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Research on the Construction of Blended Courses in Labor Economics Empowered by Knowledge Graphs

Renren Li*

Guangzhou Software Institute, Guangzhou 510980, Guangdong, China

***Corresponding author:** *Renren Li, lirenren2022@163.com*

Abstract: The deep integration of digital technology and education is an important trend in current higher education reform. Knowledge graph, as an emerging technology, plays a significant role in promoting the quality of curriculum construction and improving teaching effectiveness. There are pain points in the traditional teaching of labor economics courses, such as the lack of hierarchical course objectives, traditional course content design, flat course resource construction, and single course evaluation feedback. Based on this, this article uses knowledge graphs to explore the path of mixed course construction in labor economics, and proposes countermeasures to solve the pain points by redesigning course structure and content, integrating related teaching resources, using graphs to assist mixed teaching, and multi-dimensional graph evaluation, in order to enhance students' higher-order thinking ability, life growth experience, personalized learning needs satisfaction, and comprehensive literacy evaluation effectiveness.

Keywords: Knowledge graph; Labor economics; Blended curriculum construction

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1. Introduction

The development of artificial intelligence technology has injected new momentum into the high-quality development of higher education teaching. The report "Infinite Possibilities - Digital Development of World Higher Education," released by the Ministry of Education in 2022, points out that digitalization of higher education has become an inevitable trend in the development of world higher education [1]. Knowledge graph, as an emerging artificial intelligence technology, has significant advantages in presenting knowledge in a graphical manner, integrating related multi-source data, achieving precise learning resource push, assisting smart teaching, and improving adaptive learning effects, and is gradually being applied in the field of education. This article aims to apply knowledge graph technology to the construction of mixed courses in labor economics for human resource management majors. By analyzing the pain points highlighted in the current teaching status of labor economics, it explores the construction of course knowledge graphs and how graphs will empower

the construction of mixed courses, providing new ideas for solving course pain points and achieving digital transformation of courses.

2. The current situation and pain points of labor economics course teaching

2.1. The course objectives lack hierarchy, and the training of students' higher-order thinking abilities is insufficient

The current objectives of labor economics courses are determined based on the combination of professional talent training programs and job requirements, divided into knowledge objectives, skill objectives, and literacy objectives. However, these three levels of objectives are usually set to enable students to master basic concepts, theories, models, and their simple applications, lacking a hierarchical division from low to high levels, and neglecting the training of students' higher-order thinking abilities. Advanced thinking ability is an important skill for future students to cope with uncertainty and solve complex problems in their work and life. Including dialectical thinking, critical thinking, creative thinking, and the ability to solve complex problems. The classroom teaching of labor economics, which is dominated by knowledge transmission, has led to a lack of initiative and creativity among students in the learning process, and the ability to apply what they have learned to solve practical problems has not been exercised.

2.2. The course content design is traditional, and students' sense of life growth experience is not strong

The structure of the labor economics course is organized according to the traditional theoretical framework. Although the system is complete, the logical coherence between chapters is insufficient, and the content design is biased towards theory, lacking a connection with modern society and students' actual lives. There is also a lack of attention and guidance on students' life growth experiences, which makes it difficult for students to integrate the knowledge they have learned with social reality and personal growth. The lack of learning motivation and interest also limits the cultivation of students' innovative thinking and comprehensive qualities.

2.3. Flattening of course resource construction and low satisfaction of students' personalized learning needs

The construction of labor economics course resources lacks diversity, personalization, and digital features. At present, course resources mainly include textbooks, courseware, case studies, and exercises, but lack expansion resources that reflect new trends in the labor market, industry development trends, workplace hotspots, and new achievements in disciplines. In addition, online learning platforms lack digital transformation, making it difficult for students to easily access the necessary resources. The personalized learning needs of students have not been met, which also limits the exercise of students' self-learning and lifelong learning abilities.

2.4. The feedback on course evaluation is singular, and the effectiveness of students' comprehensive literacy evaluation is insufficient

The evaluation feedback of labor economics courses mainly relies on quantitative evaluation methods such as final exams and regular grades. This evaluation method lacks the collection of data on the entire learning process of students, and cannot form a detailed record of learning trajectories, making it difficult to comprehensively reflect students' learning outcomes and ability levels. At the same time, the single evaluation feedback also limits

students' opportunities for self-reflection and improvement, which is not conducive to the improvement and development of students' comprehensive literacy.

3. Construction of knowledge graph for labor economics course

3.1. Overview of knowledge graph

Knowledge graph is a structured knowledge representation method that represents information such as entities, concepts, and relationships in the form of nodes, edges, and attributes. This concept was officially proposed by Google in 2012 and has since been widely applied in various fields. Its application in the field of education has become an emerging technology for deepening educational reform in recent years. Knowledge graphs have the characteristics of visualization, intelligence, and semantics, and can support various applications such as knowledge retrieval, intelligent question answering, and recommendation systems. According to different application scenarios and construction goals, knowledge graphs can be divided into general knowledge graphs based on common sense knowledge and domain knowledge graphs based on professional knowledge. The former has the characteristics of large scale, wide coverage, and low accuracy, mainly used in search engines and intelligent question answering, while the latter focuses on specific fields. Compared with general knowledge graphs, its scale is smaller, but its depth and accuracy are higher, usually used for professional question answering and decision support. In terms of construction steps, the knowledge graph consists of knowledge point sorting, knowledge graph import, knowledge graph association, and knowledge graph application.

Taking the C++ programming course as an example, Xiao et al. [2] determined the course knowledge structure based on training plans, course outlines, teaching materials, and lesson plans. Then, according to the process of constructing the knowledge graph ontology, they determined the course objectives, scope, defined knowledge, and their relationships for storage and visualization, and constructed a course knowledge graph that is rich in content, searchable, and upgradable. Tu et al.[3], based on the concept of knowledge graph, have improved the course knowledge network structure from three dimensions: knowledge, problems, and abilities, and preliminarily explored a new model for the construction of biomedical electronics online courses; Taking the C language programming course as an example, He et al. [4] analyzed the pain points of course teaching, combined with the learning situation, and carried out a "one body, two wings" modular teaching practice based on knowledge graph reconstruction with students as the center. Wang [5] takes the construction of digital resources in management accounting as the research object, and uses knowledge graphs to construct high-quality courses. She designs the application path of knowledge graphs from the scenarios of goal setting, content reconstruction, model updating, evaluation profiling, and diagnostic improvement in digital resource construction, and summarizes and promotes the application effect based on evidence.

This article explores the construction of a blended course in labor economics based on knowledge graphs, aiming to form a visual and three-dimensional curriculum knowledge system and teaching resources. By using knowledge graphs to promote blended online and offline teaching, the teaching mode can be transformed, teaching methods can be innovated, and teaching evaluation efficiency can be improved, thereby enhancing the overall quality of intelligent curriculum construction.

3.2. Construction of knowledge graph in labor economics

Why was the knowledge graph of labor economics built, how was it built, and what functions will it play after completion? The exploration of these issues should always revolve around how to achieve the teaching objectives

of the course. In the context of the new liberal arts, labor economics focuses on cultivating future-oriented talents with strong abilities, good thinking, and high literacy. According to Bloom's classification goal theory, memorization and understanding are low-level cognitive goals that focus only on helping students achieve the level of memorizing basic concepts and theories of the course and being able to understand them. To cultivate new high-quality talents with high-level thinking abilities, the focus should be on deep-level high-level goals such as application, analysis, evaluation, and creation. In view of this, labor economics intends to establish curriculum teaching goals from the three dimensions of "quality, ability knowledge," so that they meet the requirements of job abilities and professional talent training goals. The construction of a knowledge graph should be conducive to achieving the teaching objectives of the course. The construction process of the knowledge graph of labor economics is shown in **Figure 1**.

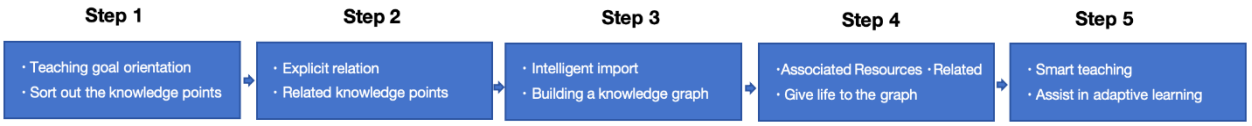

Figure 1. Process of constructing a course knowledge graph.

Among them, the first step to the third step is the preliminary preparation and introduction of the creation of the knowledge map of labor economics courses. Guided by the teaching objectives of the courses, teachers comprehensively sort out and extract knowledge points, clarify their interrelationships, and associate the knowledge points of the courses, interdisciplinary knowledge points and expanded knowledge points to form the "skeleton" of the knowledge map, so that the knowledge system of the courses becomes a visual and three-dimensional framework. The fourth step is to use artificial intelligence technology to link the curriculum resources (courseware, videos, cases, exercises, literature, textbooks, etc.) with knowledge points, endow the map with "flesh and blood," and build an intelligent learning platform for labor economics courses. Later, journals, information hotspots, books, and other expanded resources and knowledge on the Internet can be further expanded points. It should be noted that teaching resources are the "meat" of the knowledge graph, and their quality directly affects the adaptive learning effect of students. The construction quality of teaching resources must be ensured. The knowledge graph of the labor economics course and its related resources are shown in **Figure 2**.

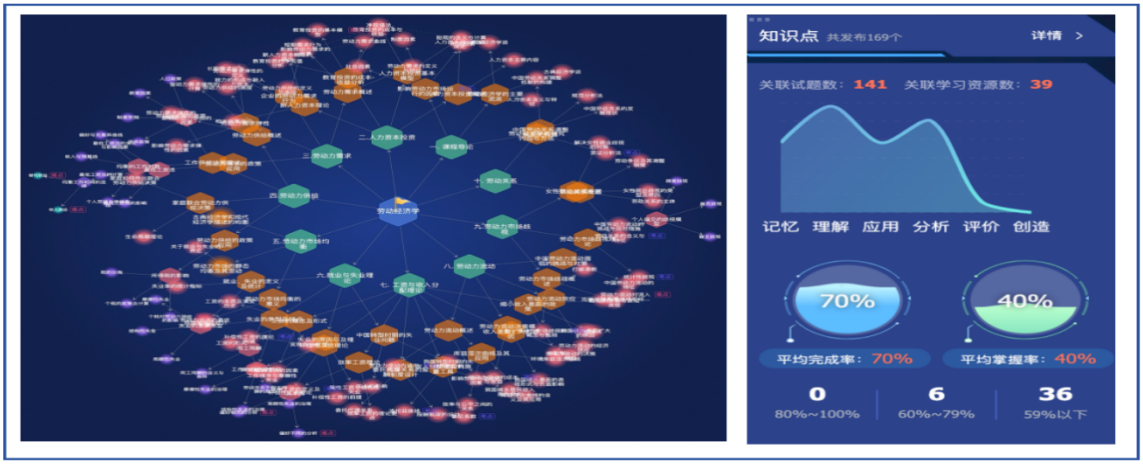

Figure 2. Curriculum knowledge graph and its associated resources.

3.3. Thoughts on the construction of a hybrid course in labor economics based on knowledge graph

3.3.1. Reset the course structure content and construct a course knowledge graph

According to the talent training plan for human resource management, clarify the courses of labor economics, pilot courses, and post courses. The relationship between curriculum design and interdisciplinary courses. Centered around students, with their life growth and career development as the main thread, guided by job demands, and aiming to cultivate new quality talents with strong abilities, good thinking, and high literacy in the era of digitalization, the course content is reconstructed according to the concept of large units and concepts. The specific approach is as follows: break the traditional content arrangement in textbooks that focuses on the behavior of both the supply and demand sides in the labor market, the operation of the labor market, and its institutional construction. Guided by Schubert's career development theory, students' life growth and career development are divided into five stages, and the development focus of each stage is clearly defined, including the growth period (0–19 years old), which mainly pursues physical and mental growth, explores interests, develops abilities, and perceives careers; Exploration period (20–24 years old), with a focus on acquiring professional knowledge and skills and conducting career exploration planning; During the establishment period (25–44 years old), choose and develop a career, and seek a balance between work and life; During the maintenance period (45–64 years old), develop new skills, deeply cultivate the profession, and condense professional achievements; During the decline period (age 65 and above), adjust your mindset to adapt to retirement and strive to develop non professional roles. On this basis, key teaching questions are determined based on the development priorities of each stage, and the core teaching content is matched with problem orientation. For example, in the growth stage, two key questions are set, one is how to correctly invest in human capital? The corresponding chapter is on human capital investment; In the era of intelligence, will companies completely replace human labor with machines? The matching is the chapter on labor demand, and so on, to complete the arrangement of the ten core courses of labor economics. Finally, the ten core contents of the course are summarized into three concepts according to their nature and characteristics, forming three major units of the course, including labor market element units (human capital investment, labor demand, labor supply), labor market operation and its policy system (labor market equilibrium, employment and unemployment theory, wage theory, income distribution, labor mobility, labor market discrimination), and labor relations processing (labor relations). After completing the reconstruction of teaching content, the three-dimensional objectives of "knowledge, ability, and literacy" of the course are determined based on the course syllabus and textbooks. The core concepts, theories, and models of labor economics are integrated, and the attributes, correlations, and key and difficult points of knowledge are marked. On this basis, the course's ideological and political points, interdisciplinary knowledge points, skill improvement points, etc. are further integrated to construct a course knowledge graph, which displays the theoretical knowledge system and enables students to have a comprehensive, systematic, and logical grasp of the course content.

3.3.2. Integrate and link multidimensional resources to achieve precise push of learning resources

In the constructed knowledge graph, multi-dimensional teaching resources (including foundational resources such as courses) are integrated. Items, videos, cases, literature, exercises, workplace knowledge, etc. are placed into knowledge points and organized in the form of network diagrams to form three-dimensional teaching resources. By utilizing knowledge graph technology, students can obtain accurate resource push based on their personalized

learning needs, and trace the source in a network structure to enhance their understanding and mastery of knowledge. In addition, knowledge graph technology can automatically associate expandable resources such as e-books, online journals, and information hotspots, achieve dynamic updates, and provide students with rich, intelligent, and convenient learning resources for personalized inquiry learning.

3.3.3. Knowledge graph supports blended learning and enhances adaptive learning effectiveness

The Labor Economics course relies on the Chaoxing Learning Platform and adopts the PBL+BOPPPS model for online implementation. Offline blended learning. In the pre-class stage, students mainly engage in online self-learning. Guided by the problems or situations in this chapter, students complete self-directed learning through activities such as publishing topics, participating in discussions, and conducting pre-class self-tests. Their learning data will be fully and tracked and recorded by knowledge graph technology, forming a learning trajectory. By analyzing the real learning situation, teachers can obtain the mastery rate of each knowledge point and develop targeted teaching strategies in advance. In the classroom, the teacher first explains and guides students on their weak points of knowledge. Based on this, teaching activities are carried out to train students' higher-order thinking abilities, guiding them to conduct in-depth exploratory learning in teams, and cultivating their ability to apply theory to solve complex problems. After class, focus on results results-oriented approach, guide students to apply knowledge through precise testing and practical projects, and enhance their ability to apply and transfer knowledge. Taking the chapter on human capital investment as an example, after students completed online self-study before class, the learning data formed by the knowledge graph showed that students did not have enough understanding and mastery of the structural changes in human capital demand in the digital economy environment. In response to this weakness, the teacher emphasized this knowledge point in class and conducted a high-level thinking ability training and exploration activity, "Human Capital Investment Strategy Simulation Decision." Students were required to divide into groups to play the role of human resource management directors of different industry enterprises, think about how to formulate a human capital investment plan for the next 3 years under the budget constraint of 5 million yuan under the challenge of digital transformation, and defend the plan at the board meeting. Around the task, the group conducted in-depth discussions to form preliminary ideas, and after class, the members further implemented the plan. Through practical training, students' theoretical mastery and decision-making ability in complex situations have been improved, while their data analysis and teamwork skills have also been significantly enhanced, and their ability to solve complex real-world problems has steadily improved. Overall, through blended learning based on knowledge graphs, students can have a clear understanding of their level of achievement in professional ethics, knowledge learning, and mastery of professional skills, stimulate their interest and confidence in learning, and engage in adaptive learning based on personalized learning paths generated by graphs. They can also use knowledge graph technology to search and obtain relevant resources, thereby improving learning efficiency and effectiveness.

3.4. Multi-dimensional evaluation of courses, detailed chemical situation diagnosis and rectification

The reform and innovation of educational and teaching evaluation required in the era of digitization mainly manifest in process evaluation, value-added evaluation, and comprehensive evaluation. By analyzing the learning trajectory, knowledge mastery level, teaching evaluation results, and emotional interaction characteristics collected by knowledge graph technology, a multidimensional graph model can be formed to provide more scientific methods and support for digital transformation, such as education evaluation and rectification [6]. The

Labor Economics course adopts a multidimensional evaluation method, and students' comprehensive grades are calculated by weighting their regular grades (accounting for 60%) and final exam grades (accounting for 40%). The evaluation of grades focuses on the evaluation of students' learning process, ability, and literacy, and the achievement of course objectives. Among them, the regular grades cover three stages before, during, and after class. Before class, a comprehensive evaluation of students' online self-learning activities, including previewing, pre-test, and discussion activities, is mainly conducted; In class activities focus on evaluating students' collaborative exploration, including answering questions in class and completing team tasks such as theme presentations, situational simulations, case studies, debates, and speeches; After class, students' knowledge application and completion of challenging tasks are evaluated through exercise quizzes and practical projects. The final exam tends to focus on subjective questions related to hot topics in the labor market and workplace issues, comprehensively evaluating students' ability to apply theoretical knowledge to solve complex real-world problems. The application of curriculum knowledge graph technology breaks the traditional evaluation mode of single dimension in teaching. Through a visualized multi-dimensional evaluation system, students' knowledge, emotions, attitudes, thinking, and behavior data throughout the entire process can be clearly presented. On the one hand, it is beneficial for students to understand their real learning situation, so as to plan learning paths accordingly. On the other hand, it can also allow teachers to evaluate students' efforts, learning performance, etc. from a developmental perspective, timely identify problems, adjust and optimize teaching plans, and promote the improvement of teaching quality.

4. Conclusion

In the era of digitization, knowledge graph technology has become a new engine for innovation in higher education teaching. The concept of graph, centered on students and starting from the cultivation of new quality talents, explores new ideas for the construction of labor economics courses from the aspects of restructuring curriculum structure, integrating teaching resources, implementing blended learning, and multidimensional evaluation. It conforms to the trend of open, personalized, and precise smart education and has practical significance. However, it is worth noting that as the leaders of education and teaching, teachers should not only enjoy the benefits of technology-empowered education but also have a correct understanding of the relationship between technology and education. They should not be satisfied with the simple embellishment of technology on education, but should deeply recognize that human development needs are the intersection and integration point of technological development and educational reform. Therefore, from this perspective, teachers should grasp the following aspects to better achieve the two-way empowerment of technology and education: Firstly, teachers should always adhere to the student-centered concept, follow the basic teaching values of "paying attention to students' growth, exploring and enhancing their life value," and avoid excessive reliance on technological means, which leads to the situation of "only technology in their eyes, no one"; Secondly, teachers should keep pace with the times and comprehensively consolidate the basic skills of digital teaching, including the ability to design blended learning environments (including online course construction, learning platform use, etc.), the ability to design blended learning environments, the ability to organize deep learning in the classroom, the ability to personalize teaching, and the ability to reflect on teaching evaluation. They should fully utilize technological advantages to empower the entire teaching process and focus on improving teaching effectiveness; Finally, teachers should enhance their awareness and ability to connect with society, take participation in social practice as an important extension and supplement of classroom teaching, discover new opportunities and

topics for educational reform through strengthening the integration of industry and education, school enterprise collaboration, and other models, and effectively integrate the reform results into daily teaching to improve teaching level and talent cultivation quality.

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Reference

[1] Wu Y, 2023, Creating a Leading Indicator for the Digital Development of Higher Education in the World – Preface to "Infinite Possibilities: Report on the Digital Development of Higher Education in the World." China Education Informatization, 2023(1): 3–4.

[2] Xiao M, Su L, Jiang J, 2022, Construction of Knowledge System for C++ Programming Course Based on Knowledge Graph. Educational Observation, 2022(10): 68–71.

[3] Tu H, Wang X, Cha Y, et al., 2023, Preliminary Exploration of Online Course Construction in Biomedical Electronics Based on Knowledge Graph Concept. Health Vocational Education, 2023(10): 19–22.

[4] He K, Chen Z, Kong W, et al., 2024, Modular Teaching Practice of "One Body, Two Wings" Based on Knowledge Graph Reconstruction. Software Guide, 2024(23): 215–220.

[5] Wang M, 2024, Research on the Digital Resource Construction of Vocational Management Accounting Curriculum Empowered by Knowledge Graph. China Management Informatization, 2024(10): 81–84.

[6] Li Z, Zhou D, 2022, Intelligent Cognitive Diagnosis and Evaluation Method Based on Disciplinary Knowledge Graph. Modern Educational Technology, 2022(11): 118–126.