

High School Students' Interests, Difficulties, and Conceptual Understanding of Cell Concepts

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Abstract

The purpose of this study was to determine the learning interests, difficulties, and conceptual understanding of high school students on cell concepts. The study was conducted at one of the state high schools in Serang. The study cohort comprised 71 students enrolled in class XI, specializing in Mathematics and Natural Sciences, and a teacher in Biology. The data collection methodology employed in this research involved conducting structured interviews with the biology educator and survey questionnaires among students. The stages in carrying out data analysis are data reduction, data display, and the iterative process of drawing conclusions and verification. The results of this research showed the importance of students' conceptual understanding of cell concepts, as evidenced in the data analysis of students who have a low level of conceptual understanding. The low understanding of the concept is caused by several factors, including cell concepts being too complex and abstract, dominant learning not being interactive, cell concepts being conceptual, and difficulty understanding foreign languages or Latin. Based on the results of interviews with biology teachers, several obstacles result in students' low conceptual understanding of cell concepts, including students being less interested in seeking additional explanations regarding cell concepts, students having low memory ability in studying the lesson concepts that has been presented by the teacher, and still a lack of availability of teaching aids in schools for cell concepts.

Keywords: learning interest, difficulties, conceptual understanding, cells, high School Students

INTRODUCTION

Indonesian education runs because of the curriculum, but there are still many problems in the implementation of the curriculum. In Indonesia, the education curriculum is still experiencing frequent changes. Indonesia has implemented the 2013 curriculum, which is the latest curriculum, and is expected to foster an innovative, creative, active, and affective society through integrated skills, understanding, and knowledge (Sahnan & Wibowo, 2023). The educational process equips students with skills, knowledge, attitudes, and values to be able to work and develop in social life. Biology is one of the branches of natural science (IPA) that provides many learning experiences for understanding the concepts and skills of scientific processes related to biological life. In addition, biological phenomena are also solved through students' process skills so that they can get facts and establish concepts, theories, and scientific attitudes (Turnip et al., 2018).

Conceptual understanding ability refers to the process of intellectual psychology in adapting to new concepts obtained and assimilating them into existing knowledge, thus building new understanding (Triwahyuni, 2017). Students are said to understand a concept if they can fulfill the indicators of conceptual understanding including interpreting, giving examples, summarizing, and drawing conclusions on the concepts being studied (Hermawati

et al., 2019). Conceptual understanding can affect student learning success. The importance of conceptual understanding is that it can train students' ability to solve problems that are related to the concept (Siahaan et al., 2021). This means that the concepts of the subject matter must first be understood by students before understanding the concepts of new concepts, with the aim of not having difficulty understanding new lessons and concepts. Learning through conceptual understanding techniques can be the basis for students to be able to solve other problems related to the concepts studied (Novitasari et al., 2021). Understanding of a biological concept is needed in the learning process, one of which is in the cell subconcepts so that the ability to understand concepts is needed by students to learn the next concepts. If students have not understood the concepts studied previously, then these students will have difficulty applying the concept (Suendarti & Liberna, 2021).

Cell concepts is a biology subject that has a contextual and abstract nature, so it can cause difficulties in understanding concepts and have an impact on student learning outcomes. (Syarif et al., 2023). Students only master cell images and their functions because they focus more on that. So that the impact that occurs is that students are unable to build relationships between concepts, have temporary memory abilities, and combine previous concepts with new concepts to form student thinking in understanding abstract concepts (Adrianto et al., 2020). This is to research Murni (2013), namely the cause of student misconceptions is because the concepts is relatively abstract, there are many foreign terms in the concepts so it is difficult to understand, and student unpreparedness in obtaining concepts provided by the teacher (Subrata et al., 2019). Misconceptions that occur in students can hinder the process of receiving and integrating new knowledge into their thinking it will prevent students from learning more deeply about the concepts, especially biology (Wulandari et al., 2017).

Research on conceptual understanding in cell concepts has been studied by several researchers. Based on research conducted by Dinarni et al (2021), that cell concepts is a lesson that has a conceptual nature, so students often experience misconceptions, Submatter of cell structure and function is one of the cell conceptss that have an abstract nature, so students can have difficulty understanding it. Meanwhile, according to Rahman et al (2018), the concepts of animal and plant cell organelles is concepts that has an abstract nature because it cannot be seen directly. This makes it difficult for students to imagine their body shape and structure. Therefore, the right teaching media is needed so that the concepts can be easily understood by students. As for other research conducted by Subrata et al (2019), regarding students' difficulties in understanding the cell sub-concepts, the percentage of students who do not understand the concept is greater than the percentage of students who know the concept of the cell. Based on previous research the importance of understanding concepts in

reducing student misconceptions in learning biology cell concepts. So students' interest in learning needs to be developed to reduce difficulties and understanding of concepts.

METHOD

The method used in this research is a cohort study. The research was conducted in one of the senior high schools in Serang. The subjects of this study were 71 students in class XI majoring in Mathematics and Natural Sciences and 1 Biology teacher. Samples were taken using the random sampling method, namely, sample members were randomly selected from the population without regard to strata in the population (Sugiyono, 2018). This research data collection technique uses interview sheets for teachers and questionnaires for students to know students' interest in learning, difficulties, and understanding of concepts. Interviews were conducted with Biology teachers and 71 student respondents in class XI IPA who studied concepts on the concept of cells. Data analysis methods in this study include data reduction, data presentation, and conclusion drawing/verification. Data reduction based on the results of interviews and questionnaires given during data collection, Presentation of data analyzed from the results of the questionnaire given to students with the conclusion of the answers presented in the form of graphs using Microsoft Excel software, then drawing conclusions or verification is done after the desired data is obtained, analyzed, and then concluded (Subrata et al., 2019).

RESULTS AND DISCUSSION

Based on observations, we found that interest in learning cell concepts biology gets a percentage of 81.7%, student difficulties in learning cell concepts biology get a percentage of 69%, and understanding of concepts in learning cell concepts biology gets a percentage of 15.5% so that based on the results of the questionnaire given to 71 respondents, class XI students experience a low understanding of the concept of biological concepts on the concept of cells. The following graph and its criteria can be seen in Figure 1. Graph of Student Conceptual Understanding.

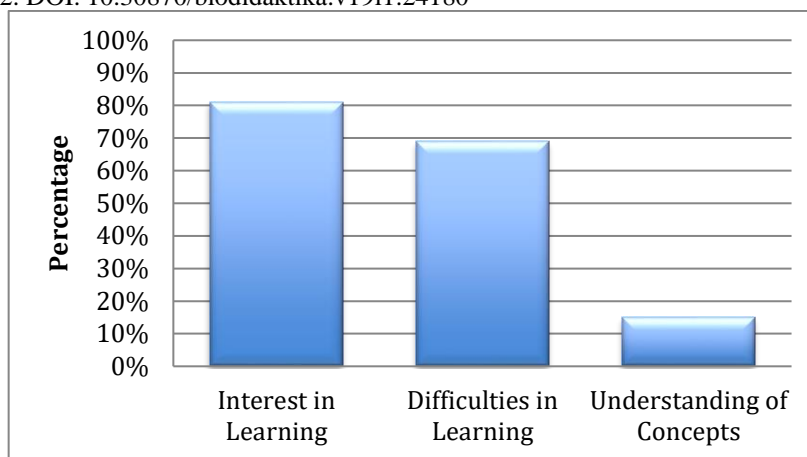


Figure 1. Graph of Student Conceptual Understanding

Based on the results of 71 class XI students in one of the public high schools who were the research subjects, interest in learning got a percentage of 81,7%, which showed high criteria. The high interest in learning biology, especially cell concepts, is due to several reasons, such as the fact that cells have an important role in life and are a place to study the structure and function of living things, so students are interested in learning it. Learning interest has an important role in learning because it is one of the keys to student activeness. With a high interest in learning, students will have activeness that comes from within themselves (Muliani, 2022). However, in learning cell concepts biology, students also experience some difficulties. The results of the questionnaire show that 69% of the total 71 students experience obstacles when learning. These obstacles can be caused by two factors: factors that come from within students, namely internal factors, and factors that come from outside students, namely external factors. Internal factors that become learning barriers for students include intellectual ability, motivation in learning, and low memory (Puspitasari et al., 2019). Examples of external factors include the teacher's way of delivering learning and inadequate learning equipment (Ulfa et al., 2023). One of the things that can be done to overcome learning obstacles is to provide student activeness and involvement in learning so that it can provide high interest and learning outcomes (Octavia & Purwantoyo, 2016).

Understanding of student concepts from the questionnaire results get a percentage of 15.5%, which means that understanding of concepts in learning biology of cell concepts at one of the senior high schools in Pamarayan is very low. Low concept understanding is said if students are unable to re-explain the concepts given by the teacher using their own words (Suryani, 2018). The low understanding of this concept is due to several factors, as follows, cell concepts is too complex and abstract, dominant learning has not been interactive, cell concepts is conceptual, and it is difficult to understand foreign languages or Latin. These

results are by the research by Dinarni et al (2021), who explained that cell concepts is a lesson that has a conceptual nature, and students often experience misconceptions, one of which is in the sub-concepts of cell structure and function. This is because the concepts has an abstract nature, so students have difficulty understanding the concepts. Meanwhile, according to Rahman et al (2018), the concepts of animal and plant cell organelles is an abstract subconcepts. This is because the concepts cannot be observed directly, making it difficult for students to imagine the structure and shape of the body. Low conceptual understanding because the concepts has complex concepts and is interrelated with other disciplines, and it needs guidance from the teacher in-depth and more understanding because it is abstract concepts (Afifah & Asri, 2020).

Student success in learning can be influenced in several ways, one of which is by understanding concepts. Understanding this concept implies that students do not necessarily need to remember the learning concepts provided but must also understand the concept and its implementation (Rahman et al., 2018). Conceptual understanding can be seen in several ways, one of which is that students can re-express the explanation that has been presented by the teacher using their sentences. This is by research by Arisanti et al (2016) which explains that students who have been said to have mastered the concept are those who can respond to different questions or stimuli in the same category. Concept mastery is the ability of students to explore science, especially biology scientifically, including in terms of theory and its application in everyday life, especially in cell concepts.

The results of the questionnaire show that the most difficult concepts is in the sub-concept of chemical components that make up cells, which gets a percentage of 70.4%, the sub-concept of cell structure and function gets a percentage of 15.5%, and the sub-concept of animal and plant cell organelles gets a percentage of 8.5%. According to Raida (2018) Biology learning, especially cell concepts, is considered difficult due to several factors, such as the concepts being conceptual, the concepts being abstract, the fact that there are many foreign or Latin languages, and the fact that there are many biological objects that cannot be seen with the naked eye. In line with research conducted by Subrata et al (2019), one of the obstacles in learning biology concepts on the concept of cells is recognizing something small in size so that it cannot be seen manually, where there are various complexities, so it is not enough just to explain cells but must provide theoretical concepts. This can lead to misconceptions among students, namely errors in understanding and interpreting the concepts learned. Other causes of misconceptions in students' understanding are limited information received, limited possibilities to test new theories, errors in textbooks, and information from

the wrong media delivered. Students are always passive and accept what they hear from the teacher (Syarif et al., 2023).

Based on the results of interviews with biology teachers, some of the obstacles that result in low understanding of the concept of students' cell concepts, include students being less interested in seeking additional explanations about cell concepts, students having low memory in learning the subject matter given by the teacher, and the lack of availability of teaching aids at school for cell concepts. The efforts made in dealing with the obstacles when learning the concept of cells, according to the biology teacher of SMAN 1 Pamarayan is in addition to using lecture and discussion learning methods, learning media is also very important in helping students understand the concept of learning. This is in line with research by Prihatiningtyas et al., (2022) which explains that one of the important components to support learning activities being carried out well is learning media.

CONCLUSION

Based on the results of the analysis conducted during data collection, cell concepts is a very important concept to learn and requires a good understanding because it cannot be seen manually with the eyes. So it is classified as concepts that is quite difficult to learn because the concept is abstract and many foreign terms exist in cell concepts. The importance of understanding concepts in cell concepts is to reduce the occurrence of misconceptions in students so that they can learn the next concepts. The results of a questionnaire were given to students at one of the schools in Serang, Banten. Students experience a low concept understanding of cell concepts. The low understanding of concepts on cell concepts is also explained by the results of interviews with teachers, that students have low memory and lack of props or learning media to support understanding of concepts on cell concepts.

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