

# Research on Interdisciplinary Project-Based Teaching in Primary Schools Catalyzed by Digital Intelligence Empowerment

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**Abstract:** With the rapid development of information technology, digital intelligence empowerment has gradually become an important direction of educational innovation. This paper uses the case analysis method to explore in depth how digital intelligence empowerment and project-based teaching can promote the integration of primary school curricula. Taking the teaching of intelligent patrol cars as an example, this paper analyses the positive role of digital intelligence empowerment in improving teaching effectiveness and cultivating students' comprehensive ability. The research results show that digital intelligence empowerment not only enriches teaching resources but also optimizes the teaching process. Combined with project-based teaching methods, it can effectively improve students' interest in learning and performance. This study provides a useful reference and inspiration for the project-based teaching of curriculum integration in primary schools and has certain practical significance and theoretical value for promoting the process of educational informatization.

**Keywords:** Digital intelligence empowerment; Curriculum integration; Project-based; Intelligent patrol car

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## 1. Introduction

With the rapid development of information technology and the digital transformation in the field of education, digital intelligence empowerment has become a new engine for the reform of primary education and teaching <sup>[1]</sup>. Digital intelligence empowerment refers to improving the level of intelligence, personalization, and precision of education through information technology, so as to realize the optimal allocation of educational resources and the improvement of educational quality. Under the catalysis of mathematical intelligence empowerment, the project-based teaching of primary school curriculum integration came into being <sup>[2]</sup>. It aims to break the barriers of disciplines, integrate curriculum resources, take projects as the carrier, guide students to actively explore and cooperate in learning, and cultivate their innovative thinking and practical skills <sup>[3]</sup>. The purpose of this study is to explore the effective strategies and methods of project-based teaching in primary school curriculum integration catalyzed by mathematical intelligence.

## 2. Digital intelligence enabling curriculum integration

### 2.1. Integration of digital intelligence technology and curriculum teaching

Digital intelligence technology provides more possibilities and means for curriculum teaching. For example, in primary school mathematics teaching, mathematical intelligence technology can be used to preview before class, and students can understand the knowledge points of this class in fragmented time through micro-courses and other forms. In classroom teaching, multimedia resources, interactive teaching software, and other tools can be used to assist teaching and explanation, so as to improve students' interest and participation in learning. At the same time, digital intelligence technology can also be used for after-school expansion to provide students with rich learning resources and practical opportunities.

### 2.2. Integration of digital intelligence-enabled curriculum resources

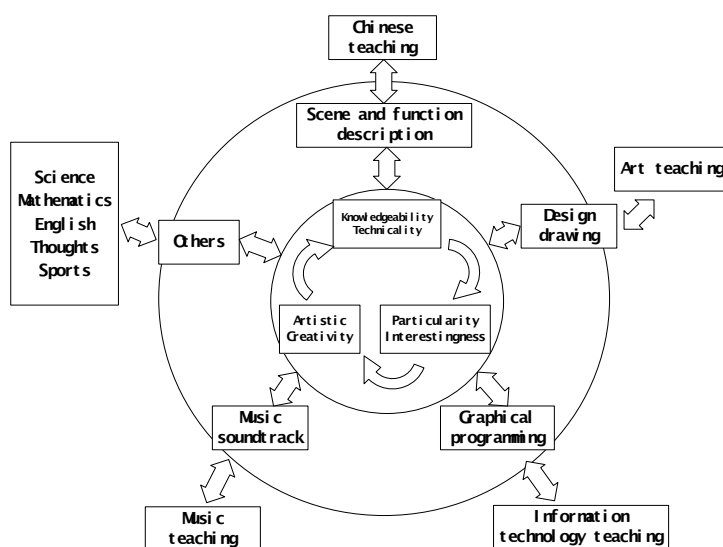
The integration of digital intelligence empowerment courses requires the integration of various teaching resources, including teaching materials, teaching aids, network resources, etc. In the process of teaching, teachers should make full use of these resources to provide students with rich learning materials and practical opportunities. At the same time, teachers can also communicate and cooperate with other teachers to jointly develop curriculum resources for digital intelligence empowerment and improve teaching effectiveness.

### 2.3. Integration strategies and methods

The establishment of a digital teaching resource library, with all kinds of digital teaching resources for centralized management, is convenient for teachers to search and use. The introduction of intelligent teaching aids, such as intelligent teaching platforms, online learning systems, etc., helps teachers better organize and manage teaching activities and improve teaching effectiveness. It is important to strengthen the integration of interdisciplinary resources, integrate the resources of different disciplines, and provide students with a comprehensive learning experience.

## 3. Project-based teaching framework

The project-based teaching framework can provide students with a more practical and innovative learning environment, and cultivate their practical skills and innovative spirit. The framework is shown in **Figure 1**.



**Figure 1.** Project-based multidisciplinary integrated teaching framework

### **3.1. Project-based teaching design**

#### **3.1.1. Goal setting**

In project-based teaching, we must first clearly set the project objectives. Students' education focuses on the cultivation of comprehensive quality. By focusing on the guiding ideology of "knowledge and technology," "artistry and creativity," and "particularity and interest," project objectives with clarity, feasibility, and practical significance are designed to guide students' learning and exploration in the project process. When setting goals, it is necessary to consider the acceptance ability of primary school students, existing knowledge level, skill development, and subject requirements.

#### **3.1.2. Teaching content design**

Teaching content design is the core of project-based teaching. The teaching content should be closely centered on the project objectives, and reflect the basic knowledge, principles, and methods of the subject. The design should consider the systematicity, coherence, and practicality of the teaching content to ensure that students can truly learn knowledge and skills in the process of completing the project.

#### **3.1.3. Resource integration**

Project implementation needs to make full use of various resources, such as books, networks, laboratories, and so on. Teachers need to integrate and optimize these resources to provide sufficient resource support for students. At the same time, it is also necessary to encourage students to find and use resources independently and cultivate their independent learning and innovation abilities.

### **3.2. Project-based discipline integration**

#### **3.2.1. Integration of language**

As a humanities and social subject, Chinese subject has profound historical and cultural background and wide practical application. The study of the Chinese subject involves not only the study of text knowledge but also the inheritance and innovation of Chinese excellent traditional culture<sup>[4]</sup>. The characteristics of the Chinese subject lie in its profound cultural background, extensive realistic connection, and rich emotional experience. Primary school Chinese mainly involves learning Chinese characters, basic words and sentences, short argumentative essays, and expository texts. The project is closely related to the Chinese subject, including the project introduction and the scene description of the project.

#### **3.2.2. Integration of art**

The integration of project-based and art courses helps to improve students' art skills, creativity, and aesthetic ability. Through project-based learning, students can integrate and apply knowledge of multiple disciplines in the process of completing an actual project<sup>[5]</sup>. For example, in the history project and the process of learning history, students can make artwork about a certain historical period, which can not only make them understand history deeply but also improve their art skills.

#### **3.2.3. Integration of information technology**

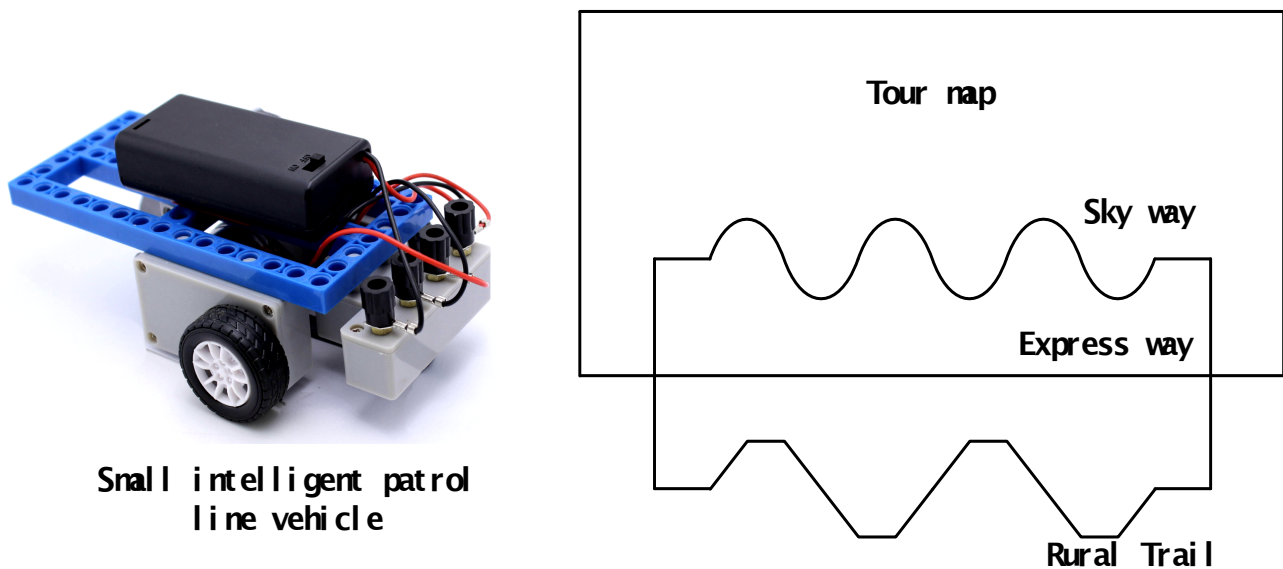
In the process of project design and implementation, the knowledge and skills of information science should be integrated. For example, students can be required to use a graphical programming language to implement a function or use data analysis techniques to solve practical problems. In this way, students can learn and apply the knowledge of information science in practice.

### 3.2.4. Integration of other courses

Project-based teaching can also integrate mathematics, science, English, and other courses, and can design a comprehensive project that can cover the knowledge of multiple courses. Such projects can involve multiple disciplines, giving students the opportunity to integrate the knowledge and skills of different courses to form an interdisciplinary comprehensive ability.

## 4. Intelligent patrol car integrated teaching design

Taking the intelligent patrol car project as an example, this paper designs an integrated teaching scheme integrating Chinese, art, information technology, and other courses to realize a project-based integration model. The intelligent patrol car project includes car function and scene description, car structure drawing, car assembly, car graphical programming, car photoelectric sensor debugging, creative patrol map design, etc. The car and the reference map are shown in **Figure 2**.



**Figure 2.** Intelligent patrol car and reference map

The intelligent patrol car integrates knowledge, technology, art, creativity, particularity, and interest. The following analyzes the integration teaching of intelligent patrol cars and various disciplines.

### 4.1. Discipline integration

#### 4.1.1. Integration of Chinese teaching

The first step of project development is the definition of requirements and scene description. First, the intelligent patrol car display video is uploaded on the digital intelligence teaching platform, so that students can complete the writing of the functional points of the intelligent patrol car and the scene description by watching the video. By writing the requirement definition and scene description of the intelligent patrol car, the students' ability of language organization and expository writing is trained, and their writing thinking is broadened.

#### 4.1.2. Integration of art teaching

Art is the most creative course, which can stimulate students' abstract thinking and realistic thinking. After completing the requirement definition and scene description, the intelligent patrol car will draw the intelligent patrol car. According to the image of the car in the video, combined with their own imagination, students draw

their designed intelligent patrol car on paper with pencil, including the frame, wheel, mechanical structure, and so on. Through drawing, students' logical thinking, line drawing, and innovative design ability are improved.

#### **4.1.3. Integration of information technology**

After completing the drawing of the intelligent patrol car, the students will assemble the intelligent patrol car according to the drawings, and preset the driving logic for the car through graphical programming. Graphical programming greatly reduces the threshold of programming, so that non-professionals can also participate in programming activities. In the graphical programming, students can design functions for the intelligent patrol car according to their creativity, and exercise their scientific practical skills through the joint debugging of software and hardware.

### **4.2. Analysis of teaching effect**

#### **4.2.1. Mastery of technical knowledge**

Through the study of the intelligent patrol car project, students not only master the basic technical knowledge of sensors, programming, and mechanical principles, but also integrate the knowledge and skills of Chinese, art, music, and other disciplines, and learn how to apply this knowledge to practical projects. Students can operate the car independently, and realize the automatic line patrol function of the car through programming, which improves the understanding and application of technical knowledge.

#### **4.2.2. Cultivation of practical operation skills**

The intelligent patrol car integration course focuses on the cultivation of practical operation skills. Students have improved their hands-on ability and problem-solving skills by building, programming, and debugging the car. They have learned to transform theoretical knowledge into practical operation, and constantly optimize and improve their work in practical operation.

#### **4.2.3. Stimulation of innovative thinking**

The intelligent patrol car integration course encourages students to give full play to their innovative thinking and design a creative and practical car scheme. Students are constantly trying various ideas and methods in the course to discover new solutions to solve problems. This teaching method stimulates their innovative thinking and cultivates their creativity and imagination.

### **5. Conclusion**

The intelligent patrol car integration course catalyzed by mathematical intelligence has achieved remarkable results in cultivating students' practical skills, innovative thinking, teamwork, and interest in learning. This teaching mode provides new ideas and methods for the project-based teaching of primary school curriculum integration, which is worthy of further promotion and application.

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## Disclosure statement

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## References

- [1] Liang X, 2022, Information Technology Empowers Home-School Co-Education in the Digital Age. *Information Technology Education in Primary and Secondary Schools*, 2022(5): 37–39. <http://doi.org/10.3969/j.issn.1671-7384.2022.05.013>
- [2] Wang H, 2022, Integrating the Principle of Teaching Evaluation Consistency, Using Project-Based Guidance Teaching—Taking the Application of Scratch Programming Teaching in Primary Schools as an Example. *Computer Enthusiasts*, 2022(8): 258–2586.
- [3] Liu Y, 2023, Research on the Design and Practice of Interdisciplinary Integration Theme Based on Project-Based Learning—Taking “The Design and Production of Telescopes” as an Example, dissertation, Guangxi Normal University.
- [4] Yin Y, 2024, Internet-Supported Primary School Chinese Project-Based Teaching Research. *China New Telecommunications JF China New Telecommunications*, 26(4): 176–178.
- [5] Xu Q, 2023, Interdisciplinary Integrated Elementary School Art Project-Based Learning Practice. *Basic Education Research*, 2023(16): 64–66, 70. <http://doi.org/10.3969/j.issn.1002-3275.2023.16.017>

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