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Practice and Reflection on the Integration of Research Cases into Intelligent Logistics Application Courses

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Abstract: This paper discusses the teaching practice of integrating research cases into intelligent logistics application courses. It describes the facilitating effects on teaching, including providing real cases to enhance the combination of theory and practice, stimulating students' interest and initiative in learning, cultivating innovation and critical thinking, promoting the integration of interdisciplinary knowledge, and enhancing teamwork and communication skills. The actual results achieved, such as improving grades, cultivating students' comprehensive abilities, and creating a first-class programme, are introduced. Meanwhile, the problems in the implementation of the case are analysed, including the need to improve the enthusiasm of students' participation and the limited research resources, and the next planning ideas are put forward, such as strengthening publicity and promotion, setting up an incentive mechanism, strengthening the construction of the research team and deepening the integration of research and teaching.

1. Introduction

In education and teaching, it is of great significance to integrate scientific research cases into course teaching. Intelligent logistics application course actively explores the combination of scientific research cases and teaching, aiming to improve students' learning effect and comprehensive ability. This paper analyses the practice of integrating scientific research cases into the intelligent logistics application course, describes its facilitating effect on teaching, the actual results achieved, and at the same time reflects on the problems existing in the implementation process and puts forward ideas for the next step of planning [1].

2. The Contribution of Research Cases to Teaching and Learning

2.1. Provide Practical Teaching Cases to Enhance the Combination of Theory and Practice

Through scientific research case studies, students can better understand the principles of algorithms and learn how to apply theoretical knowledge to practical problems. For example, the

case of intelligent logistics path planning based on optimisation algorithms can be used by teachers to show students the powerful ability of optimisation algorithms in solving real-world problems and enable students to participate in scientific research. It can help students understand the application of automated driving technology in the logistics industry and the technical principles behind it. At the same time, students can enhance their problem-solving skills by analysing the challenges in system design and implementation [2].

2.2. Stimulate Students' Interest and Initiative in Learning

By participating in the design and realisation of an intelligent warehouse management system, students can feel the charm of technology and stimulate their interest and enthusiasm in the logistics industry. By analysing the case study of logistics forecasting and scheduling, students can gain a deeper understanding of the application prospects of deep learning in the logistics industry and be motivated to further study and explore.

2.3. Cultivating Students' Creative and Critical Thinking Skills

In these scientific research cases, the solution of complex problems and the application of innovative technologies are often involved. By analysing the technical implementations and solutions in the cases, teachers can guide students to think about different solution ideas and methods, and develop their innovative thinking and critical thinking skills. For example, in the case of energy management and optimisation of green intelligent logistics systems, students need to think about how to reduce energy consumption and emissions while meeting logistics needs. This requires them to have critical thinking and be able to consider various factors comprehensively and find the optimal solution [3].

2.4. Promoting the Integration and Application of Interdisciplinary Knowledge

The research cases cover knowledge from a wide range of fields such as optimisation algorithms, autonomous driving technologies, Internet of Things, deep learning and energy management. By studying and analysing these cases, students can better understand the connections and intersections between different disciplines and promote the integration and application of interdisciplinary knowledge. For example, in the case of intelligent logistics unmanned vehicle delivery system, students need to master interdisciplinary knowledge of automatic driving technology, sensor technology, communication technology and other interdisciplinary knowledge, and apply it comprehensively to system design and realization [4].

2.5. Enhance Students' Teamwork and Communication Skills

In the study and practice of research cases, students usually need to form teams to work together. Through teamwork, students can learn how to divide labour, support each other and solve problems together [5]. At the same time, in the process of case analysis and discussion, students also need to communicate and exchange with teachers and classmates to improve their communication skills. For example, in the case of intelligent logistics path planning based on optimisation algorithm, students need to form a team for algorithm design and implementation. Through teamwork and communication, they can work together to solve problems and achieve better results [6].

3. Practical Results Achieved

In the Intelligent Logistics Application Course, the course team actively integrates the results of scientific research projects into the teaching practice, and makes the course content more vivid and practical by introducing scientific research and innovation cases. These cases include both the promotion and application of the basic theories of intelligent logistics, so that students can better understand and master the core principles; they also include the expansion and extension of professional theories and methods, aiming at broadening students' knowledge horizons and stimulating their innovative thinking.

The teaching process of integrating scientific research and innovation cases is presented in the following links in the intelligent logistics application course: firstly, we select scientific research and innovation cases closely related to intelligent logistics as the introduction of the course to stimulate students' interest and curiosity in learning. Then, through in-depth analyses of the cases, we enhance students' understanding of the basic principles of intelligent logistics and their practical application ability. On this basis, the learning tasks are clarified and students are encouraged to further explore the advanced technologies and application methods of intelligent logistics through online independent learning and offline group discussion. In the online independent learning stage, students can selectively learn relevant knowledge points and case studies according to their own foundation and interests, so as to improve the relevance and effectiveness of learning. The offline group discussion provides students with an interactive communication platform, allowing them to deepen their understanding and application of intelligent logistics knowledge in joint discussions. During the whole learning process, teachers will participate in the whole process, answering questions and solving puzzles in a timely manner to ensure that students can master the core knowledge and skills of intelligent logistics in a relaxed and pleasant atmosphere.

Through this teaching method of integrating scientific research and innovation cases, the Intelligent Logistics Application A programme can not only meet the learning needs of students with different bases, allowing them to practice and improve on their original bases; it can also effectively improve the overall learning efficiency and quality of the class. At the same time, this teaching method can also cultivate students' independent learning ability, teamwork ability and innovative thinking ability, laying a solid foundation for their future career development.

Since the blended teaching model incorporating research and innovation cases, the percentage of grades above average has increased significantly and the excellence rate has improved, as shown in Table 1.

Most of the students have a positive attitude towards the blended teaching mode of integrating scientific research and innovation cases, and they generally believe that this mode effectively deepens their understanding of the knowledge points, broadens their knowledge horizons, and stimulates their innovative spirit. Based on this, teachers give full play to the advantages of their own scientific research projects and guide students to actively participate in college students' innovation training programmes, extracurricular scientific and technological activities and various related competitions, so as to promote students' further expansion and deepening of theoretical knowledge. In addition, in order to enhance the comprehensive ability of students, the course team has also included the writing of scientific research papers into the teaching content, and explained in detail the connection between academic research and academic papers, the basic structure of academic papers, as well as the common problems and their causes in the process of writing papers, thus effectively enhancing the students' writing ability, presentation skills, and the ability to analyse and summarize. Students also selected their thesis topics based on the content of this course and teachers' scientific research topics, and two students' thesis topics for the class of 2019 were "Research on Warehouse Multi-Robot Scheduling and Path of D E-commerce Transshipment

Warehouse" and "Optimization Research on Low-Carbon Logistic Distribution Path for Moyo Dairy Industry based on Genetic Algorithm", and three students' thesis topics for the class of 2020 were "Study on Cooperative Optimization of Inventory Position Distribution and Picking Path for Enterprise A based on Genetic Algorithm". The thesis topics of three students of class 2020, "Research on Collaborative Optimisation of Inventory Space Allocation and Picking Path of Enterprise A Based on Genetic Algorithm", "Research on Optimisation of Cold Chain Logistics Path Planning of Huayang Food Enterprise Based on Ant Colony Algorithm", and "Research on Optimisation of Inventory Cost of Huashin Clothing Company Based on Machine Learning", all originate from the scientific research topics related to the course.

Table 1: Distribution of Learning Achievement in Intelligent Logistics Application A, Classes 2017-2020

grade	Talented	favorable	medium	pass a test	fail	passing rate
Property Management 2017	14.65%	50.96%	28.0%	5.73%	0.64 %	99.36%
Class of 2018 Property Management	28.57%	31.68%	20.50%	9.32%	9.94%	90.06%
Physical Engineering 2018	20.93%	30.23%	27.91%	20.93%	0.0%	100%
Property Management 2019	8.79%	56.59%	28.57%	6.04%	0.0%	100%
Physical Engineering 2019	6.9%	41.38%	34.48 %	17.24%	0.0%	100%
Physical Engineering 2020	21.43%	57. 1%	21.43%	0.0%	0.0%	100%
Class of 2020 Property Management	21.57%	45.09 %	26.96 %	5.88 %	0.0%	100%

The course group also transforms the scientific research advantages into characteristic courses, and the "Intelligent Logistics Application A" course was approved as a first-class course in Guangdong Province in 2023. The course absorbs high-quality scientific research results to form a case base for practical teaching in a timely manner, and through the course learning, the students establish a more comprehensive and intuitive understanding of the development of intelligent logistics, its content, methodology, process, problems and cutting-edge trends, and appreciate the importance and value of intelligent logistics in a more practical way. The importance and value of intelligent logistics.

The teaching team of Intelligent Logistics Application Course has successfully extracted a series of representative and inspiring cases of scientific research and innovation on the basis of in-depth excavation and combing of scientific research projects and achievements, which have been cleverly integrated into the blended teaching mode. This initiative not only greatly stimulated students' interest and enthusiasm in learning, but also significantly improved their knowledge comprehension and willingness to participate in class discussions. At the same time, the efficiency and quality of students' learning were also improved in all aspects. Teachers also benefit greatly from the teaching process. Through the introduction of the latest scientific research results, teachers constantly

improve and update their own knowledge system, making the teaching content more cutting-edge and rich. Through the combination of online and offline teaching methods, we will endeavour to enhance students' learning efficiency and practical application ability, and make greater contributions to the cultivation of high-quality talents with innovative spirit and practical ability. The course team will further increase its investment, screen more high-quality and cutting-edge scientific research results as teaching cases, and continuously deepen the integration of scientific research and teaching.

The course team has been committed to integrating its own scientific research results and experience into teaching, in terms of helping students to transform theoretical knowledge into practical applications and cultivating their innovative thinking and problem-solving ability through guiding college students' innovation and entrepreneurship training programme projects. Combined with its own scientific research topics and thesis, it guides students to carry out the specific declaration of various projects, and in the past three years, it has set up one national project, three provincial projects and three school-level projects.

Combined with research in smart city construction and big data application, the project guides students to explore new paths for non-genetic inheritance protection. Through the introduction of digital intelligence technology to achieve digital management and sharing of non-heritage resources, and to promote the deep integration of industry, academia and research, the project was approved as a national innovation and entrepreneurship training programme for university students. Relying on the research results in supply chain management and green logistics, we instruct students to carry out green logistics practice under the circular economy model. By optimising the design of logistics network, reducing transportation costs, improving resource utilisation efficiency, and realising green and sustainable development, the project was approved as a provincial-level innovation and entrepreneurship training programme for university students. Combined with the research in blockchain technology and cultural creative industry, students are instructed to explore the innovative development path of creative IP products in the data environment. By building a blockchain-based cultural and creative IP trading platform, the project ensures the security of intellectual property rights and promotes the prosperous development of cultural and creative industries, which was approved by the Provincial Climbing Plan. Relying on the research results of supply chain optimisation, students are instructed to carry out research on the optimisation of the supply chain of the industrial chain of rural characteristic products. Through the introduction of symbiosis concepts and methods, the project promotes the integrated development of agriculture, industry, service industry and other industries, and enhances the added value and market competitiveness of rural speciality products, which is approved as a provincial climbing programme project. By integrating their own scientific research results and experience into the declaration of students' projects, they can not only provide students with more targeted and effective guidance, but also cultivate their innovative thinking and practical ability. This not only helps students' personal growth and development, but also has a positive significance on promoting the university's research level and talent training quality. At the same time, through the close integration of research and teaching, they can also constantly update their own knowledge system and teaching methods, and improve their own teaching level and research ability.

Students are greatly helped to improve their research level by supervising teachers' research results and participating in teachers' research projects. Based on the teachers' research results, students have published several papers, which can be seen as an all-round promotion effect of research on teaching. These researches not only provide students with the opportunity to explore their professional knowledge in depth, but also help them to combine theory and practice, and cultivate innovative thinking and problem-solving ability. At the same time, these research results also provide valuable cases and materials for teaching, which makes the teaching content closer to

the reality and improves the relevance and effectiveness of teaching. In addition, the potential of students is also very great, the two students under my supervision have published articles in EI conferences, and we have helped them to pass the postgraduate interviews successfully, and the students' response is very good. Therefore, encouraging and supporting students to participate in scientific research activities and integrating scientific research results into teaching is of great significance to improving teaching quality and cultivating innovative talents.

By guiding students to participate in scientific research projects, not only can we stimulate their learning interest and creativity, but also cultivate their practical ability and innovative spirit. In the past three years, the students were led to successfully declare three software copyrights and one utility model patent, which not only highlight the team's scientific research strength, but also inject new vitality and momentum into the teaching work.

Teachers' scientific research results provide students with real and complex problem situations, enabling them to apply what they have learnt in practice and deepen their understanding of theoretical knowledge. At the same time, the process of participating in the project also exercises students' ability of independent thinking, problem solving and teamwork, which are difficult to achieve in classroom teaching. On the one hand, students gain valuable practical experience in the project, which enhances their professional skills and comprehensive quality. On the other hand, the results also provide students with the opportunity to show their talents and enhance their self-confidence and sense of achievement.

4. Problems in the Implementation of the Case of Research for Teaching

4.1. Students' Motivation to Participate In Research Projects Needs to Be Improved

Research projects often require students to focus on a specific research topic for an extended period of time, which undoubtedly increases the burden of time and energy on students. Particularly in the current educational environment, students are under pressure from a variety of sources, including academic performance, extracurricular activities, and future career planning, which may diminish their motivation to participate in research projects. They may be more inclined to invest their energy in other activities that they consider more valuable or urgent, thus neglecting the importance of research activities for their personal growth and future development.

4.2. The Limited Nature of Research Resources

In practice, due to restricted faculty members in the project team and financial constraints, research resources are often difficult to meet the needs of the project, which in turn affects the output and quality of the research results. This not only affects the quality and progress of research projects, but also limits the opportunities and depth of students' participation in research activities. As the research output is not particularly outstanding, project teams may also face greater difficulties in securing support from external resources, further exacerbating the problem of resource shortage.

5. Ideas for Next Steps in Planning Research for Teaching

A series of measures can be taken in order to increase students' motivation to participate in scientific research programmes. Firstly, strengthen the publicity and promotion of students' scientific research activities, and make use of classes, lectures and other forms to let them understand the value and significance of scientific research activities. Secondly, set up a reward mechanism for scientific research projects, use scientific research funds to commend and reward

students with excellent performance in scientific research projects, motivate them to participate in scientific research projects more actively, and continue to help students publish papers and apply for patents for free. In addition, more opportunities and platforms for scientific research practice can be provided so that students can exercise their abilities and skills in practice and increase their confidence and interest in participating in scientific research projects.

The research team is the key to the successful implementation of research projects. Therefore, the construction and management of scientific research teams need to be strengthened. Firstly, teachers with rich experience and research ability are selected to serve as project instructors to improve the quality and level of the project. Secondly, the collaboration and communication among team members should be strengthened to form a good research atmosphere and cooperative spirit. In addition, external excellent talents and resources can be actively introduced to enhance the overall strength and research level of the team.

In order to further strengthen the degree of integration of scientific research cases in teaching, it is necessary to further deepen the integration of scientific research and teaching, and explore more effective integration paths. By organising more scientific research projects into the classroom and inviting scientific research experts to give lectures, students can have a more intuitive understanding of the process and results of scientific research, so as to stimulate their interest and enthusiasm for participation.

6. Conclusion

The integration of scientific research cases into the intelligent logistics application course has achieved remarkable results, and has contributed to teaching in many ways, including enhancing the integration of theory and practice, stimulating students' interest, cultivating their thinking ability, facilitating interdisciplinary integration, and improving their teamwork ability. At the same time, it also faces the problems of low motivation of students' participation and limited research resources. In the future, the quality of teaching should be further improved by strengthening publicity and promotion, setting up reward mechanisms, building research teams and deepening the integration of research and teaching, so as to cultivate high-quality talents with innovative spirit and practical ability.

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