

Students' learning difficulties based on cognitive level of excretory system material

Syarif Rizalia^{a,1,*}, Sesar Nopriansyah^{a,2}, Muhammad Saefi^{b,3}, Widi Cahya Adi^{c,4}, Eka Damayanti^{d,5}, S. Sukmawati^{e,6}

^a Tadris of Biology, Faculty of Tarbiyah and Teacher Training, IAIN Kendari, Jl. Sultan Qaimuddin, No.17, Baruga District, Kendari, Southeast Sulawesi 93116 Indonesia,

^b Biology Study Program, Faculty of Science dan Technology, Universitas Islam Negeri Maulana Malik Ibrahim Malang, Jl. Gajayana No.50, Malang, East Java 65144, Indonesia

^c Biology Education Study Program, Faculty of Science dan Technology, Universitas Islam Negeri Walisongo Semarang, Jl. Prof. Dr. Hamka KM.03, Ngaliyan, Semarang, Central Java 50185, Indonesia

^d Early Childhood Education, Faculty of Tarbiyah and Teacher Training, Universitas Islam Negeri Alauddin Makassar, Jl. Sultan Alauddin No.63, Romangpolong, Somba Opu, Gowa, South Sulawesi 92113, Indonesia

^e English Language Education, MTs Negeri 3 Muna, Bone Kancitala Village, Bone District, Muna, Southeast Sulawesi, Indonesia, 93663

¹syarifrizalia@iainkendari.ac.id*; ²sesarnopriansyah02@gmail.com; ³muhammadsaefi@bio.uin-malang.ac.id; ⁴widicahyaadi@walisongo.ac.id; ⁵eka.damayanti@uin-alauddin.ac.id;

⁶g-suk40400838191001@madrasah.kemenag.go.id

*For correspondence:

syarifrizalia@iainkendari.ac.id

Article history:

Received: 5 February 2024

Revised: 13 July 2024

Accepted: 17 July 2024

Published: 19 July 2024

 10.22219/jpbi.v10i2.32212

© Copyright Rizalia *et al.* This article is distributed under the terms of the Creative Commons Attribution License



p-ISSN: 2442-3750

e-ISSN: 2537-6204

How to cite:

Syarif Rizalia, S., Nopriansyah, S., Saefi, M., Adi, W.C., Damayanti, E., & Sukmawati, S. (2024). Students' learning difficulties based on cognitive level of excretory system material. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 10(2), 521-530.
<https://doi.org/10.22219/jpbi.v10i2.32212>

Abstract: The biology material on the excretory system has a high level of learning difficulty, including the complexity of the material and the high level of abstraction, which can affect students' learning process and outcomes. Therefore, it is necessary to analyze the internal and external sources causing learning difficulties by conducting research that aims to interpret: 1) the level of students' learning difficulties based on the cognitive level of the excretory system material, 2) the factors causing students' learning difficulties based on the cognitive level of the excretory system material. This research is a qualitative study using an ex post facto method conducted at SMA Negeri 2 Konawe Selatan. The subjects of this research are 56 Grade XI students who experience learning difficulties, and the biology teacher. The data collection techniques used are: 1) tests, which were analyzed descriptively statistically; 2) interviews, which were analyzed through four stages: collection, reduction, display, and conclusion, followed by testing the validity of the data through triangulation. The results of this research show that: 1) Students' learning difficulties viewed from the cognitive levels of each learning indicator on the excretory system material are generally categorized as slightly difficult with a percentage of 58.93%; 2) The factors causing students' learning difficulties are students' interest in learning, students' habits during the learning process, evaluation techniques, as well as family, school, and community environmental aspects.

Keywords: cognitive level; excretory system; learning difficulties

Introduction

Learning difficulties are a condition in the learning process which is characterized by the presence of obstacles in achieving the set learning goals or outcomes (Pautina, 2018). Learning difficulties are considered as one of the obstacles that include understanding and conveying knowledge both in written and oral form (Haryanti et al., 2022). These obstacles can come from internal factors or external factors, where internal factors include physical (physiological) and mental (psychological) conditions, while external factors are the environment (society) which supports the learning process. All of these factors

determine the success of the learning process, and will directly determine the frequency of students' learning difficulties (Anggara et al., 2018; Khasawneh, 2021).

Factors that determine the success of learning as a process are shown in the learning results obtained through evaluation activities (Ioannidi & Samara, 2019; Syafi'i et al., 2018). Some evaluation activities that are usually carried out in schools include Daily Tests (UH), Mid-Semester Exams (UTS), to Final Semester Exams (UAS) (Fitrianti, 2018). This evaluation applies to all subjects including biology. However, biology is still seen as a difficult subject because it is considered boring, there is too much memorization, and there is a lot of use of foreign languages (Nisak, 2021).

Based on the results of an interview with one of the biology teachers at SMA Negeri 2 South Konawe, it is known that there are still many students who have difficulty learning biology, especially in the excretory system material, where there are still many students who get scores below the minimum learning completeness (KBM) standard on the results of their daily assessment before a remedial. According to the teacher, during the learning process students tend to feel bored and pay less attention to the material being presented. Apart from that, the facilities owned by schools are still lacking, such as textbooks/electronic excretory system material which is lacking thus students find it difficult to search for and interpret concepts related to indicators of excretory system material during the learning process. Practical facilities such as charts, torsos, and other laboratory equipment regarding excretory system material are considered to be inadequate, so this indirectly adds to the factors that cause students' learning difficulties and becomes a problem for students who do not like studying biology. Interviews were also conducted with students who thought that the excretory system material was difficult to understand because there were many foreign terms used on the mechanisms of the organs involved in the excretory system. Apart from that, some students think that teachers do not provide deeper motivation to encourage them to learn and understand the excretory system. Then the teacher's monotonous teaching style is also felt to be one of the factors causing students to be reluctant and bored of learning excretory system material.

There are several similar studies that analyze learning difficulties. Simorangkir et al. (2020) in their research on the analysis of students' learning difficulties in the human excretory system material, explain that the excretory system material has its own level of difficulty which is quite hampering student learning, including about structure and function of the kidney organs in the human excretory system, and the subject of the formation process urine. Many students are still overwhelmed in learning and understanding the subject. This is of course caused by various factors, both internal and external. In line with this, Reigeluth et al., (2016) in their research on the analysis of students' learning difficulties in biology, explains that the highest factor causing students' learning difficulties is the teacher's explanation which is not well understood by students thus students will indirectly find it difficult to understand the excretory system material. Rahmawati et al., (2017) in their research also stated that students' learning difficulties are not only caused by misunderstandings about the material, but also because the knowledge students possess does not align with the context of the material being taught. This internal factor certainly affects students' learning process and outcomes during the learning activities. Additionally, Alsamiri (2018); Asare, (2023) stated that many teachers do not understand how to identify students who are experiencing learning difficulties. This is due to environmental factors (education model) that lack focus on developing teachers' competencies related to identifying students' learning difficulties.

These four studies analyze the level of students' learning difficulties from various different perspectives. However, none of them have analyzed how learning difficulties are influenced by the complexity of the excretory system material. This study examines students' learning difficulties based on cognitive levels in the excretory system material, providing a new perspective on how cognitive aspects play a role in understanding complex and abstract material. The novelty of this research lies in its approach that integrates cognitive level analysis with internal and external factors, offering a more comprehensive view of the sources of learning difficulties. The urgency of this research arises from the need for a deeper understanding of how various cognitive levels affect students' ability to learn excretory system material, which can help teachers design more effective learning strategies tailored to the cognitive needs of students.

Method

The present study is a qualitative research with an *ex post facto* method, in which reveals facts related to students' difficulties in learning the excretory system material. This research was carried out between June and July of 2023 at SMA Negeri 2 Konawe Selatan. The technique for selecting and determining research objects is purposive random sampling, namely giving tests on excretory system material to all class XI science students at the school. The test results were sorted according to the KBM value of 75. Students who did not achieve the KBM score became the main research objects who had difficulty in learning the excretory system material, and the second object is the Class XI Science teacher who teaches biology on the excretory system material.

The research uses two data collection techniques, namely tests and interviews. The test includes 10

essay questions about the excretory system. Essay questions had already been tested to determine their validity and reliability. The questions are prepared based on achievement indicators of Basic Competencies in the excretory system material, which consists of learning indicators in the excretory system material, namely (1) knowing the definition of the excretory system; (2) identifying various organs in the excretory system; (3) mentioning the structure and function of various organs of the excretory system; (4) identifying the relationship between the structure and function of organs in the excretory system; (5) explaining the mechanism of the excretory system; (6) explaining functional disorders/abnormalities in the excretory system (Kusuma, 2020). The correlation between indicators and cognitive level can be seen in Table 1.

Table 1. Excretory System Test Question Grid

Learning Indicators	Cognitive Aspect of Learning Indicator
Knowing the definition of the excretory system	C1
Identifying various organs in the excretory system	C3
Identifying the relationship between the structure and function of organs in the excretory system	C3
Explaining the mechanism of the excretory system	C4
Explaining functional disorders/abnormalities in the excretory system	C5

Structured interview. A list of questions was prepared and had been validated, the interview speed was controlled, and there was no improvisation during the interview process. Interviews were conducted on students and teachers. Student interview sheets are based on indicators: student interest in learning, student habits and interests during the learning process, learning evaluation, student difficulties in mastering the material, as well as external factors (Amos et al., 2022; Sardiman, 2020). Teacher interview sheet based on indicators: preparation of learning tools, management of learning implementation, student responses, learning activities, and external factors (Asare, 2023; Reigeluth et al., 2016). This research uses descriptive statistical data analysis techniques to describe the level of learning difficulty with categories of student learning difficulty levels based on the following criteria, can be seen in Table 2.

Table 2. Categories of student learning difficulty levels

Criteria	Category
$80 < x \leq 100$	Not difficult
$60 < x \leq 80$	Slightly difficult
$40 < x \leq 60$	Quite difficult
$20 < x \leq 40$	Difficult
$0 \leq x \leq 20$	Very difficult

(Riduwan, 2011).

Data from interviews were analyzed using descriptive qualitative through 4 stages, namely: (1) data collection; (2) data reduction; (3) data display; (4) conclusion stage. Test the validity of the data using three types of triangulations, namely source triangulation, technical triangulation, and time triangulation.

Results and Discussion

The main source for analyzing students' learning difficulties in the excretory system material is the results of filling in the learning outcomes test question instrument. Before the questions are given to the research object i.e the students, theoretical validation was first carried out by the Biology Education Lecturers who teach learning evaluation courses, which is followed by empirical validation, namely testing the question instrument on class XII students who are not the object of this research, with the assumption that the students Class XII has studied the excretory system material and has also become the object of the researcher's initial observations. The test questions obtained through the trials were then processed for validity and reliability tests to obtain questions that are good to use and to correct or eliminate the questions that cannot be used. Nine questions were eventually obtained for all material indicators of the excretory system. The test questions were given to 91 class XI students of SMA Negeri 2 Konawe Selatan, with the following results in Table 3.

Table 3. Frequency of Students' Studying Completeness on Excretory System Material

No.	Number of students	%	Information
1	35	38.46	Completed
2	56	61.54	Not completed

Table 3 explains that there were 56 students who scored below the minimum learning completeness (KBM) before the remedial, which became the object of research to diagnose their learning difficulties in the excretory system material. Next, the test results of the 56 people were sorted based on learning indicators for excretory system material to obtain accurate data about their learning difficulties, which can be seen in Table 4.

Table 4. Frequency of Students' Learning Difficulty Test Results Based on Indicators of Excretory System Material

No	Indicator	% Correct Student Answers	Category
1	Knowing the definition of the excretory system	96.42	Not difficult
2	Identifying various organs in the excretory system	46.43	Quite difficult
3	Identifying the relationship between structure and function of organs in the excretory system	48.21	Quite difficult
4	Explaining the mechanism of the Excretory System	44.64	Quite difficult
5	Explain functional disorders/abnormalities in the excretory system	58.93	Slightly difficult

Table 4, explains that students have no difficulty in knowing the definition of the excretory system, with the percentage of students' correct answers being 96.42%. However, there are several indicators that are quite difficult for students to answer, namely identifying various organs in the excretory system with the percentage of students' correct answers only being 46.43%, identifying the relationship between the structure and function of organs in the excretory system with the percentage of students' correct answers only being 48, 21%, as well as explaining the mechanism of the excretory system with the percentage of students' correct answers only being 44.64%. This is in line with research by Simorangkir et al., (2020) which states that in general students will not experience difficulties in learning and answering questions with indicators of knowing the definition of the excretory system, because the character of the indicators is relatively easy with cognitive level C1 which only relies on students' ability to remembering the previously received information. The Students do not understand and rarely apply knowledge about excretory system material in depth in daily life so indicators at cognitive level C3 with the operational verb of identifying have become difficult to learn (Amini et al., 2018). Thus, it can be said that students still have difficulty learning excretory system material, especially in discussions that require moderate to high cognitive abilities such as identifying, explaining mechanisms, and explaining functional disorders/abnormalities as a form of evaluation.

Interviews were conducted to determine the factors causing students to experience learning difficulties

Interviews were conducted referring to the indicators of factors that cause learning difficulties, both internal and external factors, which were then analyzed using triangulation techniques and data validity. Internal factors consist of indicators of students' interest in learning, students' habits, and interests during the learning process, learning evaluation, students' difficulties in mastering the material, as well as external factors consisting of indicators of the family, school, and community environment. Based on the results of interviews on the indicators of student interest in learning, the following data was obtained.

"I don't have a high interest and motivation to learn, I don't even like the excretory system material, because I think this material is too much and complicated so it is difficult to understand."

Furthermore, the researcher asked the student to elaborate their statement in regards to the learning indicators of the excretory system material which was categorized as difficult. The interview results suggests that what the student mean by too much was about the excretory system organs which have many parts that must be understood, and the existence of the excretory system mechanism for each organ which is abstract in nature making students less enthusiastic in learning the material. Interest is one of the main factors in students' learning difficulties (Rahmadani et al., 2017). Enthusiasm that comes from a student's interest will have a direct proportional impact on the progress of something they are doing. If students are interested in learning activities, it is certain that the process will run well and students will not experience learning difficulties, and vice versa. Apart from that, Hamdu & Agustina, (2011) explain that interest also influences students' learning motivation. Without motivation, students will find it difficult to learn optimally. Learning motivation plays an important role in students' school engagement and achievement, this also occurs in intellectually gifted children, because it allows them to translate their true abilities (Hornstra et al., 2023). Low motivation causes the desire to learn to be low, which has an impact on learning outcomes. Due to the low indicators of students' interest and motivation to learn about excretory system material, it is certain that the students will find it increasingly difficult to understand the material on excretory system.

Interviews regarding indicators of students' habits and interests during the learning process, obtained the following data

"I always pay attention to the teacher when explaining the material in class, but because the material uses a lot of foreign and scientific terms, my focus becomes distracted between paying attention to the teacher or memorizing the foreign and scientific terms, so I always try to note down important points from the teacher's explanation of the system excretion material. Although there are still things I don't understand, I can ask the teacher later on. Apart from that, I feel that this excretory system material should be very interesting to study because it is related to daily human activities. However, the large number of abstract parts that have to be studied have caused my enthusiasm and interest in the excretory system to decrease."

Furthermore, the researcher asked students in regards to the learning indicators of excretory system material which belong to difficult categories. Based on the results of the interview, the statement that there are many foreign and scientific terms in the excretory system material refers to the kidney organ which is composed of cortex, medulla, papilla, pelvis, ureter, and others. Then there are the liver, lungs and skin which also have many organelle structures with foreign names. Furthermore, the student's statement of the abstract material refers to various excretion mechanisms of the kidneys (urine formation), liver (sweat formation), and others. All of these processes are explained through reading literature which students consider difficult to understand because the concepts are not real. This is in line with a study [Rahmayani et al., \(2017\)](#) which state that the excretion system material is indeed quite difficult, where there are many foreign terms in the excretion system material, differences in excretion mechanisms that must be understood, and so on. This requires students' concentration and time to understand it so that when these two things are not fulfilled, students will experience learning difficulties. In addition, [Muspikawijaya et al., \(2017\)](#) state in their research that biology teachers who often use the lecture method will make students easily sleepy when studying. Teachers who lack variation in teaching will make students tend to get bored and less interested in learning biology, which will ultimately be the cause of their learning difficulties ([Chin & Osborne, 2008](#); [Dunlosky et al., 2013](#)).

Interviews regarding learning evaluation indicators, obtained the following data

"I am not able to explain or answer questions about the excretory system because there is a lot of material that has to be studied, for example questions about the mechanism of urine formation, or the organelles that make up the excretory system organs. If I get material that I don't understand, then I re-read the notes I made previously, or ask teachers and friends who understand more about this material but still I have limitations in understanding the explanation."

Furthermore, the researcher asked students regarding the learning indicators of excretory system material which was categorized as difficult. Based on the results of the interview, the statement *not being able to answer questions about the excretory system material* means that there are many sequences of mechanisms for each excretory organ that must be understood by the student. Where the sequence is correlated with various learning indicators as a basis for creating the given questions, consequently the student found it difficult to answer these questions. Students will find it difficult to draw conclusions at the end of learning because from the start they have not focused on the material presented by the teacher, obscuring student to know the learning objectives or the essence of the excretory system material ([Amini et al., 2018](#)). As a result, it is certain that students will find it difficult to learn and answer the test questions during learning evaluations. [Putri, \(2018\)](#) in her research explains that the various mechanisms occurring in the excretory system are complex material requiring students' ability to receive and process information on a higher level in terms of information identification indicator as to avoid learning difficulties.

Interviews regarding indicators of students' difficulties in mastering the material obtained the following data

"I find it difficult to follow the teacher's method of delivering the material, because the excretory system material is so dense that the learning process seems fast and unclear. This causes a lot of material that I can't understand, sometimes I don't even know what the teacher is explaining about the excretory system material."

Furthermore, the researcher asked students regarding the learning indicators of excretory system material which was categorized as difficult. Based on the results of the interview, it was revealed that the student was slightly uncomfortable with the teacher's way of teaching who seemed to be a rushed way of discussing excretory system materials within limited time, which caused students to be unable to master the excretory system material properly and correctly. [Prastyaningtias, \(2019\)](#); [Wysiadecki et al., \(2024\)](#) explains that complex material such as systems in the body needs to receive a great attention because it will be related to the issue of mastering the material, selecting suitable learning methods,

determining strategies and appropriate learning techniques to equip students for further learning where concepts are a prerequisite for studying the next subsequent concepts. It is, therefore, very important to understand and master these materials first to avoid gaps and student learning difficulties.

Interviews regarding external factors, which consist of several indicators including family, school and community environment, obtained the following data

"My parents rarely tell me to study at home because they are busy with their respective jobs so they don't have time to remind me to study. Then, the very hot school environment made me unable to pay attention to the teacher's explanations for long. Apart from that, the laboratory equipment is still inadequate so we have never carried out practical work on excretory system material. Meanwhile, regarding the environmental conditions of the community, this school is included in the Halu Oleo Airport area, Southeast Sulawesi, so noise pollution is definitely very high here. This also causes the delivery of material often be paused and it often disrupts our concentration."

Furthermore, the researcher asked the student to elaborate the learning indicators to excretory system material which was categorized as difficult. Based on the results of interviews, family/parental support factors, for example providing learning facilities and providing encouragement/psychology, are opportunities for students to develop interest and motivation in learning. Then, the excretory system material, which is mostly abstract, cannot only be explained briefly. For example, the structure of the kidney organ, rather than students only being asked to observe pictures and memorize the organelles, the use of torsos and other practical tools can support students in overcoming learning difficulties. Furthermore, the conditions of the surrounding environment greatly influence students' concentration in studying so that the calmer the conditions in the community, the better the students' concentration in learning. For example, in understanding the various mechanisms that occur in the excretory system.

Parents have more time to socialize with children, they can more freely observe their children's behavior compared to teachers (Abdurrahman, 2019). Therefore, parents are expected to spend time training and developing their children's skills and behavior that are useful in overcoming learning difficulties. Then Practicum activities are a product of technological advances which can be an alternative solution to overcome problems related to limited time in learning activities (Gaffar, 2016). However, practicum as a learning facility must be prepared by schools if they want this to be a solution. Adequate school facilities, such as libraries, laboratories, etc., will make students more enthusiastic about learning, but on the contrary, such facilities might as well hinder students from completing their learning activities (Rizki & Fauziddin, 2021). Sardiman, (2020) explains that the community environment also influences learning difficulties, starting from activities around the school and its conduciveness. Too many activities that make noise will cause students' learning to be neglected and cause difficulties in learning. Therefore, external factors must be considered because they greatly influence the physical and psychological condition of students in avoiding learning difficulties (Kurniawan et al., 2023).

Interviews regarding indicators of learning device preparation, obtained the following data

Interviews regarding the factors causing students' learning difficulties in the excretory system material were also conducted with teachers, with the assumption that to strengthen the data from interviews with the students, or that something new could be discovered. Interviews were conducted with reference to indicators of factors causing learning difficulties, namely indicators of preparation of learning tools, management of learning implementation, student responses, learning activities, and external factors, which were also analyzed using triangulation techniques and data validity.

"The first preparation carried out by the teacher before the learning process is preparing the administration. Administrative preparation is in the form of a syllabus, lesson plans, as well as tools that will be used in the learning process such as charts, PowerPoint and biology textbooks. It also usually involves using the torso to show parts of the excretory system organs. But currently the torso that is usually used in the learning process has been damaged and cannot be used anymore."

Based on the results of the interview, it is known that the teacher has tried to prepare a learning plan with all limitations. However, the use of monotonous teacher learning models and the lack of supporting facilities remain factors causing students' learning difficulties in excretory system material. This is supported by research conducted by Amoah et al., (2023) who explains that biology learning resources in most schools are currently still inadequate, which causes most teachers not to organize theoretical or practical activities regularly which affect several dimensions of learning and it also impacts the students' achievement expected by the current curriculum, for example the dimension of increasing the students' learning achievement. Achievement and learning outcomes are greatly influenced by students' learning difficulties, the higher the level of student learning difficulties, the lower the student learning outcomes will be and vice versa, so it can be concluded that despite being indirectly related, the preparation of learning tools is a very important indicator in influencing students' learning difficulties (Amini et al., 2018).

Interviews regarding indicators for managing learning implementation obtained the following data

"Class management in the learning process is firstly to carry out openings such as giving greetings, asking for news, after that to convey appreciation, namely linking the material that has previously been studied, after that to provide motivation and an overview of the benefits of studying the excretory system material. The strategy used is usually like at the beginning of the lesson I show a related picture and introduce the excretory system material. Then, as the excretory system material is very complex while the time given is very limited, the methods I use in the learning process are, therefore, always material explanations, questions and answers, discussions and presentations."

Based on the results of the interview, it is known that the teacher has tried to carry out learning activities according to the syntax that has been chosen, by selecting the same learning model at each meeting. [Darling-Hammond et al., \(2020\)](#) explains that classes run with coherent teaching methods have a positive correlation and encourage students' learning processes. Student teachers have varying feelings about their ability to cope with complex teaching situations ([Bracha & Hoffenbartl, 2015](#)). This means that if a teacher organizes his learning activities according to the syntax/steps of the learning model, the students' understanding process will be better because of directed learning.

Interviews regarding student response towards learning indicators obtained the following data

"Student responses in the learning process vary depending on the students themselves, usually some are happy, and there are also those who don't pay attention to the material I convey. However, before the learning process begins, I first convey motivation to students so that they have enthusiasm and enjoy studying the excretory system material because this material discusses the organs in the human body. However, there are still some students who do not pay attention to lessons in class, there are those who are active and enthusiastic about learning, but there are also those who are less active. There are even some students who might feel bored in class so that when I explain the excretory system material, some students pay attention and some don't. Apart from that, there are students who are always active in asking questions when there is material they don't understand, but there are still some students who usually don't understand but don't dare to ask. In fact, this is normal, but the diversity of students' characters takes up the teaching time and time for delivering the material."

Based on the results of interviews, it is known that students' responses also influence the teacher's ability to manage the class. This is because the time that has been set for the teacher to use in teaching, is also used to anticipate the various characteristics of students in the class when studying excretory system material. This is a challenge in the teaching and learning process. Changes are needed in interpreting student behavior. If teachers try to adapt their teaching patterns to students' conditions by paying more attention to student behavior (for example, students who tend to be passive in learning activities), then students can become more motivated and interested in what they are learning ([Aas et al., 2023](#)). Observations help teachers to understand motivation, perceptions, learning, and attitudes that influence student learning behavior ([Areche, 2022](#)).

Interviews regarding learning activity indicators obtained the following data

"Usually, after explaining the material, students are usually divided into several groups to do assignments to discuss the excretory system material or are usually given assignments and let them present it so that we can see the students' abilities. Students are always given essay/multiple choice/oral test questions at the end of each lesson according to the syntax of the Learning Implementation Plan (RPP), to see the level of students' understanding of the excretion system material. During the learning activities, some students experienced difficulties due to lack of focus and lack of attention, which was assumed to be due to their lack of interest in learning the excretory system material. Apart from that, many students are confused when learning the excretory system because there are many foreign/scientific terms that have to be memorized and understood, so I often use Indonesian to translate these foreign/scientific terms in the hope that they will be easy for the students to understand."

Based on the results of the interview, it is known that the teacher has tried to make the excretory system material easier for the students to understand, given the students' diverse character conditions. The way to overcome this problem is to train communication competencies, reduce/summarize the syllabus, and publish an outline explanation for each lesson. This begins with the assumption that students' experiences of learning difficulties are caused by inefficiencies in teachers' teaching practices. Students have different abilities, and teachers are expected to be able to flexibly apply teaching methods that can adapt to those ability levels ([Dickerson et al., 2021](#)). A behavior management approach that is appropriate to the development of student behavior is a strategy that is required as a set of teacher skills ([Darling-Hammond et al., 2020](#)).

Interviews regarding external factors of student learning difficulties according to teachers, consisting of school and community environmental indicators obtained the following data

"The school environment during hot or stuffy weather makes students stifflingly hot, while biology subjects are often given during the day so it is certain that many students are less focused on studying the excretory system material. Then the equipment in the laboratory is still inadequate so that students have never carried out direct practice on the excretory system material, but there are books available in the library for study and students can even borrow and take them home so that it all comes back to students' awareness of using these books. Furthermore, the community environment is very supportive of learning activities as this school is included in the TNI-AD area so that the value of discipline is highly upheld here. However, it is unfortunate that the school's location is so close to the airport that noise pollution cannot be avoided, which disrupts students' learning activities, including when delivering excretory system material. Because of that, sometimes the time set by the teacher to complete the material in one meeting ends up running out due to noise pollution."

Based on the results of interviews, it is known that teachers have tried to adapt to all the shortcomings that exist in the school environment and society. However, this is not yet a solution that is able to overcome students' learning difficulties in studying excretory system material. [Laia & Zagoto, \(2023\)](#) explained that the school environment plays an important role in the learning development of students, where a comfortable school environment will be able to help students' learning activities well, on the contrary, good cooperation between educators and the community is needed to be able to build a good learning environment, and able to overcome learning difficulties. Therefore, a teacher is required to be able to build this learning environment by implementing methods and interventions which belong to his social competence. Learning methods and interventions apply in complex systems, and their impact depends on various factors in the universal context (society) as well as the way in which and by whom the method is applied and enforced in learning activities ([Hirsh et al., 2022](#)).

Conclusion

Based on the results of the research and discussion, several conclusions can be drawn as follows. First, Students' learning difficulties viewed from the cognitive levels of each learning indicator on the excretory system material are generally categorized as slightly difficult with a percentage of 58.93%. Second, Factors causing students' learning difficulties based on the cognitive level in the excretory system material are viewed from various indicators, namely students' interest in learning, students' habits and interests during the learning process, learning evaluation, students' difficulties in mastering the material, as well as external factors consisting of aspects of the family, school environment., and society. All these indicators were stated to be less supportive of student learning activities which resulted in student learning difficulties in studying the excretory system material.

Acknowledgment

Researchers would like to thank: IAIN Kendari which has given permission to carry out research activities as a form of implementing the tridharma of higher education; SMA Negeri 2 Konawe Selatan, which has given permission to carry out a series of research activities at the school so that it can reveal various facts that can be used as recommendations for the progress of the world of education;

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

S. Rizalia: writing original draft preparation, methodology, analysis, review, and editing; **S. Nopriansyah:** writing original draft preparation, methodology, analysis, review, and editing; **M. Saefi:** review and editing; **W. C. Adi:** review and editing; **E. Damayanti:** review and editing; **S. Sukmawati:** writing original draft preparation.

References

- Aas, H. K., Uthus, M., & Løhre, A. (2023). Inclusive education for students with challenging behaviour: development of teachers' beliefs and ideas for adaptations through Lesson Study. *European Journal of Special Needs Education*, 00(00), 1–15. <https://doi.org/10.1080/08856257.2023.2191107>
- Abdurrahman, M. (2019). *Anak berkesulitan belajar: Teori, diagnosis, dan remediasinya*. Rineka Cipta, 131.
- Alsamiri, Y. (2018). How learning disabilities teachers in the kingdom of Saudi Arabia define students with giftedness and learning disabilities. *Cakrawala Pendidikan*, 37(3), 356–365. <https://doi.org/10.21831/cp.v38i3.21566>
- Amini, F., Nasution, M. Y., Mulkan, M., & Sugito, H. (2018). Analisis kemampuan kognitif dan kesulitan belajar siswa materi sistem ekskresi di SMA Negeri 1 Karang Baru. *Jurnal Pelita Pendidikan*, 6(4), 225–232. <https://doi.org/10.24114/jpp.v6i4.11053>
- Amoah, J. E. M., Eminah, J. K., Ngman-Wara, E. I. D., & Azure, J. A. (2023). The status of biology teaching and learning materials in selected central regional schools, Ghana. *Cogent Education*, 10(1), 1–14. <https://doi.org/10.1080/2331186X.2023.2198939>
- Amos, S., Eghan, M. P. K., & Oppong, E. (2022). The impact of instructional materials in teaching and learning of biology in the colleges of education in the central region of Ghana. *Open Journal of Educational Research*, 2(5), 213–221. <https://doi.org/10.31586/ojer.2022.400>
- Anggara, B., Priatna, N., & Juandi, D. (2018). Learning difficulties of senior high school students based on probability understanding levels. *Journal of Physics: Conference Series*, 1013(1), 1–7. <https://doi.org/10.1088/1742-6596/1013/1/012116>
- Areche, F. O. (2022). Students learning behaviour: Factors influencing students learning behavior. *Journal*, 2(3), 1–11. <https://doi.org/10.22161/ijllc>
- Asare, P. Y. (2023). Profiling teacher pedagogical behaviours in plummeting postgraduate students' anxiety in statistics. *Cogent Education*, 10(1), 1–21. <https://doi.org/10.1080/2331186X.2023.2222656>
- Bracha, E., & Hoffenbartal, D. (2015). The Existence of Sense of coherence in teaching situations among student-teachers. *Procedia - Social and Behavioral Sciences*, 180(November 2014), 722–729. <https://doi.org/10.1016/j.sbspro.2015.02.185>
- Chin, C., & Osborne, J. (2008). Students' questions: A potential resource for teaching and learning science. *Studies in Science Education*, 44(1), 1–39. <https://doi.org/10.1080/03057260701828101>
- Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97–140. <https://doi.org/10.1080/10888691.2018.1537791>
- Dickerson, C., Levy, R., Jarvis, J., & Thomas, K. (2021). The role of pupils in developing student teachers' knowledge of teaching. *Journal of Education for Teaching*, 47(4), 475–494. <https://doi.org/10.1080/02607476.2021.1890985>
- Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest, Supplement*, 14(1), 4–58. <https://doi.org/10.1177/1529100612453266>
- Fitrianti, L. K. D. E. P. P. | F. | A.-I. J. P. (2018). Prinsip kontinuitas dalam evaluasi proses pembelajaran. *Al-Ishlah: Jurnal Pendidikan*, 10(1), 1–14. <https://journal.staihubbulwathan.id/index.php/alishlah/article/view/68>
- Gaffar, A. A. (2016). Pembelajaran berbasis praktikum virtual untuk meningkatkan sikap ilmiah siswa kelas x pada materi invertebrata. *Jurnal Bio Educatio*, 1(1), 18–25. <https://doi.org/10.31949/be.v1i1.436>
- Hamdu, G., & Agustina, L. (2011). Pengaruh motivasi belajar siswa terhadap prestasi belajar IPA di sekolah dasar. *Jurnal Penelitian Pendidikan*, 12(1), 25–33. https://scholar.google.co.id/citations?view_op=view_citation&hl=en&user=iKCBfDwAAAAJ&citation_for_view=iKCBfDwAAAAJ:2osOgNQ5qMEC
- Hirsh, Å., Nilholm, C., Roman, H., Forsberg, E., & Sundberg, D. (2022). Reviews of teaching methods—which fundamental issues are identified? *Education Inquiry*, 13(1), 1–20. <https://doi.org/10.1080/20004508.2020.1839232>
- Hornstra, L., Mathijssen, A. C. S., Denissen, J. J. A., & Bakx, A. (2023). Academic motivation of intellectually gifted students and their classmates in regular primary school classes: A multidimensional, longitudinal, person- and variable-centered approach. *Learning and Individual Differences*, 107(October 2022), 102345. <https://doi.org/10.1016/j.lindif.2023.102345>
- Ioannidi, V., & Samara, E. (2019). Children with learning difficulties and conditions of school inclusion - a brief report and a constant challenge of inclusive education. *European Journal of Education*

- Studies*, 6(3), 1–7. <https://doi.org/10.5281/zenodo.3239979>
- Kurniawan, F., Yeni Erita, Didi Syahrir, & Vani Qhairum Nisa Utami. (2023). The influence of students' environment on students' learning motivation. *Journal of Digital Learning and Distance Education*, 1(8), 297–305. <https://doi.org/10.56778/jdlde.v1i8.58>
- Kusuma, N. R. (2020). Modul pembelajaran SMA biologi kelas XI. In *Modul Biologi Kelas XI KD 3.9*. Direktorat SMA, Direktorat Jenderal PAUD, DIKDAS dan DIKMEN. https://repositori.kemdikbud.go.id/21917/1/XI_Biologi_KD-3.5_Final.pdf
- Laia, S., & Zagoto, S. F. L. (2023). Hubungan kondisi lingkungan sekolah dengan aktivitas belajar siswa di SMP Negeri 1 Onolalu. *Counseling For All (Jurnal Bimbingan Dan Konseling)*, 2(2), 52–64. <https://doi.org/10.57094/jubikon.v2i2.695>
- Muspikawijaya, Iswari, R., & Marianti, A. (2017). Analisis kesulitan peserta didik SMA/MA kabupaten Luwu Timur dalam memahami konsep pada materi metabolisme sel. *Journal of Innovative Science Education*, 6(2), 252–263. <https://doi.org/10.15294/JISE.V6i2.15439>
- Haryanti, N., Muhibbudin, M., Imam Junaris. (2022). Analisis kesulitan belajar siswa (disleksia dan disgrafia) di masa pandemi covid-19. *Journal of Instructional and Development Researches*, 2(1), 7–16. <https://doi.org/10.53621/jider.v2i1.60>
- Nisak, N. Z. (2021). Analisis kebutuhan bahan ajar biologi untuk siswa SMA ditinjau dari tingkat kesulitan materi, keterampilan berpikir tingkat tinggi, dan keaktifan belajar siswa. *EduBiologia: Biological Science and Education Journal*, 1(2), 128. <https://doi.org/10.30998/edubiologia.v1i2.9629>
- Pautina, A. R. (2018). Aplikasi teori gestlat dalam mengatasi kesulitan belajar dalam anak. *Manajemen Pendidikan Islam*, 6(1), 14–28. <https://journal.iaingorontalo.ac.id/index.php/tjmpi/article/view/503>
- Prastyaningtias, S. D. (2019). Analisis kesulitan mahasiswa Institut Teknologi dan Sains Nahdlatul Ulama Pasuruan pada mata kuliah biologi umum materi sistem pencernaan manusia. *Jurnal Eksakta Pendidikan (Jep)*, 3(1), 61. <https://doi.org/10.24036/jep/vol3-iss1/307>
- Putri, I. I. (2018). Kemampuan menerima dan mengolah informasi (mmi) peserta didik SMA dalam pembelajaran biologi. *J. Ind. Bio. Teachers*, 1(2), 80–84. <https://ibt.ejournal.unri.ac.id/index.php/IBT/article/view/6208>
- Rahmadani, W., Harahap, F., & Gultom, T. (2017). Analisis faktor kesulitan belajar biologi siswa materi bioteknologi di SMA Negeri Se-Kota Medan. *Jurnal Pendidikan Biologi*, 6(2), 279–285. <https://doi.org/10.24114/jpb.v6i2.6546>
- Rahmawati, I., Sutopo, S., & Zulaikah, S. (2017). Analysis of students' difficulties about rotational dynamics based on resource theory. *Jurnal Pendidikan IPA Indonesia*, 6(1), 95–102. <https://doi.org/10.15294/jpii.v6i1.9514>
- Rahmayani, R., Sinambela, M., & Rosida, R. (2017). Analisis faktor kesulitan belajar siswa pada materi pokok sistem ekskresi manusia kelas XI MIA SMA Negeri 16 Medan. *Jurnal Pelita Pendidikan*, 5(2), 1–11. <https://doi.org/10.24114/jpp.v5i2.8415>
- Reigeluth, C. M., Beatty, B. J., & Myers, R. D. (2016). Instructional-design theories and models, volume IV. In C. M. Reigeluth, B. J. Beatty, & R. D. Myers (Eds.), *Instructional-design theories and models* (2nd ed.). Routledge. <https://doi.org/10.4324/9781315795478>
- Riduwan, R. (2011). *Skala pengukuran variabel-variabel penelitian*. Alfabeta. <https://scholar.google.com/scholar?q=Dr.+Riduwan+Skala+pengukuran+variabel-variabel+penelitian&hl=en>
- Rizki, L. M., & Fauziddin, M. (2021). studi kasus pada mahasiswa yang mengalami kesulitan belajar matakuliah statistika. *Jurnal Pendidikan Tambusai*, 5(3), 11304–11314. <https://doi.org/10.31004/jptam.v5i3.3010>
- Khasawneh, M. A.S. (2021). Cognitive flexibility of students with learning disabilities in english language and its relationship to some variables. *Shanlax International Journal of Education*, 9(3), 49–56. <https://doi.org/10.34293/education.v9i3.4003>
- Sardiman, A. M. (2020). *Interaksi & motivasi belajar mengajar*. PT RajaGrafindo Persada. https://scholar.google.co.id/citations?view_op=view_citation&hl=id&user=7ErKVm4AAAAJ&citation_for_view=7ErKVm4AAAAJ:mVmsd5A6BfQC
- Simorangkir, A., Napitupulu, M. A., & Sinaga, T. (2020). Analisis kesulitan belajar siswa pada materi sistem ekskresi manusia. *Jurnal Pelita Pendidikan*, 8(1), 1–11. <https://doi.org/10.24114/jpp.v8i1.11247>
- Syafi'i, A., Marfiyanto, T., & Rodiyah, S. K. (2018). Studi tentang prestasi belajar siswa dalam berbagai aspek dan faktor yang mempengaruhi. *Jurnal Komunikasi Pendidikan*, 2(2), 115–123. <https://doi.org/10.32585/jkp.v2i2.114>
- Wysiadecki, G., Orkisz, S., Balawender, K., Golberg, M., & Żytowski, A. (2024). The human body - not only a biological entity. *Translational Research in Anatomy*, 34(October 2023), 2023–2025. <https://doi.org/10.1016/j.tria.2023.100270>