

# Cognitive and Behavioral Adaptation Strategies in Learning Financial Derivatives: A Qualitative Study on Undergraduate Students

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## Abstract

Financial derivatives constitute a challenging course for undergraduate students due to the complexity of the underlying concepts and calculations. This study explores students' cognitive and behavioral adaptation strategies in learning financial derivatives, employing financial literacy theory, cognitive and behavioral learning theories, and risk management theory as analytical frameworks. A qualitative approach was adopted, involving in-depth interviews with 21 seventh-semester students from a private university in Jakarta, selected through purposive sampling. The data were analyzed thematically and supplemented with quantitative counts of adaptation strategy frequency. The findings indicate that students struggle to comprehend technical terminology and apply derivative concepts, challenges that are further exacerbated by a lack of contextual learning. The most common adaptation strategies include case-based learning, self-directed study, group discussions, and the use of technology such as artificial intelligence and social media. The study highlights the need for more interactive, simulation-based teaching methods and expanded access to digital learning resources.

*Keywords:* financial derivatives; adaptation strategies; cognitive learning; financial literacy; interactive learning

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## 1. Introduction

Financial derivative instruments are vital components of modern financial markets, primarily serving the purposes of risk management and speculation. Their significance began to grow in the post-1970s era, driven by an increasing need to reduce volatility in capital markets. Derivatives such as forward contracts, futures, and options allow investors to lock in prices and transfer risks associated with fluctuations in asset values. Over time, the market for these instruments has expanded rapidly, with equity derivatives particularly those linked to indices gaining considerable popularity among both institutional and retail investors (Ganai et al., 2023). These instruments are commonly employed as hedging tools against financial risks, enabling companies to stabilize cash flows and protect themselves from adverse price movements (Garskaite-Milvydiene, 2022; Miljković, 2023).

However, despite their importance in the financial world, financial derivative instruments are often perceived as a challenging subject by students due to the complexity of the concepts, intricate mathematical calculations, and their close connection to the dynamics of financial markets. Seventh-semester students studying this subject frequently encounter difficulties in understanding the mechanisms of derivative contracts, such as futures, options, and swaps, as well as their application in risk management contexts. These challenges are further exacerbated by the lack of practical experience, limited access to comprehensible learning resources, and teaching approaches that tend to prioritize theory over practice. In response to these challenges, students develop various adaptation strategies, both cognitively such as analytical thinking, recognizing calculation patterns, and linking theory to practical applications, and behaviorally such as engaging in peer discussions, seeking supplementary materials, and practicing independently. This phenomenon presents an interesting area for further research to understand how students adjust to complex academic challenges and how these adaptation strategies can enhance the effectiveness of learning financial derivatives.

This study is designed to answer the following four research questions:

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RQ1: How do students understand the basic concepts of financial derivative instruments, and what are the main challenges they face in the learning process?

RQ2: What cognitive adaptation strategies do students use to understand the concepts and calculations of financial derivative instruments?

RQ3: What behavioral adaptation strategies do students apply to overcome difficulties in learning financial derivative instruments?

RQ4: How effective are the cognitive and behavioral adaptation strategies in enhancing students' understanding of financial derivative instruments?

## 2. Literature Review

Financial literacy theory is highly relevant in the context of understanding financial derivative instruments, such as futures and options, which are often considered complex and require a deep understanding of risk management. Adequate financial literacy enables individuals, particularly students, to more easily grasp the fundamental principles and operational mechanisms of these instruments, as well as the appropriate methods for managing the associated risks. As Lusardi and Mitchell (2007) have noted, sufficient financial knowledge is a crucial investment in the development of human capital, supporting more rational decision-making in asset and financial risk management. In this context, the research by Akram et al. (2024) shows that financial literacy (FL) levels among students are generally still low. Male students studying business and coming from high-income families exhibit better FL levels compared to other students. Conversely, students in their early 20s tend to have lower FL levels. Demographic and socioeconomic factors, such as gender, field of study, and family income background, significantly influence students' FL levels, with certain groups, particularly women and students from low-income families, requiring special attention to improve their financial understanding.

The research by Aulianda et al. (2023) and Aprilia (2024) offers insights into how cognitive learning theory is applied in education, including in the understanding of financial derivative instruments. Aulianda et al. (2023) demonstrate that the use of Learning Management Systems (LMS), such as Moodle and Edmodo, can enhance students' cognitive learning through features that support better conceptual understanding and increase engagement with complex material, including derivatives. Meanwhile, Aprilia (2024) highlights the importance of applying active learning strategies to help students connect new knowledge, such as financial derivative concepts, with existing knowledge, thereby strengthening their ability to understand and apply these concepts in real-world contexts. Both studies support the idea that learning based on cognitive theory, which involves information processing and the application of concepts, is highly effective for teaching complex topics like financial derivative instruments.

Risk management in derivative instruments is a crucial topic for making effective financial decisions, as discussed by Xie (2024) and Lembang & Asri (2022). Xie (2024) emphasizes the importance of strengthening risk management strategies to address the systemic and operational challenges that arise in the use of derivative instruments and introduces measures to enhance awareness and reporting mechanisms within financial organizations. On the other hand, Lembang and Asri (2022) focus on using derivatives as tools to manage financial risk in portfolios, highlighting the critical role of a deeper understanding of the risks associated with these instruments. Both studies indicate that proper risk management is essential to reducing the potential for losses in derivative usage, as well as improving the stability and efficiency of financial decisions made.

In synthesizing the various theories discussed, this study proposes that a combination of high financial literacy, the application of active learning strategies, and a deep understanding of risk management are key elements in developing a comprehensive understanding of derivative instruments. A study by Hsiao and Tsai (2018) shows that individuals with higher levels of financial literacy tend to be more active participants in the derivative market, as financial literacy helps reduce barriers to understanding complex derivative products. Additionally, active learning approaches such as group discussions, case studies, and simulations have proven to be more effective in enhancing the understanding of financial concepts and decision-making behavior compared to traditional lecture methods (Lento, 2016). Therefore, contextual learning methods that support the development of practical skills through the use of technology and case-based studies will greatly assist students in preparing for real-world challenges in financial risk management, including understanding and using derivatives appropriately.

Financial derivative instruments, with all their complexities, often present a significant challenge in higher education, particularly for students pursuing degrees in economics, accounting, and financial management. Many studies indicate

that students struggle to understand the mechanisms of derivative contracts and their application in risk management. For example, Dewi and Muchtar (2023) found in their research that low financial literacy can influence students' financial decisions, including investments in high-risk instruments such as derivatives. Moreover, Mardikaningsih and Darmawan (2023) emphasize that limited risk tolerance and financial literacy often cause students to hesitate in making investment decisions involving derivative instruments. Therefore, financial literacy is considered crucial, as explained by Anindya and Hasnawati (2024), who show that strong financial literacy can enhance students' investment decisions and minimize unwanted risks, including those associated with the use of derivative instruments.

Low financial literacy can be a barrier for students in understanding both the theory and practice related to derivative instruments. This also increases the risks in investment decision-making and leads to suboptimal risk management. Research by Wijaya et al. (2024) shows that financial literacy and financial behavior have a long-term impact on students' investment decisions. This finding is consistent with a study by Romadhani and Handini (2023), which found that financial literacy significantly influences students' investment decisions in a digital investment firm based in Surabaya. Therefore, improving financial literacy is a crucial step in preparing students to face the challenges of advanced financial topics, including derivative instruments.

In addition to financial literacy, lifestyle and social environment also influence how students learn and understand financial material. A study by Zainudin et al. (2024) shows that lifestyle and social environment have a significant impact on individuals' financial behavior. Students with a consumptive lifestyle and high financial anxiety tend to struggle with concentration and applying logical reasoning during the learning process. To address these challenges, adaptive learning strategies based on active approaches, such as group discussions, practice exercises, and real-life case simulations, are necessary. This approach has been shown not only to enhance conceptual understanding but also to build students' confidence in applying financial knowledge practically (Ng & Karjanto, 2023).

In the context of learning, support from lecturers and the implementation of interactive teaching methods have been shown to play a crucial role. Research by Suryadi et al. (2024) indicates that the use of digital simulation games can enhance students' financial literacy, attitudes, and behaviors in financial management. Additionally, a study by Marzani et al. (2023) reveals that the development of web-based learning media is effective in improving students' self-directed learning in economics courses. With these resources, students can more easily access learning materials and improve their understanding of complex topics.

### **3. Research Method**

A qualitative research method was chosen as the appropriate approach to explore students' understanding of financial derivative instruments. Given the complex nature of the topic and its direct connection to students' personal experiences, in-depth interviews serve as an effective way to understand their experiences, perceptions, and learning strategies (Nowell et al., 2017; Flick, 2023). The qualitative approach allows the researcher to explore in-depth how students overcome difficulties in understanding derivative instruments and how they develop effective learning strategies. Additionally, this approach provides students with the opportunity to freely express the factors influencing their learning process, such as financial literacy, motivation, and support from lecturers and peers.

The research process begins with the selection of informants using purposive sampling, aimed at choosing students who are relevant to the research topic, particularly those enrolled in courses related to derivative instruments. The selected informants are expected to have an adequate level of understanding to provide in-depth perspectives. The primary data collection method used is in-depth interviews, designed to explore students' learning experiences, the strategies they employ, and the challenges they face in understanding the complex concepts of derivative instruments. The interviews are conducted in a semi-structured manner, allowing flexibility to explore issues that arise spontaneously during the conversation (Damiano et al., 2022). This approach provides the researcher with an opportunity to delve into the complex dynamics associated with students' understanding of challenging topics and to identify the factors influencing their learning process (Osborne & Grant-Smith, 2021).

After the data has been collected, the next step is data analysis using thematic analysis. In this analysis, the interview data will be examined to identify key themes that reflect the students' experiences. The goal of this analysis is to uncover patterns related to learning strategies, challenges faced, and factors that support the understanding of derivative instruments (Braun & Clarke, 2021). This process enables the researcher to construct a more comprehensive narrative about how students tackle challenges in learning and how they adapt to complex material (Flick, 2022).

The advantage of the qualitative approach lies in its ability to provide deeper insights into the subjects' experiences, which are difficult to achieve through a quantitative approach. This study aligns with previous findings that show in-

depth interviews allow researchers to explore individuals' perceptions and interpretations of complex phenomena (Ruslin et al., 2022). Additionally, using interviews enables researchers to capture social dynamics and emotional factors that influence how students cope with learning challenges (Jamshed, 2014). With this qualitative approach, this study is expected to make a significant contribution to the design of more effective learning strategies for complex courses, as well as to deepen the understanding of the factors that influence students' ability to master financial derivative instruments.

Using purposive sampling, 21 informants were selected, all of whom are final-year students (7th semester) currently taking the Financial Derivatives Instruments course at Dian Nusantara University (Undira) in Jakarta, Indonesia. The gender distribution consists of 4 male students and 17 female students. A semi-structured interview format was prepared with 10 questions, including 3 questions related to RQ1, 2 questions for RQ2, 3 questions for RQ3, and 2 questions for RQ4.

The data obtained through in-depth interviews with students were analyzed using a qualitative approach based on content analysis. The interview transcripts were thoroughly reviewed by the researcher to identify patterns, cognitive strategies, and adaptive behaviors used by students in understanding financial derivative concepts. Each statement was then coded openly and thematically, with the data grouped into relevant categories and subthemes. A quantizing process was conducted by calculating the frequency and percentage of informants who mentioned specific strategies. This manual analysis was performed by systematically organizing the data using tables and matrices to facilitate the understanding of emerging patterns. The final analysis results are presented as a thematic narrative, supported by direct quotes and numerical data to provide a more comprehensive understanding of the trends in students' adaptive strategies.

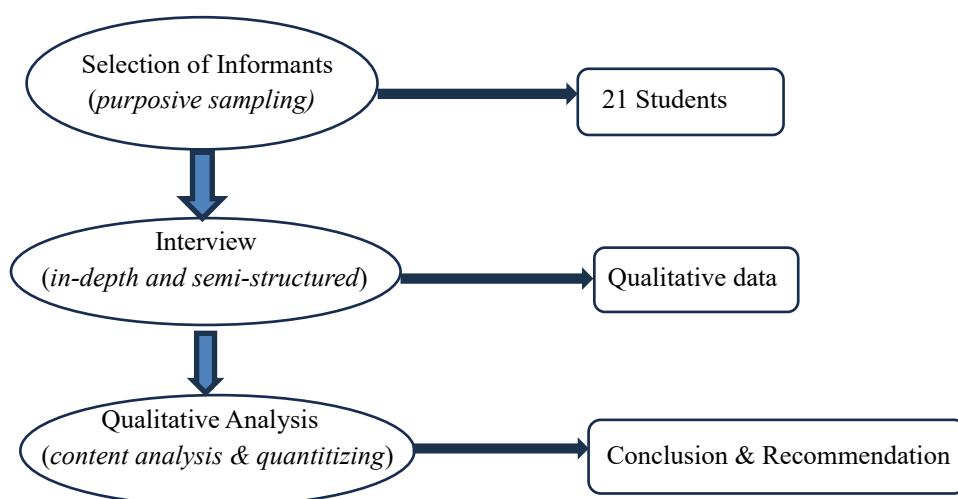


Figure 1. Research Diagram Flow

Table 1. List of Questions and Relevance to Research Questions (RQ)

Topic	Question	Research Question
Understanding Concepts and Challenges in Learning	1. What was your initial understanding of the Financial Derivatives course before you started learning it?	RQ1
	2. What is the biggest challenge you face in understanding the basic concepts of derivative instruments such as futures, options, and swaps?	
	3. How was your experience with this course? Did the teaching methods used help you understand the material well?	
Cognitive Adaptation	1. How do you develop an understanding of the theory and calculations in derivative instruments?	RQ2

Topic	Question	Research Question
Strategies in Learning	2. Do you have specific strategies for understanding difficult concepts, such as case analysis or using simulations? If yes, how do you apply them?	
Behavioral Adaptation Strategies in Learning	1. What study habits do you apply to overcome difficulties in this course? (e.g., self-study, discussing with peers, or attending additional tutoring). 2. How often do you use additional learning resources such as educational videos, other reference books, online discussion forums, or Artificial Intelligence? 3. Does the academic environment (e.g., the role of lecturers, peers, or learning communities) affect your understanding of this course? If yes, how?	RQ3
Effectiveness of Adaptation Strategies	1. Which of the strategies you applied do you think is most effective in helping you understand financial derivative instruments? Why? 2. If there were a more effective learning method, what changes would you expect in the teaching system to help students understand this course better?	RQ4

#### 4. Results and Discussion

*RQ1: How do students understand the basic concepts of financial derivative instruments, and what are the main challenges they face in the learning process?*

**Table 2.** Understanding of Concepts and Learning Challenges

Topic	Theme	Number of informants	Percentage (%)
Initial understanding	• Do not understand	11	52
	• Understand a little	10	48
Challenge	• Technical terms and basic concepts	14	67
	• Analysis and Practice	7	33
Learning Method	• Case study	10	48
	• Discussion	5	24
	• Analogy with practice	5	24
	• Relying on the module	1	5

Based on the qualitative analysis, it was found that 52% of the informants at the beginning of the course had no understanding at all of financial derivative instruments. Even the remaining 48%, while somewhat familiar, did not fully understand the mechanisms and uses of these instruments. The biggest challenge for students, with 67% stating that the technical terms and basic concepts of each derivative product were difficult, and the other 33% felt they needed analysis and practice of the theories presented. 48% of the informants requested a learning method based on real case studies, 24% requested more discussions, and another 24% asked the lecturer to provide analogies with real-world applications. Only one informant, or 5%, relied on the standard module material.

Below are excerpts from some informants' statements: Bunga: "At first, I didn't understand at all, I had only heard the term before." Then Lisa: "The biggest challenge was understanding the technical terms used..." Chairun emphasized: "... I feel that a teaching method based on case studies and real-life examples is very helpful..."

RQ2: What cognitive adaptation strategies do students use to understand the concepts and calculations of financial derivative instruments?

**Table 3.** Cognitive Adaptation Strategies in Learning

Topic	Theme	Number of informants	Percentage (%)
Understanding theory and calculations	• Attending lectures	9	43
	• Practice exercises	5	24
	• Learning basic concepts	5	24
	• Discussion with peers	2	9
Special strategies	• Analyzing real case studies	17	81
	• No strategy	3	14
	• Following course modules	1	5

Based on the content analysis approach and the process of quantizing, it was found that 43% of the informants, for understanding theoretical material and calculation techniques, adapted by solely following the lecture materials in the form of modules, quizzes, and forums. The remaining 24% practiced exercises, 24% explored basic concepts, and 9% engaged in discussions with peers. Special strategies for cognitive adaptation in learning were dominated by 81% who performed real case analysis and case studies, while only one informant, or 5%, relied on modules. Interestingly, 14% of the informants had no specific strategy.

Here are the quotes from some informants: Sarah: "*I study from the module provided....*," Citra: "*... doing practice exercises....*," and Yonathan: "*My strategy is probably finding example case studies...*"

RQ3: What behavioral adaptation strategies do students apply to overcome difficulties in learning financial derivative instruments?

Based on Table 4, the behavioral adaptation strategy of students in their learning habits shows that 67% engage in self-study, while 33% rely on peer discussions. The largest additional source of information is Artificial Intelligence, used by 57%. This aligns with the research conducted by Rachman and Donald (2025) regarding the use of Artificial Intelligence in students' academic tasks. Students also utilize social media platforms such as YouTube, e-learning, and similar platforms, accounting for 38%. Only one student, or 5%, does not use additional sources in their learning behavior. Interestingly, 90% of students indicated that the role of lecturers in the academic environment dominates learning behavior, while the remaining 10% attribute the role to peers

**Table 4.** Behavioral Adaptation Strategies in Learning

Topic	Theme	Number of informants	Percentage (%)
Study habits	• Self-study	14	67
	• Discussion with peers	7	33
Additional sources	• Artificial Intelligence	12	57
	• Social media platforms	8	38
	• Not used	1	5
Academic environment	• Role of lectures	19	90
	• Role of peers	2	10

Here are some quotes from the informants, Rindayu: "*I usually study independently after class...*", Sartika: "*I am used to discussing with my friends...*". Ratna: "*I usually watch educational videos on YouTube...*". Anaas: "*... sometimes I use Artificial Intelligence assistance to understand the calculations...*". Jessica: "*The role of the lecturer is very influential...*"

RQ4: How effective are the cognitive and behavioral adaptation strategies employed by students in enhancing their understanding of financial derivative instruments?

**Table 5.** Effectiveness of Adaptation Strategies

Topic	Theme	Number of informants	Percentage (%)
Most effective strategy	• Case studies	9	43
	• Peer discussion	8	38
	• Use of Artificial Intelligence	2	10
	• Lecturer's explanations in class	2	10
Teaching Changes	• Case studies	11	52
	• Simulations and interactive methods	6	28
	• Access to information sources	2	10
	• Open communication with lecturers	1	5
	• Peer discussions	1	5

Based on Table 5, the most effective strategies for student adaptation are Case studies, Peer discussions, the Use of Artificial Intelligence, and Direct explanations from the lecturer in class, with the following percentage weights: 43%, 38%, 10%, and 10%, respectively. The teaching changes that students primarily expect are Case studies (52%) and Simulations and interactive methods (28%). Some students also hope for access to information sources such as books, articles, and videos, open communication with lecturers, and peer discussions, with percentages of 10%, 5%, and 5%, respectively

Here are some quotes from the informants: Nessa: "*The most effective method is using real case examples and simulations...*". Muhammad: "*... engaging in Q&A with Artificial Intelligence...*". Dewi: "*... discussions with friends are quite helpful...*". Sartika: "*... incorporating more interactive simulations...*". And Risna: "*... access to various learning resources such as books, articles...*".

## 5. Conclusion

This study provides an in-depth understanding of the cognitive and behavioral adaptation strategies employed by students in learning about financial derivative instruments. The key findings of this research are as follows:

- At the outset, all students demonstrated a very limited understanding of the fundamental concepts of financial derivatives, highlighting significant challenges in the early stages of the learning process.
- The primary difficulties faced by students involved understanding complex technical terms and the limited use of case studies and practical exercises in teaching. As a result, students expressed a preference for learning methods centered around case studies, interactive discussions, and the use of analogies that closely relate to real-world applications. Only a small number of students relied solely on standard course modules as their main learning resource.
- To overcome difficulties in understanding theoretical concepts and calculations related to derivative instruments, students adopted adaptive strategies such as following lecture materials, completing practice exercises, and deepening their understanding of basic concepts. The most prominent strategy involved analyzing the material through relevant and real-life case studies.
- In terms of study habits, students commonly relied on self-directed learning and group discussions with peers. Additionally, technologies such as artificial intelligence and social media platforms served as valuable supplementary resources that enriched their understanding. The lecturer's role in mentoring and guiding students was found to have a significant influence on shaping students' behavioral adaptation in the learning process.
- According to the students, the most effective adaptation strategies included case-based learning and peer discussions. They expressed a desire for changes in teaching methods that would place greater emphasis on case study applications, practical simulations, and interactive learning. Furthermore, students also wanted improved

access to a broader range of learning resources, such as textbooks and academic articles, to further enhance their knowledge.

The findings of this study offer significant contributions to educational stakeholders, particularly instructors and academic administrators, by emphasizing the importance of incorporating direct student feedback regarding the challenges they face in learning financial derivative instruments, which are often perceived as difficult. The study highlights the need to develop more engaging and application-oriented teaching methods, such as case studies, simulations, and interactive discussions, to support students in understanding complex financial topics. Educators are also encouraged to leverage technology, including artificial intelligence and digital platforms, to enrich the learning experience and provide greater access to supplementary resources.

A limitation of this study is its narrow focus on a single course and the absence of a quantitative examination of the interactive relationships between the thematic findings and students' behavioral and cognitive adaptation strategies. Future research could address this limitation by involving a broader range of educational institutions to evaluate the generalizability of the results. A mixed-methods approach could also be valuable in quantitatively analyzing the correlations between adaptation strategies and student learning outcomes, while longitudinal studies may provide deeper insights into how these strategies evolve over time.

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