

# Group Cooperative Teaching Design With Knowledge Graphs in Project-Driven Learning

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## ABSTRACT

Using the educational knowledge graph to express the logical characteristics of knowledge, this paper takes project-driven learning in the teaching of “Information Technology in Secondary Schools” as an example and studies the group cooperative teaching mode based on the educational knowledge graph. The relationship between knowledge points in subject courses is described in the form of a knowledge graph, and the learning activities of coordinating the cooperation of each group are completed through the integration process of the knowledge graph. The use of a group cooperation teaching mode in the classroom can not only build a collaborative knowledge system between teachers and students but also help to carry out project-driven learning. The application of the knowledge graph of “Information Technology in Middle School” in the classroom can better show the logic between knowledge, and its graphical structure can help students to structure the knowledge they have learned.

## KEYWORDS

Group Work, Knowledge Graph, Middle School Information Technology, Project-Driven

## INTRODUCTION

The development of information technology has brought great convenience to life. In terms of education, the integration of education and information technology can stimulate student learning motivation and guide students to study independently. There have been many applications based on knowledge graphs in the general domain, but in terms of education, there are fewer applications. The “New Generation Artificial Intelligence Development Plan” clearly states that it is necessary to study knowledge graph construction technology, focus on educational knowledge graphs, and give full play to the advantages of knowledge graphs in teaching (State Council.,2017). The use of knowledge graphs in education can

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effectively establish connections between knowledge points, thereby forming structured knowledge and establishing a complete knowledge system (Chen et al., 2018). As an important part of the new generation of intelligent education, knowledge graphs can not only stimulate self-learning motivation but also provide educational services for visualizing the relationship between knowledge concepts (A. Li et al., 2020), which facilitates teachers in carrying out project-driven learning group cooperation modes. At present, most information technology education relies on teachers to conduct classroom lectures. In this case, by using the logical characteristics of the educational knowledge graph, students are further guided to structure the knowledge system, and through the knowledge graph, a group cooperative teaching mode of project-driven learning can be carried out, which can actively guide students to conduct cooperative learning. A graph can improve the dull phenomenon of students in the classroom, create a warm learning atmosphere for students to learn, and improve the scientific and rational aspects of teaching. By investigating the application of knowledge graphs in teaching with information technology in middle school, the application of knowledge graphs can assist teachers in comprehensively understanding the process of students' cognitive development and tacit knowledge learning through group meaning wisdom. Carrying out group cooperation learning activity classes and guiding students to carry out project-driven learning can stimulate autonomous learning motivation, improve the knowledge acquisition rate, increase communication and interaction, enhance students' sense of participation in the learning process, and promote the improvement of learning quality.

## RELATED WORK

### Educational Knowledge Graphs

An *educational knowledge graph* is a knowledge base composed of nodes and their relationships, in which nodes represent knowledge points or teaching resources related to knowledge points (Li, 2020). Also known as a *subject knowledge graph*, it can help students and teachers understand subject development and basic knowledge and combine the implicit semantic information in a knowledge graph to promote the efficient use of subject knowledge. At present, some researchers have carried out related research on educational knowledge graphs. Li Zhen et al. (2019) analyzed the connotation of educational knowledge graphs from different perspectives, proposed the classification and construction technology of educational knowledge graphs, and expounded the application prospect of educational knowledge graphs from the aspects of educational big data intelligent processing, educational resource aggregation, and teaching implementation. Hou Xia et al. (2019) proposed an online teaching resource construction model based on the knowledge graph and the collaborative open online course (COOC) as the object. Su Xiang (2019) proposed the knowledge graph construction process and semantic retrieval of the course.

Currently, an increasing number of scholars at home and abroad have begun to focus on the research and construction of high-quality, large-scale knowledge graphs. At present, many large-scale, open, and shared knowledge graphs have been constructed at home and abroad, among which the most representative ones are Word Net (Fellbaum, 1998), Freebase (Bollacker et al., 2008), DBpedia (Auer et al., 2007), Zhishi.me (Niu et al., 2011), and so on. The introduction of knowledge graph technology into the field of education is helpful for the visualization, acquisition, and retrieval of knowledge (Hu et al., 2016), and it can also effectively promote the personalization and precision of teaching work. Therefore, education experts and scholars have begun to pay close attention to the research of knowledge graphs in education.

In foreign countries, Wolfram Research has built Wolfram Alpha, a knowledge base engine for intelligent knowledge retrieval, which supports knowledge query and calculation in multiple fields (Chechelnytsky, 2012). Hall (1996) introduced a knowledge graph as a teaching aid in teaching and found that a knowledge graph can effectively improve learning efficiency. Domestically, the Knowledge Engineering Research Office of Tsinghua University has built eduKG, a knowledge graph of basic education with wide coverage. The knowledge graph covers the knowledge points of nine courses in the basic education

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