Needs analysis for the development of case-based food microbiology teaching materials

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Article Information	Abstract
	The availability of teaching materials and learning resources is an important component in a lecture. The purpose of this study was to describe the results of a questionnaire on the needs of teaching materials by students. This study used descriptive qualitative method. Research respondents consisted of 30 students. The research instrument used a case-based needs analysis questionnaire on food microbiology material. Data analysis techniques by describing the data from the questionnaire needs of teaching materials, which are analysed in detail. The results in this study were that 94% of students still found it difficult to understand learning food microbiology material, as many as 76% of students felt they did not understand food microbiology material only by using references from books. As many as 53% of students stated that the learning resources currently used had not attracted interest in learning food microbiology material, as many as 100% of students said they would be happy if food microbiology learning was presented using a variety of learning resources. As many as 71% of students stated that they had not studied food microbiology material based on the cases presented in it. As many as 100% of students wish to have a case-based book on food microbiology material. Based on these results, it can be concluded that case-based teaching materials on food microbiology need to be developed. *Abstrak. Ketersediaan bahan ajar dan sumber belajar adalah salah satu komponen penting dalam sebuah perkuliahan. Tujuan penelitian ini adalah menguraikan hasil angket kebutuhan bahan ajar oleh mahasiswa. Penelitian ini menggunakan metode deskriptif kualitatif. Responden penelitian terdiri dari 30 mahasiswa. Instrumen penelitian ini menggunakan angket analisis kebutuhan bahan ajar berbasis kasus pada materi mikrobiologi pangan. Teknik analisis data dengan menguraikan data hasil angket kebutuhan bahan ajar, yang dianalisis secara mendetail. Hasil pada penelitian ini adalah 94% mahasiswa masih merasa kesulitan dalam memahami pembelajaran materi mikrobiologi pangan, sebanyak 76% mahasiswa merasa belum memahami materi mikrobiologi pangan hanya dengan menggunakan referensi dari buku. Sebanyak 53% mahasiswa menyatakan sumber belajar yang pakai saat ini belum menarik minat untuk belajar materi mikrobiologi pangan, sebanyak 100% mahasiswa menyatakan senang jika pembelajaran mikrobiologi pangan disajikan dengan menggunakan berbagai sumber belajar yang bervariasi. Sebanyak 71% mahasiswa menyatakan belum mempelajari materi mikrobiologi pangan berdasarkan adanya kasus-kasus yang disampaikan di dalamnya. Sebanyak 100% mahasiswa berkeinginan untuk memiliki buku berbasis kasus pada materi mikrobiologi pangan. Berdasarkan hasil tersebut, dapat disimpulkan bahwa bahan ajar berbasis kasus materi mikrobiologi pangan perludikembangkan.*

A. Introduction

Regulation of the Minister of National Education of Indonesia Number 11 of 2005 Chapter 2 explains that textbooks have two types which include textbooks used as mandatory references by teachers and students in the learning process; and enrichment books and reference books which function to increase students' knowledge and insight. Textbooks have two main missions, namely textbooks must be good sources of knowledge and media and can improve the learning process; and textbooks are expected to help the learning process in order to increase students' knowledge.

Textbooks are a learning tool commonly used in schools and in universities to support a teaching program. In the process, this communication involves at least three things, namely communicator: in this case the writer as the transmitter of the message, communicant: in this case the reader as recipient of the message, and content of the message: in case, this is the content/concept of the scientific discipline to be delivered (Harahap et al., 2016).

According to Kinanti & Sudirman (2017) there are three indicators that must be considered to determine the suitability of textbooks are; there is conformity of the material with competency standards and basic competencies, material accuracy, and exists learning support materials.

Teaching materials are one component that plays a role in the learning process. Teaching materials are one component that helps teachers in carrying out teaching and learning activities in the classroom. Textbooks have a different character from reference books in general. Textbooks are adapted to the curriculum, written and designed based on students' needs, use communicative language, refer to competencies that must be achieved, are prepared for the instructional process and have a feedback mechanism from students. In general, it can be said that textbooks can develop students' potential to become independent learners (Irawati & Saifuddin, 2018).

Some of the requirements needed to make books a source of learning, namely the availability that can be reached by students, can help students to learn and meet their needs in independent learning. A good textbook must be able to motivate students by making use of interesting things such as pictures, illustrations, sample questions (cases), have sufficient material to support teaching and can be used to support problem solving activities (Mentari & Laily, 2016).

In Regulation of the Minister of Education and Culture No. 754 of 2020 concerning Main Performance Indicators for State Universities, namely case studies used as learning material for solving case studies in national tertiary courses. Regulation of the Minister of Education of the Republic of Indonesia No 3 of 2020 concerning National Higher Education Standards, namely the learning process through curricular activities must use effective learning methods in accordance with the characteristics of the course to achieve certain abilities specified in the course. The learning method in question includes; group discussions, simulations, case studies, collaborative learning, cooperative learning, project-based learning, problem-based learning, or other learning methods that can effectively facilitate the fulfilment of learning outcomes.

Previous research has found that case-based learning is better than conventional methods, where case-based learning can improve critical thinking skills and class interaction (Mentari & Laily, 2016). The use of case-based textbooks (case method) in the learning process will provide opportunities for students to analyse problems presented in the form of cases, make conclusions based on available information, to draw conclusions about the assumptions that have been formulated (Safitri & Purbaningrum, 2020).

Case-based focus on one particular object which is raised as a case to be studied in depth so as to reveal the reality behind the phenomenon. In the view of the phenomenological paradigm, what is visible or visible to the eye is not essentially something real (reality). It's just a reflection of what's inside. The task of case study researchers is not to become visible knowledge. Because of this, case studies can also be interpreted as the process of studying or understanding a case and at the same time looking for the results (Assyakurrohim et al., 2023).

One effort to implement student-centred learning so that students can be active in learning is through discussions so that they can improve students' critical thinking skills. Efforts to link cases or issues in the environment with biology learning materials in schools through Socio-Scientific Issues (SSI) based teaching materials require increasing understanding of the concepts of biological material that exist in everyday life so that teaching materials are also needed that can be used by students to learn effectively. independent because students like to study biology outside school hours. Teaching materials can be used as an alternative source for students' independent learning. Teaching materials prepared by providing alternatives to certain issues can expose students' abilities in debate and discussion (Septiningrum et al., 2021).

Food Microbiology is a compulsory subject in the Biology Study Program, Universitas Negeri Medan. Food microbiology is the science that studies the effect of processing on microorganism cells, including the mechanisms of resistance of microorganisms to processing. Besides that, it also studies harmful changes such as spoilage and food poisoning, as well as beneficial changes such as in food fermentation.

The process of processing and preserving food cannot completely prevent all adverse changes. Some findings in the learning process of microbiology courses include other students not teaching materials to support learning activities. Students search for literature related to the material discussed on the internet with appropriate sources that cannot be accounted for (Sholihah & Sofiyana, 2019).

Based on the results of an analysis of student needs conducted through questionnaires to students of the Biology Study Program, Universitas Negeri Medan, the results showed that 71% of students had difficulty finding learning resources or literature in the form of books. Case-based Food Microbiology. Food Microbiology books circulating among students and educators are still in the form of Food Microbiology books which provide very few case examples. Based on the constraints that exist in the field, it is very important to conduct research on "Case-Based Food Microbiology Textbook Needs Analysis". This study aims to analyse the need for case-based food microbiology teaching materials.

B. Material and method

This type of research is descriptive qualitative. Qualitative descriptive research aims to describe phenomena or situations in depth, without measuring or testing hypotheses. This research was conducted at Medan State University. The research subjects were students, and the number of respondents in the research sample was 30 students. Sampling was carried out by lottery, which means that each student has the same opportunity to become a respondent.

The research instrument used was a questionnaire to analyse the need for case-based teaching materials on food microbiology. This questionnaire is designed to collect information about students' needs regarding the desired teaching materials with the following procedure.

1) Sample Identification: Sampling is done randomly through a lottery from the student population.
2) Questionnaire Distribution: Questionnaires were distributed to 30 students who had been selected as respondents.
3) Data Collection: Students are asked to fill out a questionnaire with answers that match their views on the need for teaching materials.

4) Data Analysis: The data collected was analysed using descriptive techniques, focusing on percentages and opinion descriptions.

Data was collected through a questionnaire, which contained questions related to the need for case-based teaching materials on food microbiology. The data analysis technique used is descriptive. Data collected from the questionnaire was analysed by presenting the percentage of answers from respondents and also explaining the opinions expressed in depth. The results of the analysis are used to conclude the learning material needs desired by students.

It is hoped that by using this method, research can provide a clear picture of the need for case-based teaching materials on food microbiology from the perspective of students at Medan State University.

C. Results and discussion

This research was conducted to describe the results of a case-based needs analysis of food microbiology teaching materials. Questions are made in Indonesian, and can be seen in Figure 1 to Figure 6. Details of the research results can be seen in Table 1. Based on the results of the needs analysis it is known that on average students studying food microbiology courses only read books so this is what causes students to have difficulty understanding food microbiology courses because students feel there are no examples of food microbiology cases where most microbiology books only copy and adopt from literature alone.

Based on this needs analysis, it is also known that the learning resources currently used by students have not attracted their interest in studying food microbiology. Under these conditions, teaching materials are needed that can support student learning, namely teaching materials in the form of case examples to help them understand the material. With these case examples they hope to be able to relate the concept of microbiology to its application and be able to interpret and criticize the facts of microbiology cases in food. In line with Cahyani & Setyawati (2017), the use of problems in real cases is also intended because students who are used to facing problems in a lesson, especially those related to the real world, will be able to prepare mentally better when facing problems in their lives.

Table 1 Student Needs Questionnaire Results

No.	Questionnaire	Yes	No
1.	Have you ever had difficulty understanding learning Food Microbiology material?	94%	6%
2.	Can you understand Food Microbiology material using only references from books?	76%	24%
3.	Are the learning resources that you are currently using interesting to learn about Food Microbiology?	47%	53%
4.	Would you like it if learning Food Microbiology was presented using a variety of learning resources?	100%	-
5.	Did you study Food Microbiology material based on the cases presented in the book?	29%	71%
6.	Do you wish to have a case-based book on Food Microbiology?	100%	-

Learning difficulties are one symptom which appears in students who are characterized by low or low learning achievement below the predetermined value (Sugihartono 2012). There are several factors that can influence students in understanding lecture material, including models and learning methods, learning media, teaching materials, and infrastructure for activities learning (Sari & Anantyarta, 2018).
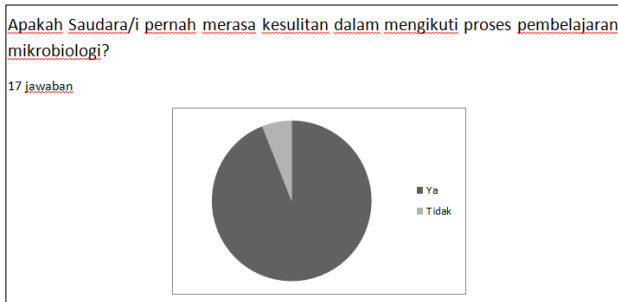

Figure 1 Microbiology learning process (in Indonesian)
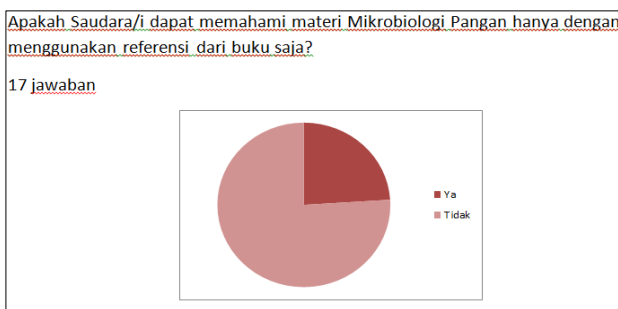

Figure 2
Understanding of food microbiology material (in Indonesian)

Figure 3 Interest in current learning resources (in Indonesian)

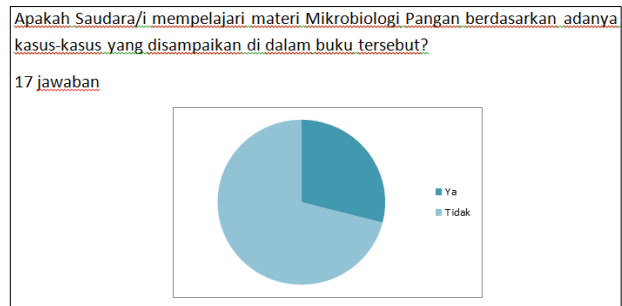Figure 4 Interest in learning resources varies (in Indonesian)

Figure 5
There are cases in current teaching materials (in Indonesian)

Figure 6
Availability of case-based teaching materials (in Indonesian)

Students state that learning food microbiology needs to be case-based. Case-based learning is a form of active learning that focuses on cases and involves students learning by doing. The case is a fact of circumstances that occur and are experienced by a person or environment. Case can also mean a case or problem that needs to be resolved. Another opinion says that case learning involves interactive conditions, student exploration of realistic and specific situations (Mutmainnah, 2020). Case base involves students in making decisions on questions that do not only have one correct answer (Gultom, 2018).

According to Ulfiyani (2018) that "case-based learning is feasible because it provides two advantages, namely (1) it can develop students' speaking skills based on direct learning experiences, and (2) students have the opportunity to develop critical thinking skills through solving a case". In addition, according to Kantar (2013); Vasconcelos et al. (2022) in case-based learning, students face practical problems that must be handled according to their own knowledge. Case learning simulates real-world situations and asks students to actively grapple with complex problems (Columbia for Teaching and Learning, n.d.). Therefore, the development of case-based teaching materials needs to be done. This is in line with the opinion (Safitri & Purbaningrum, 2020) which states that it is necessary to develop case-based textbooks for students.

Case-based textbooks are learning resources from a course that has the characteristics of case-based learning. Therefore the preparation of textbooks must be adapted to case-based learning.

Meanwhile, according to Williams in Azzahra (2017) the order in presenting the contents of a case-based textbook is: (1) Determine the case; (2) Analyze cases; (3) Determine information, data and literature; (4) Determine steps to resolve the given case; (5) Formulate the conclusion of the case; (6) Presenting the conclusions; and (7) Agree on a conclusion on the given case. As explained by Tarigan & Tarigan (2020) that teaching materials in the form of textbooks were chosen because these teaching materials apart from being a source of learning can also be a provider of activity instructions and a driver of student motivation because they link the subject matter to everyday life experiences. Course teaching materials are developed by individuals who understand the situation relevant has a positive influence on learning (Yulinda et al., 2021; Yulinda et al., 2022).

According to Dimas et al. (2017) preparation of teaching materials aims to make it easier for educators to carry out learning, helps students obtain alternative teaching materials other than textbooks which are sometimes difficult to understand, and provides teaching materials that suit the curriculum and student characteristics. Material Relevant teaching supports contextual learning so that students understand usefulness and meaningfulness of the learning process (Qari'ah et al., 2016). That matter driven by environmental mastery factors and social processes around teach (Safriani et al., 2017).

According to Rahmat et al. (2023) a case deserves to be called a case in case-based learning, if it has the following characteristics: (1) Decision-oriented: the case describes a real condition that demands an immediate decision to resolve the case; (2) Participation: cases are described to increase motivation from student involvement in analyzing problems; (3) Development of discussions: case contents are presented in order to form various thoughts and analysis of the results of discussions between students; (4) Substantive: the main part of the case discusses rumors and real information; and (5) Questions: cases usually do not ask questions, because understanding what should be asked is an important part of case analysis.

D. Conclusion

Based on the results and discussion originating from the needs questionnaire, it is known that students still find it difficult to understand learning food microbiology material, students feel they have not understood food microbiology material using only references from books, students state that the learning resources currently used do not attract interest in learning on food microbiology material, students expressed their pleasure if food microbiology learning was presented using a variety of varied learning resources. Students stated that they had not studied food microbiology material based on the cases presented in it, students wished to have a case-based book on food microbiology material. It is hoped that the results of the questionnaire for teaching materials for the food microbiology course can be used as a basis for developing teaching materials that are tailored to the needs of students.

E. References

Assyakurrohim, D., Ikhram, D., Sirodj, R.A., & Afgani, M.W. (2023). Metode studi kasus dalam penelitian kualitatif. *Jurnal Pendidikan Sains dan Komputer.* 3(1). 2809-467. DOI: https://doi.org/10.47709/jpsk.v3i01.1951

Azzahra, A. (2017). *Pengaruh model case based learning terhadap hasil belajar biologi siswa pada konsep jamur.* (Bachelor's Thesis, Fakultas Ilmu Tarbiyah dan Keguruan, UIN Syarif Hidayatullah, Jakarta).

Cahyani, H., & Setyawati, R. W. (2017, February). Pentingnya peningkatan kemampuan pemecahan masalah melalui PBL untuk mempersiapkan generasi unggul menghadapi MEA. In *PRISMA, Prosiding Seminar Nasional Matematika*, (pp. 151-160). Retrieved from https://journal.unnes.ac.id/sju/index.php/prisma/article/view/21635

Columbia Center for Teaching and Learning. (n.d). *Case Method Teaching and Learning.* Columbia University.

Dimas, A., Cari, C., Suparmi, A., Sarwanto, S., & Handhika, J. (2017). Profil analisis kebutuhan bahan ajar mahasiswa materi dinamika gerak pada mata kuliah fisika dasar. In *Prosiding SNFA (Seminar Nasional Fisika Dan Aplikasinya),* (Vol. 1, pp. 42-45). DOI: https://doi.org/10.20961/prosidingsnfa.v1i0.4502

Gultom, A. (2010). *Pengaruh metode pembelajaran berbasis kasus dan penggunaan simulator PLC terhadap hasil belajar mahasiswa Teknik Otomasi Politeknik TEDC.* (Master's Thesis, Program Pascasarjana, Universitas Pendidikan Indonesia, Bandung).

Harahap, S. R., Harahap, F., & Hasruddin, H. (2016). Pengembangan bahan ajar mikrobiologi pangan berbasis masalah. *Jurnal Pendidikan Biologi, 5*(3), 187-192.

Irawati, H., & Saifuddin, M. F. (2018). Analisis kebutuhan pengembangan bahan ajar mata kuliah pengantar profesi guru biologi di Pendidikan Biologi Universitas Ahmad Dahlan Yogyakarta. *Bio-Pedagogi: Jurnal Pembelajaran Biologi, 7*(2), 96-99. DOI: https://doi.org/10.20961/bio-pedagogi.v7i2.27636

Kantar, L. D. (2013). Demystifying instructional innovation: The case of teaching with case studies. *Journal of the Scholarship of Teaching and Learning, 13*(2), 101-115. Retrieved from https://scholarworks.iu.edu/journals/index.php/josotl/article/view/3217

Kinanti, L. P., & Sudirman, S. (2017). Analisis kelayakan isi materi dari komponen materi

pendukung pembelajaran dalam buku teks mata pelajaran sosiologi kelas XI SMA Negeri di Kota Bandung. *Sosietas, 7*(1), 341-345. Retrieved from https://ejournal.upi.edu/index.php/sosietas/article/view/10347

Maidiana. (2021). Penelitian survey. *ALACRITY: Journal of Education, 1*(2), 20-29. DOI: https://doi.org/10.52121/alacrity.v1i2.23

Mentari, S., & Laily, N. (2016). Pengembangan bahan ajar berbasis kasus (case based) pada mata kuliah aspek hukum ekonomi dan bisnis. *Journal of Accounting and Business Education, 2*(1), 105-106. DOI: http://dx.doi.org/10.26675/jabe.v2i1.6053

Mutmainnah, S. (2020). Pengaruh penerapan metode yang berpusat pada mahasiswa terhadap efektivitas pembelajaran akutansi keperilakuan. In *Simposium Nasional Akutansi 11 (SNA 11)*, Universitas Tanjung Pura, Pontianak.

Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 3 Tahun 2020 tentang Standar Nasional Pendidikan Tinggi. Jakarta: Depniknas.

Peraturan Menteri Pendidikan Nasional Indonesia Nomor 11 Tahun 2005 tentang Penilaian Buku Teks Pelajaran. Jakarta: Depniknas.

Rahmat, A., Arif, M., Mirnawati, M., Azizah, S., Lestari, L. P., Aliyyah, R. R., ... & Suharyati, H. (2023). *Desain pembelajaran berbasis kasus.* Gorontalo: Ideas Publishing.

Safitri, P. T., & Purbaningrum, K. A. (2020). Pengembangan buku ajar berbasis kasus (case based) pada mata kuliah statistika pendidikan. *JPPM (Jurnal Penelitian dan Pembelajaran Matematika), 13*(2), 256-267. DOI: http://dx.doi.org/10.30870/jppm.v13i2.8768

Sari, N. K., & Anantyarta, P. (2018). Pengembangan petunjuk praktikum histologi Program Studi Pendidikan Biologi. *BIOMA: Jurnal Biologi dan Pembelajaran Biologi, 3*(2), 124-138. Retrieved from http://jurnal.unmuhjember.ac.id/index.php/BIOMA/article/view/1611

Septiningrum, D., Khasanah, N., & Khoiri, N. (2021). Development of biology teaching materials of virus based on Socio-Scientific Issues (SSI) to improve student's critical thinking ability. *Jurnal Phenomenon, 11*(1), 87-104. DOI: https://doi.org/10.21580/phen.2021.11.1.4973

Sholihah, M. A., & Sofiyana, M. S. (2019). Analisis kebutuhan bahan ajar mikrobiologi untuk mahasiswa program studi pendidikan biologi. *Jurnal Biologi dan Pembelajaran Biologi, 4*(2), 123-132. DOI: https://doi.org/10.32528/bioma.v4i2.3162

Sugihartono, S., Fathiyah, K. N., Harahap F., Setiawati F.A., Nurhayati SR. (2012). *Psikologi pendidikan.* Yogyakarta: UNY Press.

Tarigan, D. J., & Tarigan, H. G. (2020). *Telaah buku teks Bahasa Indonesia*. Bandung: Angkasa.

Ulfiyani, S. (2018, December). Pembelajaran keterampilan berbicara berbasis kasus: Upaya peningkatan keterampilan berpikir kritis mahasiswa. In *Prosiding Seminar Nasional Pertemuan Ilmiah Bahasa dan Sastra Indonesia,* (Vol. 40), Universitas Pekalongan, Pekalongan. Retrieved from https://proceeding.unikal.ac.id/index.php/pibsi40/article/view/98

Vasconcelos, C., Silva, J., Calheiros, C. S., Mikusiński, G., Iwińska, K., Skaltsa, I. G., & Krakowska, K. (2022). Teaching sustainable development goals to university students: A cross-country case-based study. *Sustainability, 14*(3), 1-15. DOI: https://doi.org/10.3390/su14031593

Yulinda, R., Putri, R. F., & Sya'ban, M. F. (2021). Pembuatan bahan pembelajaran melalui google site untuk guru SMP pada pembelajaran daring. *Jurnal Warta Desa (JWD), 3*(2), 130-135. DOI: https://doi.org/10.29303/jwd.v3i2.143

Yulinda, R., Putri, R. F., Amalia, R. N., & Hayati, F. (2022). Analisis bahan ajar IPA berwawasan lahan basah untuk calon pendidik IPA. In *Prosiding Seminar Nasional Lingkungan Lahan Basah,* (Vol. 7, No. 2, pp. 163-169), LPPM Universitas Lambung Mangkurat, Banjarmasin. Retrieved from https://snllb.ulm.ac.id/prosiding/index.php/snllb-lit/article/view/730