

Design and Application of Digital Image Resources in Microlearning

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Abstract

Digital image resources are resources in which image materials are preserved through digital processing. It is presented in the form of videos and pictures, which distinctly reflect the representative image resources of each industry field. After digitalization, the image resource has the advantages of easy computer processing, easy access speed, easy remote transmission and access, easy non-linear editing of image materials, and easy unlimited reproduction of image materials without affecting the quality of image materials. Therefore, digital image resources are widely used in various industries, and with the continuous development of social informatization, a large number of digital image resources are used in micro-lessons to enhance the richness of micro-lesson contents and improve the learning effect of learners. This paper reflects the design and application of digital image resources in microlearning by taking the creation of the microlearning work of "Surface Area of Rectangular and Square Bodies" in the second book of 5th grade mathematics in elementary school as an example. The paper begins with a detailed overview of the creation concept, guiding ideology and idea of the microlearning design, followed by an overview of the latest status and development of the design and application of digital image resources in microlearning, including the trends and current situation of research and creation of digital image resources in microlearning at home and abroad, as well as the elaboration of the concept of design and application of digital image resources in microlearning. Then, we analyze the innovative points and difficulties of the micro-course "Surface Area of Rectangular and Square", which reflects the design and application of digital image resources in micro-course.

Keywords

Digital image resources; Microlearning; Design; Application.

1. Introduction

1.1. Background and Significance of Design Creation

With the advent of the digital era, the digital processing and preservation of image resources has become an inevitable trend. At the same time, in the era of rapid development of information technology, people can share resources through the Internet, and the digitally processed and preserved image resources are more convenient for people to transmit and share through the Internet, which greatly improves the utilization rate of digital image resources. Digitally preserved image resources are important resources for learning and research, and they play an increasingly important role in all aspects of social life. Especially in the field of education, a large number of digital image resources are used in micro-lessons, which makes micro-lesson teaching resources more abundant, thus stimulating learners' interest in learning and improving the efficiency of learning.

As the reform of education informatization system continues to progress and the state pays more and more attention to the education industry, the design and application of digital image resources in micro-lessons is also receiving keen attention from the education sector. The Ministry of Education has also issued a notice on education informatization, which provides policy support and guarantee for micro-lesson teaching, and provides strong hardware support for processing and preserving image resources in a digital way, making it easier to apply digital image resources in micro-lessons. Digital image resources are widely used in micro-lessons, which marks the availability of digital image resources as an educational resource in the usual sense in the field of education.

Microlearning is the delivery of the content to be learned through digital media devices to learners. The use of digital video resources in microlearning greatly enhances the richness of microlearning content, thus making digital video resources a necessary resource in the process of creating microlearning. In this study, we demonstrate the design and application of digital video resources in microlearning by creating the microlearning work of "Surface Area of Rectangular and Square Bodies" in the second book of 5th grade mathematics.

1.2. Concept, Guiding Ideas and Conception of the Design

The design and application of digital image resources in micro-lessons shows that digital image resources play a crucial role in the creation of micro-lessons. On the one hand, digital image resources preserve valuable resources in various industries and play a special social function. On the other hand, digital image resources are used in micro-lessons to promote the continuous improvement and development of micro-lessons. In micro-lesson teaching, digital image resources as an auxiliary educational resource form, digital image resources are committed to ensure the quality of micro-lesson teaching. Whether digital image resources can be effectively applied to micro-lessons will become an important indicator to measure teachers' professionalism. In the creation of micro-lessons, a large number of digital image resources are used to make the content of micro-lessons easier for learners to understand and master.

The design and application of digital image resources in micro-lessons reflects the continuous improvement of micro-lessons themselves. In the context of digitalization and information development, micro-lessons have become a common form of teaching and learning, and it is especially important to ensure the quality of micro-lessons. The micro-lesson of "Surface Area of Rectangular and Square Bodies" in the second book of 5th grade mathematics was created by using digital video resources to enhance the richness of the content of the micro-lesson. In the process of creating the micro-lesson, the teaching process is designed based on the BOPPPS teaching model, which makes the micro-lesson teaching process more rational and makes it easier for learners to master the knowledge of the micro-lesson. In a word, applying digital image resources to micro-lessons is an effective way to ensure the quality of micro-lessons.

2. Overview of the Latest Status and Development of Similar Creations

In China, digital image resources were not applied in microcourses earlier, and the research on the design and application of digital image resources in microcourses started later than foreign countries. However, with the establishment of information environment, the continuous improvement of digital technology, and the gradual enrichment of digital resources, a solid foundation has been laid for the design and application of digital image resources in micro-courses. In recent years, the issue of elderly care has become a hot issue in society, and the training of elderly caregivers is particularly important, and microlearning has become the preferred training method. The application of digital image resources to this micro-course training simplifies the complex teaching content and meets the cognitive characteristics of elderly caregivers. More importantly, the design and application of digital video resources in

micro-lessons is becoming more and more popular among educators, and digital video resources have become a necessary resource in the creation of micro-lessons.

In the Missouri History Museum of the United States, the image resources of the city of St. Louis from its birth in 1764 to the present are preserved, and these image resources are very valuable to us. This is enough to show that digital image resources have been quite mature in the preservation of historical resources abroad. In foreign countries, digital image resources in various industries started earlier than in China, and the design and application of digital image resources in micro-courses is no exception. With the development of information-based society, micro-lesson teaching using the Internet as a bridge has become a popular teaching method among foreign teachers, and they have applied digital image resources in micro-lesson teaching to free learners from boring learning and improve learners' ability of independent learning.

3. Analysis of the Innovative Points of the Work and The Difficult Points to Overcome

I have learnt a lot from the micro-lessons I have produced, and I have also learnt a lot from the experience and lessons I have learnt from the micro-lessons I have produced. After making the PPT and lesson plan for the micro-lesson, I have been working on the recording of the micro-lesson, and I have repeatedly revised the recorded micro-lesson to achieve the best teaching effect. The micro-lesson design is based on the surface area of rectangular and square bodies in the second book of Mathematics for Primary 5, and the design and application of digital video resources in the micro-lesson is demonstrated in the form of a video. The design of the micro-lesson is based on the use of digital video resources.

In the process of creating this micro-lesson, I was unable to obtain more and better materials for the content of the micro-lesson due to time and hardware, and I did not invest enough time and effort. After learning about the subject matter, I wanted to use as much of my knowledge and theoretical foundation as possible in the creation of this micro-lesson. Through the creation of this micro-course, I believe that it is a good start for my further development. However, it should be concluded that in the creation of the micro-lesson, not only is it necessary to consider various aspects, but also the choice of digital video resources that are conducive to the teaching content of the micro-lesson when creating the micro-lesson PPT, as well as the teaching mode to be used in the teaching process of the micro-lesson. The PPT and lesson plan for the micro-lesson are the key to creating a good micro-lesson. On the one hand, in creating the PPT for the micro-lesson, it is necessary to collect a large amount of material to select the material that will better present the content of the micro-lesson; on the other hand, in creating the lesson plan, it is necessary to read the textbook knowledge about the content of these micro-lessons in depth and select the mode of teaching that is suitable for the learners at this stage. In the future, you will need to invest more time in creating micro-lessons. The main theme of everything is to be conscientious, diligent and practical, and to take one step at a time to reach the goal that you want to achieve, in the hope that you will be able to create more and more wonderful micro-lessons in the future.

4. The content of the Work Undertaken By the Individual

4.1. Preparation Phase

In the early stage of creating the micro-lesson, we went to the websites of China Journal Network, China Knowledge Network and Vipshop to collect a large amount of relevant literature, read and take notes. The topic of this micro-lesson was determined to be "Surface Area of Rectangular and Square Bodies" in the second book of 5th grade mathematics, and the PPT and lesson plan of this micro-lesson were made to reflect the application of digital image

resources. As well as searching a large number of micro-lesson videos on the topic through the Internet website, the purpose of which is to gain experience in creating this micro-lesson video. The specific micro-teaching design for the surface area of rectangular and square bodies (Primary 5 Mathematics) is as follows:

4.1.1. Microteaching Content

Analysis of the teaching content of micro-course: This micro-lesson is from the People's Education Press compulsory education textbook elementary school mathematics chapter 3, section 2, the surface area of rectangular and square objects

- (1) Micro-lesson content: surface area of rectangular and square objects
- (2) Micro-lesson type: new lesson
- (3) Subject to which microteaching belongs: elementary school mathematics
- (4) Microteaching target: 5th grade elementary school students
- (5) Knowledge structure.

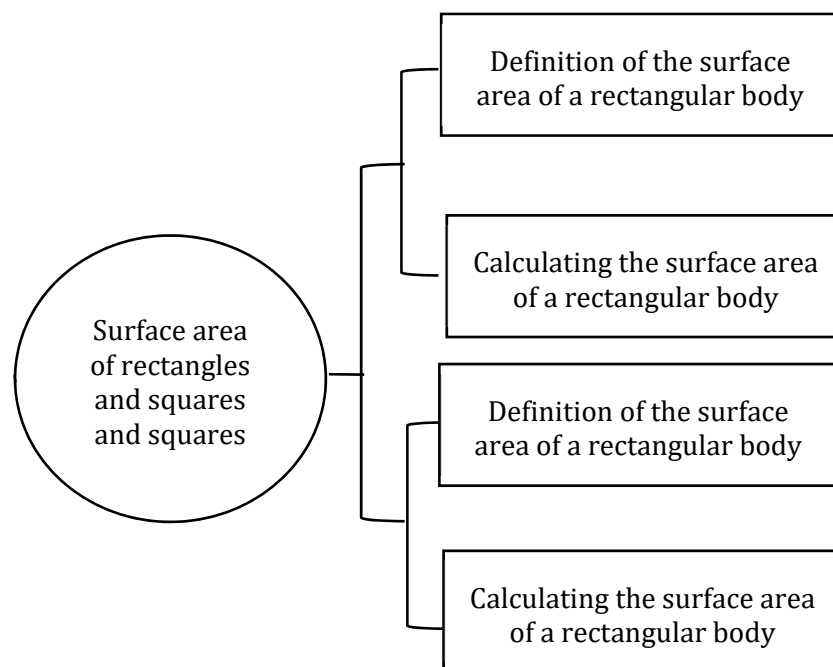


Figure 1. Knowledge structure map

The focus and difficulties of microteaching:

- (1) Microteaching focus:
 - ① Understanding the meaning of surface area of rectangular and square objects.
 - ② Master the calculation of the surface area of rectangular and square objects.
- (2) Teaching difficulties:
 - ① Distinguish between the surface area of a rectangular and a square body by the method of calculation.
 - ② Calculate the surface area of rectangular and square objects correctly.

4.1.2. Teaching Objectives of Microlearning

Knowledge and skills objectives:

- ① Know the meaning of the surface area of rectangular and square objects.
- ② Master the calculation of the surface area of rectangular and square objects.

Process and Method Objectives:

- ① The teacher recorded and edited the micro-lesson "Surface Area of Rectangular and Square Bodies", posted it on the Internet, and then the students watched the content of this section of the micro-lesson and learned accordingly.

emotional attitude and value objectives: ①To develop students' independent learning ability through microlearning. ②Fostering students' spatial developmental thinking through microlearning. ③Develop students' observation skills through microlearning.

4.1.3. Learner Characteristics Analysis

General characteristics analysis: Primary five students have initially formed certain attitudes toward learning and have a certain degree of autonomy and self-discipline. At this stage, students are focused, intentional memory gradually develops and dominates, abstract memory develops, but the role of concrete image memory is still very obvious. More importantly, students learn to master preliminary scientific definitions and to make logical arguments independently, but their thinking activities still have a large component of concrete images. And having been exposed to mathematics before, they have their own unique approach to learning mathematics and are highly motivated to learn.

Starting level:

(1) Cognitive structure analysis.

Fifth graders are often exposed to rectangular and square shaped objects in their lives and can distinguish between rectangular and square shapes, but they do not yet master the calculation of the surface area of rectangular and square shapes, so they should be guided from shallow to deep to calculate rectangular and square shapes correctly.

(2) Analysis of cognitive ability

Fifth graders have been in elementary school for some time and have developed their own learning habits, and their learning abilities have grown significantly.

(3) Analysis of learning attitude

Fifth graders have formed their own study habits and learning styles after years of study: they pay attention to lectures, complete their homework independently, are willing to explore problems with questions, and are highly motivated to learn, but their own abilities are still lacking.

4.1.4. Teaching Strategies of Micro-class

(1) Microteaching methods: lecture method, situational teaching method, task-driven method, analysis and induction method.

(2) Microteaching equipment: multimedia courseware, Internet.

4.1.5. Teaching Concept of Micro-class

In today's era of rapid development of information technology, a large amount of knowledge and information can be disseminated through the Internet, micro-lessons have become a good window for online teaching, and students learn accordingly through micro-lessons uploaded to the Internet by teachers to master the knowledge to be mastered. However, in order to make a micro-lesson well received by students, it is necessary to make great efforts in the production of micro-lessons and mobilize students' interest in learning. Therefore, the content of the micro-lesson in this lesson is made by combining more digital video resources to make the content of the micro-lesson more vivid, so that students can achieve better learning results and, more importantly, improve students' self-learning ability.

4.1.6. Microlearning Process Design

Table 1. Microlearning process design

Microlearning Events	Microlearning Teacher Activities	Students outside the micro-course Events	Media required for micro-classes	Micro-class design ideas
Introduction (Create a situation to introduce learning)	Citing pictures of rectangular and square shaped boxes commonly found in everyday life, ask students: How many square decimeters of cardboard are needed to make these boxes, and what is this requirement?	Students watch and reflect on this microlearning video.	Internet	Use pictures of rectangular and square shaped boxes that are close to students' lives to stimulate their interest and build their motivation.
Clarify learning objectives	Give the learning objectives. 1. recognize the meaning of the surface area of rectangular and square objects. 2. master the formula for calculating the surface area of rectangular and square bodies. 3. be able to calculate the surface area of rectangular and square objects correctly.	Students watch the microlearning video and keep in mind the learning objectives given by the teacher.	Internet	Informing students of the learning objectives allows learners to have a clear idea of what they are going to master in this lesson and improves the efficiency of learning.
Pre-test	1. Give pre-course test questions. (1) The square has () faces, they are all () and the area of each face of the square is (). (2) The rectangular body has () faces, and the area of the front and back two faces (). The area of the left and right sides () and the area of the top and bottom sides (). 2. The teacher guides the students to think accordingly to understand their prior knowledge.	1. Carefully watch the pre-class test questions given by the teacher in the microlearning video. 2. Actively follow the teacher's ideas and participate in the teacher's micro-teaching activities.	Internet	Conducting a simple test about the relevant basic content to be learned in the lesson will help to understand the students' knowledge base, as well as to focus them on the lesson and get them into the learning mode quickly.
Participatory Study	1. Show the video of making a square and ask students to follow the video to make a square, while the video of making a rectangular cube asks students to watch and make a rectangular cube by themselves, and wait until the actual classroom to show the actual rectangular and square cube they made. 2. Show the diagram of the rectangular body and explain how to calculate the surface area of each side of the rectangular body. 3. After an in-depth study of how to calculate the surface area of each side of a rectangular body, ask students: What is the surface area of a rectangular body? Ask students how to calculate the surface area of a rectangular body. And guide students to think about these two questions. 4. After learning about the surface area of a rectangular body, guide students to think: What is the surface area of a square body? What is the surface area of a square and how do you calculate the surface area of a square? Teacher and give answers to these two questions.	1. Follow the teacher's instructions and make a cube with your own hands by following the video on making a cube. Remember to watch the video on making a rectangular cube after class and to make a rectangular cube with your own hands. 2. Look carefully at the unfolding diagram of the rectangle shown by the teacher and listen carefully to the teacher's explanation: what is the surface area of a rectangle and how it is calculated. 3. Listen carefully to the teacher's explanation: what is the surface area of a square and how it is calculated.	Internet	1. Allowing students to make rectangular and square cubes with their own hands will give them a real sense of involvement in the actual classroom activities and motivate them to learn. 2. Showing the side diagram of the rectangular body will help students understand more about each side of the rectangular body and make it easier to learn and understand the surface area of the rectangular body and how to calculate it. 3. Learn how to calculate each surface area of a rectangular body first, then explain what is the surface area of a rectangular body and how to calculate the surface area of a rectangular body will become more clear and easy to understand. 4. Learning the surface area of a rectangle and how to calculate it first, and then learning the surface area of a

				square and how to calculate it, will make students more comfortable.
Post-test	<p>1. The teacher gives one test question each about calculating the surface area of a rectangular and a square:</p> <p>① How many square meters of cardboard should be used to make a packing box: 0.7m long, 0.5m wide and 0.4m high?</p> <p>② A square gift box with 1.2 dm long ribs, how many square decimeters of wrapping paper are used to wrap the box?</p> <p>2. The teacher guides the students to work together to solve the two test questions.</p>	<p>1. Look carefully at the test questions given by the teacher and think about how to do them, take out your sketchbook and write down your solution process.</p> <p>2. Listen carefully to the teacher's explanation of how to solve the problem and reflect on how you have problems in the process of solving the problem.</p>	Internet	It will test the students' mastery of the lesson, evaluate their learning in time, and help them to check and fill in the gaps after the lesson as well as adjust the teaching strategy of the micro-lesson in time.
Summarize and assign after-class homework	<p>1. The teacher summarizes the content of this micro-lesson: ① The surface area of a rectangular body is the sum of the areas of the six faces.</p> <p>② The formula for calculating the surface area of a rectangular body. $L \times H \times 2 + L \times W \times 2 + H \times W \times 2 = (L \times H + L \times W + H \times W) \times 2$</p> <p>③ The surface area of a square is the sum of the areas of the six faces.</p> <p>④ The formula for calculating the surface area of a square: the length of a prism \times the length of a prism \times 6</p> <p>2. The teacher assigns the homework after class: ① Put 3 cubes whose prongs are all 1 cm long together to form a rectangular cube, how many square centimeters is the surface area of this rectangular cube?</p> <p>② How do you put 4 cubes, all of which are 1 cm long, together to form a rectangular body with the largest surface area?</p> <p>assigned homework.</p>	<p>1. Listen carefully to the teacher's summary of this micro-lesson and recall in your mind what you have learned in this micro-lesson.</p> <p>2. Follow the teacher's requirements for homework assignments and carefully complete the after-school assignments assigned by the teacher.</p>	Internet	<p>1. To summarize the micro-lesson content of this section, which will help students really grasp the knowledge content learned in this lesson.</p> <p>2. Assigning post-lesson homework to students will help them consolidate what they have learned in this micro-lesson, deepen their memory and not easily forget what they have learned in this micro-lesson.</p>

4.2. Recording Stage

Based on the PPT of the micro-lesson created and the lesson plan written, the micro-lesson video was recorded using Camtasia Studio software. During the recording process, the speed of speech is controlled at medium speed, the voice is clear, and the whole process is learner-centered. As a micro-lesson recorder, you need to be proficient in Camtasia Studio software to ensure the quality of the recorded micro-lesson content.

4.3. Post-production Stage

When that micro lesson is recorded, it is edited and produced in post-production according to the quality of its recording and the actual requirements. In the post-production process, good hardware equipment will improve the efficiency of its creation micro-classes. However, on the late stage of this work creation, some unnecessary time was delayed because of objective environmental factors, but fortunately it did not affect the whole process of creating this micro lesson. In the specific post-editing operation, EDIUS video editing software was applied to post-process the video for engraving; Adobe Audition was used to increase the volume of audio processing, etc. Finally, post-editing and production is a discipline that requires more practice and comprehension in order to improve our post-editing and production level.

5. Final Work Effect Analysis

This micro-lesson work shows the design and application of digital image resources in the micro-lesson in the form of a video using "Surface Area of Rectangular and Square Bodies" as

the main content of the micro-lesson in the second book of elementary school grade 5 mathematics. In the whole process of creating this micro-lesson, the digital image resources suitable for this micro-lesson are highlighted to solve the problem that the fifth grade students tend to calculate the surface area of rectangular and square bodies wrongly. The PPT and lesson plan of the micro-lesson will be created first, then the micro-lesson will be recorded, and finally the recorded micro-lesson video will be edited and sound processed. The final micro-lesson will show the design and application of digital video resources in the micro-lesson, and will be exported and burned to CD.

6. Creative Experience and Extended Thinking

The pre-production of this micro-lesson design sets the stage for the post-production recording and editing. In this micro-lesson, the pre-production of the PPT and lesson plan is an important guarantee of the final result, and the post-production of the recording and editing work is an important measure to achieve the most desirable result of the work. This micro-lesson has a unique perspective, showing the design and application of digital video resources in micro-lessons. More importantly, I have benefited from the design of this micro-lesson and have learnt a lot of practical knowledge in creating this micro-lesson, as well as combining theory and practice. However, I also found that my professional knowledge is still inadequate and I need to continue to learn more and practice more. Therefore, in my future work and study, I will continue to improve my professionalism by having a proper attitude, being practical, diligent and gaining practical experience. In the future, I will continue to explore and practice in creating micro-courses, with a view to creating better micro-courses that showcase the design and application of digital video resources in micro-courses. This work calls on educators to use more digital video resources in micro-lessons to ensure the quality of micro-lessons and to improve the learning effect of learners.

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