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Research on the Teaching of Financial Engineering Assisted by Artificial Intelligence

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Abstract: With the rapid development of artificial intelligence technology, its application in the field of education is becoming increasingly widespread, bringing profound changes to traditional teaching models. As an interdisciplinary field that emphasizes both theory and practice, Financial Engineering urgently needs to explore how to use artificial intelligence technology to improve teaching effectiveness. This study explores the application of artificial intelligence technology in the teaching of Financial Engineering, aiming to improve the quality and efficiency of education. By analyzing practical cases of artificial intelligence in courseware production, test paper generation, and student Q&A, combined with literature review, we evaluate its advantages and challenges. The research results indicate that artificial intelligence can support personalized learning, reduce the burden on teachers, and improve learning efficiency, but it also faces problems such as insufficient technological acceptance, lack of humanized interaction, and risk of excessive dependence. In summary, the scientific application of artificial intelligence assisted teaching can bring significant improvements to the education of Financial Engineering, but it is necessary to balance technological and humanistic factors.

Keywords: Artificial Intelligence; Assisted Teaching; Education Quality; Personalized Learning

1. Introduction

With the rapid development of artificial intelligence technology, its application in various fields is becoming increasingly widespread. The education sector, as an important link in social progress and personal growth, has also been deeply influenced by artificial intelligence technology. Artificial intelligence assisted teaching, as an emerging teaching model, is gradually changing traditional teaching methods. It is bringing new teaching experiences to teachers and students, too.

Artificial intelligence assisted teaching refers to the application of artificial intelligence technology to assist the educational process. It can improve the quality and efficiency of education. Its most important goal is to provide personalized and adaptive learning experiences that meet the diverse needs and potentials of students. By analyzing student learning performance and feedback data, artificial intelligence can provide teachers with more comprehensive and accurate student evaluations and guidance. It can help teachers better develop personalized teaching plans.

Some scholars believe that artificial intelligence technology has many advantages in assisted teaching. Artificial intelligence can make full use of big data for creative design of teaching content. Artificial intelligence can better improve teaching effect. Artificial intelligence can comprehensively enhance students' ability to analyze and solve problems. In addition, the artificial intelligence model can provide students with rich teaching resources. Artificial intelligence can also improve their learning interest and exploration ability through intelligent dialogue and interaction with students. Moreover, artificial intelligence technology facilitates the embedding of real world situations in teaching and enhances students' ability to integrate theory with practice [1-5]. Some scholars believe that the use of artificial intelligence technology in assisted instruction will also pose challenges. First of all, teachers rely too much on artificial intelligence big language model and lack their own teaching experience to integrate into teaching. Secondly, students overuse the big language model of artificial intelligence to complete various course papers. Students lack their own thinking and analysis [6-10]. To sum up, although there are some achievements in the research of artificial

intelligence assisted instruction, there is a lack of Applied Research on the course of financial engineering. Therefore, this paper focuses on financial engineering teaching with artificial intelligence assistance.

2. Application Fields of Artificial Intelligence Assisted Instruction

Artificial intelligence assists teachers in making courseware. There are two main ways to apply artificial intelligence. The first way is to input the electronic files of textbooks that need to make courseware, so that artificial intelligence can read and refine the key points to make courseware. These files preferably are word files or recognizable PDF files. The author chooses the web page version of Baidu artificial intelligence big language model. The author inputs the word file of the textbook "financial engineering". Then the author asks the system to make the coursework of the first chapter. The contents of the courseware generated by the large model are as follows. Slide 1 is the title page, showing Chapter 1 as an introduction to financial engineering. Slide 2 is the introduction, including the importance of financial engineering and the definition of financial engineering. Slide 3 is an overview of financial engineering, introducing the nature and main objectives of financial engineering. Slide 4 shows financial engineering instruments, including underlying securities and financial derivatives, as well as the application and value of financial engineering instruments. Slide 5 is an overview of financial derivatives, including the definition, classification, function and application of financial derivatives. Slide 6 is the development history and background of financial engineering, including the origin and development of financial engineering and the driving factors for the origin and development of financial engineering. Slide 7 is the basic analysis methods of financial engineering, including absolute pricing method and relative pricing method, risk neutral pricing method, state price pricing method, arbitrage and no arbitrage equilibrium. Slide 8 is the conclusion and outlook, summarizing that financial engineering is an emerging interdisciplinary subject. Its core lies in the design, pricing and risk management of financial products. Artificial intelligence believes that with the development of financial markets, financial engineering will play a greater role. By comparing textbooks with courseware, the artificial intelligence big model does incorporate the knowledge focus of Chapter 1 into courseware. The overall effect of courseware is good, but it is slightly simple. It does not show the specific definition. It lacks some pictures and tables to make courseware more vivid. Because artificial intelligence uses the web version, teachers need to convert it into ppt format. Teachers need to process and polish it at the same time. The second way is to let artificial intelligence make courseware directly. The author asked artificial intelligence to make courseware for Chapter 2 of Financial Engineering (overview of forward and futures). The contents of the courseware generated by the large model are as follows. Slide 1 is the introduction, which briefly introduces the importance of forward and futures in financial engineering and the basic concepts of forward and futures. Slide 2 is an overview of forward contracts, including the definition of forward contracts, multiple and short parties in forward contracts, and the return/profit calculation of forward contracts. Slide 3 shows the types of forward contracts, including forward interest rate agreements (FRA), forward foreign exchange contracts and forward stock contracts. It also give examples and explain the specific contents and application scenarios of each contract. Slide 4 is the trading mechanism and characteristics of forward contracts, including decentralized over-the-counter trading, non standardized contracts, and analysis of the advantages and disadvantages of forward contracts. Slide 5 is an overview of futures contracts, including the definition of futures contracts, multiple and short parties in futures contracts, and the standardization characteristics of futures contracts. Slide 6 shows the types of futures contracts, including interest rate futures, stock index futures and foreign exchange futures. It gives examples and explain the specific contents and application scenarios of each futures contract. Slide 7 is the trading mechanism and characteristics of futures contracts, including centralized trading on the exchange, standardized contracts, special trading and delivery systems (such as daily mark to market settlement, margin system, etc.). It provides analysis of the advantages and disadvantages of futures contracts. Slide 8 is the comparison of forward and futures, including trading venues, standardization, default risk, relationship between the parties to the contract, price

determination methods, settlement methods and settlement methods. Slide 9 is the conclusion and case analysis, including summarizing the main characteristics and differences between forward and futures, providing specific case studies, such as Shanghai and Shenzhen 300 stock index futures contracts, emphasizing the application value of forward and futures in risk management. Through comparison, the author finds that the chapter arrangement of the whole courseware in the second way is quite different from the teaching materials. The textbook is divided into three sections. The first section is the forward and forward market. The second section is the futures and futures market. The third section is the comparison of forward and futures. Because there is no input of textbook documents to train the artificial intelligence model, the output results can only be said to have general reference value. Teachers need to re produce courseware in line with the arrangement of textbook chapters.

Artificial intelligence helps teachers produce course papers. The author chose Baidu artificial intelligence big language model web page version. We require artificial intelligence to produce a set of "financial engineering" test papers. Test papers are out of 100 points. Artificial intelligence needs to give answers and analysis. Artificial intelligence quickly produced a set of tests with answers and analysis. The first question was a single choice question, with 2 points for each question, totaling 20 points. The second question was multiple topic, with 3 points for each question, totaling 15 points. The first question was the judgment question, with 2 points for each question, totaling 10 points. The fourth question was a short answer, with 10 points for each question, totaling 30 points. The fifth question was calculation, with a total of 15 points. The sixth question was case study, 10 points. The types of questions are relatively rich. The total score also meets the requirements. Let's take the case study problem as an example to see the effect of artificial intelligence. The title reads as follows. An investment company plans to invest in the stock of an emerging technology company in the next year. The stock price is expected to fluctuate greatly. In order to manage investment risk, the company decides to use financial engineering tools for hedging. The company currently holds 100000 shares of the technology company. The company is considering buying corresponding put options as a hedging strategy. Assuming that the current stock price is 50 yuan per share. The risk-free annual interest rate is 4%. The option expiration time is one year. The execution price is 48 yuan per share. Please design a basic hedging strategy and estimate the number of put options to buy (assuming 100 shares per option). When the stock price falls to 45 yuan per share and rises to 55 yuan per share, the effect of hedging strategies is evaluated respectively. We need the comparison of total earnings after hedging and earnings without hedging. Please analyze why the investment company chose put options as a hedging tool and explain its expected effect. The answer is as follows. The put option is selected as a hedging tool because the put option gives the holder the right to sell the underlying asset at the agreed price (strike price) when the option expires. When the stock price falls, the value of options increases. The value of options can partially or completely make up for the loss of stock investment. Therefore, the purchase of put options helps to reduce the overall risk of the portfolio. According to the hedging demand, one put option is needed for every 100 shares to hedge. Thus, for 100000 shares, 1000 put options need to be purchased. The specific number of options also needs to consider the specific terms of the option contract and transaction costs. When the stock price falls to 45 yuan per share, the loss of unhedged stock investment is (50-45) * 100000=500000 yuan. If the put option is executed, the available income is (48-45) * 100000=300000 yuan (ignoring the option fee). The total loss after hedging is 200000 yuan, which is lower than the loss without hedging. When the stock price rises to 55 yuan per share, the stock investment profit is (55-50) * 100000=500000 yuan. At this point, the put option may be worthless (depending on the option market price). The hedging strategy does not generate additional returns, but it avoids potential short losses. Thereby, hedging strategies do not reduce profits when stock prices rise. It effectively reduce losses when stock prices fall. There are no unreasonable questions and answers, which meet the requirements of case analysis questions. It should be noted that because the author uses a non member version, the number of words will be limited in the process of writing the question. The author needs to enter the requirements of artificial intelligence to continue to write the question. The number of individual questions is

small. The author also needs to communicate with artificial intelligence in time.

Artificial intelligence helps teachers answer questions. Teachers generally arrange a special question and answer time. They can also answer questions before and after class. At the same time, teachers will also establish QQ groups to facilitate students to ask questions. However, teachers have other tasks that make it impossible to answer students' questions at any time. Some questions are related to students' future work and life. It is difficult for teachers to give detailed answers at once. At this point, teachers can teach students to use artificial intelligence to answer questions and solve puzzles. For example, students like to ask, what is the use of financial engineering for future employment and life. It's hard for even teachers to respond fully to this question all at once. Artificial intelligence's answer is as follows. Financial engineering has a significant positive impact on future employment and life. First, learning financial engineering can improve college students' professional skills and comprehensive quality. Financial engineering not only covers the basic theories and basic knowledge of economics and finance, but also probes into professional skills courses such as financial mathematics, international finance, commercial bank management, investment banking, securities investment, corporate finance, financial market, risk analysis and simulation. The study of this course can help students master the ability to design, develop and comprehensively use various financial tools. Students can creatively solve financial practical problems. Thus study of this course can significantly improve their professional skills and comprehensive quality. Second, studying financial engineering can broaden the employment fields and opportunities of college students. The employment prospects of financial engineering majors are very broad. Graduates can engage in financial management, investment and financing, risk management and other work in banking, securities, insurance, trust and other financial institutions, as well as other economic management departments, non-financial companies, enterprises and institutions. With the continuous development and innovation of financial market, financial engineering plays an increasingly important role in risk management, investment strategy and financial product design. Therefore, talents with financial engineering background are popular in the job market. Third, studying financial engineering can enhance the professional competitiveness of college students. In the financial industry, especially in the high-end financial sector, talents with financial engineering knowledge and skills tend to be more competitive. For example, the profession of financial engineer has been very mature abroad, while in China, with the rapid development of the economy, this profession has gradually attracted attention and become a popular profession. Through systematic study of financial engineering, students can obtain the qualifications needed for careers such as financial engineers. Thus it will enhance their competitiveness in the workplace. Fourth, studying financial engineering allows college students to cope with complex changes in financial markets. Financial markets are a volatile field that requires keen insight and the ability to cope with complex situations. The study of financial engineering can help students understand the operation mechanism of financial markets. The study of financial engineering can help students master the tools and methods of risk management. Thus they can make more scientific and reasonable decisions in the face of market volatility and uncertainty. Fifth, studying financial engineering can promote personal financial management and investment decisions. In addition to having a positive career impact, financial engineering can help students make better personal financial management and investment decisions. By learning the knowledge and skills of financial engineering, students can more rationally analyze market trends and risks. Students can formulate more scientific and reasonable investment plans. Thus students can achieve the preservation and appreciation of personal wealth. Obviously, the response of artificial intelligence is relatively comprehensive and scientific. Not only students can like it, but also teachers can get inspiration.

3. Advantages of Artificial Intelligence Assisted Teaching of Financial Engineering

The advantages of artificial intelligence assisted financial engineering teaching are as follows.

First, artificial intelligence can help college students with personalize study. Artificial intelligence assisted instruction can provide targeted learning materials and feedback according to each student's needs and potential. It can improve students' learning motivation and

effect. College students can use artificial intelligence at any time to consult all kinds of learning puzzles. Artificial intelligence can immediately give more comprehensive and scientific answers. College students can also consult artificial intelligence about bad study habits. For example, the author consulted artificial intelligence Beanbag AI, what to do if college students like to play mobile phones in class. Artificial intelligence offers a variety of approaches. In class, college students can try to use notebooks and pens to record important points of knowledge, rather than relying on mobile phones. College students can also agree with classmates not to play with their phones in class and supervise each other. College students should actively participate in class discussions. College students should ask questions and answer questions, so that they can focus more on class content and reduce the impulse to play with mobile phones.

Second, artificial intelligence can reduce the burden on teachers. The intelligent teaching system can automatically grade homework and test papers. The intelligent teaching system can reduce the workload of teachers. The intelligent teaching system can give teachers more time and energy to pay attention to the personalized needs of students. For example, rain classrooms now used in colleges and universities already have some artificial intelligence functions. Teachers can arrange artificial intelligence designed questions in the courseware. Then students answer them in class. The system can automatically correct them. Teachers can also observe the accuracy of students in real time. Teachers can adjust teaching arrangements in time. Teachers can explain the weak knowledge points that students generally grasp again. Students can also know their learning status, so that they can review and answer questions after class. The homework grading system based on artificial intelligence technology can quickly scan and grade students' homework. The homework grading system not only give the results of grading, but also analyze the specific causes of wrong questions. The homework grading system can generate academic analysis reports, so that teachers can understand students' mastery of knowledge points. In this way, teachers do not need to spend a lot of time manually correcting homework and counting errors, so they have more energy for teaching and research, lesson preparation, analysis of learning and personalized teaching programs.

Finally, artificial intelligence can improve the learning efficiency of college students. By analyzing students' learning data, artificial intelligence can recommend more suitable learning resources and paths for students and improve learning efficiency. We can take a course in financial engineering. The first stage is basic knowledge learning, lasting 1-2 weeks. Students read the relevant chapters of the textbook "financial engineering" to understand the basic concepts, development and application fields of financial engineering. The second stage is core content learning, lasting 3-6 weeks. Students deeply study financial derivatives knowledge, such as futures, options, forward contracts and so on. Students should master the pricing principles and methods of financial derivatives, including arbitrage free pricing and risk neutral pricing, etc. The third stage is practice and case analysis, which takes 2-3 weeks. Through practical case analysis, financial engineering technology is used to solve specific financial problems, such as derivatives pricing, risk management strategy formulation and so on. The fourth stage is review and summary, which takes one week. Students should review what they have learned. Students should organize their notes and build a framework for your knowledge. Students should do exercises or test questions to test their learning. Students should summarize the problems and gains in the learning process to lay the foundation for further learning or application.

4. Challenges of Artificial Intelligence Assisted Teaching of Financial Engineering

There are three challenges to artificial intelligence assisted teaching of financial engineering.

Some teachers may have limited ability to accept and apply new technologies. It is difficult for them to give full play to the advantages of artificial intelligence tools. They have not improper operation in the process of use. Some older teachers have not been exposed to such advanced technologies in their education and early teaching practices. It is relatively slow for them to adapt and learn new things. The onerous teaching task makes some teachers lack enough time and energy to deeply study and learn new artificial intelligence tools.

Artificial intelligence lacks human interaction. Although artificial intelligence can provide

information and answers, it can not completely replace the emotional communication and humanistic care between teachers and students. In the process of education, a teacher's smile, encouragement and patient listening can give students warmth and strength. Teachers can stimulate their learning motivation and self-confidence. This emotional support and connection is the foundation of a good teacher student relationship and helps create a positive learning atmosphere. Although artificial intelligence can provide a lot of information and answer questions quickly, it lacks human emotional perception and empathy. It can not really understand students' inner feelings. It can not give that kind of interaction full of love and care.

There is a risk of relying on artificial intelligence technology. For teachers, if they rely too much on artificial intelligence, they may fall into a comfort zone. Teachers no longer actively update educational ideas. Teachers may not explore new teaching methods and strategies. Teachers may not strive to improve their teaching design, classroom management and communication with students. In the long run, teachers' professional development will be limited. It will be difficult to cope with complex situations and sudden problems in education. For students, overreliance on artificial intelligence can undermine their ability to think and solve problems on their own. When they confront with a problem, they may first think of using technology to get answers. They may not analyze, reason and try to solve them themselves. This is not conducive to cultivating students' critical thinking, innovation and perseverance.

5. Conclusions and Outlook

As a new teaching mode, artificial intelligence assisted instruction has great potential and advantages. However, it still faces many challenges and problems in practical application. In the future, we need to further study and explore the application and development direction of artificial intelligence in the teaching field of financial engineering. So it can better serve the teaching of financial engineering.

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