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IMPLEMENTATION OF CASE METHOD IN CALCULUS COURSE

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ABSTRACT (10 PT)

Penelitian ini bertujuan untuk mengkaji penerapan metode Case Method dalam pembelajaran mata kuliah Kalkulus, dengan fokus pada peningkatan partisipasi mahasiswa, motivasi belajar, serta komunikasi multi-arah dalam konteks pembelajaran daring dan luring, sehingga menciptakan kelas yang dinamis dan hidup. Metode penelitian yang digunakan adalah deskriptif dengan pendekatan kualitatif, di mana analisis deskriptif dan kajian pustaka digunakan sebagai teknik utama dalam menganalisis data. Subjek penelitian ini adalah mahasiswa yang mengikuti pembelajaran dengan metode Case Method. Instrumen yang digunakan untuk pengumpulan data adalah wawancara berbasis tugas, yang memungkinkan pengumpulan data kualitatif mengenai pengalaman dan pandangan mahasiswa terkait metode ini. Hasil penelitian menunjukkan bahwa mahasiswa dengan kemampuan tinggi dapat mengikuti pembelajaran dengan metode Case Method dengan sangat baik, mahasiswa dengan kemampuan sedang dapat mengikuti dengan baik, dan mahasiswa dengan kemampuan rendah dapat mengikuti dengan cukup baik. Diskusi dari hasil ini menyoroti bagaimana metode Case Method mampu meningkatkan keterlibatan dan motivasi belajar mahasiswa dari berbagai tingkat kemampuan, serta menciptakan komunikasi yang efektif dalam pembelajaran. Implementasi penelitian ini menekankan pentingnya adaptasi metode Case Method dalam pembelajaran untuk menciptakan lingkungan belajar yang interaktif dan mendukung perkembangan keterampilan komunikasi serta partisipasi aktif mahasiswa, baik dalam pembelajaran daring maupun luring.

This study aims to examine the application of the Case Method in teaching Calculus courses, focusing on enhancing student participation, learning motivation, and multi-directional communication in the context of both online and offline learning, thereby creating a dynamic and lively classroom. The research method used is descriptive with a qualitative approach, where descriptive analysis and literature review are used as the main techniques for data analysis. The subjects of this study are students who participate in learning using the Case Method. The instrument used for data collection is task-based interviews, which allow for the collection of qualitative data regarding students' experiences and perspectives related to this method. The results of the study show that students with high abilities can follow the learning process with the Case Method very well, students with moderate abilities can follow it well, and students with low abilities can follow it fairly well. The discussion of these results highlights how the Case Method can enhance student engagement and learning motivation across different ability levels and create effective communication in

learning. The implementation of this research emphasizes the importance of adapting the Case Method in teaching to create an interactive learning environment that supports the development of communication skills and active student participation, both in online and offline learning.

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1. INTRODUCTION

The implementation of the Case Method is an approach that aligns with the Merdeka Belajar Kampus Merdeka (MBKM) program and significantly enhances student skills, namely Creativity Skills, Critical Thinking Skills, Communication Skills, and Collaboration Skills (4Cs). This skill enhancement positively impacts the quality of graduates and reduces the waiting time for them to enter the workforce (Blázquez et al., 2023). According to Ririen & Irawati (2023), the use of the Case Method significantly improves students' critical thinking and collaborative skills. The Case Method also encourages students to think creatively in solving various problems (Aromatica & Koeswara, 2022). Therefore, the Case Method should be a mandatory method in the preparation of the Semester Learning Plan (RPS) through academic policies to increase the effectiveness of building student competencies relevant to 21st-century needs, emphasizing collaboration between lecturers and students (Song et al., 2022).

Case Method-based learning aims to enhance students' critical thinking so they can solve concrete problems, find solutions, and develop skills and communication (Suratno et al., 2023). However, the implementation of the Case Method has not been optimal due to factors such as lack of understanding of the objectives and steps for applying the Case Method and low participation in assignments (Zhou et al., 2023; Khimmataliev et al., 2021). This aligns with findings from Guimarães & da Silva Lima (2023), which show that clear learning objectives and structured steps can increase active student participation. Additionally, research by Ibragimov et al. (2023) indicates that a supportive learning environment can enhance student understanding and participation.

In practice, the Case Method fosters active student participation in discussions, increases learning motivation, and promotes multidirectional communication in both online and offline learning. Lecturers act as facilitators who guide the learning process and effectively evaluate to achieve learning objectives (Efendi, 2021; Djunaedi et al., 2023). Case-based learning has been proven to be well-received by students and effective in the context of classroom management courses (Puri, 2022). Research by Huda et al. (2023) also supports that active learning methods, including the Case Method, significantly improve student learning outcomes. Moreover, a study by Misra & Anggraeni (2022) shows that active learning methods can enhance student motivation and engagement.

Challenges in learning, such as initial reading difficulties and literacy development, can also be addressed with this method, contributing to the improvement of 21st-century skills (Novani & Yolanda, 2022). Case studies encourage the acquisition of theoretical knowledge relevant to final assessments, equipping students with both theoretical

background and practical experience (Chumak et al., 2022). The appropriate selection of learning methods, such as the Case Method, significantly impacts students' critical thinking skills (Fauzi et al., 2023). Research by Dorimana et al. (2022) indicates that problem-based approaches can overcome difficulties in understanding theory and practical applications. This is reinforced by findings from Aba-Oli, Koyas, & Abera (2024), which assert that problem-based learning effectively enhances students' problem-solving and critical thinking skills.

The strategy of implementing the Case Method is effective in developing student skills. However, formative and summative evaluations are needed to measure the effectiveness of this strategy (Rosidah & Pramulia, 2021). These evaluation studies are important to ensure the readiness of the strategy to be applied in other courses and to develop other necessary skills (Kibrit et al., 2022). Research by Amsal and Kartika (2022) also shows that continuous evaluation and constructive feedback are crucial in case-based learning. Good evaluation allows for adjustments to methods to improve overall student learning outcomes (Ngoc, 2023).

The implementation of Learning by the Case Method has proven to have a positive impact on learning effectiveness, even though intellectual and emotional intelligence do not moderate this effect (Fitri & Patriana, 2022). Research by Tutal and Yazar (2023) supports these findings by showing that active learning methods, such as the Case Method, generally improve learning effectiveness regardless of certain moderating variables. Additionally, research by Dogani (2023) shows that case-based approaches can enhance conceptual understanding and practical applications in various disciplines.

Case Method-based research is an approach that can train students' higher-order thinking skills, involve them in analyzing existing cases around them, and link them with theory (Vahlepi et al., 2021). The development of interactive e-modules based on the Case Method can also enhance students' professional competence, providing a clear, easy, and engaging learning experience (Probowati et al., 2023). Student learning outcomes significantly increase after the implementation of the Case Method, indicating the positive impact of this method on learning (Syam, 2022). Research support from Fathonah et al. (2024) emphasizes that problem-based learning effectively enhances students' problem-solving and critical thinking skills.

2. METHOD

This research was conducted on Informatics Engineering students at Indraprasta PGRI University who have completed the Calculus course. The method used in this study is a descriptive method with a qualitative approach, involving descriptive analysis techniques and literature review to describe students' Calculus learning outcomes (Sitepu et al., 2022). The qualitative descriptive method was chosen because it can provide an in-depth description of the phenomena studied, particularly in the context of higher education (Dzogovic & Bajrami, 2022; Kawar et al., 2024).

2.1. Research Subjects

The subjects of this study consisted of 6 students from the Odd Semester of the 2023/2024 Academic Year. The selection of subjects was done using purposive sampling technique based on certain criteria, namely: the students have studied Calculus material so they are able to solve related problems in everyday life; students have varying grades (high, medium, and low); and students are able to communicate their thoughts both in writing and orally. The purposive sampling technique was chosen because it allows

researchers to select subjects most relevant to the research objectives (Nyimbili & Nyimbili, 2024).

The procedure for selecting subjects in this study involved several steps. First, the researchers selected a class with the best average application of the Case Method. Second, the researchers selected subjects based on the predetermined grade categories. Third, the researchers finally selected 6 research subjects according to the specified criteria. This approach ensures that the selected subjects are representative and relevant to the research focus (Surawy-Stepney, 2023).

2.2. Data Collection

Data collection was carried out through task-based interviews with several steps. First, the researchers selected research subjects according to the predetermined categories and criteria. Second, the researchers determined the data collection time by discussing it with the respective students, considering their class schedules. Third, the researchers conducted data collection by asking the students to analyze problems and communicate their problem-solving methods. The researchers also asked the students about their readiness to receive Calculus learning with the Case Method application. This approach allows researchers to obtain rich and in-depth data on students' learning experiences (Sanchez-Danday, 2023).

2.3. Data Analysis

After the data was collected, the researchers described the data obtained from the students and concluded the independence and Calculus learning outcomes with the application of the Case Method. This approach ensures that data analysis is conducted systematically and comprehensively, providing a comprehensive picture of the effectiveness of the applied learning method (Kittur, 2023). The research results are expected to provide valuable insights for the development of teaching methods in higher education, especially in the Calculus course (Zhou et al., 2023).

3. RESULTS AND DISCUSSION

3.1. Result

The learning outcomes of Calculus in the best class that applied the Case Method achieved an average score of 75. Then, research subjects were selected as shown in the table below.

Table 1. Summary of Research Subject Score Categories

Subject	Category	Score
First	High	95
Second	Moderate	75
Third	Low	50

After identifying the research subjects, an in-depth description was conducted through task-based interviews. The results of the task-based interviews are presented in the table below:

Table 1. Summary of Research Subject Score Categories

No.	Category	*Case Method* ***Indicator***		
		Understanding of	**Learning Interaction**	**Learning Independence**

		Material		
1	High	During the lesson, they can understand 95% of the material presented.	Active during the learning process, frequently asks questions, answers problems, and participates actively in group discussions.	The learning independence is very high and always studies the material presented in the video and completes the practice questions.
2	Moderate	During the lesson, they can understand 60% of the material presented, so they need to review the material independently by watching the provided videos.	Interaction during learning is good but needs to be improved to be more active in learning and group discussions.	Learning independence needs to be improved because it is not yet consistent in understanding the videos before the lectures start.
3	Low	During the lesson, they can understand 30% of the material presented and do not review the material independently.	Interaction is not yet optimal as there tends to be no comments during the learning process.	The enthusiasm for learning needs to be improved because rarely attends classes, and learning independence needs to be improved because rarely completes the practice questions.

3.2. Discussion

High Ability

Students with high ability, scoring 95 on exams, demonstrate very good understanding of the material, focus during learning, and active participation in group discussions. Their enthusiasm and self-directed learning are also high. This indicates that their self-directed learning emerges from within, as they prepare themselves by studying video materials before lectures and completing all exercises. Thus, during lectures, they only need to clarify unclear concepts.

Research by Hodijah et al. (2022) supports these findings, indicating that the Case Method can develop students' skills in problem identification, analysis, information seeking, drawing conclusions, and presenting their analysis in front of the class. This aligns with other studies showing that self-directed learning is closely related to better learning outcomes (Leonte, 2022; Kumyoung et al., 2024). Additionally, according to Mulu et al. (2023), strong self-confidence can enhance active participation and success in learning.

Students with high ability also show active engagement in group discussions, responding to and answering questions from other groups. According to research by Indriyani (2024), effective group work can enhance understanding of the material and student engagement. Furthermore, active participation in discussions enhances students' critical and analytical thinking skills (Li, 2023; Rai et al., 2023).

Moderate Ability

Students with moderate ability, scoring 70 on exams, demonstrate good understanding of the material, although their activity in learning needs improvement. They tend to study independently for materials they do not understand, but their enthusiasm and self-directed learning need to be enhanced as they are not consistently prepared before lectures.

Research by Arpizal et al. (2021) shows that implementing the Case Method can cultivate students' self-directed learning. Moreover, according to Kusumaningtyas et al. (2023), intrinsic motivation plays a crucial role in self-directed learning. Students with moderate ability need encouragement to enhance their self-direction to focus more on understanding the presented material.

According to Zhu et al. (2021), effective learning strategies such as planning, monitoring, and evaluating their own learning can help students with moderate ability improve their learning outcomes. Additionally, the use of technology in learning can also enhance students' self-directed learning (Maimun & Bahtiar, 2023; Eden et al., 2024).

Students with moderate ability also need to be encouraged to be more active in learning. Active participation in discussions and class activities can enhance understanding and retention of the material (Sulistyoningsih, 2020; Razaei, 2023). Thus, these students can better utilize the Case Method and achieve better learning outcomes.

Low Ability

Students with low ability, scoring 50 in exams, show difficulty in understanding the material, lack active participation in learning, and exhibit low enthusiasm and self-directed learning. This indicates that they need more support and motivation to effectively engage in Case Method learning.

Research by Widyastuti & Triana (2024) suggests that students who struggle to understand the material and are inactive in discussions often lack sufficient curiosity and tend to be passive learners. According to Tanaka et al. (2022), social interaction and collaboration can help students develop better understanding. Therefore, it is important to encourage these students to ask questions actively and participate in discussions.

Furthermore, according to research by Borah & Dr. Nisanth PM (2024), self-efficacy or confidence in their ability to learn plays a crucial role in academic success. Students with low ability need support to develop confidence and self-directed learning. This can be achieved through guidance and constructive feedback.

More personalized learning approaches, such as tutoring or mentoring, can also assist students with low ability (Zhiyenbayeva et al., 2021; Sambrani et al., 2024). By providing additional support, these students can become more engaged in learning and improve their understanding of the material.

Additionally, research indicates that using varied learning strategies and active learning approaches can enhance engagement and comprehension among students with low ability (Gosavi & Arora, 2022; Eustáchio et al., 2024). Therefore, it is crucial to adopt more interactive and varied teaching methods to help these students achieve better learning outcomes.

4. CONCLUSION

From the discussion on students' abilities in Case Method-based learning, it can be concluded as follows: (1) High Ability: Students demonstrate excellent understanding, high participation, and independence. Thorough preparation positively impacts confidence and collaborative skills. The Case Method is effective in developing analytical skills; (2) Moderate Ability: Students grasp the material well but need to enhance participation and self-directed learning. Implementing the Case Method can foster independence with adequate support; and (3) Low Ability: Students struggle with understanding the material and show less participation. Despite using the Case Method, additional support in motivation and curiosity is crucial. Overall, the appropriate method implementation and adequate support are crucial in enhancing learning quality, encouraging all students to be more active and independent.

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