

**ANALYSIS OF FACTORS CAUSING LEARNING DIFFICULTIES AMONG
BIOLOGY STUDENTS AT UNIVERSITAS NEGERI MEDAN
IN THE ANIMAL DEVELOPMENT COURSE**

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ABSTRACT

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Animal Development Course is the basic component of the biology study program. Given the importance of Animal Development courses as a basis for understanding advanced concepts in the field of biology, the identification of factors that cause learning difficulties is very important. By understanding these factors, it is hoped that a more effective learning strategy can be developed and in accordance with the needs of students. Based on that background, this research aims to analyze the factors that cause learning difficulties for Biology students at Medan State University in the Animal Development course. This research is expected to contribute to the development of more effective learning strategies and improve the quality of biology education at Medan State University. This research uses a qualitative approach. The instrument used in this study is an interview sheet designed to explore the factors of learning difficulties in depth.

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INTRODUCTION

The Animal Development course is a fundamental component of the Biology study program, focusing on the intricate processes of growth and differentiation of animal organisms from early developmental stages to maturity. Its content covers advanced concepts, including embryogenesis, organogenesis, cellular differentiation, and genetic regulation, all of which require an advanced understanding of abstract and dynamic biological phenomena. The complex nature of this subject matter often poses significant challenges for students in achieving optimal understanding. In particular, students frequently face substantial learning barriers that may stem from internal factors such as an inadequate understanding of abstract concepts, as well as external factors including insufficient laboratory resources or conventional pedagogical approaches such as the lecture method. These challenges not only hinder academic performance but also affect overall learning motivation.

Research conducted by Amalia (2021) in a case study at UIN Sultan Thaha Saifuddin Jambi explained that students face significant obstacles in understanding animal physiology concepts closely related to developmental processes, such as hormonal regulation during gastrulation and organogenesis, with the main contributing factor identified as a lack of interactive learning methods and visualization of biological processes. Findings revealed that as many as 70% of students experienced difficulties at the analytical cognitive indicator level. Research conducted by Tarigan et al. (2022) showed that courses related to biological development have a high level of difficulty because they involve processes that cannot be directly observed and require strong abstraction skills. Students often have difficulty understanding concepts such as embryonic induction, cell determination, and organ formation patterns due to limitations in visualizing these processes.

A study conducted by Lestari & Putri (2020) involving biology students at Universitas Negeri Padang revealed that determinants of learning challenges stem not

only from content characteristics but also from pedagogical considerations, including insufficiently varied instructional strategies, inadequate use of supportive educational media, and a lack of practical application related to the theoretical concepts being taught. Furthermore, research shows that students' limited scientific literacy skills exacerbate difficulties in understanding scientific literature, which serves as the primary reference material for the course. In line with this, research conducted by Andriani (2023) described that factors such as barriers to conceptualization and a lack of fundamental understanding often emerge as the main causes, as evidenced in a study discussing the learning challenges faced by biology students, in which 80.82% of participants reported experiencing difficulty as a consequence of dealing with abstract content.

Research conducted by Hizqiyah et al. (2022) showed that the contemporary digital era introduces specific challenges in the field of biology education. While technological advances offer a large amount of available learning material, students often face problems related to information overload and distinguishing relevant and reliable data. In addition, excessive reliance on technology can adversely affect students' ability to engage in critical and analytical thinking. Universitas Negeri Medan, as one of the higher education institutions with a well-accredited Biology study program, certainly has a responsibility to ensure the quality of optimal learning. However, based on preliminary observations and informal discussions with students, there are still indications of learning difficulties in the Animal Development course, reflected in suboptimal academic grades and low levels of student participation in class discussions.

Given the importance of the Animal Development course as a foundation for understanding advanced concepts in the field of biology, identifying the factors that cause learning difficulties becomes very important. By understanding these factors, it is hoped that more effective learning strategies can be developed that suit students' needs. Based on

this background, this study aims to analyze the factors that cause learning difficulties among Biology students at Universitas Negeri Medan in the Animal Development course. This research is expected to contribute to the development of more effective learning strategies and to improve the quality of biology education at Universitas Negeri Medan.

METHOD

This study uses a qualitative approach to analyze the factors of learning difficulty among students of the Biology Study Program at Universitas Negeri Medan in the Animal Development course. A qualitative approach was chosen because it is descriptive and exploratory in nature, allowing the researcher to deeply explore the phenomenon of learning difficulty through the subjective perspectives of participants. This approach is suitable for uncovering the internal and external factors that influence the learning process, such as conceptual barriers, teaching media, laboratory practical's, group discussions, and teaching methods, without relying on measured quantitative data.

This study was conducted at the Faculty of Mathematics and Natural Sciences, Universitas Negeri Medan, with research subjects being Biology students from the 2022–2023 cohort who had already taken the Animal Development course, with a total of 20 participants/samples. The instrument used in this study was an interview sheet designed to explore the factors of learning difficulty in depth. The interview guide consisted of 16 open-ended questions.

Interview questions for identifying students' learning difficulty factors in Animal Development material

No. Question

- 1 What are the main difficulties you face when studying animal development material?
- 2 How much influence does the lecturer's teaching method have on your understanding of animal development?

No. Question

- 3 What obstacles do you experience when learning the terminology used in animal development material?
- 4 How do you cope with difficulties when facing animal development material?
- 5 How effective is the learning media used in supporting your understanding?
- 6 What role does laboratory practical work play in helping you understand animal development?
- 7 Do you feel that the animal development material is relevant to your academic/scientific needs?
- 8 Does group discussion help clarify the animal development material for you?
- 9 What kind of additional help or learning resources do you need to understand this material?
- 10 How difficult do you find it to complete assignments or exercises related to animal development?
- 11 How does assessment in this course affect the way you study?
- 12 Do you have difficulty systematically understanding the stages of animal development?
- 13 How did you feel when you first attended the Animal Development lecture?
- 14 Do you feel you have enough time to study the animal development material properly?
- 15 So far, mention one positive thing you have felt from group discussions in the Animal Development course.
- 16 What benefits of animal development do you apply in your daily life?

RESULTS AND DISCUSSION

The interview results showed that 95% of students, 19 out of 20, reported experiencing significant difficulty memorizing and understanding scientific terms written in Latin. Respondents said that terms such as morula, blastula, gastrula, and germ layer derivatives such as ectoderm, mesoderm, and endoderm

often sound similar and are easily confused. One respondent stated: *"My main difficulty is distinguishing developmental stages such as blastula and gastrula, and understanding organogenesis because the details are quite complex. There are many foreign Latin terms and illustrations/images that are sometimes hard to understand without detailed explanation."*

The majority of students, 18 out of 20 respondents, also experienced difficulty understanding the chronological sequence of embryonic developmental stages systematically, particularly in distinguishing processes that occur simultaneously at the molecular and morphological levels. As many as 75% of respondents also had difficulty understanding abstract processes such as cellular induction, paracrine interaction, and genetic regulatory mechanisms that cannot be directly observed. Respondents said that one particular problem was connecting events at the cellular level with macroscopic morphological changes in the embryo.

Regarding the factors influencing students' understanding in learning the Animal Development course, the first is the lecturer's teaching method, where most respondents stated that the lecturer's teaching method has a very large influence on their understanding of the material. *"Very significant. If the lecturer explains using images, animation, or analogies, I find it easier to grasp. If it's only text, it's rather hard to understand. Very significant, because the way of explaining, the use of media, and giving real examples greatly affect understanding."*

According to them, effective teaching methods include: the use of visual media such as images, animations, and 3D videos; giving real examples and analogies from daily life; providing systematic explanations with step-by-step illustrations; and connecting the material to clinical contexts or real-world applications. Respondents said that learning only through text or PowerPoint slides without images tends to be ineffective and makes it difficult for students to understand the dynamic developmental process.

The second factor is the role of laboratory practical work, where all respondents stated that practical work is very important because it helps connect theory with real-world experience. Respondents said that directly observing embryo specimens under a microscope helps visualize concepts that were previously abstract. Practical work offers direct visual experience. However, 4 out of 20 respondents complained about the lack of laboratory equipment and insufficient practical time. *"Very helpful. From the practical sessions, I can directly see the process of embryo development, not just theory. That makes my understanding more solid. Wow, practical work is really important! Seeing chicken embryos or other animals directly, for example, makes the theory in class become real and easier to remember."*

The third factor is the effectiveness of learning media, where the majority of respondents (17 out of 20) rated that learning media can improve understanding through the use of effective visualization. Media are considered to provide high understanding, for example animated videos about the embryo development process. In addition to static images, respondents also suggested using more interactive and dynamic learning media. *"Very effective. It helps my understanding of the material. If it's just regular PowerPoint, it's just so-so. But it's very effective if there are videos, good images, or interactive diagrams. That really helps in imagining the process."*

The next factor is group discussion, which proved effective for 100% of respondents in clarifying their understanding of the material. Benefits felt include explaining concepts in simpler and easier-to-understand language, increasing confidence in expressing opinions, and dividing tasks in searching for learning resources. *"Yes, because we can exchange understanding and explain things in simple language. Yes, group discussion is very helpful because there's an opportunity to exchange opinions, complement each other, and strengthen understanding of concepts. That's true, because each person tends to have strengths in different parts of the material, and this can complement each other."*

The next factor is motivation, where learning success is greatly influenced by motivation. Those with high intrinsic motivation, or curiosity about life processes, tend to independently seek additional learning resources and are more resilient to complex material. Conversely, those with external motivation, or grade-driven motivation, tend to only study the material close to exam time. *"My motivation is quite high because I'm interested in learning about life from its earliest stages. With that motivation, I try to find additional resources to understand better. It's fundamental. High motivation helps overcome boredom when having to repeat the same material over and over. High motivation speeds up the process of mastering the material. I can memorize and understand the flow faster because I feel intrinsically interested."*

The interview results indicate that most students face major challenges in remembering and understanding Latin scientific terms found in the Animal Development material, such as morula, blastula, and gastrula. As many as 95% of respondents stated that phonetically similar terms cause confusion and slow down the understanding process. This aligns with the findings of Mardin et al. (2025), who confirmed that the use of complex scientific language and terminology is a major obstacle in the biology learning process, particularly in material involving foreign and abstract terminology. The use of similar and hard-to-distinguish terms further complicates students' comprehensive understanding of the steps of embryo development. This difficulty indicates that students need learning strategies based on understanding the meaning of terms, rather than mere memorization.

According to Handayani et al. (2023), the phonetic similarity of terms for early embryo developmental stages (such as morula, blastula, gastrula) triggers misperception. Students tend to rely on partial memorization rather than functional understanding or process visualization. The most significant conceptual error is students' inability to precisely distinguish the morphogenetic

processes occurring at each stage, resulting in a fragmented and incorrect perception of the sequence of embryo development. This confirms that phonetically similar terms create cognitive overload and hinder the formation of a complete concept map.

All respondents stated that laboratory practical work plays an important role in understanding the Animal Development material, especially through direct observation of embryo specimens under a microscope. Practical work allows students to connect abstract theory with concrete empirical evidence. However, four respondents complained about limited laboratory equipment and short practical time. According to Laelasari (2019), laboratory experience plays a central role in science education. Therefore, it is important to explore alternative approaches/strategies to maximize the learning potential of laboratory activities.

As many as 85% of respondents rated that visual and animated learning media are very helpful for understanding concepts, especially in depicting processes that cannot be directly observed. Respondents considered interactive media such as 3D videos and digital simulations more effective than static images. All respondents (100%) acknowledged that group discussion is very effective in clarifying understanding of the material. Students felt more comfortable exchanging ideas and explaining concepts in simple language compared to listening to formal explanations in class. Discussion also increased confidence and a sense of responsibility in learning. According to Akbar (2019), most students prefer discussing with friends over reading books when experiencing learning difficulties. The use of textbooks or e-books without supporting media tends to make students bored. Students lose motivation when studying using text without accompanying video, and students dislike reading so much text on a screen. Therefore, an innovation is needed to develop textbooks that can be equipped with video media or 3D images as concrete examples to help students understand concepts.

The Animal Development course is one of the compulsory courses for all students in the Biology Department. A preliminary survey (interview) conducted with students revealed that they experience difficulties with the Animal Development concept in the course material. In addition, students also experience technical difficulties in making use of the available teaching materials (course handouts) for this subject. There are at least three types of difficulties expressed by students taking the course. First, the language used in the handouts is relatively difficult to understand; the images and text are also unclear. Second, the experimental animals used in the handouts are difficult to find. Third, students have difficulty obtaining journal articles and textbooks relevant to the material being studied.

In the learning context, critical thinking is very important because it enables students to evaluate information, make appropriate decisions, and solve problems effectively. The case study approach encourages students to become more critical in responding to questions given by lecturers and fellow students. Discussions that occur in class often become an arena for students to sharpen their arguments and test the ideas they hold. In this context, students not only receive information but also analyze and evaluate various existing points of view. This process not only trains critical thinking skills but also improves communication and collaboration skills, which are important in the world of work.

In the curricular context, the implementation of the Merdeka Curriculum (Indonesia's "Freedom to Learn" curriculum), which emphasizes independent learning and method adaptation, greatly affects learning difficulties. Siregar & Rohani (2024) revealed that external factors such as family conditions and school support are also very determinative. For example, some students' inability to adequately access digital devices hinders the utilization of technology-based learning media, which is one of the keys to this new curriculum. This indicates the need for intervention from educational institutions to provide adequate supporting facilities so that

the effective learning process can proceed in line with the curriculum's objectives.

On the other hand, the role of laboratory practical work is also very important in connecting theory with real experience, especially through direct observation of embryos under a microscope. Practical work allows students to capture empirical evidence, thereby strengthening conceptual understanding (Laelasari, 2019). However, limited laboratory facilities, such as equipment and narrow practical time slots, remain obstacles that still need to be addressed. The development of adequate laboratories will open greater opportunities for students to learn in depth through direct experience.

Motivation is another internal factor that greatly influences how students process and overcome learning difficulties. Students with high intrinsic motivation tend to be more active in seeking additional learning resources and persist in understanding complex material, while grade-based or external motivation tends to lead only to suboptimal learning close to exam time (Andayani et al., 2022). This condition emphasizes the importance of a pedagogical approach that not only transfers knowledge but also builds curiosity and active student engagement.

The use of learning models suited to students' visual learning style is also highly potential for overcoming barriers to understanding biology material. A visual learning model based on augmented reality (AR) developed in the journal *Biosfer* (2025) shows that the use of this interactive technology can significantly improve learning outcomes and student interest. With interactive visualization, students can more easily understand material that is abstract and complex in nature, such as animal development.

Overcoming learning difficulties cannot be separated from the difficulty factors described above; therefore, identifying the main causal sources and other contributing sources among participants is essential in order to address learning difficulties. The steps needed to overcome learning difficulties can be carried out through six stages: 1) Data

collection. To find the sources causing learning difficulties, a great deal of information is needed. To obtain this information, direct observation, referred to as data collection, must be conducted. In data collection, various methods can be used, including observation and interview techniques. 2) Data processing.

CONCLUSION

Based on the results of the analysis, it is concluded that the learning difficulties of Biology students at Universitas Negeri Medan in the Animal Development course center on two main factors: confusion over phonetically similar Latin scientific terminology (morula, blastula, gastrula), experienced by 95% of respondents, and difficulty understanding abstract concepts that cannot be directly observed. External factors such as limited practical time and equipment, as well as reliance on textbooks without supporting media, also exacerbate this problem.

REFERENCES

- Akbar, M. N., Amin, M., & Lestari, U. Studi Eksploratif terhadap Proses Pembelajaran Materi Organogenesis Turunan Mesoderm Matakuliah SPH II di Jurusan Biologi (Doctoral dissertation, State University of Malang). DOI: 10.17977/jptpp.v4i5.12422
- Andayani, E., Mustikowati, R.I., Setiyowati, S. W., & Firdaus, R. M. (2022). Case method: Mengoptimalkan Critical Thinking, Creativity, Communication Skill dan Colaboratively Mahasiswa Sesuai MBKM di Era Abad 21. *Jurnal Penelitian dan Pendidikan IPS (JPPI)*, 16(1), 52-60. DOI: <https://doi.org/10.21067/jppi.v16i1.6973>
- Andriani, R. (2023). Analisis Kesulitan Belajar Mahasiswa Program Studi Biologi Pada Matakuliah Kimia. *Jurnal Jendela Pendidikan*, 3(01), 74-82. DOI: <https://doi.org/10.57008/jjp.v3i01.413>
- Deadara, A. (2017). Penggunaan Media Pembelajaran dalam Pembelajaran Biologi. *Jurnal Pendidikan Biologi*, 3(2), 107-113. doi: 10.24114/jpb.v3i2.5002
- Laelasari, I., Sari, N. E., & Nuhaya, N. (2019). Strategi yang Dapat Dikembangkan Dalam Pembelajaran Laboratorium Biologi. *Thabiea: Journal of Natural Science Teaching*, 2(1), 29-38. DOI:10.21043/thabiea.v2i1.4815
- Lestari, L., & Putri, DH (2020). Analisis Faktor Penyebab Kesulitan Belajar Mahasiswa Biologi pada Mata Kuliah Mikrobiologi, Universitas Negeri Padang. *Konferensi Internasional Biologi, Sains, dan Pendidikan (ICoBioSE 2019)*, 10, 253–258. DOI: 10.2991/absr.k.200807.051
- Nardin, H., & Ramlawati, R. (2025). Analysis of Students Biology Learning Difficulties in Senior High School. *Jurnal Penelitian Pendidikan IPA*, 11(6), 995-1005. DOI: 10.29303/jppipa.v11i6.11383
- Nasir, A., Nurjana, N., Shah, K., Sirodj, R. A., & Afgani, M. W. (2023). Pendekatan fenomenologi dalam penelitian kualitatif. *Innovative: Journal Of Social Science Research*, 3(5), 4445–4451. <https://jinnovative.org/index.php/Innovative/article/view/5224>
- Nurazizah, W. E., & Diana Rochintaniawati. (2023). Analisis Persepsi Guru dan Siswa dalam Pembelajaran Biologi Multidisciplinary Pada Penerapan Kurikulum Merdeka. *International Research in Academic Science (IMRAS)*, 6(6), 1–10. <https://doi.org/https://doi.org/10.5281/zenodo.10019837>
- Pratiwi, A. T. (2020). Faktor Penyebab Kesulitan Belajar pada Matakuliah Analisis Laporan Keuangan Mahasiswapendidikan Ekonomi Fkip Untan. *Jurnal Pendidikan dan Pembelajaran Khatulistiwa (JPPK)*, 6(6).

- Tarigan, L. Z., & Sipahutar, H. (2025). Pengembangan Buku Ajar Perkembangan Hewan Berbasis Capaian Pembelajaran. JURNAL PENELITIAN PENDIDIKAN, PSIKOLOGI DAN KESEHATAN (J-P3K), 6(2), 752-763.
- Telaumbanua Leny Suryani, & Natalia Kristiani Lase. (2022). Pengembangan Media Interaktif Power Point pada Materi Virus dalam Proses Pembelajaran Biologi Kelas X SMA. Journal of Smart Society Adpertisi, 1(1), 1–13.
<https://jurnal.adpertisi.or.id/index.php/jssa/index>
- Widodo, A., & Sriyati, S. (2022). Analisis Aksesibilitas Digital Siswa dalam Hal Pemanfaatan Teknologi dan Kendala yang Dihadapi dalam Pembelajaran Biologi. Pendidikan Sains , 11 (1), 75. DOI: 10.24235/sc.educatia.v11i1.10241