

Extension of Basic Course of Colors for Design Majors in Colleges and Universities — Teaching Innovation and Practice of "Color Design Course"

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Abstract—The basic course of color is an indispensable part in the basic course of design majors. It has been nearly a hundred years since Bauhaus established the teaching system with three major components, and great progress has been made in the field of color design. The traditional teaching system and concept of color design cannot meet the needs of current teaching. This paper aims at the current problems of color design courses for design majors in colleges and universities; for example, teaching contents emphasize painting color and disconnect from professional design courses. Therefore, this paper proposes to add some teaching contents and methods in supplementary color design courses such as quantify color values, color training and color surveys, add color training, and introduce color image coordinates, in order to improve the teaching effectiveness of the course and strengthen the link between basic courses and design courses.

Keywords—colleges and universities; color design course; innovation; practice

I. INTRODUCTION

Color, shape and texture are the three basic elements of design, and the first thing people perceive is color. In the development of design discipline, color is one of the three basic courses and was established in the Bauhaus Era. And the three basic courses include plane formation, color formation and three-dimensional composition. The discipline construction of design majors in Chinese universities and even in the world is still based on the framework proposed by Bauhaus. So up to now, the basic course of color is still the most important course of color-related teaching in the field of design.

However, with the refinement of design discipline and the development of color design itself, traditional courses of "color sketch" and "color composition" can no longer meet the needs of the design discipline, its limitations have gradually emerged. For example, students' learning and perception of color is too perceptual and lack of rational analysis. Teaching content, training methods and teaching results tend to emphasize on painting colors which has no relevance with the design discipline. Course content lacks of advanced information in the field of color application, etc.

In addition, at the micro-level of curriculum teaching, teachers' theoretical knowledge often fails to guide students'

training and homework effectively. The author once learned that some students learn color stereo and color phase loop. Although they understand the principle of color stereo and color phase loop, they often do not use color stereo or color phase loop in color selection and use. The students did not associate the previous theoretical knowledge with their homework. From the feedback information of the students, there are many situations such as lack of interest in basic courses and distraction in class. In addition, there is also the idea that basic courses are not important and only professional courses are useful.

Facing the limitations and shortcomings of traditional teaching methods, the author's college has reformed the color-related courses. Relying on the resources of the Research Center of Color and Public Art of Nankai University, based on retaining the course of "color sketch" and "color composition", the course of "basic color design" was added to connect the basic course of design with the specialized course of design. The author is a teacher of this course. After more than three years of teaching practice and innovation, a complete set of scientific teaching concepts and modes has been gradually formed.

II. THE CORE TEACHING IDEA OF THE COURSE

In view of the limitations and shortcomings of traditional color basic courses, the main purpose of this course is to make up for the missing link between basic courses and professional courses. The core teaching idea of curriculum in theory is embodied in the need for students to establish a scientific concept of color, understand color system by quantitative analysis and lay a good theoretical foundation for rigorous design and for color application, and at the same time, try to understand as much as possible the latest information and achievements in the field of color application on the basis of learning the development history of color subject. At the level of practice, the core content is to let students learn how to use color. There must be a theoretical basis for color design. Therefore, students need to be skilled in various color matching techniques, and skilled in the use of color image coordinates and the ability of color measurement, collection and subsequent analysis and induction.

In addition, the number of exercises in class should be increased, to let students change from inactive listening knowledge to active experiencing and using knowledge, increase teacher-student interaction and improve students' learning efficiency. The relationship of core teaching concepts is shown in "Fig. 1".

■ Theoretical Study

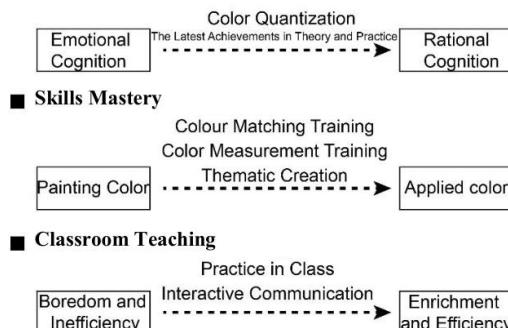


Fig. 1. The relationship of core teaching concepts.

III. THE COLOR SYSTEM USED IN THE COURSE

One of the major supports for realizing the teaching objectives of this course is to introduce the hue and tone system (H&T system) of the Japanese Institute of Color Design (NCD) and the matching color card and ticket. On the one hand, the introduction of this system quantifies the concept of color to facilitate the establishment of a scientific concept of color; on the other hand, it unifies the source of color used by students to facilitate training and evaluation. "Fig. 2" is a sketch of NCD hue and tone system. "Fig. 3" shows the color tickets used in teaching. Each set has 130 pieces, and each color ticket has a size of 1.5 *6CM.



Fig. 2. Sketch of NCD hue and tone system.



Fig. 3. Color tickets.

Generally, in the classroom of color teaching, students can only watch the color circle and color cube, but cannot use it. First, the number of such teaching tools is very limited, and it is impossible for every student to have one. Second, besides helping students understand the color system and spatial relationship, the teaching tool has no way to carry out other types of teaching. In addition, under the traditional teaching mode, one of the reasons why color quantification training cannot be realized is that students often rely on painting pigments to complete the training. Common paints include water powder, watercolor and propylene. Because the materials purchased by students are produced by different manufacturers, the color itself varies greatly. In addition, in the training process, because pigments have fewer types, it is has to mix colors to get more colors, which leads to the increase of difficulty and subjective differences in color.

Joseph Alberts once mentioned in his book *Color Composition* that there are five advantages to using color tickets. First, the use of color tickets avoids some unnecessary work in the preparation of pigments. Secondly, students no longer need to face the dilemma of the failure of color modulation repeatedly, saving time and materials, so that students maintain a consistent positive interest. Thirdly, color tickets are easy to reuse the same color. Fourthly, it is more convenient to use color tickets, because it hardly needs any other equipment except glue and one-sided blades. Fifth, color tickets can also avoid unwanted other lines (such as brush marks and brush strokes).

After introducing NCD hue and tone system into teaching, students can use color tickets to train, and the problems they met before can be solved easily.

IV. TEACHING PROCEDURES OF THE COURSE

The main teaching tasks of the course have four units. They are basic knowledge of color, coordinate of color image and color matching training, color investigation and analysis, and the latest achievements and information in the field of color application.

Among them, the basic knowledge of color includes the development of color subject, three elements of color, color circle, color cube, NCD color system and so on. Color image coordinates and color matching training include monochrome image coordinates, color matching image coordinates, language image coordinates, color and emotion, color and language, and 8 color matching methods. The investigation and analysis of color includes the explanation of color geography, the production of color cards, the measurement of color, the collection of color data and the quantitative analysis of color data. The latest achievements and information in the field of color application mainly introduce the important academic and scientific research achievements published by major scientific research, enterprises and associations at home and abroad in recent years.

The links of teaching and their relationships are shown in "Fig. 4".

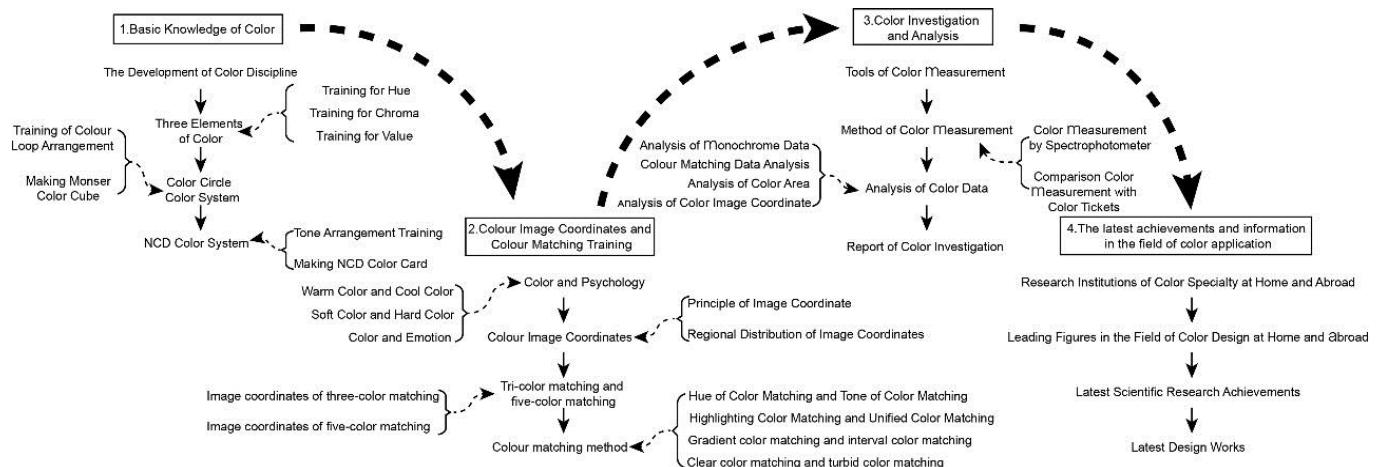


Fig. 4. Links of teaching and their relationships.

V. DEMONSTRATION OF IMPORTANT TEACHING SECTIONS

Because of the limitation of space, the author cannot show all the teaching sections one by one. In this paper, two training sections with ideal teaching effect are described in detail, that is, color matching training and color data analysis.

A. Color Matching Training

Color matching training is the best training method for the transition from painting color to design color. It not only gets rid of the traditional way of using color in painting color, but also is not bound by a certain design field.

1) The materials: NCD special color ticket, training paper with color matching theme, scissors, glue, A1 drawing paper, marker pen.

2) Training content: The content of color matching training is divided into three parts. First of all, we need to use human emotional vocabulary as the starting point for three-color matching, namely "color and emotional matching exercises". Secondly, take adjectives as the starting point to carry out three-color matching, namely "color matching exercises with adjectives". Finally, starting from the method of color matching, three or five color matching is carried out, including color matching exercises, tone matching exercises, unified color matching exercises, highlighting color matching exercises, interval color matching exercises, gradient color matching exercises, clear color matching exercises and turbid color matching exercises.

3) Training goal: The goal of color matching training can also be divided into three levels, but it does not exactly correspond to the training content. Firstly, students can experience the interaction between color and human emotion and psychology by using "color and emotional color matching exercises" and make use of "color matching exercises with adjectives" to let students learn to grasp the corresponding relationship between color and adjectives. Secondly, in the meantime of these two kinds of training, it is feasible to let students match colors according to the

coordinates of color image to understand and master monochrome, color matching and language image coordinates. Finally, students can be trained with various color matching methods to achieve the purpose of skilled use and mastery of these color matching techniques.

4) Training process: Before the "Color and Emotional Color Matching Exercise" begins, each student needs to get an NCD special color ticket, an A4-size printed training paper, a pair of scissors and a rubber stick. The students were then divided into groups of six to eight, each with an A1 drawing paper and a marker.

At the beginning of the training, teachers need to explain each emotional vocabulary simply to avoid students' misreading and misjudgment. At the same time, in order to avoid restricting students' creativity and imagination, do not over-interpret words. Then let the students start to match colors according to vocabulary. When matching, students need to analyze and associate according to the given vocabulary, and then find three color tickets in NCD special color ticket to form a three-color matching group. At this time, it is needed to use scissors to cut and paste the three-color tickets according to the size of 1.5 x 1.5 cm on the corresponding position of the exercise paper, and complete all the vocabulary in turn, and the color matching part of the exercise ends.

Quick and first impression is a premise for the exercise, so students are required to complete it in 25 minutes and no more than 30 minutes. There are 12 vocabulary words in this exercise. That is to say, the average time for each color combination is 2 minutes, not more than 2.5 minutes at most. The pressure of time can mobilize the maximum potential of students, while avoiding the use of mobile phones to access dictionaries, pictures and other information. Finally, the most authentic and initial choice of every student will be presented.

These 12 words represent different thoughts and feelings of human beings as shown in "Fig. 5", and they are representative. When the color matching exercise is completed, let the students cut it according to the dotted line. Teachers can put the students' color matching together according to the order of vocabulary, and let the students see

the similarities and differences, to understand the relationship between color matching and emotion more deeply. At the same time, each group of students needs to draw cross coordinates on A1 paper, and then put their own color matching in the coordinates. The position relationship refers to NCD three-color image coordinates, each word is done once, and you can practice twelve times. Repeated exercises can help students understand the color relations and differences between the color coordinates, so that they can know the general characteristics of the colors in different areas of the coordinates. "Color matching exercises with adjectives" and color matching exercises are basically based on the above training methods.

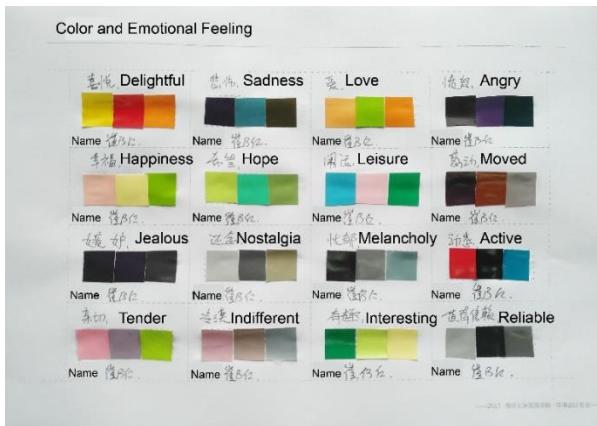


Fig. 5. Color and emotional feeling training (Nairen Cui).

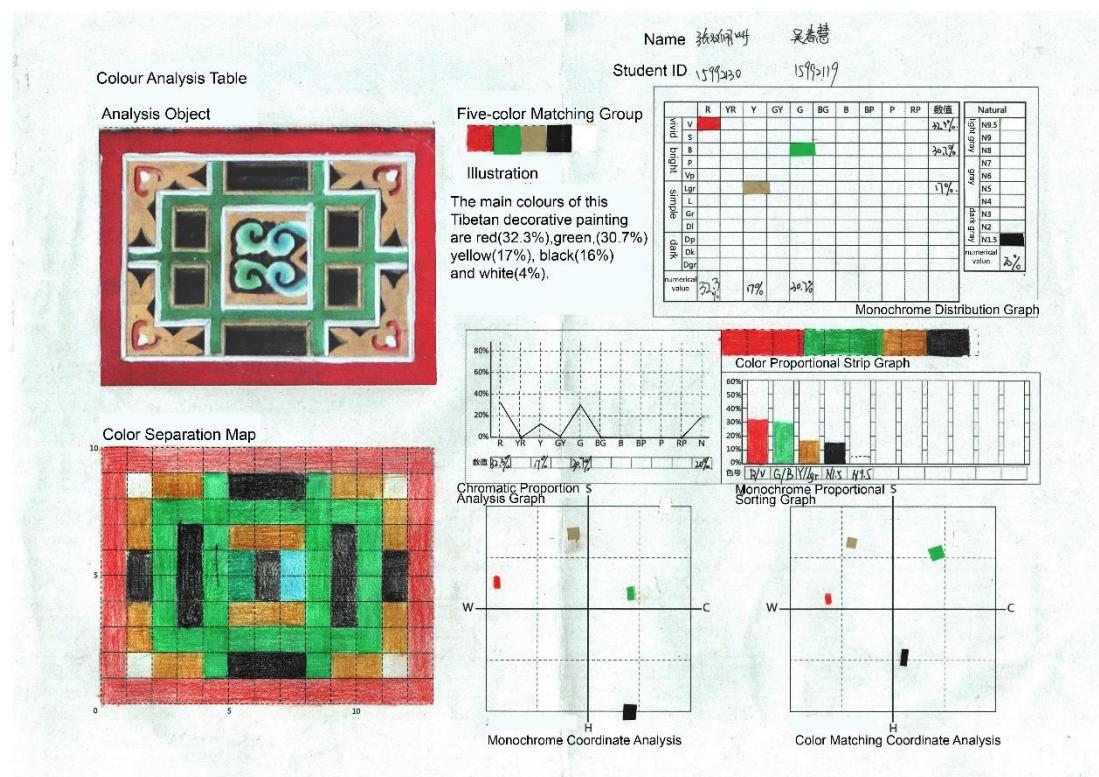


Fig. 6. Training of pane color analysis in Tibetan area (Peishan Zhangshuang, Chunhui Wu).

B. Training of Color Data Analysis

1) The materials: NCD special color measuring card, printed manuscript of the tested object, color analysis table, color pencil, scissors, glue stick.

2) Training content: The training of color data analysis includes two parts: one is the measurement of color; the other is the statistical analysis of the data after measurement.

The objects of color measurement are windows and New Year pictures with Chinese traditional characteristics. As shown in "Fig. 6" and "Fig. 7". In order to facilitate the training in class, we use color printed manuscripts. Statistical analysis of color data includes monochrome distribution, color combination, color proportion and its position relationship in color image coordinates, etc.

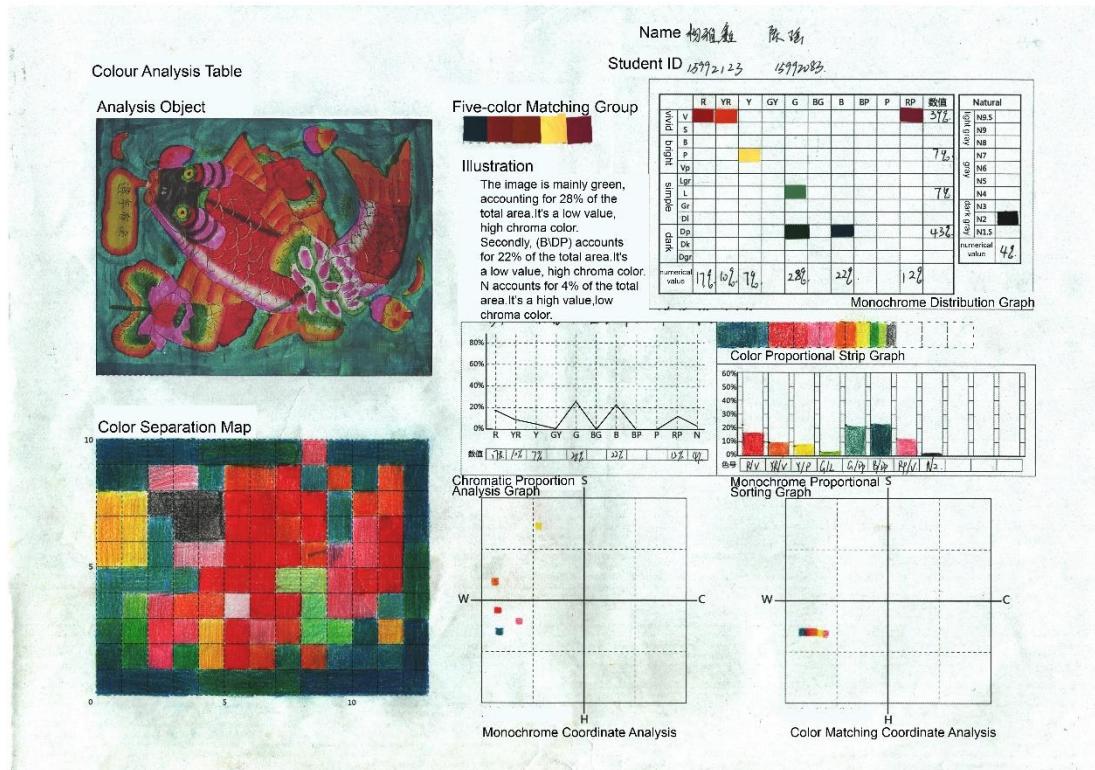


Fig. 7. New Year Picture Tank Fish Color Analysis Training (Yixin Yang, Yan Chen).

3) Training goal: The goal of the training is very clear, including two points. First, let students master the basic method of color measurement through color card, and secondly, let students know how to make quantitative analysis of the data through color analysis table.

Of course, after the completion of the training, students are also expected to summarize the rules and lay the foundation for the color investigation in the future professional design courses.

4) Training process: The training involves dividing students into groups of two to three people. Because color card comparison has certain subjectivity in color measurement, it can not only rely on one student's judgment to produce results, but also need two or more students to confirm their color. Therefore, doing this can avoid the errors caused by personal factors as far as possible.

At the beginning of the training, the team members need to use color cards to compare and record the color of each part of the object. Then, color pencils with similar colors are selected and painted in the grid to "mosaicize" the tested object. In the process of painting, if the color is covered with one grid or more than 50%, it will be calculated by one grid, if less than 50%, it will not be counted, in order to avoid the occurrence of half grid. In this way, only color can be used to restore the object under test. This step does not require students to draw the measured object again. On the one hand, it is convenient for students to understand the color "impression" of the measured object; on the other hand, it is convenient for statistics and analysis of data.

After finishing the painting, the monochrome composition of the object will be analyzed first. The specific steps are to feedback each color measured to NCD hue table, and calculate the proportion of each color, and fill in the numerical value of the proportion in the hue table. Through this step of filling in the form calculation, we can see the relationship between the color distribution of the tested object, and the proportion information of color and non-color. Then five colors with the highest proportion are selected to form a five-color matching group according to the color matching relationship of the original object, which is the combination that best represents the color impression of the tested object.

In addition, its color ratio strip map and color distribution map can also be obtained based on the analysis of its monochrome data.

Finally, the coordinates of NCD monochrome and color matching image are used to mark the position of monochrome and color matching, and the information of color impression and corresponding color language is analyzed by coordinates.

The training is classroom training, and the tested object is printed manuscript, so its color reductivity is deviated. However, in order to teach smoothly and orderly, this is only a compromise, abandoning a certain degree of authenticity. From the whole course point of view, the follow-up supplements the field survey homework, so that students can stay in the real environment to investigate the color of buildings, landscapes, clothing, products and other objects, to make up for the lack of practice in class.

VI. CONCLUSION

Over the past three years, the contents and methods of teaching have been constantly improved and innovated. Students' attendance and concentration in class are also very high, and the teaching effect is very good.

After introducing NCD color system, the quantitative analysis of color is made, to make the teaching more theoretical and operational. Students' perception of color has also risen from the initial perceptual perception to the rational perception and even the degree of analysis and use. The transformation from painting color to design color and then to color design was well completed. It is more closely linked with the follow-up design courses, and lays a solid foundation for the further improvement of students' professional ability in the future.

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