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Research and Implementation of Blended Teaching Mode under the Background of Artificial Intelligence—A Case Study of Business Educational Courses

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Abstract: Higher education is always about reforming the teaching method because of the deep integration of artificial intelligence and education, which is becoming an unavoidable trend. Taking business educational courses for example, this paper constructed a blended teaching mode in the teaching and learning process, which was proved to be more efficient for teachers and students. By applying the blended teaching model, teachers can improve teaching quality by strengthening cognition, optimizing methods, engaging in multifaceted practice, and optimizing platforms.

Keywords: Blended teaching mode; Artificial intelligence; Business educational courses

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1. Introduction

As people enter the era of artificial intelligence, the core technologies of the Internet and AI have reached a new level of maturity, making traditional teaching methods like rote learning and cramming insufficient to meet the needs of today's students. Numerous areas, including finance, healthcare, education, and manufacturing, are seeing tremendous progress thanks to the rapid development of core artificial intelligence technologies. In the long run, the impact of artificial intelligence technology should prioritize practical application over mere gimmicks. The advancement of smart education brings forth both prospects and difficulties. For company education, the innovation and design of teaching mode, teaching method, and teaching process have deep connotations. The School of Economics at Guangzhou City University of Technology has been continuously exploring and implementing blended teaching reforms in business courses, incorporating cutting-edge artificial intelligence technologies, and has achieved numerous accomplishments [1].

2. Background of the artificial intelligence era

Artificial intelligence technologies encompass machine learning, expert systems, knowledge graphs, random search algorithms, artificial neural networks, and more, as shown in **Figure 1**. The rapid development of artificial intelligence takes technical innovation as the entry point, meets various educational topics and teaching links, and continuously promotes the innovation of teaching products, process optimization, and the improvement of teaching efficiency. In recent years, artificial intelligence products such as smart speakers, AlphaGo robots, ChatGPT, etc. have surfaced continuously. The "New Generation Artificial Intelligence Development Plan", released by the State Council, delineates China's goals for AI development by 2030, with a focus on speeding up the creation of an innovative and globally leading technological powerhouse, while emphasizing the interconnected growth of research and development, product application, and industry cultivation, while insisting on the integrated development of research and development, product application, and industry cultivation [2].

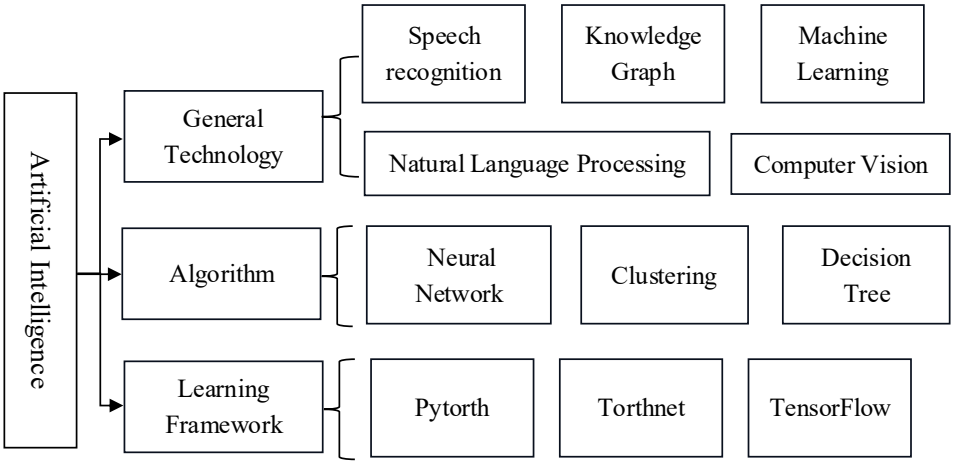

Figure 1. Core artificial intelligence technologies

In the era of artificial intelligence, teaching will become more intelligent. The upgrading of artificial intelligence tools promotes further reforms and explorations of teaching modes by educational practitioners. Technological updates and iterations can diversify and personalize students' learning processes. This will not only change students' learning methods but also provide teachers with more opportunities. Since the continuous improvement and development of business education courses, the degree of specialization is high, the connection with the social scene is close, the content is rigorous and serious, and the knowledge is broad. However, in the new era, how to enable the development dividend of artificial intelligence technology to business education has become a difficult problem. While teaching business-related knowledge, teachers also assist students in establishing the correct ethical values in finance. The exploration of blended teaching modes in the context of artificial intelligence has gradually become one of the focuses of educational practitioners.

3. Characteristics of business education courses

Business education courses integrate foundational theories from disciplines such as economics, finance, and investment, covering content related to mathematics, operations research, and systems science. Business education courses not only incorporate modern finance, information technology, and engineering methods but

also play a crucial role in fields such as economic management. The construction goal of a business education curriculum is not only to make students have a solid financial, mathematical, computer knowledge and foreign language level, but more importantly, to promote students to establish a strong sense of innovation, help students broaden their horizons at the spiritual level, and improve their ability to solve problems. Through the study of business education courses, students can basically master the basic principles of economics and the main concepts and theoretical knowledge of financial engineering, finance, international business, etc., and have the ability to apply financial engineering, mathematics, computer knowledge, and at the same time apply this knowledge and ability to practice.

With the rapid development of Internet technology, business education courses continue to differentiate, and the teaching content gradually tends to be combined with financial technology. Courses such as artificial intelligence, cloud computing, financial frontier topics, and financial technology have emerged one after another. From the perspective of talent training, financial engineering courses are facing new changes, being familiar with computer programming and AI technology, and the ability to apply scientific and technological means to financial practice are gradually listed as teaching and training objectives. Every year, there is an endless stream of high-efficiency graduates majoring in business. To better adapt to the demand of the job market, business education is transforming to information education, and the teaching model needs to be changed accordingly to better adapt to the present. Application of the blended teaching model under the background of artificial Intelligence has become a focal point of current research in the near future.

Guangzhou City University of Technology has five typical majors of Business education: financial engineering, economics, international economics and trade, economic statistics and taxation. The school takes advantage of the blended teaching model by providing a large quantity teaching resources, high-quality teaching ideas, improving the students' subjective initiative, and stimulating students' interest. In addition, the students have won many international and national academic competition awards, such as the international first prize in the 2018 American Mathematical Contest in Modeling for College Students (MCM/ICM), and the Silver Prize in the "Internet +" Innovation and Entrepreneurship Competition for College Students in Guangdong Province in 2021 under the guidance of the teachers. Covering universities across the country, the event is the largest comprehensive event in China and one of the most influential events. From the perspectives of artificial intelligence, blockchain, cloud computing, and big data, the school of economics conducts in-depth analysis, exploration, and handling of economic issues, leading students to seize opportunities, win the initiative, and integrate into the development trend of the national and world economy.

4. Deficiencies of the traditional teaching model

Business courses cover required courses and elective courses, such as economics, introduction to financial engineering, introduction to fintech, corporate finance, investment theory, international finance, financial derivatives, etc. The traditional teaching model emphasizes the process of teacher instruction, with the teacher as the center, and the teaching resources are single, which can be divided into three stages: teaching, learning, and feedback. The teaching models mainly focus on the one-way transmission of knowledge [3]. Some classes also include case analysis, classroom discussions, and assignments, but the teaching activities are relatively dull. The deficiencies of the traditional teaching model are obvious.

4.1. One-way output by the teacher

Under the traditional teaching model, teachers mainly rely on textbooks and assistive multimedia equipment for one-way output. On the one hand, they can have complete control over the content and scope of the textbook, but on the other hand, the implementation of the course is inflexible. It is difficult for teachers to tailor their teaching to individual students, and they generally have uniform requirements and standards for students, lacking the ability to discern students' learning outcomes. In traditional teaching, teachers themselves think in a fixed way, seldom communicate with students, pay little attention to students' concentration and expression ability, and it is difficult to improve students' practical operation ability, and basically can only stay at the level of textbook knowledge. The dominant position of the teacher determines the tone of the classroom, often causing students to lose interest and find the classroom content boring, leading to a situation where they give up learning. The classroom atmosphere mostly depends on the teacher's personality, and what attracts students is mostly the teacher's teaching style rather than the depth and breadth of their professional knowledge. Teachers themselves have very limited resources, and it is difficult for them to obtain more data or case materials from financial institutions or companies. Some teachers stick to the script and have little updates in their classroom design, lack of learning resources, and lack of motivation.

4.2. Strong passivity of students

Students are also important participants in the teaching process and one of the determinants of classroom efficiency. Traditional classrooms have low requirements for students, and students themselves have a strong sense of passivity, relying on the teacher's thinking patterns, and their self-growth is slow. In the process of learning course knowledge, it is difficult for students to improve their innovative ability, understanding ability, and problem-solving ability. Moreover, in the traditional teaching mode, students rarely refute teachers' views and are basically in a situation of full acceptance, and it is difficult for teachers to cultivate students' divergent thinking, which makes some students' questions about professional knowledge after class basically limited to textbook knowledge, and students' ability to combine textbook knowledge with practical application is poor. In class, most students deal with the classroom teacher's questions, do not preview before class, do not review after class, and lack subjective initiative. The communication between students and teachers, and the direct communication between students and students is even less.

4.3. Lack of evaluation feedback and process-based assessment

In traditional classrooms, students have little feedback on the content of the class, mainly concentrated on the process of questioning during or after class. Students evaluate the courses at the end of each semester, but overall, very few students can provide teaching suggestions and evaluation feedback during the semester. Secondly, under the traditional teaching mode, teachers' teaching and students' learning are combined. When the course content is designed theoretically and specialized knowledge points, it is difficult for students to understand, and the process assessment process in the classroom is less. The teaching process is controlled by teachers, who often ignore students' classroom experience for the sake of teaching progress, which makes it difficult to teach students according to their aptitude and ensure the learning effect.

5. Advantages of the blended teaching model

The blended teaching model can be understanded as a combination of traditional teaching and online

teaching [4]. Based on traditional teaching, technology update and digital resource advantages, blended teaching improves teaching quality and promotes teaching reform through mutual assistance of physical teaching and physical classroom. The advantages of implementing blended teaching include the following three points.

5.1. Diversified resources and diverse learning methods

Small Private Online Course (SPOC) platforms based on artificial intelligence can assist teachers in building online resources. As the Massive Open Online Courses (MOOC) online learning is not suitable for all students from different schools, teachers are encouraged to build up their own online courses. SPOC is a newly emerged educational model. The blended teaching model of SPOC with the specialized courses teaching has become a new exploring point.

Students can spontaneously engage in online learning and participate in offline discussions, which is very suitable for implementing flipped classrooms. For example, most financial engineering courses have dispersed knowledge points and abstract theories. Through courses using Python, Stata, etc., students' hands-on ability can be developed and their logical thinking can be expanded. By adding online programming software practice courses to theoretical teaching, students can effectively acquire more skills and adapt to employment demands. Guangzhou City University of Technology has established online course systems for financial engineering, corporate finance, and Chinese tax law at the school level, focusing on students and output-oriented, continuously improving the teaching model.

5.2. Flexible course design with clear course objectives

In blended teaching, teachers need to redesign courses, allocate time for pre-class, in-class, and post-class activities, and make use of resources from platforms such as online classrooms and learning portals. They establish new teaching steps and teaching plans, and emphasize the "student-centered" curriculum objectives, aiming at cultivating virtue and nurturing talents. They set learning and assessment schemes tailored to differentiated and personalized students, and enrich teaching content through methods such as exercises, discussions, voting, case analysis, and online exams. This aims to achieve the goals of moral education, innovation, and enhancing students' problem-solving abilities.

5.3. Innovative assessment methods and enhancement of process-based assessment content

Under blended teaching, teachers need to update the assessment plan, collect online learning records such as students' self-study, discussion, attendance, and homework by using the platform, analyze and use the data, increase the proportion of normal grades, and then make a reasonable evaluation based on the offline exam scores at the end of the semester. This not only emphasizes students' independent learning, enhances students' learning initiative, further increases the proportion of process assessment, and helps teachers to continuously improve the teaching process and improve the teaching quality. The courses of finance majors are closely connected with the real world. Online platforms can be used to assign social research tasks in groups to help students better understand professional knowledge and enhance their understanding of society.

6. Implementation steps of the blended teaching model

Blended teaching has become a new norm, and it should effectively organize offline and online spaces and

resources. It is not simply about transferring offline textbook content to the online platform and repeating the teaching process. The implementation steps of the blended teaching model can be categorized into three stages: pre-class, in-class, and post-class activities.

6.1. Pre-class preparation stage

During the pre-class stage, teachers can utilize online resources to assist students in completing pre-class preparation. The duration of course learning is not limited to in-class hours, and management should also extend to out-of-class hours. Overall, it is important to emphasize the alignment of form and content, select appropriate teaching methods, focus on concepts and applications, and stimulate students' interest in learning. Teachers can introduce introductory videos or diagnostic tests before class, utilize AI-assisted self-learning, and help students familiarize themselves with the key points, difficulties, and learning framework.

6.2. In-class implementation stage

In the implementation stage of the class, teachers can not only give PPT lectures in class but also use online mode to arrange for students to independently learn various case analysis, exercise explanations, and other resources. Students can utilize the platform to ask questions, and teachers can provide timely feedback. The content of both online and offline teaching should not be mere repetition, but rather complementary, with challenging and novel knowledge points. Additionally, teachers should establish a quality baseline to ensure that students meet the minimum requirements, and also provide resources that go beyond expectations.

6.3. Post-class consolidation stage

During the post-class consolidation stage, teachers should track and provide feedback. Teachers can arrange learning activities, ensure a moderate workload for students, and assign post-class assignments, group discussions, group projects, etc., to support student interaction and engagement, emphasizing active learning and the development of higher-order skills [5].

In the overall assessment process, evaluation methods are gradually becoming more diversified and have reasonable assessment criteria, providing a basis for teachers to track students' learning progress. Particularly in offline assessments, attendance should not be included in the grading and should only serve as a record of student participation in class. In online assessments, assignments, reports, and tests are submitted in online formats and assessed through online feedback. Collecting data through information technology helps evaluate students' overall learning outcomes. Online learning duration and records should only be used as reference points in the assessment process and should not be directly considered as assessment criteria.

7. Strategies to strengthen the blended teaching model

In the ever-changing era, "Transformation: A Mindset for Coping with the Complex New World" presents the Malik curve, which highlights the transition between the old and new eras. In the current impact of digital education, transformational change will gradually lead to mediocrity or even disappear if it is not timely. To construct the Malik curve of education, we should do the following four aspects.

7.1. Strengthening cognition

Firstly, in teaching, teachers should reach a consensus on the development of artificial intelligence technology

and the expansion of intelligent education, actively adapting to technological changes. Outdated teaching concepts cannot keep up with the development of the times. Focusing on the goal of improving students' abilities, positioning the ability system, revising the curriculum outline based on the Outcome-Based Education (OBE) concept, and improving the evaluation system for achieving course objectives. The new three centers focus on students, learning, and learning outcomes, shifting the emphasis from traditional teaching, textbooks, and classrooms. The use of blended teaching models provides a better path for innovative teaching reforms, allowing for the inclusion of each teacher's creative thinking, serving teacher development, promoting the deep integration of information technology and teaching, and further enhancing the quality and effectiveness of teaching.

7.2. Optimizing methods

In the context of intelligent education, teachers can leverage knowledge graphs to support teaching reforms and update teaching models, innovating curriculum design methods and strategies. A knowledge graph is a visualization technology that describes knowledge resources and carriers, and enables in-depth exploration, analysis, construction, visualization, and display of knowledge, as shown in **Figure 2**. By extracting knowledge and forming various knowledge relationships, an electronic teaching resource and practice platform can be built to serve student development. Students can flexibly arrange learning content, allocate learning priorities and challenges, expand learning time and space, and have high flexibility and strong personalization. Establishing knowledge point-level online learning using knowledge graphs, tracking students' learning progress through video learning traces, and enabling efficient intelligent retrieval are the trends in online learning development. In this process, key learning points refer to the core concepts and knowledge points that students need to focus on and understand to better grasp and apply what they have learned.

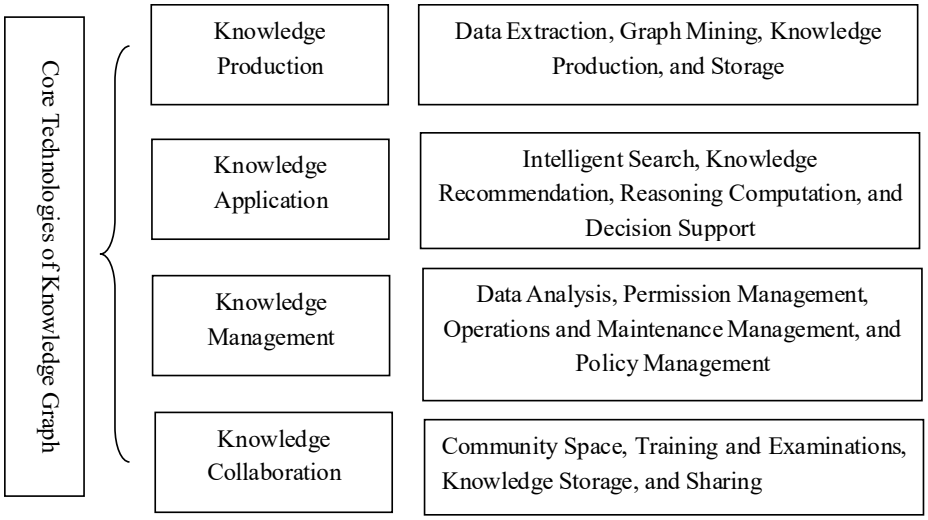

Figure 2. Core technologies of knowledge graph

7.3. Multifaceted practice

Utilizing AI recommendation systems, personalized guidance can be provided to students for offline self-directed learning, completing assignments, and reinforcing knowledge. Updating the teaching syllabus and estimating the time burden of online and offline learning, with a focus on outcome-oriented results, clarifies

the abilities that students can acquire. Insufficient offline time fails to reflect the innovativeness and challenges of the course. Teachers should strive to increase interactive learning by incorporating practice-based teaching, student-led presentations and evaluations, peer assessments, debates, and discussions, as well as expanding learning channels through various resources such as textbooks, course materials, videos, exercises, and discussions. For example, in a Python course, one-third of the class time can be dedicated to whole-class lectures, one-third to in-class exercises, and one-third to in-class experiments, followed by assessments based on different categories (**Table 1**).

Table 1. Hybrid teaching design for Python

	Lecturing	**In-class exercises**	**In-class experiments**
Allocation of class hours	One-third of the total class hours	One-third of the total class hours	One-third of the total class hours
Assessment methods	Written examination	Submit assignments	Submit experimental reports
Teaching methods	Face-to-face teaching	Online self-directed learning	Complete in groups of 5-6 members

7.4. Optimizing platforms

By constructing an AI course resource platform, teachers can address the pain points and challenges of the course and enable both online and offline, in-class and out-of-class, and theoretical and practical teaching. Teachers can compile course resource indexes, recommend resources, cater to small class sizes, ensure rapid updates, and offer high levels of challenge. Implementing a game-based learning approach, intelligent question-and-answer systems, and setting up different difficulty levels can stimulate students' interest in learning. The power of the teaching platform is significant, as it possesses a unified data foundation, a cloud-based data platform, and a governance system for transformative change. The development of online course resources is an ongoing and continuous accumulation process without an endpoint. The construction serves as the foundation, while the application is the key, effectively harnessing the application benefits of course development in serving talent cultivation.

8. Summary

The use of technologies for higher education reforms is not new. The deep integration of artificial intelligence and education has become an inevitable trend, and the reform of the teaching mode is a permanent subject for higher education. By applying the blended teaching model, teachers can improve teaching quality by strengthening cognition, optimizing methods, engaging in multifaceted practice, and optimizing platforms. In the future, artificial intelligence technology will develop rapidly, offering the possibility for teachers to improve teaching methods, reform course assessments, and enhance efficiency. This certainly presents an impressive challenge.

Disclosure statement

The authors declare no conflict of interest.

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