Proceedings of the 4th International Conference on Computing Innovation and Applied Physics
DOI: 10.54254/2753-8818/84/2025.21210

# *Application Analysis of Multimedia in Primary School Mathematics Education*

**Zhengxuan Ge[1,a,*]**

[1]*NUIST Reading Academy, Nanjing University of Information Science and Technology, Jiangsu Province, Nanjing, 210044, China*
*a. 202283710057@nuist.edu*
**corresponding author*

***Abstract:*** Multimedia technology, widely applied in the internet+ education model of today, has been extensively used in primary education. This paper analyzes the advantages of multimedia technology in primary school mathematics education, specifically discussing its role in stimulating students' interest in learning, enriching teaching methods, and optimizing the allocation of teaching resources. By using multimedia forms, students can understand abstract mathematical concepts more intuitively and vividly, thereby improving learning efficiency and interest. This paper summarizes a series of strategies for the application of multimedia, particularly pointing out that the reasonable use of multimedia in concept teaching and problem-solving method transmission not only enhances the interactivity of classroom teaching but also strengthens students' independent learning ability and thinking ability. This paper points out that through reasonable design and effective use of multimedia teaching, a pleasant learning atmosphere can be created for students, thereby promoting the mastery of knowledge. At the same time, teachers' teaching efficiency and classroom management ability have also been significantly improved. This study provides theoretical support for how to effectively apply multimedia technology in primary school mathematics teaching and offers valuable practical references for improving the quality of primary school mathematics teaching.

***Keywords:*** Mathematics Education, Multimedia, Digital Teaching, Information Technology.

## 1. Introduction

Multimedia technology is increasingly applied in the field of education in the new era of the internet plus, gradually changing traditional educational models. In teaching, multimedia teaching enriches teaching methods, optimizes the allocation of educational resources, and significantly enhances the overall teaching effect. For instance, Xue points out that multimedia technology improves students' enthusiasm for learning and enhances the efficiency of knowledge transfer [1].

The application of multimedia technology in mathematics teaching is particularly important. More and more educators recognize the potential of digital and information technology in education, finding that using video, audio, animation, and other forms makes mathematics teaching more vivid and intuitive, enhancing students' learning efficiency. Lu's research shows that using animation, audio, and other forms to present mathematical knowledge can help students build mathematical models and stimulate interest in learning [2]. Tian points out that multimedia technology is particularly prominent

© 2025 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2753-8818/84/2025.21210

in breaking through teaching difficulties, such as by dynamically demonstrating and visually presenting knowledge points to effectively improve students' understanding [3].

Mathematics is a highly abstract discipline, and primary school is the foundational stage of students' mathematics learning. Students' mathematical thinking is still in its early stages, and their ability to understand abstract concepts is weak. Traditional teaching methods may not meet students' needs for understanding abstract concepts. The interactivity and intuitiveness of multimedia technology have significant advantages in primary school mathematics (PSM) education. Yang emphasizes that through multimedia teaching, teachers can transform abstract mathematical concepts into concrete and intuitive learning experiences, thereby improving the quality of classroom teaching [4]. Multimedia teaching has unique advantages in PSM education. It stimulates students' interest, optimizes teaching resources, enriches teaching methods, and helps students build an intuitive understanding of abstract mathematical concepts. Knowledge transfer through multimedia technology can more effectively decompose and demonstrate knowledge points.

This paper discusses the specific application status of multimedia technology in PSM teaching. It focuses on how to enhance students' interest in learning, help teachers break through the difficulties in traditional teaching, and optimize classroom teaching effects. This paper aims to provide references for optimizing future PSM teaching models.

## 2. Advantages of multimedia in PSM education

The advantages of multimedia technology in improving teaching effectiveness, enriching teaching methods, and expanding teaching resources in PSM education have gradually emerged, becoming an important tool for promoting the improvement of educational quality.

### 2.1. Improving teaching effectiveness

In primary school teaching, the application of multimedia courseware not only shortens the time for new lessons but also greatly increases practice time, with more diverse forms of practice, which helps to enhance students' memory and effectively stimulates their interest in learning. Especially with bright colors and vivid images, it is conducive to students' memorization of mathematical concepts. Bright colors, realistic shapes, continuous movements, plus music, and dynamic display methods, make mathematical content more attractive and highly likely to arouse the interest of primary school students, stimulating their motivation to learn.

Key knowledge points in PSM teaching, with abstract concepts difficult to express in language or text, traditional classroom teaching methods are hard to accurately convey knowledge points. Multimedia technology uses images, animation, and other expression methods to concretize abstract concepts, helping students clearly understand mathematical knowledge. For example, when teaching the order of operations with parentheses, teachers use fun micro-lessons to introduce the classroom. In the micro-lesson, a rabbit acts as a math teacher, vividly explaining the knowledge points of small and medium brackets, and combining actual examples to demonstrate the three-step operation of bracket operations. This intuitive teaching method enhances students' interest in learning, helps students quickly master knowledge points, and significantly improves classroom efficiency.

### 2.2. Enriching teaching methods

Traditional mathematics teaching uses textbooks and blackboards to display. Multimedia teaching uses pictures, videos, animations, and other display methods to explain mathematical knowledge, making primary school data knowledge more intuitive and understandable, and enhancing students' ability to accept knowledge [5]. The deep application of digital transformation and educational technology provides more possibilities for enriching teaching methods. For example, the mathematics

DOI: 10.54254/2753-8818/84/2025.21210

teaching and research group of Shanghai Haihua Primary School, with the help of digital platforms such as lesson preparation assistants, teaching assistants, and homework tutoring assistants, carried out teaching practice activities with the theme of "Digital Transformation Aids Mathematics Classroom, Platform Application Improves Teaching Efficiency." Through the application of digital platforms, mathematics teaching has achieved diversification of content presentation, further stimulating students' interest in learning, improving classroom learning effects, and promoting the innovation and optimization of teaching models.

The rich and diverse presentation methods of multimedia teaching stimulate students' curiosity. For example, computer simulation experiments help students better understand experimental principles and operation methods. Designing game learning not only helps students improve their learning skills but also cultivates their creativity and teamwork. Using remote education breaks geographical barriers and realizes the widespread application of online teaching.

### 2.3. Expanding teaching resources

Multimedia teaching often combines puzzle games, practical exercises, and computer models, and the application of multimedia teaching resource libraries, enhances the effective use of teaching resources, alleviating the shortage of educational resources [6]. For example, multimedia technology continues to expand in educational smart platforms, providing rich teaching resources and interactive learning environments, offering students better learning experiences and opportunities, ensuring the effective operation of the education system, and promoting the fair development of education in various regions [7].

The introduction of multimedia technology means that the use of primary school teaching resources is no longer limited to traditional textbooks and classrooms, but in a more open form to meet students' learning needs. Teachers choose suitable resources based on students' learning situations and design targeted learning tasks. Students use multimedia platforms to explore learning content of interest independently. Resource expansion has improved teaching efficiency and cultivated students' independent learning and inquiry abilities.

## 3. Application strategies of multimedia in PSM education

### 3.1. Reasonable selection of multimedia teaching tools

Multimedia can easily bring students' thinking and interest into the scenes set by teachers. Due to its teaching convenience and diversity, students can more clearly understand difficult knowledge points. For example, through multimedia animation playback of PSM multiplication rhymes, teaching becomes more interesting, and students can quickly understand.

Traditional teaching methods have irreplaceable advantages in imparting basic knowledge, standardized problem-solving, and thinking training. Multimedia technology is good at making abstract mathematical concepts vivid and intuitive. Teachers combine the two teaching methods when explaining new knowledge or reviewing and consolidating. For example, when explaining concepts or engaging in heuristic teaching, use multimedia videos and animations to stimulate students' interest, and switch back to traditional teaching methods for in-depth explanation and practice. At the same time, using traditional teaching methods and multimedia education methods can stimulate students' interest and ensure the system and coherence of mathematical knowledge. Li proposed that personalized teaching of PSM based on information technology can better focus on the different learning needs of students, enhancing the pertinence and effectiveness of teaching [8].

DOI: 10.54254/2753-8818/84/2025.21210

### 3.2. Creating lively teaching situations

Introducing practical life problems into PSM teaching allows students to more intuitively feel the practical value of learning mathematics. Huang discussed the strategies of game-based teaching in PSM supported by information technology, emphasizing that the appropriate use of game elements in teaching can effectively attract students' attention and improve interest in learning [9]. Multimedia technology provides more convenience for the introduction of life elements, such as teachers using multimedia to display shopping scenes, travel calculations, and other daily life scenes [10].

Teachers create various life and work situations, use multimedia to display them, and integrate PSM problems to encourage students to think. For example, when teaching area knowledge, teachers use multimedia to display a farm, give the length and width, and let students calculate the areas of pastures, cow sheds, office areas, etc. Realistic problem situations stimulate students' observation and expand their thinking, gradually mastering mathematical knowledge in virtual scene observation.

### 3.3. Improving classroom interaction and participation

Multimedia interactive teaching stimulates students' curiosity through visual and auditory stimuli, attracting their attention, and prompting them to actively participate in learning. For example, Ma pointed out that the reasonable use of multimedia can improve the interactivity and vividness of classroom teaching, enhancing students' sense of participation and learning effects [11].

Homework Together APP is a commonly used homework assignment software where each level must be completed to successfully unlock the next. Points are earned upon successful level completion. Level 1: Take a square piece of paper and fold it in half. The paper is divided into the same (number) parts, each part is (fraction) of it. Level 2: As shown in Figure 1, several shapes with colored sections and corresponding fraction descriptions are displayed. Students need to determine if these fraction representations are correct, marking with a checkmark ( √ ) or an X (×) within the parentheses. As illustrated in Figure 1, the task visually aids students in understanding the meaning of fractions and the relationship between the colored sections and the whole. Level 3: As shown in Figure 2, students are required to color in the diagram according to the given fractions using their preferred colors. For example, they are asked to represent 1/4, 1/2, 1/6, and 1/8 with color. Through this task, students deepen their understanding of fractions, exercise their logical thinking, and improve their hands-on abilities. As shown in Figure 2, students concretize abstract fraction knowledge through practical operations, enhancing their absorption and application of knowledge. Please color according to the given fractions in the diagram (see Figure 2) [12].



1/2 ( ) 1/3 ( )

Figure 1: Fraction coloring schematic diagram, helping students understand the relationship between fractions and colored parts (Photo/Picture credit: Original).

DOI: 10.54254/2753-8818/84/2025.21210




Figure 2: Fraction representation example, helping students master different fractions through color marking (Photo/Picture credit: Original).

PSM learning requires students to have strong abstract thinking and logic, simplifying abstract knowledge into more concrete forms. Relying solely on traditional teaching methods for exam-oriented education cannot fully meet the current social development. To reasonably improve students' mathematics scores, it is necessary to start from the student's perspective and cultivate their spirit of independent learning. Teachers in multimedia classrooms use tools such as interactive whiteboards and real-time feedback to understand the current learning status of students, analyze their mastery of knowledge, and adjust teaching plans in a timely manner to teach students according to their aptitude, stimulating their interest in learning. Encourage students to communicate with each other during the learning process to deepen their understanding of the teaching content.

## 4. Multimedia application cases in PSM teaching

### 4.1. Case 1: application of multimedia in PSM concept teaching

Fractions are an important knowledge point in third-grade mathematics. The concept of fractions is relatively abstract and poses a significant challenge for students to understand. Relying solely on teachers' blackboard teaching methods, students find it difficult to comprehend. However, using multimedia methods such as animation and audio can help students grasp the concept of fractions [13].

Using multimedia design, a circular image is displayed on the electronic screen, followed by animated lines dividing the circle. Different colors represent the fraction values of each part, with audio explanations provided simultaneously, allowing students to intuitively understand fractions during the observation process.

The application of multimedia teaching methods helps students overcome understanding difficulties, allowing them to intuitively understand the meaning of fractions. Color differentiation, dynamic effects, and audio annotations stimulate students' interest in learning, making it easier for them to remember the meaning of fractions. Teachers guide students to ask questions and interact, deepening their understanding of fractions. The practical application of multimedia technology in primary school classrooms makes it easier for elementary students to understand mathematical concepts, enhancing teaching effectiveness.

### 4.2. Case 2: application of multimedia in solving PSM problems

The most important part of fourth-grade mathematics courses is teaching students to solve application problems. In traditional mathematics teaching, teachers use text or oral explanations, which students find difficult to follow. Multimedia technology can play a significant role in the teaching of application problems.

Teachers use multimedia images and animations to demonstrate the problem, using an electronic pen to draw flowcharts to break down application problems [14]. For example, to solve the problem of how much Xiao Ming spent in the store, the actual situation of the store is simulated, displaying the prices of goods on display. Teachers list the problem-solving steps on the screen, accompanied

DOI: 10.54254/2753-8818/84/2025.21210

by brief explanations, enabling students to thoroughly master the methods of solving application problems.

Multimedia uses visual methods to let students understand the structure of application problems, using flowcharts to help students clarify problem-solving steps and avoid potential confusion [15].

Intuitive teaching methods allow students to operate and experience problem-solving approaches, helping them develop structured thinking habits and fostering their logical reasoning and problem-solving skills.

## 5. Problems and challenges

Multimedia technology has obvious advantages in PSM education, but it also faces problems and challenges during application. Teachers' technical literacy and multimedia teaching ability directly affect teaching effectiveness. Many teachers lack experience in the application of information technology and lack training and support, leading to insufficient use or suboptimal results of multimedia resources. Multimedia equipment and software are updated quickly, and schools and teachers face outdated equipment and mismatched technology. This increases the difficulty of teaching and limits the full play of multimedia technology. At the same time, students' dependence on multimedia teaching may be too high, leading to neglect of basic knowledge mastery and independent thinking ability cultivation. For example, some students may become overly dependent on screens and animations, causing attention to be scattered and reducing learning initiative. The design and selection of multimedia teaching content are challenging, as students of different subjects and ages have significant differences in understanding ability, interests, and cognitive levels. Teachers need to choose appropriate multimedia teaching resources targetedly; overly complex or inappropriate content may confuse students and affect teaching effectiveness.

In summary, although multimedia technology has great potential in PSM teaching, teacher training and technical support, cultivation of students' independent learning ability, and precise selection of teaching resources remain key issues to be overcome.

## 6. Conclusion

Primary school education in the new era deeply integrates mathematics courses with multimedia information technology, giving full play to the advantages of multimedia. Teachers skillfully use multimedia in the teaching process, which not only enhances classroom teaching effects, stimulates students' interest in mathematics, promotes students' initiative in learning, and cultivates good knowledge and abilities, but also improves the effectiveness of classroom teaching. This study shows that multimedia technology has many advantages in PSM education, such as improving teaching effects and optimizing resource allocation. Multimedia game-based teaching can create an attractive learning environment, making students more engaged in learning. However, over-reliance on multimedia may weaken students' independent thinking ability. Teachers should moderately control the use of multimedia and combine it with traditional teaching methods to achieve the best teaching effects.

Future research and practice should continue to explore how to seamlessly integrate multimedia technology with classroom teaching, and develop teaching resources and interactive methods that better meet the psychological needs of primary school students based on their learning characteristics and cognitive laws. As PSM teachers, they should fully utilize information technology, innovate educational models, and integrate mathematics courses more with multimedia information technology, making students willing and loving to learn, and truly achieving the comprehensive development of students.

DOI: 10.54254/2753-8818/84/2025.21210

## References


[1] *Xue, F. (2022). Analysis of the application of multimedia technology in primary school mathematics teaching under the background of 'Internet Plus'. China New Telecommunications, 24(16), 173-175.*

[2] *Lu, S. (2022). Analysis of the application of multimedia technology in primary school mathematics teaching. New Curriculum, (07), 124.*

[3] *Tian, F. (2021). Analysis of the application of multimedia in primary school mathematics teaching. Primary and Secondary School Education (Teaching), (06), 65-66.*

[4] *Yang, M. (2022). Application of multimedia technology in primary school mathematics education. China New Telecommunications, 24(08), 191-193.*

[5] *Agus, H. S., Hobri, & Kriswianti, N. T. (2021). Developing a handbook on multimedia integration in mathematics teaching for Indonesian primary school students. International Journal of Education in Mathematics Science and Technology, 9(2).*

[6] *Yue, Z. (2020). Analysis of the application of multimedia teaching technology in primary school mathematics teaching. Exam Weekly, (06), 95-96.*

[7] *Wang, D. (2020). Application of multimedia teaching in primary school mathematics education. Primary and Secondary School Education (Teaching), (01), 79-80.*

[8] *Li, R. (2024). Research on personalized teaching of primary school mathematics based on information technology. Primary School Teaching Design, (S1), 98-99.*

[9] *Huang, Y., & Sun, Z. (2024). Discussion on the strategy of game-based teaching in primary school mathematics under the support of information technology. Anhui Educational Research, (25), 96-98.*

[10] *Luo, S. (2019). Analysis of the application of multimedia teaching technology in primary school mathematics teaching. Course Education Research, (22), 115.*

[11] *Ma, P. (2024). Skillful use of multimedia to improve the teaching effectiveness of primary school mathematics classrooms. China New Telecommunications, 26(19), 170-172.*

[12] *Xiao, Y. (2023). Strategy of using multimedia in primary school mathematics teaching under the background of 'Internet Plus Education'. Primary and Secondary School Education, (11), 44-46.*

[13] *Liu, D. (2019). Analysis of the application of multimedia teaching technology in primary school mathematics teaching. Test and Research, (13), 61.*

[14] *Wen, J. (2024). Exploration of application strategies of modern information technology in primary school mathematics teaching under the background of new curriculum. Education Communication and Technology, (03), 80-84.*

[15] *Universitas Negeri Jakarta Researchers. (2020). Development of scientific-based educative multimedia games to improve Indonesian narrative writing skills for elementary school students.* Science Letter, Science - Social Science.