



Analysis of Students' Learning Difficulties in Understanding the Concept of Nervous System Material in Humans at MAS Hajjah Amalia Sari

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Abstract

Learning difficulties are one of the problems that students often experience in the biology learning process, especially in abstract and complex materials such as the human nervous system. Less than optimal understanding of concepts can have an impact on low student learning outcomes and hinder the achievement of learning goals. This study aims to analyze students' learning difficulties in understanding the concept of nervous system material in humans at MAS Hajjah Amalia Sari for the 2024 academic year. This study uses a quantitative approach with the support of qualitative data. The subject of the study was 25 students in grade XI of MAS Hajjah Amalia Sari. Data collection techniques are carried out through concept comprehension tests, interviews, and documentation. The concept comprehension test is prepared based on seven indicators of concept comprehension, namely interpreting, giving examples, grouping, summarizing, drawing inferences, comparing, and explaining. The data obtained was analyzed descriptively to determine the level of students' understanding of concepts and the form of learning difficulties experienced. The results showed that the level of students' conceptual understanding of nervous system material was in the medium category with an overall average score of 60. Indicators provide examples and interpret are in the good category, while indicators summarize, draw inferences, compare, and explain are in the sufficient category and indicate a more dominant level of difficulty. Students' learning difficulties are influenced by various internal factors, such as low high-level thinking skills, uneven learning motivation, and differences in students' initial abilities. In addition, external factors such as limited learning media, practicum facilities, and learning methods that are still dominated by lectures also affect students' understanding of concepts. Based on these findings, improvement efforts are needed through the application of more innovative learning methods, the use of visual and audiovisual media, and student-centered learning to improve conceptual understanding and reduce students' learning difficulties in human nervous system materials.

Keywords: learning difficulties, concept comprehension, human nervous system, biology learning

INTRODUCTION

Teachers are one of the important elements in the world of education that play a role in forming quality human resources to support development. Therefore, teachers are required to play an active role and position themselves as professionals in the field of education.

Achieving these goals requires joint efforts from various parties, especially the role of teachers in implementing effective learning strategies. Determining and selecting a learning strategy is the first step that determines the success or failure of the learning process. Learning at school is in essence expected to be able to encourage students to learn optimally, but in practice students often face various obstacles and difficulties in learning (Rohmawati et al., 2023; Nasution & Aslan, 2025).

Learning is a process of effort made by individuals to obtain new changes as a result of experience and interaction with the environment. These changes take place consciously and in a directed manner with the aim of achieving better conditions than before. In addition, learning is also understood as a process of change in a person which is reflected through improving the quality and quantity of behavior, including skills, knowledge, attitudes, habits, understanding, skills, thinking, and various other abilities (Sudirman et al., 2023; Solihin et al., 2025).

Learning difficulties are a condition when students are less able to meet the demands of learning so that the learning process and outcomes are not optimal. This condition is characterized by obstacles or disturbances in learning that can be caused by internal or external factors. Internal factors include physical and psychological aspects such as attention, interest, and readiness to learn, while external factors include the family, school, and community environment. Learning difficulties can also be seen from students' inability to complete assignments given by teachers, which has an impact on low learning achievement and requires special attention and handling to improve academic achievement (Asrianti et al., 2023). Learning difficulties are often associated with non-optimal achievement of students' achievements. Learning achievement is influenced by factors from within the student and external factors. Learning difficulties are conditions when students face obstacles in achieving learning goals, so greater efforts are needed to overcome them (Iman, 2024; Solihin et al., 2025).

Biology or life science is a branch of science that studies life, including the structure, function, growth, evolution, distribution, and classification of all living things. Biology is also understood as a field of science that systematically studies nature and organizes knowledge in the form of facts, concepts, and principles. As a subject, biology has a wide scope of material because it discusses all living things, from humans, animals, to plants. In the process of learning biology, students are trained in various skills, such as observing, classifying, measuring, interpreting, using laboratory tools, predicting, presenting results in writing and graphically, and conducting experimental activities. Therefore, biology learning requires active interaction between teachers and students (Sari & Ferry, 2024; Harahap et al., 2020).

Biology knowledge is increasingly used to solve various human problems, such as in the fields of health, agriculture, animal husbandry, and other important sectors, thus making biology one of the science subjects that is quite in demand by students (Harahap, 2025). Despite this, many students still show low academic achievement in this subject. This is in line with the view that science subjects are often considered difficult, both at the high school and college levels. This condition is related to the characteristics of science that requires the ability to integrate, organize, synthesize, and analyze various information and concepts that are complex (Fauzi & Mitalistiani, 2018).

In addition, the number of biology terms that are difficult to understand in the material

of the human nervous system is also a factor causing learning difficulties. To overcome these problems, teachers can clearly mention biology terms accompanied by explanations of their meanings so that students can understand the material more easily. Intellectual intelligence is one of the internal factors that affect the achievement of learning achievements, which is generally related to the individual's ability to understand, analyze, and solve problems. Students with a high level of intellectual intelligence tend to be faster and easier in understanding learning materials and solving problems faced (Sigalingging et al., 2025).

One of the high school/MA subjects that is often considered difficult by most students is biology lessons. Biology is one of the branches of natural sciences studied at the high school level. Biology can also be interpreted as the science that studies living things to find out and understand life in the universe. Biology is a science and knowledge that is carried out systematically. This is what makes biology not only a mastery of a collection of knowledge in the form of facts, concepts or principles, but it is obtained through a process of discovery (Darmawan, E., 2021).

Based on the results of an interview conducted with one of the biology teachers at MAS Hajjiah Amalia Sari, Mr. Drs. Ahyaruddin, stated that biology is one of the subjects that is difficult for most students at MAS Hajjiah Amalia Sari to understand. This is due to several factors, including quite a lot of memorization, difficulty in remembering foreign terms and Latin, and the lack of learning media used so that students fantasize more about the things that are conveyed. He also stated that "Biology subjects are considered difficult compared to other subjects, student learning outcomes have completeness learning is approximately 50%." According to him, the knowledge competence of students is good, some are moderate and some are still lacking. Students still have difficulties in achieving the competence of plant tissue practicum material skills. Practicum is still carried out simply due to limited tools and time.

Students' learning difficulties in biology subjects at MAS Hajjiah Amalia Sari need to be analyzed, in order to find out the dominant learning difficulties at each stage of learning materials. In addition, it is also to find out the factors that cause students to have difficulty learning in biology subjects. These factors can be used as material to make improvements in the learning process so that they can improve student learning outcomes. The analysis of students' learning difficulties and the new concepts needed is carried out so that learning can be developed to minimize students' difficulties and failures while equipping students with new things that can facilitate the learning process.

Based on the background of the problem, the author is interested in conducting a research entitled "Analysis of Student Learning Difficulties in Understanding the Concept of Nervous System Material in Humans at Mas Hajjiah Amalia Sari for the 2024 Academic Year".

RESEARCH METHODS

This study uses a quantitative approach supported by qualitative data to analyze students' learning difficulties in understanding the material concepts of the human nervous system. The research was carried out at MAS Hajjiah Amalia Sari in the even semester of the 2024/2025 school year with 25 research subjects in grade XI. Data collection techniques are carried out through concept comprehension tests, interviews, and documentation. The concept

comprehension test is prepared based on seven indicators of concept comprehension, namely interpreting, giving examples, grouping, summarizing, drawing inferences, comparing, and explaining. Quantitative data was analyzed descriptively by calculating the average scores and achievement categories of each indicator, while qualitative data was used to reinforce the results of the analysis through interview findings and documentation relevant to students' learning difficulties.

RESULTS AND DISCUSSION

This research was carried out at MAS Hajjah Amalia Sari which is located in Batunadua District, Padangsidempuan City. This school is one of the Islamic-based upper secondary education institutions under the auspices of the Ministry of Religion of the Republic of Indonesia. This research was carried out in an even semester for the 2024/2025 school year with the subject of research, namely class XI students totaling 25 people.

The selection of the research location is based on the consideration that the school has characteristics that are in accordance with the research objectives, especially in examining students' understanding of concepts in Biology subjects, especially the material of the human nervous system. Based on the results of initial observations and interviews with subject teachers, it was found that nervous system material is one of the materials that are considered difficult by students because it is abstract, complex, and requires high-level thinking skills. This study uses a quantitative approach with the support of qualitative data. Quantitative data is obtained through concept comprehension tests, while qualitative data is obtained through interviews and documentation. The concept comprehension test is structured based on seven indicators of concept comprehension according to Bloom's revised taxonomy, namely: interpret, give examples, classify, summarize, draw inferences, compare, and explain.

Results of the Student Concept Comprehension Test

The results of the concept comprehension test showed that the level of students' understanding of nervous system material was still in the moderate category. The overall average score obtained by students is 60, which indicates that concept comprehension is not optimal and still needs improvement through more effective learning strategies.

The following is a presentation of the results of the research based on each indicator of concept understanding:

1. Interpreting Indicators

The results of the analysis showed that the interpreting indicator obtained an average score of 74, which is in the good category. This shows that most students have been able to understand the information presented in the form of text, images, and tables, and then turn it

into a simpler form of explanation.

This interpretive ability is seen when students are able to explain the functioning of parts of the nervous system based on the images or descriptions given. However, there are still some students who experience Difficulty in understanding abstract scientific terms, so it requires additional explanations from teachers.

2. Exemplifying Indicators

The indicator gives an example of obtaining an average score of 77, which is the highest score among all indicators. This shows that students are relatively able to relate the concept of the nervous system to concrete examples in everyday life, such as the reflex of pulling the hand when exposed to a hot object or the body's response to light stimuli.

This ability shows that the learning provided has helped students connect theoretical concepts with real experiences. However, there are still some students who are only able to give simple examples and are not able to explain their relationship in depth with the underlying scientific concepts.

3. Classifying Indicators

The average score on the grouping indicator is 62, which is in the good category. Students are generally able to group parts of the nervous system, such as the central nervous system and the peripheral nervous system. However, errors are still found in distinguishing the functions of each part, especially when asked to explain the relationship between components.

These difficulties show that students' conceptual understanding is still partial and not yet fully integrated. This can be due to the lack of use of visual media or learning models that help students understand the structure of the nervous system as a whole.

4. Summarizing Indicator

The summarized indicator obtained an average value of 49, which falls into the category of sufficient. These results show that most students have difficulty summarizing the material concisely and systematically. Many students tend to copy the content of the text without being able to sift through important information.

This difficulty in summarizing shows that students' high-level thinking skills still need to be improved. The ability to summarize requires students to understand the core of the material, organize the information, as well as express it back in their own language, which is a high-level cognitive skill.

5. Inferring Indicators

On the indicator of inference attraction, the average score obtained by students is 55,

which falls into the category of sufficient. This shows that students still have difficulty in drawing conclusions based on the information or data available.

This difficulty can be caused by a lack of practice in analytical thinking and a lack of habituation in answering questions that require a high level of reasoning. Students tend to be more familiar with memorization problems than questions that require analysis and drawing conclusions.

6. Comparing Indicators

The comparative indicator obtained an average score of 46, which is in the category of sufficient and is the lowest score among all indicators. This suggests that most students have difficulty distinguishing characteristics between concepts, such as the difference between the central nervous system and the peripheral nervous system.

This difficulty indicates that students have not fully understood the relationships and differences between concepts conceptually. The lack of use of visual media and comparison tables is suspected to be one of the factors causing the low achievement of this indicator.

7. Explaining Indicator

The indicator explains obtaining an average score of 60, which is included in the sufficient category. These results show that students still have difficulty in explaining a concept in a concise and logical way, especially when asked to relate cause and effect in the nervous system. This limitation of the ability to explain shows that students still need guidance in developing logical and argumentative thinking skills. This also shows the importance of using learning methods that encourage students to actively re-explain the material that has been learned. If reviewed from each indicator, the following results were obtained:

Table 1. Indicators score

Indicator	Average Score	Category
Interpret	74	Good
Providing Examples	77	Good
Grouping	62	Good
Summing up	49	Enough
Drawing Inferences	55	Enough
Compare	46	Enough
Explain	60	Enough

Based on the results of the research that has been presented, it can be concluded that the level of understanding of the concept of grade XI MAS student Hajijah Amalia Sari towards nervous system material is still in the medium category. Although some indicators show quite good results, overall students' concept comprehension skills still need to be

improved. The low achievement in several indicators is caused by various factors, both internal and external. Internal factors include students' diverse initial abilities, uneven learning motivation, and limited high-level thinking skills. Meanwhile, external factors include limited facilities and infrastructure, lack of use of learning media, and learning methods that are still dominated by lectures.

The results of this study are in line with the findings of previous research which stated that biology learning will be more effective if supported by visual media, practicum activities, and student-centered learning methods. Without a variety of methods and media, students tend to have difficulty understanding abstract concepts such as the nervous system.

Therefore, efforts are needed to improve the learning process, including by implementing more active and innovative learning models, such as problem-based learning, the use of audiovisual media, and assignments that encourage students to think critically and reflectively. Thus, it is hoped that students' understanding of the concept of nervous system material can increase significantly.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the level of understanding of the concept of grade XI student MAS Hajjah Amalia Sari in the material of the human nervous system is in the medium category. Students show a relatively good understanding of the indicators of interpreting, giving examples, and grouping, but still have difficulties in the indicators of summarizing, drawing inferences, comparing, and explaining. Learning difficulties are influenced by various factors, both internal such as thinking skills high level, learning motivation, and diverse initial understanding of students, as well as external factors such as limited learning media, practicum facilities, and less varied learning methods. Therefore, efforts are needed to improve the quality of learning through the use of more interesting media, the application of student-centered learning methods, and the provision of exercises that train critical and analytical thinking skills so that students' understanding of the concept of nervous system material can be optimally improved.

REFERENCES

- Asrianti, Y., Mellisa, & Fauziah, N. (2023). Kesulitan Belajar Biologi Siswa Kelas XI SMA YLPI Pekanbaru. *Biology and Education Journal*, 3(1), 10–23.
- Darmawan, E. (2021), *Strategi Belajar Mengajar Biologi*. Pustaka Rumah.
- Fauzi, A., & Mitalistiani. (2018). High School Biology Topics That Perceived Difficult By Undergraduate Students. *Didaktika Biologi: Jurnal Penelitian Pendidikan Biologi* (2018),

2(2), 74.

- Harahap, L. J. (2025). Environmental Awareness of University Science Students and Its Role in Sustainable Development. *Bioedunis Journal*, 04(02), 181–188.
- Harahap, L. J., Komala, R., & Ristanto, R. H. (2020). Assesing Critical Thinking Skills and Mastery Concepts: the Case of Ecosystem. *Edusains*, 12(2), 223–232. <https://doi.org/10.15408/es.v12i2.16544>
- Iman, M. (2024). *Diagnosis Kesulitan Belajar*. PT. Literasi Nusantara Abadi Grup.
- Nasution, W. R., & Aslan, A. (2025). Integrasi mata pelajaran coding dan kecerdasan buatan (ai) dalam kurikulum sekolah dasar sebagai upaya meningkatkan keterampilan abad ke-21. *Journal of Community Dedication*, 4(4), 225–236.
- Rohmawati, I. N., Santi, T. K., & Prasetyo, T. H. (2023). Strategi Guru Dalam Mengatasi Kesulitan Belajar Siswa Di Ma Darul Latief Ar Rosyid Kabat Kabupaten Banyuwangi. *Bio Educatia Journal*, 3(2), 17.
- Sari, I. P. N., & Ferry, D. (2024). Analisis Kesulitan Belajar Siswa pada Mata Pelajaran Biologi di SMA. *Biosfer*, 9(2), 172–173.
- Sigalingging, D. M., Kurniawan, F., & Dongoran, M. (2025). *Analisis Kesulitan Belajar Siswa Pada Materi Sistem Saraf Manusia*. 10(1), 26.
- Solihin, S., Harahap, L. J., & Bae, K. (2025). Box Ocean Ecosystem Sorting Media (BOESM) Development based on Coding and Artificial Intelligence Unplugged. *Bioedunis Journal*, 04(01), 61–70. <https://doi.org/10.24952/bioedunis.v4i1.16553>
- Sudirman, Nasrianty, Kurniawati, N., Kartini, K. S., Widiyarti, G., Sukmawati, R., Vonnisye, Silka, Rezeki, S. F. L., & Marlinda. (2023). *Proses Belajar dan Pembelajaran*. CV. Media Sains Indonesia