

# Revealing Obstacles: Examining High School Students' Difficulties in Understanding Digestive System Concepts in Class XI MIPA

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**Abstract:** This research aims to determine the internal and external factors that cause learning difficulties experienced by class XI students when studying digestive system material. The research used a survey method with a cross-sectional research design involving high school students from three schools in Banten and a class XI biology teacher. Data collection using questionnaires and interviews. Data analysis was carried out using Microsoft Office Excel, and the findings were displayed in the form of a percentage graph. The results of measuring the student learning interest showed that 55.53% of students stated that difficulty in distinguishing types of digestive system enzymes was one of the factors in students' lack of interest in understanding the material. The learning study habits indicators showed that only 28.9% of students applied understanding of the material in their daily lives, this triggered students' lack of memory for the material. Meanwhile, the teacher teaching method indicator showed that 24.43% of students stated that the learning process in class felt monotonous, this was due to the use of learning strategies by teachers which was still relatively lacking, apart from that in the learning facilities indicator, the teaching materials used in schools were still dominant rely on textbooks.

**Keywords:** Digestive system; Learning difficulty factors; Revealing Obstacles

## Introduction

Academic learning impairments are common, frequently showing difficulty with counting, writing, reading, and expressive communication. These problems emphasize the importance of a thorough grasp of the elements causing students' learning difficulties. There are two main reasons why students struggle with their studies: external influences that come from the larger world and internal elements that are unique to each student, such as their interests, IQ, and state of health. Internal elements include the general state of health, mental capacities, and personal interests of each student, all of which significantly influence their educational experiences (Grøtan et al., 2019; Tanta et al., 2023). Physical and psychological health issues can make it difficult for students to interact with the subject in

class, and variances in IQ and a range of interests affect how well they absorb and remember the knowledge. On the other hand, learning challenges may be made worse by outside variables originating from the student's community, family, and educational environment. The home setting, defined by encouragement and support from family members, plays a critical role in determining how a student approaches their education (El Nokali et al., 2010). In a similar vein, the socioeconomic and cultural milieu of the immediate neighborhood can either offer additional educational advantages or pose obstacles to academic advancement (Kartini et al., 2022; Vadivel et al., 2023). The level of students' learning problems is also greatly influenced by the school environment, which includes instructional strategies, resources that are accessible, and the general educational culture. These two aspects of internal and

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external influences work in concert to add to the complexity of students' learning challenges, according to a study by Najiah et al. (2023). In order to execute customized interventions that meet each student's unique learning requirements, educators and support systems must recognize and address this complex interaction. A comprehensive comprehension of these elements enables academic institutions to provide inclusive settings that promote resilience and give students the skills they need to succeed in the classroom.

It is essential to remember that non-intellectual variables can cause learning difficulties and low IQ concerns. These challenges can be influenced by various factors, including curricular emphasis, inappropriate teaching strategies, and the intrinsic difficulty of learning (Armella et al., 2022). Students with learning challenges, also known as learning impairments, have difficulty demonstrating their learning ability, resulting in a discrepancy between their intelligence level and the expected academic accomplishment (Lodge et al., 2018). In order to overcome these obstacles and guarantee successful learning results, competent educators must diagnose these learning issues in each class (Sitorus et al., 2022).

Building unity is why collaboration between teachers and students is essential in learning. Students engage in learning activities while teachers carry out teaching activities. Teachers' behaviors significantly influence the students' learning activities. Students and teachers engage in a reciprocal loop that impacts both parties. Zairullah et al. (2021) and Abbas et al. (2022) assert that a dynamic process occurs in the collaborative teaching and learning process that may substantially influence educators and students alike. How teachers and students work together depends on the methods, plans, and tactics used during teaching and learning (Sitorus et al., 2022). Class cooperation and discovery learning models are typically used, according to an analysis of the requirements of biology instructors in the three schools that were the subject of the study (Pakaya et al., 2023). However, when it comes to specific biological topics, the use of these models and techniques of instruction is considered inadequate because of the apparent deficiency in student participation in the learning process. Biology teachers often deal with highly complicated information; thus, they need to teach in a way that helps students understand topics deeply (Rayanto et al., 2021).

Teachers must support students in gaining abilities across a variety of biology texts in order for them to meet the stated learning objectives for biology. Nevertheless, students usually need help to fulfill these competencies, commonly failing to meet the knowledge, attitudes, and skills requirements of the Minimum Completeness Criteria. The difficulty comes when students need help

understanding the material's complexity, making meeting the desired learning goals more difficult. Students usually view biology as a challenging topic (Junaedi, 2019).

Misconceptions among students arise from several sources, including the description of bodily systems and the impression that biological content is complex (Mardhiyah et al., 2021). Complicated subjects like internal organs, organ systems, and bodily functions add to the apparent complexity. The topics covered in Class XI include the reproductive system, respiratory system, excretory system, digestive system, and body defense system. According to a needs analysis, 35.56% of students needed help understanding the information about the digestive system. Students frequently reported having trouble discriminating between digestive enzymes, comprehending scientific jargon, and explaining the anatomy of the digestive organs.

Interviews with biology teachers revealed that while the content on the digestive system may seem simple at first, students frequently find it challenging to understand the complexities of organ construction, especially regarding the animal tissue covered in earlier sections. According to Alfiraida (2018), knowledge of the human digestive system is essential for students' day-to-day lives as it calls for application skills and helps with digestive system-related social concerns. Considering the issues mentioned above, it is essential to determine the causes of students' struggles with the content of the food digestive system. With an emphasis on the breadth of the class XI food digestive system content, this exploratory study attempts to find efficient teaching resources. It approaches that are customized to the needs of individual students. The main objective is to identify the barriers preventing students from comprehending the content related to the digestive system and to clear the path for more efficient teaching strategies. Factors that make it difficult for students to understand material need to be measured, seeing that there are still students who have difficulty understanding the material, this is also a material for future evaluation by educators in creating better learning.

## Method

The survey technique, which attempts to collect data on one or more variables from members of the targeted community, has been selected as the research methodology for this study (Maidiana, 2021). A cross-sectional study design with both descriptive and predictive goals is used. This design draws one or more samples from populations at a single moment in time.

The study population comprises high school students from three different Banten regions-Serang City, Cilegon City, and Tangerang Regency. For the

study, 20% of the class XI population from each school was chosen using a straightforward random sample approach. There were 480 class XI students enrolled in all three schools; 32 individuals from each school made up the research sample, which included 96 students. As per Arikunto (2019), if the population has fewer than 100 members, the entire count is considered the sample; if the population has more than 100 members, a selection range of 10%-15% or 20%-25% might be used.

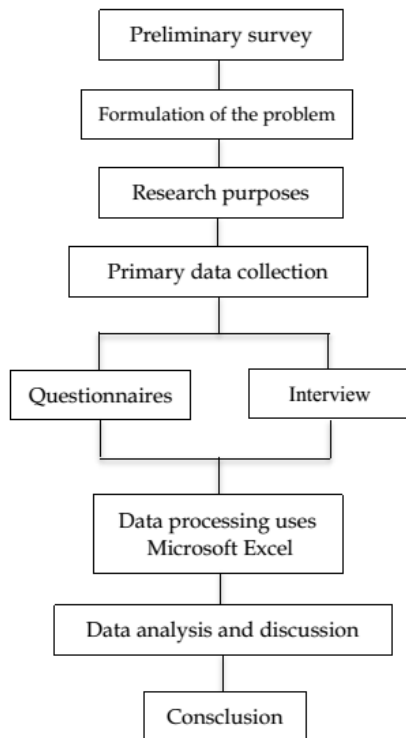


Figure 1. Research flow

Table 1. Instruments of Learning Difficulty Factors

Aspects	Indicators
Internal factors	1. Students learning interest
	2. Students learning motivation
	3. Learning study habits
External factor	1. Teachers teaching method
	2. Teacher-learner relationship
	3. Learning facilities

In order to gather data, a sample of class XI students and instructors from the three participating schools participated in in-person interviews and questionnaires which the indicators can be seen in Table 1. Data processing was done using Microsoft Office Excel, which made it possible to calculate scores and percentages for each instrument used. The data processing results are shown graphically, giving the study findings a visual representation.

## Result and Discussion

### Internal Factors

Many different variables might contribute to learning challenges. The first cause type is internal, which comes from inside the students. These internal elements include physiological and psychological components relevant to the student's mental and physical health (Putri et al., 2023). This study's internal elements are discussed in detail, including several aspects. The internal factors in this research are divided into several explanations, including:

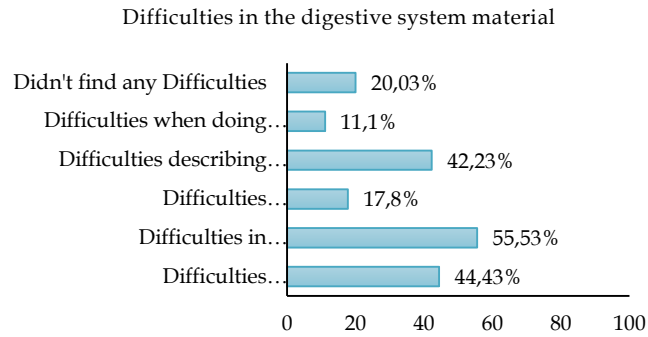
### Students Learning Interest

The basis for a student's participation in the learning process is their level of interest in the subject matter, which is crucial for their academic achievement. A strong interest might inspire students with a strong desire to participate actively in academics. Engaging learning materials can help students feel less lethargic and improve their ability to concentrate by inspiring them to participate fully in the learning process. The level of interest students have in their educational journey is mainly determined by the quality of the learning materials themselves. Research has shown that students become less interested in studying a particular subject when they believe it to be difficult, according to Suhartini et al. (2023). In order to create instructional techniques and resources that pique students' attention, educators must acknowledge and handle these dynamics.

The most common area of difficulty for students when studying the digestive system was identifying enzymes, with an average percentage of 55.53%, according to the recapitulated findings of a specific questionnaire (Figure 1). Subsequently, 44.43% reported difficulty understanding foreign terminology related to digestive system content. The fact is consistent with findings from teacher interviews on biology, which show that although the subject of the digestive system is thought to be relatively easy, some students find it challenging. Some students need help understanding, but they also need to meet the required minimal proficiency. The complexity of biology terminology is a barrier since it calls for more than just reading; students must commit these concepts to memory to have a thorough grasp.

Because of a mix of cognitive and conceptual problems inherent in the subject matter, high school students sometimes have difficulties when studying the information on the digestive system of food. According to Kirschner et al. (2018), the mental effort needed to process information in working memory is referred to as cognitive load. Students have a heavy cognitive burden because of the digestive system's complex complexities,

including internal organ mechanics, enzymatic activities, and scientific language (Nguyen et al., 2020). Students may need help to cognitively digest and integrate the vast information as the subject dives into complicated biological topics, which might provide a perceived understanding barrier.



**Figure 2.** Difficulties facing by students in digestive material

Furthermore, according to the constructivist philosophy, students actively generate knowledge based on their experiences and past knowledge (Dennick, 2016). Students may need help in the context of the food digestive system since the subject is abstract and calls on them to make links between abstract ideas and practical applications. It becomes imperative that theoretical knowledge and practical understanding be integrated, and students may need help to close this knowledge gap. Understanding these constructivist and cognitive elements can help teachers design lessons that reduce cognitive load, encourage active learning, and improve students' understanding of the complex concepts related to the food digestive system (Merta et al., 2022).

Based on class interviews, the study found that 42.23% of students had trouble articulating the digestive organs' structures. This discovery reveals a cognitive challenge related to the content of the digestive system content. According to Cognitive Load Theory, the mental effort needed to process information in working memory is referred to as cognitive load (Venkat et al., 2020). Students' cognitive burden is increased in this context due to the intricacies of the digestive system, mainly when it is linked to examining animal tissue samples from the prior course. According to the notion, students must efficiently manage their cognitive resources to integrate new information when learning materials build upon past knowledge. The difficulty comes when students need help understanding how one topic relates to another, especially when past teachings need to be reviewed. Acknowledging the implications of the cognitive load hypothesis, educators should modify their instructional tactics to provide scaffolding for students' learning experiences. Therefore, it will

improve their comprehension of the intricate digestive system information and provide a smoother transition between related subjects.

Giving learners organized help as they work on projects, are just a little bit above their present competency level. Scaffolding becomes essential while studying the digestive system content since it helps students navigate the complexity of related subjects like the connection between the digestive organs and the earlier study of animal tissue. Teachers can build a bridge that allows for a smooth transition by providing focused help and progressively reducing it as students become proficient (Broman et al., 2018). This method not only lessens cognitive burden but also fosters a deeper comprehension of the complex subject. By using thoughtful scaffolding, teachers enable their students to expand on what they already know, overcome the mental obstacles presented by difficult subjects, and eventually improve their understanding of the digestive system.

#### *Student Learning Motivation*

In the context of education, motivation is a critical component that profoundly affects the process of learning. A motivated student is likelier to participate fully in class activities, facilitating and improving learning outcomes (Gultom et al., 2023). Teachers must understand motivation's dynamic role in influencing students' educational experiences. However, inspiring students is a complex process that calls for various instructional strategies and approaches to capture their attention and maintain their passion for learning. Educators must establish a dynamic and inspiring learning environment that fosters intrinsic motivation and inspires students to approach their studies with interest and passion.

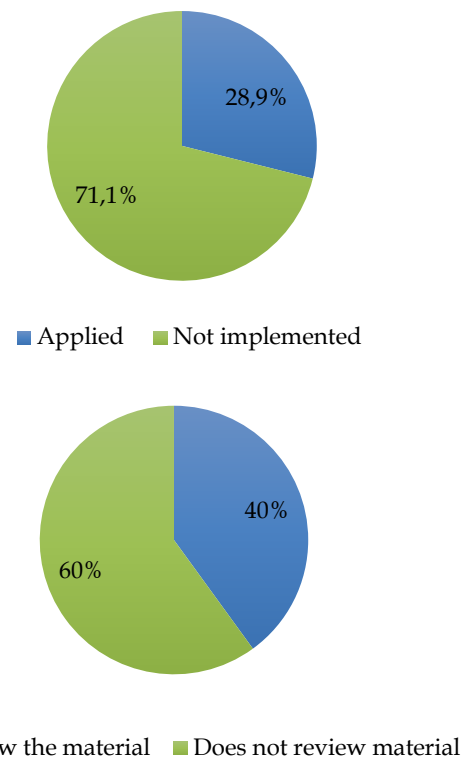
The complex nature of motivation emphasizes the need for educators to use a range of instructional strategies and pedagogies that correspond with their pupils' varied interests and preferences. Teachers aware of each student's unique demands can adjust their methods to create an engaging environment that supports active learning. Teaching is only one aspect of a teacher's job; another is creating an atmosphere where students feel inspired, respected, and in control of their education. Encouraging students to participate actively in their studies requires a constant awareness of motivation and encouragement development (Al-Said, 2023). In their capacity as educators, teachers need to be well-versed in the elements that propel motivation and use tactics that cater to the variety of personalities and learning preferences in the classroom. In this sense, developing a captivating and dynamic learning environment that helps students succeed academically depends heavily on motivation. Ratna et al. (2022) so

eloquently puts it, encouragement and inspiration are the keys that open the door to students' engaged and productive learning experiences.

*Learning Study Habits*

Participating actively in class is an integral part of the learning process since it gives people direction on the subject matter and how to become proficient. This approach shapes people's learning experience by being deeply embedded as a learning habit. Students are obligated to pay close attention to what their teachers are saying to participate actively in the educational process at school. This essential phase establishes the foundation for understanding and internalizing the material. Students are encouraged to use their cognitive skills by asking insightful questions about the course content and listening. Asking questions and getting explanations improves comprehension and encourages a proactive attitude to learning. As Zaifullah et al. (2021) point out, the strategies used in the classroom are crucial to developing good study habits. More than just taking in information, effective class participation motivates students to participate actively in the learning process. By asking insightful questions, students enhance the dynamic and participatory nature of the classroom setting (Walck-Shannon et al., 2021). This active participation and careful listening form the basis for establishing strong study habits that extend beyond the classroom.

Perceptive results were obtained from analyzing the food digestive system learning process. Notably, 28.9% of students used problem-solving techniques in real-world scenarios to show how they might apply the content they had studied. Furthermore, by answering questions from their textbooks, 28.87% of students participated in active learning and demonstrated their understanding of the digestive system subject. Remarkably, forty percent of students diligently reviewed the food digestive system information before moving on to other subjects. Nonetheless, it is essential to recognize that a significant proportion of students as demonstrated by the percentage results have not yet completely embraced the processes of application, reflection, and thorough review of the content that has been studied. This finding highlights places where adjustments may be made to increase students' knowledge of the concepts of the food digestive system. It identifies a possible gap in their understanding of the content (Amalini, 2022). Acknowledging these similarities in the learning process gives teachers vital information to improve their methods of instruction and help students absorb their knowledge more successfully.



**Figure 3.** Students' study habits in studying digestive system

*External Factors*

External Factors the causes of students' learning difficulties are external factors or those originating from outside the student, for example family, school and so on. External factors in this research are divided into several explanations, including:

*Teachers Teaching Method*

Evaluating the approaches and models used by biology teachers in three different institutions showed that standard teaching techniques such as lectures, discussions, Q&A sessions, and experiments were often used. Nonetheless, various learning models, such as contextual, cooperative, jigsaw, and problem-based learning methods, are used. This shift in learning approaches aligns with the educational movement that encourages students to think critically, be creative, collaborate, and innovate. In order to support a constructivist approach in which the teacher plays the role of facilitator, multiple learning models must be incorporated (Atma et al., 2021).

According to a review of the classroom environment, 28.9% of students said they enjoyed the learning process of the food digestive system. The way a teacher presents the content significantly impacts how enjoyable learning is, especially when it creates a unique and captivating environment that sets it apart from other courses. Conversely, 24.43% of students felt the learning

process was tiresome. According to Pawicara et al. (2020), several factors, including the length of learning sessions, the kinds of media and materials used, and the need for more variation in teaching models and

approaches, might contribute to learning monotony. Students' passion for learning may need to be improved by repetition, highlighting educators' need to vary their teaching strategies.

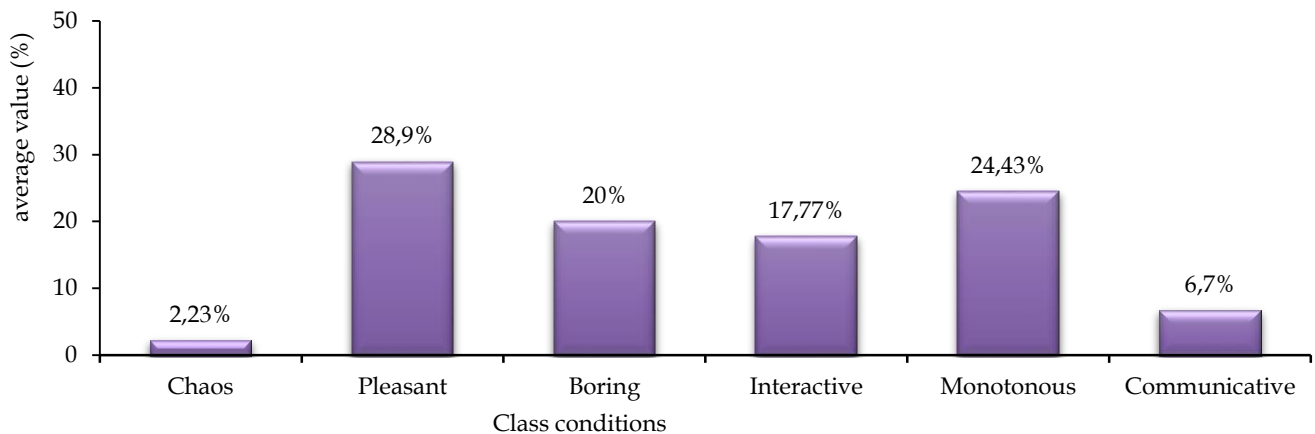


Figure 4. Class conditions during studying digestive system

Additionally, using various teaching techniques helps pupils learn new ways and avoids boredom. Teachers might use a variety of instructional strategies, including visual aids, interactive games, group discussions, and practical experiments, in recognition of the fact that every student learns differently. Students with varied talents and preferences might find resonance in classroom activities because of this diversity, which accommodates a range of learning preferences (Oliveira et al., 2023).

*Teacher-learner Relationship*

As stated, the student-teacher relationship is essential in an effective classroom. In particular, student-teacher relationships are important for students in both short-term and long-term education. Student-teacher relationships are important in the short term because they create a thriving classroom environment, help students develop self-esteem and improve students' mental health (Buffet, 2019). In the same way, these positive relationships can reduce behavioral problems and increase academic success. Student-teacher relationships help promote student academic success.

Therefore, student-teacher relationships help students in the short term. These relationships support students for the particular year they spend in an educational environment with educators (Buffet, 2019). Likewise, a positive student-teacher relationship is vital in the long term because it gives students confidence as well as ensuring that they know that their ideas are valuable. In turn, this allows students to carry this confidence throughout their future years in pursuing academic education. In addition, self-confidence and recognition of self-worth can be seen in the social and

emotional aspects of students' lives. Another long-term impact is that positive relationships with teachers teach students that mistakes are an indication that they are learning. Learning is taking place and students can identify this through the production of positive student-teacher relationships. Relationships like this will grow students' self-confidence in the long term (Pawicara et al., 2020).

*Learning Facilities*

In the three research schools, on average, teaching materials are used in the form of textbooks such as textbooks or worksheets. The internet and laboratories are additional learning resources for students. Of the three schools, only one school is accustomed to using digital teaching materials in the form of E-books or E-modules which can be accessed via the internet or based on references provided by biology teachers in class (Susilohadi, 2019). Multimedia materials, including films, animations, and interactive simulations, may provide an engaging way to explain complex digestive system principles. These tools offer a multi-sensory approach to learning the material and improve the learning process's visual attractiveness (Abdulrahaman et al., 2020). Animations, for instance, can have a more significant impact when visualizing physiological processes. For instance, animations to visualize physiological processes can significantly impact students' understanding and recall of the subject matter. Active engagement is encouraged by the focus on dynamic and interactive courses, which creates a more engaging learning environment. Students are more likely to retain the material when they actively participate in the learning process, whether through

group discussions, practical experiments, or real-world applications of the concepts taught. This hands-on learning approach fosters critical thinking, problem-solving abilities, and a more thorough comprehension of the digestive system content (Hasanatin et al., 2021; Widiatmo et al., 2019).

Meanwhile, at both schools there is internet access to support the learning process which is usually used by students to search for learning resources using personal smartphones, however the resources obtained are often considered incomplete by students. Based on research on the suitability of digestive system material in high school biology textbooks conducted by Ritonga (2022), the high school textbooks that analyzed the digestive system material did not provide information on diseases or disorders that occurred, the book did not explicitly explain the implications for science and the environment, technology, and society. Meanwhile, on the topic of digestive system material, students are expected to be able to apply and relate the material to various aspects of daily life.

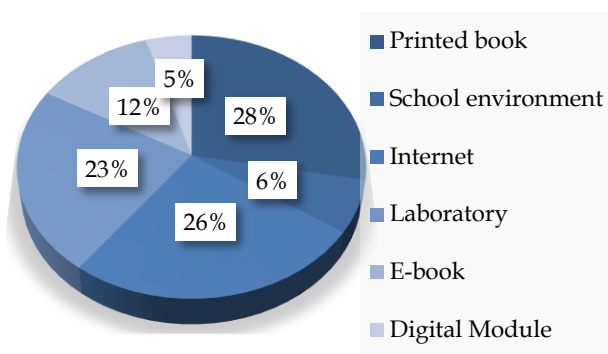


Figure 5. The use of learning resource

Students' difficulties in understanding material are based on the teaching materials used by students, as well as the delivery of the material by the teacher. Teaching materials that support students to understand material more easily are generally highly recommended. Figure 4 shows the completeness of the material in textbooks used in schools received an average percentage of 28% which was insufficient. According to Vojř et al. (2021) that in the high school textbooks that analyzed the material on body systems, information about diseases or disorders that occurred was not presented, the books did not explicitly explain the implications for science, environment, technology, and society. Meanwhile, the additional learning resource that is widely used by students is the internet with a percentage of 26%. The internet has benefits such as making it easier for us to access various available sources of information, because the internet can help us improve our standard of living through education. The internet can also access various

references, both in the form of research results and articles from studies in various fields (Daoud et al., 2021). However, increased internet use could potentially increase internet addiction among students in the future. Students cannot be monitored directly by teachers, so internet use is controlled among students (Chen et al., 2020). The use of digital modules by students in biology learning reaches a percentage of 5%. Even though the use of digital modules is a manifesting of the skills process expected in 21st century learning, there are still many schools that cannot provide digital-based teaching materials (Jagušt et al., 2019). Based on the recapitulation of the results of using digital modules in the students' biology learning process, it was found that 54.46% of students had used digital modules in the biology learning process, of which 33.36% of the modules used still had deficiencies both in terms of material content and module appearance. Meanwhile, 45.53% of students from the three schools that were research subjects had never used digital modules in biology learning, whether accessed by themselves on the internet or provided by biology teachers in class XI.

## Conclusion

Based on the research results, it can be concluded that several factors make it difficult for class XI students to understand the food digestive system material. These factors include both internal and external aspects. Internally, students' interest in studying the topic of the digestive system is low due to the complexity of the material components. For instance, students face difficulty in differentiating enzymes, with a significant 55.53% struggling in this area. Externally, the strategies used by teachers in learning activities are still considered insufficient. The class conditions during learning remain monotonous, reported at 24.43%. Furthermore, the use of materials, media, and learning resources has not varied across the three schools that were the subject of the research. This lack of diversity in teaching methods contributes to the overall difficulty students face in understanding the digestive system material.

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## Author Contributions

Conceptualization, A.T, I.K.; methodology, A.T, R. O. K.; writing original draft preparation, A.T, I.K, R.O.K.; formal analysis, A.T; investigation, A.T; visualization, A.T, R.O.K. translate, R.O.K; writing review, I.K, R.O.K, M.E.H; editing, I.K, R.O.K, validation, I.K, R.O.K; review, M.E.H; supervision, M, M.E.H and resources, M. All authors have read and agreed to the published version of the manuscript.

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**Conflicts of Interest**

The authors declare no conflict of interest.

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