An Innovative Application of "learning by doing" Principal in the Classroom Teaching—Take the Self-made Experimental Teaching Aids of RGB as an Example

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Abstract: In the chapter "Light and Color" of the science book for seven-grade student, which is published by Zhejiang education publisher, we can produce the phenomenon of light dispersion by irradiating the prism with sunlight. The color of the colored light band is red, orange, yellow, green, blue, indigo, and purplearranged in order, and experiments have shown that white light is made of a mixture of multiple color lights. In the textbook, there is no experimental demonstration to demonstrate that red, green, and blue colors can be mixed. Based on this, I have made my own RGB light-emitting diode three-primary-color synthesis experimental teaching aids, and used the intuitive three-primary-color synthesis demonstration experiment in the classroom to explore the various colors of red, green, and blue. Students are interested in learning science. At the same time, students' hands-on ability and scientific inquiry ability are cultivated.

1. Introduction

1.1 The Main Materials Used

RGB light emitting diode, battery, wire, switch, slide rheostat

1.2 Teaching Aids

There is a three-primary-color LED in this teaching aid circuit, which can emit three colors of red, green, and blue in the three primary colors, and only allows current to pass in one direction. This three-primary color LED has four pins, the longest of which is It is a common positive electrode, and the other three equal-length pins are negative electrodes, which are respectively connected to the red, green, and blue light emitting diodes in the three primary color LEDs. After connecting the circuit diagram as shown in the following circuit diagram, press the corresponding switches. It emits light of different colors. If you turn off two switches at the same time, you will see a combination of different colors. For example, red and green will synthesize yellow light, and red and blue mixture will turn into pink. Mixing three kinds of blue light will turn white. You can mix two or two colors together, which is more than enough to synthesize other colors of light. If a sliding rheostat is connected to each branch, the current of each branch is adjusted from the theory. You can mix any color of light on it, and you can verify that the three colors of red, green, and blue can produce a variety of colors through this teaching aid. Three color lights called the three primary colors of light. This aids can easily be seven scientific presentations on 65 students in three primary colors of light to the synthesis experiments enable students to playful learning, learning by doing, it is a steam-style curriculum teaching aids.

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1.3 Teaching Circuit Principle and Physical Map

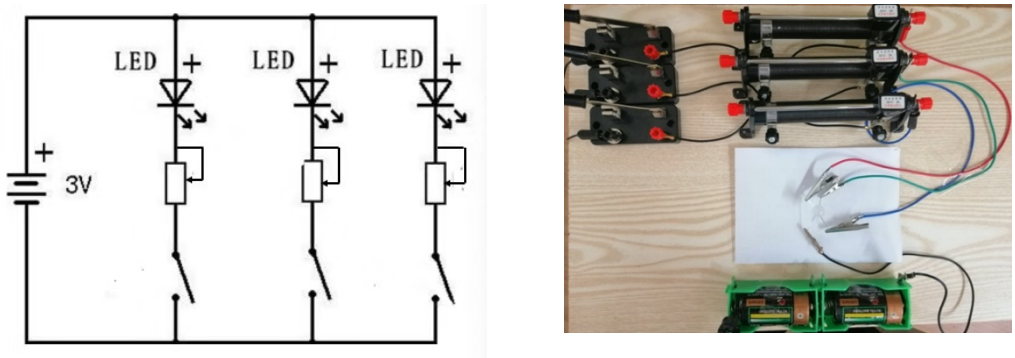


Figure 1 Principle and physical diagram of teaching aid circuit

2. Application in Classroom Teaching

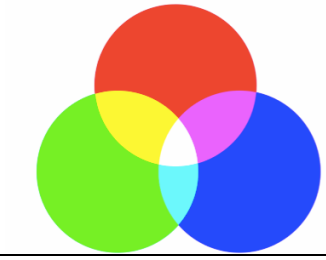
Teacher: Classmates, the teacher made a teaching aid on light and color. Today, I will perform an "experiment of light synthesis of different colors" in class. First, I asked two students to join me to connect the circuit according to the circuit diagram on the blackboard. Check that the parts are connected correctly.

Teacher-student cooperation: Put the teaching aids on a horizontal table together, and the students and the teacher together connect the circuit according to the circuit diagram and check whether the entire teaching aid is connected.

Teacher: Please ask three students to come to the stage to demonstrate the teaching aids as required. The students under the stage record the closure of the switches in the teaching aids and the changes in the light color according to the group.

Student: Three students on the stage turn off the switch, or two or two turn off the switch or turn off the switch at the same time, and the stage records the color change in groups.

Table 2 The law of equal mixing of three primary colors

Switch s1 (red)	Switch s2 (green)	Switch s3 (blue)	Shade color	The three primary colors of light
closed	disconnected	disconnected	red	
disconnected	closed	disconnected	green	
disconnected	disconnected	closed	blue	
closed	closed	disconnected	yellow	
closed	disconnected	closed	amaranth, magenta	
disconnected	closed	closed	blue	
closed	closed	closed	white	

Teacher: Please ask your classmates to send a representative in a group to communicate in the classroom based on the recorded situation and the observed experimental phenomena.

Students: Group communication

Teacher: According to physics knowledge and experimental observations, red and green will synthesize yellow light, and red and blue mixture will become magenta. If three switches are turned off at the same time, red, green and blue light mixture will become white.

Student: If you slide the sliding rheostat to different resistance values, there will be multiple changes in the shade of the color.

Teacher: If a sliding rheostat is connected on each branch and the current of each branch is adjusted, it can theoretically mix any color of light. Through this teaching aid, it can be verified that mixing three colors of red, green and blue can produce a variety of light. The three colors of red, green, and blue are called the three primary colors of light. LED TVs or displays in life are

composed of many similar three-color light-emitting diodes. A large number of small three-color light-emitting diodes form a dot matrix that can display. Colorful pattern.

Students: Students take notes and remember the three primary colors of light

Teacher: Classmates, through the previous experiment, we all saw the different colors of the three primary colors of light, so ask students to think about it: are the three primary colors of light and the three primary colors of pigments the same thing?

Student: It's not the same thing. The three primary colors of light are: red, green, and blue. The three primary colors of color and light are added and darkened. The three primary colors of pigment are: red, yellow, and blue. The three primary colors of color are added and lightened.

3. The Implementation Effect of Classroom Teaching

3.1 Creative and Interesting

The teaching aid is introduced in the classroom in the form of experiments, and allows students to cooperate to connect circuits, observe and record experimental phenomena, so that students have a sense of class participation. At the same time, the teaching aid has obvious experimental phenomena, is creative, and is interesting. It can cause students to learn. It can stimulate students 'interest in learning science and satisfy their curiosity. It can cultivate the spirit of scientific inquiry and improve students' love for science.

3.2 Easy Operation and Obvious Phenomenon

The principle of the teaching aid is very simple, the effect of the students during the presentation is very obvious, and the success rate is high. The production is simple, the operability is strong, and both teachers and students can make their own presentations. The teaching aid is not dangerous during the presentation. Students are able to demonstrate.

3.3 Learning From Doing and Having Fun

This teaching aid can be demonstrated in the seventh chapter of the second volume of science, the second chapter of the fourth chapter "light and color" chapter, through intuitive experimental phenomena, explain the three primary colors of light and the synthesis of the three primary colors. Then you can expand and explain the led TV or display in life, It is composed of many similar three-color light-emitting diodes. A large number of small three-color light-emitting diodes form a dot matrix that can display brightly colored patterns. This provides ideas for innovative teaching of physics experiments. At the same time, it can also lead students to connect circuits manually. And draw a circuit diagram, can also let students understand light-emitting diodes. This also expands the students 'knowledge. This teaching aid is very in line with the training requirements of "learning by doing" in core literacy, and cultivates students' practical and observational abilities. Students' interest in science can be learned from learning and learning from doing. At the same time, it can also be applied to the seventh chapter of the first volume of the seventh chapter-science observation.

3.4 Integration of Disciplines With Huge Potential

In fact, the process of making this teaching aid is not difficult. It also reflects engineering thinking and integrates knowledge of multiple disciplines, namely electricity and optics. As a steam course, it can be integrated into the overall appearance design (ART) and the composition is different. Calculation of voltage and resistance required for color (math).At the same time, the components used in the teaching aids are all open source hardware, which can be docked with multiple disciplines such as information technology and general technology. For example, the color and brightness changes of the colored lights can be controlled by programming to complete the design of a self-made traffic light system or a self-made color projection system. .

3.5 Green and Environmental Protection With Extremely Low Cost

This self-made teaching aid mainly uses RGB light-emitting diodes. The material is environmentally friendly, has good degradation performance, and does not cause environmental

pollution. Moreover, the production cost is extremely low, and it can be made as long as about 20 yuan.

4. Conclusion

This teaching aid can be demonstrated in the seventh chapter of the second volume of science, the fourth chapter of the fourth chapter of the "light and color" class, students on the stage for experimental operations can have more visual and intuitive understanding of the synthesis of light, through the intuitive experimental phenomenon [1], to explain the light, the three primary colors and the color and light synthesis of the three primary colors. It can further expand and explain that the LED TV or display in life is composed of many similar three-color light-emitting diodes, and a large number of small three-color light-emitting diodes form a dot matrix, which can display bright patterns. Using this self-made teaching aid for color and light synthesis teaching not only enriches the content of the classroom, but also broadens the students 'horizons, which is very helpful for cultivating middle school students' scientific interest [2]. It can also lead students to connect circuits and draw circuit diagrams and used as an assessment task in the Electrical Exploration Chapter or as a school-based steam course development.

References

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