Digital Learning and Innovation Literacy Cultivation

——Taking the Production of the Popular Science Short Video "Shenyang Li's Folk Folding Paper" as An Example

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Abstract. Digitization has become an important driving force for the new round of technological revolution and industrial transformation, and the education sector is also showing a trend of digital transformation. Digital learning and innovation literacy have gradually become essential literacy for citizens. In order to promote the implementation of the "double reduction" policy, this article aims to explore how to effectively enhance the digital learning and innovation ability of primary school students through the theme of science popularization short video production.

Keywords: Digital learning and innovation, Project-based teaching, Science popularization short videos, Primary School Information Technology Course.

1 Introduction

In 2021, the General Office of the Ministry of Education and the General Office of the China Association for Science and Technology issued the "Notice on Utilizing Science Popularization Resources to Promote the 'Double Reduction' Work '" (Jiaoji Department Letter [2021] No. 45), which mentioned that schools and teachers can make full use of after-school science popularization resources, combine classroom teaching tasks, design exhibition works and activities to promote the' Double Reduction '[1]. However, the exploration of applying science popularization resources in teaching is not new. As early as 1993, Professor McGraw in the United States designed the "One Minute Organic Chemistry Course"[2]. Carlson also proposed using movies adapted from historical events in classroom teaching, which could help students better understand the nature of historical materials and think about problems in a constructive and historical way[3]. These studies indicate that foreign countries have started to apply science popularization short videos to teaching practice earlier. The New Curriculum Standards point out that information technology courses should attach importance to interdisciplinary thematic learning. This means that students not only need to master the basic knowledge and skills of information technology, but also understand the application of information technology in other disciplines[4]. Therefore, the study focuses on creating

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short science popularization videos, combining information technology courses with post class science popularization resources for students. Through project-based teaching methods, students are encouraged to fully utilize various resources, tools, and platforms in the digital environment, and cultivate their digital learning and innovation abilities through problem exploration and the production of science popularization short videos.

2 Theoretical Basis

The pragmatic learning theory provides important guidance for the study of science popularization short video production projects, emphasizing the combination of learning and practice, the transfer and application of knowledge, as well as reflection and innovative thinking, which helps promote learners' deep understanding and dissemination of scientific knowledge, cultivate scientific communication abilities and innovative thinking[5]. The study combines the inspiration of situational learning theory to enable students to participate in the actual process of short video production, design and implement video production, and apply the learned video editing knowledge to practical projects while understanding Shenyang's intangible cultural heritage science popularization knowledge. This will deepen their understanding and mastery of knowledge, cultivate students' creative thinking and problem-solving abilities.

3 Course Content Plan

Table 1. Three rounds of action studies.

Action research session	Course title	Teaching content
First Round	I'm a little tailor	Split individual clips and delete unnecessary segments
		Be a little "Clipper" and adjust the order of materials as required
Second Round	I'm a little special effects guy	Create a science popularization short video about "Shenyang Li's Folk Pleated Paper"
		Add transition effects between video clips for seamless connection
		Be a little "Special Effects Artist" and add different transition effects between clips
Third Round	I'm a little sound guy	Create a science popularization short video about "Shenyang Jin's Knotting Technique"
		Add theme-appropriate background music to the video
		Be a little "Sound Designer" and add sound effects at appropriate positions

The core competencies of information technology courses consist of four core elements: information awareness, computational thinking, digital learning and innovation, and information social responsibility. According to the information technology teachers

at X school, there are currently no designated textbooks for teaching information technology courses. The teaching is mainly based on the "New Curriculum Standards" and combined with the actual situation of students to select content. Starting from the third grade, information technology courses are offered, and the teaching content in the third grade mainly includes computer basic operations and online resource search. In the fourth grade, the teaching content mainly includes Word and PowerPoint office software, as well as video editing software, which are used to create works. Therefore, based on the "New Curriculum Standards", the teaching requirements of the school, and the actual basic situation of students, after discussing with the internship supervisor, the following project teaching content was designed, as shown in the Table 1, for the three rounds of action research.

4 Implementation of Teaching Plan

4.1 Implementation of the First Round of Teaching Plan

Exciting Introduction and Project Perception. In the initial stage of the classroom, the teacher pre designs a series of questions related to "Shenyang Li's Folk Folding Paper" to stimulate students' curiosity and guide them to carefully watch the video about "Shenyang Li's Folk Folding Paper" and answer it. Students watch videos with questions raised by teachers. After watching, students will collaborate in groups to discuss and analyze the problem scenarios presented in the video, further understand the intangible cultural heritage of "Shenyang Li's Folk Paper Folding", and work together in groups to solve problems.

Collaborative Exploration and Program Planning. On the basis of group discussions, teachers guide students to use digital tools such as online search engines, library databases, etc. to search and collect various resources related to "Shenyang Li's Folk Folding Paper". At the same time, teachers will supervise students' task progress, guide them to combine video content and collected digital resources, jointly plan specific ideas and methods for video production, and form preliminary problem solutions.

Production of Works, Collaborative Innovation. Teachers provide students with abundant resource support, including teaching materials for intangible cultural heritage inheritors. Under the guidance of the teacher, students will use video editing software to cut, stitch, and adjust the collected video materials, remove excess segments and duplicate images, and control the duration and rhythm. At the same time, students will use creative thinking to adjust the order of materials, organize the layout of images, add special effects and music according to the group's video production ideas, and ultimately create a complete science popularization short video work. During the production process, teachers will encourage students to think independently, collaborate in learning, and work together to solve problems and difficulties.

Exhibition of Works and Exchange of Viewpoints. After the first round of teaching activities, teachers will summarize and analyze the total score of students' works, from four dimensions of completeness, technicality, artistry, and innovation, to comprehensively understand students' performance, and refer to Tables 2 and Tables 3.

Table 2. Scoring of Group Works in the First Round

	group 1	group 2	group 3	group 4	group 5	group 6	group 7
Score of works	71.44	80.65	65.88	78.32	66.16	80.42	75.54

Table 3. Scores of Various Dimensions in the First Round of Group Works

	Integrity(30)	Technicality(30)	Artistry(20)	Innovation(20)
Average score	15.44	17.65	11.30	10.35

Finally, the teacher will summarize and evaluate the entire project practice process based on the completion of students' works and classroom performance. In the evaluation process, teachers will focus on the development of students' innovative thinking, teamwork ability, problem-solving ability, and provide specific evaluations and suggestions.

4.2 Implementation of the Second Round of Teaching Plan

Through the implementation of the first round of teaching plan, students have become familiar with the basic process of project-based teaching. Based on the issues reflected during the implementation of the first round of teaching plan, adjust the project teaching process, design the second round of teaching content - add different effect transitions between different video clips, and produce a science popularization short video of "Shenyang Jin's Knot Techniques". After the second round of teaching activities, teachers will summarize and analyze the total score of students' works, as well as their scores in the four dimensions of completeness, technicality, artistry, and innovation, to comprehensively understand students' performance, refer to Tables 4 and 5.

Table 4. Scoring of Group Works in the Second Round

	group 1	group 2	group 3	group 4	group 5	group 6	group 7
Score of works	75.14	82.28	71.54	80.36	70.16	83.65	76.38

Table 5. Scores of Various Dimensions in the Second Round of Group Works

	Integrity(30)	Technicality(30)	Artistry(20)	Innovation(20)
Average score	19.15	19.50	13.30	12.25

4.3 Implementation of the Third Round of Teaching Plan

After the first two rounds of science popularization short video production project teaching, students' ability to screen, classify, and manage digital resources has been improved. Based on the issues reflected during the second round of action research, guide students to use fast editing software to add video sound effects and produce a science popularization short video titled 'Shenyang Yu's Noodle Man'. After the third round of teaching activities, teachers will summarize and analyze the total score of students' works, as well as their scores in the four dimensions of completeness, technicality, artistry, and innovation, to comprehensively understand students' performance, refer to Tables 6 and 7.

Table 6. Scoring of Group Works in the Third Round

	group 1	group 2	group 3	group 4	group 5	group 6	group 7
Score of works	79.92	85.36	75.26	83.88	77.41	87.65	80.68

Table 7. Scores of Various Dimensions in the Third Round of Group Works

	Integrity(30)	Technicality(30)	Artistry(20)	Innovation(20)
Average score	20.95	22.50	14.45	14.25

5 Comparison and Analysis of Three Round Teaching

After each round of teaching plan implementation, organize students to conduct self-evaluation and peer evaluation of their works, and finally calculate the scores of their works to reflect their knowledge mastery and innovative performance. Among them, the scores of the works implemented by the eight groups in the three rounds of teaching plan are shown in the Fig.1.

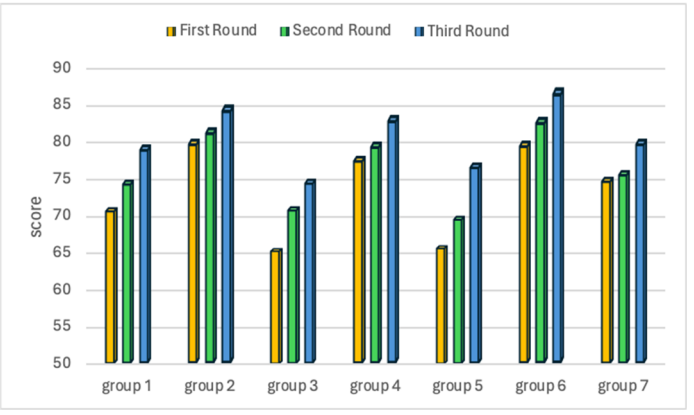

Fig. 1. Scores of each group in three rounds

During the three rounds of science popularization short video production projects, the scores of the video works produced by the eight groups showed an upward trend, indicating that the quality of the students' works is gradually improving. This also shows that the students have sufficient interest and enthusiasm for video production, can persist in making works, and gradually improve the quality of their works.

The number of works in each score segment of the comprehensive statistics of the three rounds of action research is shown in Fig.2.

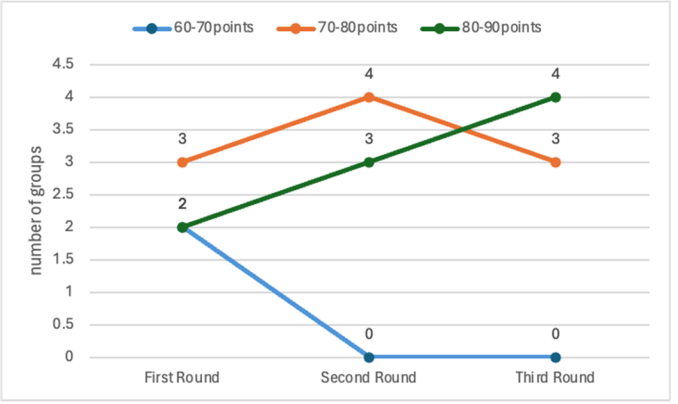

Fig. 2. Statistics of the number of works in each score range

As shown in Fig.2, In the first round of action research, there were two groups of student works with scores between 60 and 70 points. After the second and third rounds of activities, all group works scored above 70 points, and the number of works between 80 and 90 points continued to increase, further indicating that the overall quality of student works is gradually improving.

The average scores of each dimension in the three rounds of student works are shown in Fig.3.

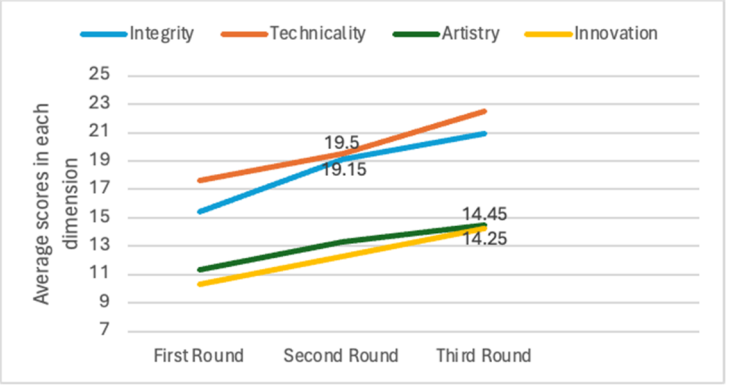

Fig. 3. Average scores for each dimension of the works in the three rounds

Overall, the scores of students' three rounds of works have gradually increased in the four dimensions of completeness, technicality, artistry, and innovation, indicating that students' participation in the project, enthusiasm for group cooperation, and seriousness in the production of works are all improving.

6 Conclusion

This study utilizes a digital learning environment to guide students to experience digital learning and innovative activities, emphasizing the cultivation of basic digital learning abilities and allowing students to participate and experience the characteristics and charm of digital learning. Students have developed innovative abilities and improved their information literacy through hands-on practice and experimental operations and developed their innovative thinking and problem-solving abilities.

Digital learning and innovation, as key elements and important support in the core competency cultivation system of information technology disciplines, cannot be ignored[6]. This article combines the production of science popularization short videos with classroom teaching to better utilize informatization, enhance the effectiveness of classroom teaching, stimulate students' learning interest and creativity, and further cultivate students' digital learning and innovation literacy. Subsequent related research can further deepen the theoretical exploration and practical application of science popularization short video production project teaching, better integrate post class science popularization resources with classroom teaching, optimize information technology classroom teaching, promote the improvement of classroom teaching quality and efficiency, provide more effective teaching strategies and methods for enhancing students' digital learning and innovation literacy, and provide stronger support for educational and teaching practice.

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