(2), 42–51. https://doi.org/10.20414/konstan.v5i2.53

Firdaus, N. R., & Wisanti, W. (2021). Profil Miskonsepsi Pada Materi Kingdom Plantae Kelas X Sma Dengan Menggunakan Three-Tier Test. *Jurnal Inovasi Pembelajaran Biologi*, *2*(1), 20–29. https://doi.org/10.26740/jipb.v2n1.p30-39

Fitri, R., Syofyati, N., & Alberida, H. (2021). Undertanding ' s Analysis the Concept of Classification of Living Organism for Student ' s Class VII at SMPN 8 Padang Analisis Pemahaman Konsep Klasifikasi Makhluk Hidup Peserta Didik. *Bioeducation*, *5*(2), 68–76.

Fridyatama, D. A. S., Valguna, P. A., Suparji, & Sumbawati, meini S. (2021). *Teori Konstruktivisme Dalam Pembelajaran Lalu Lintas Udara di Indonesia*. *6*(2), 123–132.

Gultom, D. L. S. (2019). Miskonsepsi Siswa Pada Materi Klasifikasi Makhluk Hidup Di Kelas VII MTs. Swasta Al- Washliyah Sigambal Tahun Pembelajaran 2018/2019. *Iomas*, *1*(2), 39–42.

Haidar, D., Yuliati, L., & Handayanto, S. (2020). The Effect of Inquiry Learning with Scaffolding on Misconception of Light Material among Fourth-Grade Students. Jurnal Pendidikan IPA Indonesia, 9(4), 540-553. doi:https://doi.org/10.15294/jpii.v9i4.22973

Hasanti, M. A., & Zulyusri, Z. (2021). Meta-Analisis Miskonsepsi Siswa Mata Pelajaran IPA Materi Biologi Tingkat SMP. *PENDIPA Journal of Science Education*, *6*(1), 263–268. https://doi.org/10.33369/pendipa.6.1.263-268

Ismiyanti, N. (2020). Perancangan Pembelajaran IPA Menggunakan Software Videoscribe. *VEKTOR: Jurnal Pendidikan IPA*, *1*(2), 50–58. https://doi.org/10.35719/vektor.v1i2.11

Jayanti, D. N. D., & Susantini, E. (2021). Profil Miskonsepsi Peserta Didik SMA pada Materi Kingdom Animalia Menggunakan Four-Tier Multiple Choice Diagnostic Test. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, *10*(3), 479–489. https://doi.org/10.26740/bioedu.v10n3.p479-489

Lim, H., & Poo, Y. (2021). Diagnostic Test to Assess Misconceptions on Photosynthesis and Plant Respiration: Is It Valid and Reliable?. Jurnal Pendidikan IPA

 DOI: https://doi.org/10.35719/mass.v4i2.133

Indonesia, 10(2), 241-252. doi:https://doi.org/10.15294/jpii.v10i2.26944

Mainam. (2018). Penerapan Metode Stad Guna Meningkatkan Hasil Belajar Ipa Kelas Iii SDN 002 Sekip Hulu Semester Ganjil Tahun Pelajaran 2016/2017. *Jurnal Mitra Pendidikan*, *2*(11), 1217–1281.

Mamonto, F., Umar, M. K., & Paramata, D. D. (2021). Pengembangan Perangkat Pembelajaran Ipa Smp Menggunakan Model Pembelajaran Kooperatif Tipe Student Teams Achievement Divisions (Stad) Bagi Siswa Berkebutuhan Khusus. *Jambura Physics Journal*, *3*(1), 54–63. https://doi.org/10.34312/jpj.v3i1.8137

Nabil, N. R. A., Wulandari, I., Yamtinah, S., Ariani, S. R. D., & Ulfa, M. (2022). *Analisis Indeks Aiken Untuk Mengetahui Validitas Isi Instrumen Asesmen Kompetensi Minimum Berbasis Konteks Sains Kimia*. *25*(2), 184–191.

Nugroho, D. Y. P., Mahmudi, A., & Vendyansyah, N. (2020). Media Pembelajaran Pengenalan Bakteri Menggunakan Augmented Reality Untuk Kelas X Sma Berbasis Android. *JATI (Jurnal Mahasiswa Teknik Informatika)*, *4*(1), 11–18. https://doi.org/10.36040/jati.v4i1.2323

Prakosa, B. (2018). *Keanekaragaman Hayati dan Klasifikasi makhluk Hidup*. Yogyakarta : Sentra Edukasi media.

Putri, W. K., & Ermawati, F. U. (2021). Pengembangan, Uji Validitas dan Reliabilitas Tes Diagnostik Five-Tier untuk Materi Getaran Harmonis Sederhana beserta Hasil Uji Coba. *PENDIPA Journal of Science Education*, *5*(1), 92–101. https://doi.org/10.33369/pendipa.5.1.92-101

Putri, W. O., Maria, H. T., & Hamdani, H. (2021). Analisis Miskonsepsi Menggunakan Four Tier Diagnostic Test Berbantuan Google Form pada Materi Tekanan Zat. *Edukatif : Jurnal Ilmu Pendidikan*, *3*(6), 4738–4749. https://doi.org/10.31004/edukatif.v3i6.1445

Qadri, R. A. Al, Alhaq, P. M., Muthmainnah, N., Irpadilla, M. A., Herlina, Aulia, N., & Scholten, A. R. (2019). Analisis Miskonsepsi Peserta Didik Kelas Xi Sman 1 Gowa Pada Materi Larutan Penyangga Menggunakan Instrumen Three Tier Diagnostic Test. *Jurnal Nalar Pendidikan*, *7*(1), 46–52.

Qolbiyah, A. S., & Purnamanita, E. I. I. (2022). Teori Pemrosesan Informasi dan Neurosains dalam Pengembangan Metodologi Pembelajaran Pendidikan Agama Islam. *Edukatif : Jurnal Ilmu Pendidikan*, *4*(3), 4813–4827. https://doi.org/10.31004/edukatif.v4i3.2822

Qonita, M., & Ermawati, F. U. (2020). The Validity and Reliability of Five-Tier Conception Diagnostic Test for Vector Concepts. *IPF: Inovasi Pendidikan Fisika*, *9*(3), 459–465. https://doi.org/10.26740/ipf.v9n3.p459-465

Rahmadani, N., Wardhani, S., & Sumah, A. S. W. (2022). Hubungan kemampuan awal, pemahaman konsep, dan hasil belajar siswa dalam pembelajaran daring di SMAN Sumatera Selatan. *Bioma :*

Jurnal Ilmiah Biologi, *11*(1), 1–9. https://doi.org/10.26877/bioma.v11i1.8425

Rochim, F. N., Munawaroh, F., Wulandari, A. Y. R., & Ahied, M. (2019). Identifikasi Profil Miskonsepsi Siswa Pada Materi Cahaya Menggunakfan Metode Four Tier Test Dengan Certainty of Response Index (Cri). *Natural Science Education Research*, *2*(2), 140–149. https://doi.org/10.21107/nser.v2i2.6241

Sari, I. P. M., & Ermawati, F. U. (2021). Instrumen Tes Diagnostik Konsepsi Lima Tingkat pada Materi Gerak Lurus: Pengembangan, Uji Validitas dan Reliabilitas serta Uji Coba Terbatas. *PENDIPA Journal of Science Education*, *5*(2), 152–162. https://doi.org/10.33369/pendipa.5.2.152-162

Soeharto, S., & Csapó, B. (2022). Exploring Indonesian student misconceptions in science concepts. *Heliyon*, *8*(9). https://doi.org/10.1016/j.heliyon.2022.e10720

Soeharto, S., CsapÃ³, B., Sarimanah, E., Dewi, F., & Sabri, T. (2019). A Review of Studentsâ€™ Common Misconceptions in Science and Their Diagnostic Assessment Tools. Jurnal Pendidikan IPA Indonesia, 8(2), 247-266. doi:https://doi.org/10.15294/jpii.v8i2.18649

Sugrah, N. U. (2020). Implementasi teori belajar konstruktivisme dalam pembelajaran sains. *Humanika*, *19*(2), 121–138. https://doi.org/10.21831/hum.v19i2.29274

Sulistyawati, W., Wahyudi, & Trinuryono, S. (2022). Analisis (Deskriptif Kuantitatif) Motivasi Belajar Siswa Dengan Model Blended Learning Di Masa Pandemi Covid19. *Kadikma*, *13*, *No. 1*, 68–73.

Susanti, N. K. E., Asrin, A., & Khair, B. N. (2021). Analisis Tingkat Pemahaman Konsep IPA Siswa Kelas V SDN Gugus V Kecamatan Cakranegara. *Jurnal Ilmiah Profesi Pendidikan*, *6*(4), 686–690. https://doi.org/10.29303/jipp.v6i4.317

Yona, F., & Ilhami, A. (2022). Analisis Miskonsepsi Siswa Pada materi Klasifikasi Makhluk Hidup Kelas VII SMP Negeri I Tebing Timur kabupaten Kepulauan Meranti. *Journal of Natural Science Learning*, *01*(01), 19–26.

BRIEF PROFILE

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