Application of color matching in the design of network instructional platform

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ABSTRACT

With the popularity of network, network instructional platform, as a kind of new learning means are thriving, and it also caused the attention of many scholars and research both at home and abroad. As to the discussion of online course artistry, especially the study of the color collocation of the network instructional platform is also more and more. But much of the research focuses on the theoretical level, such as research of color principles and research of color collocation. Most of these studies based on the theoretical arcane, have a far of contact with the color collocation of the practice in the design of network instructional platform. At the same time as the result of these theoretical research, on the basis of the universality principle of color theory, often not well combined with the interactivity of network instructional platform, which is strong, dynamic media, as well as the combination of a variety of media. At the same time, these studies did not focus on essential characteristics of the network instructional platform, which is a teaching tool, because of this feature, it has to complete the various tasks of teaching. So this article will explore by using the method of literature research and survey of the application of network instructional platform of color matching. By analysis of the actual case, the problems in the color collocation of the network instructional platform are presented, and good application of the principle is proved. Finally we will also discuss the application of color matching software on the network instructional platform, to further understand the principle of color collocation in the design of network instructional platform, expecting to further discuss and solve the problem of the network instructional platform design of color matching.

Key words: Network instructional platform; the color problem; color matching
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INTRODUCTION

Network instructional platform is a contemporary teaching tool based on the popular technologies of HTML, JavaScript, flash and so on. It can give a perfect exhibition of the knowledge you want to demonstrate. It provides a countermeasure for solving the uneven distribution of educational resources, quickly updated of information, learning at anytime and anywhere. For the advantages at vivid explaining, abundant contents, interactivity, network instructional platform was developed more and more at many fields. Even so, there still many problems existed in the artistic quality of the network instructional platform. For example, color matching was inconsistent with the subject. The text and the background were difficult to distinguish and color matching was applied excessively. Color matching played a vital role for the quality of a network instructional platform, moderate expression of colors can make a network instructional platform more accurate and vivid. However, nearly all of the study of the color matching in network instructional platform design focused on the theory and the principle. The discussion about the practice of color matching in network instructional platform couldn't solve practical problems. It is necessary to put the color matching into practice in network instructional platform.

COLOR MATCHING PRINCIPLES

1. The principles of colors
At least three elements were needed to define a color: hue, saturation and lightness. Hue was a color's name as we

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generally speaking which is a standard about distinguish different colors. Saturation was the purity of a color which means the standard color quantity of a color contents. Lightness was the brightness of a color which reflected the shade changes of a color.

1.1 Contrast type of colors
The contrast type of different colors usually depended on the distance and angle in a color ring. The smaller angles between two colors, the weaker contrast between them. A 12-color ring was shown as Figure 1. And the relationship between contrast colors was also listed in Figure 2.
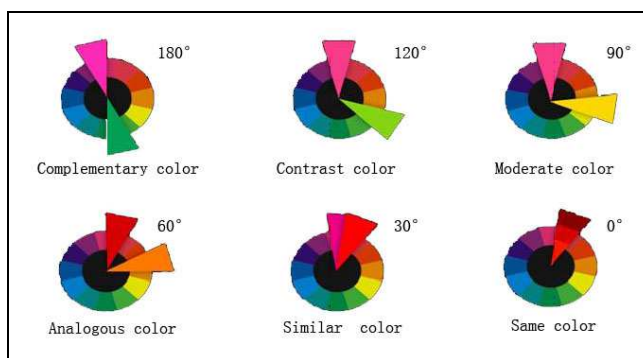

Fig.1 12-color ring

Fig.2 Comparison between different colors

1.2 Color pattern
The RGB color pattern used on the displayers was based on the change of the three color (red, green and blue) channels. The superposition between each other could get all the colors. It was the main influence factor of the artistic of a NC who always used on a displayer. RGB color pattern distributed the intensity values ranged from 0 to 255 for each pixel. So, it could make 16777216 (256*256*256) colors on the screen according to different proportion among the three colors. The panel adjusting the color in adobe photoshop through the RGB was shown in Figure 3.

Fig.3 RGB color palette

2. Color psychology
Color could affect our emotions, activate our feelings [1]. The influence of a color could be common, such as the perception of warm and cold for a color. But different person had different feelings about the same color for their difference at cultures, backgrounds, regions, ages and professionals. Herein, a few respects of the color was sorted out.

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2.1 Cold and warm colors
Red color usually associated with flame, orange made people feel warm. Green and blue color usually recalled the blue sky or the cold snow. We always divided color into warm and cold colors for the perception of different person. Warm colors stand for passionate, warm, energy, enthusiasm and so on, while cool color means calm, cool, soothing and so on. Warm colors and cold colors were respectively shown in Figure 4.

Cold colors   Warm colors

Fig.4 Cold colors and warm colors

2.2 Weight of colors
Color could display a feeling of weight, while different colors exhibited different feeling of the same object. As what was shown in Figure 5, two objects had the same weight of 10 t, but the black one feels heavier than the blue one. This might because for the black usually stands for thick and deep, while white means light and lively. This reflected the feeling of weight for different people, the lower of brightness and saturation of a color, the heavier of the weight of a color.
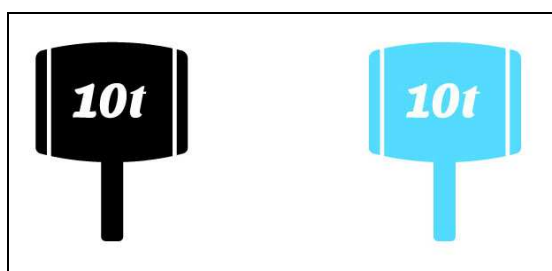
Fig.5 The comparison chart of weight with different color

2.3 Expansion of color
Two models with different colors and same shape gave a feeling they were different in size. This was the expansion of a color. As was shown in Figure 6, A and B were two models with different colors and same shape. While the picture showed as if A was greater than B. As for as hue was concerned, the warm colors stand for expansive, such as red and orange, while cold colors mean contractive, such as blue and purple. As for as lightness was concerned, a brighter color usually gives a sense of expansion, while a darker color always give a sense of contraction.
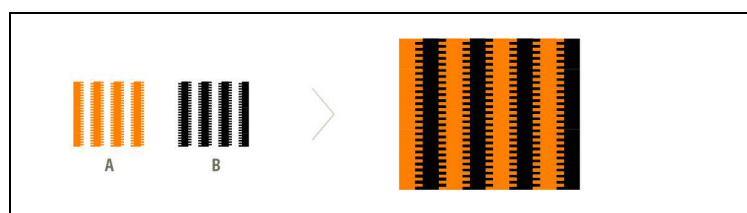
Fig.6 The comparison chart of expansion with different color

2.4. The sense of back and forth of color.
Two objects with the same distance but different colors usually gave a feeling of different distance [2]. This was the sense of back and forth of color. Generally speaking, complementary colors gave the strongest contrast in vision. The typical complementary colors were "red to green", "yellow to blue" and "white to black". While the red, yellow and white objects usually stand in the front. In terms of Lightness, high lightness usually stands on the front, while low lightness stand on the back. In terms of saturation, high saturation colors stands on the front, low saturation colors on the back. A sense of space could be created by different color when a design was proceeding. And the object could be emphasized from the multitudinous substances. The sense of back and forth of color was shown in Figure 7.
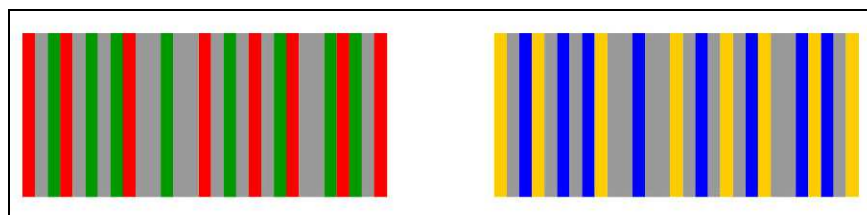
Fig.7 The sense of forth and back of color

2.5. The meaning of the color
Color itself was meaningless, while a color always made one think of certain things, or certain memories, so that affecting our emotions [3]. When color brought the experience or the previous recognition to one's mind, it would have a certain meaning. Herein, the meaning of color was brought out from the experience behind the color itself. While a color might bring out different meaning for different person for they had different experiences. A universal significance of color was sorted out in Figure 8.

Fig.8 The meaning of different color

3. Color preference of different groups
The color preference of different groups was various [4]. Herein, the color preference of the youth was surveyed for they were the potential users of the network instructional platform. What were shown in table 1 were three surveys among the youth, the undergraduates, the men and women from the literatures. Conclusions could be summarized that: (1) The fashion colors are blue, green and black; (2) people prefer to warm colors; (3) gender, age, geography, culture all impacted people's color preferences.

Table1. The survey on color preference

NO	Crowd of survey	Order of color preference	Influence factor
1	the youth	blue ,red, white, black and yellow	meaning of a color
2	the undergraduates	white, blue, black, yellow, green, gray, orange, purple.	cold color
3	the men and women	men: blue, green, and black women: blue, purple, green	sexuality

PROBLEMS OF COLOR MATCHING IN NETWORK INSTRUCTIONAL PLATFORM
The problems exist in the design of network instructional platform by analyzing 60 excellent network instructional platforms which are the national award-wining in the platform of "www.uken.cn".

1. Inconsistent of color and the theme in network instructional platform
Different learning contents for each of the network instructional platform will be correspond to the various learner characteristics. Therefore, the color collocation of network t instructional platform will be consistence with the theme of the network instructional platform according to characteristics of learner and learning content.

Through the investigation on the 60 network courseware, the proportion of choosing the main colors is shown in figure 9. From figure 9, we can see that the network courseware used blue accounted for 36.7% , especially in the
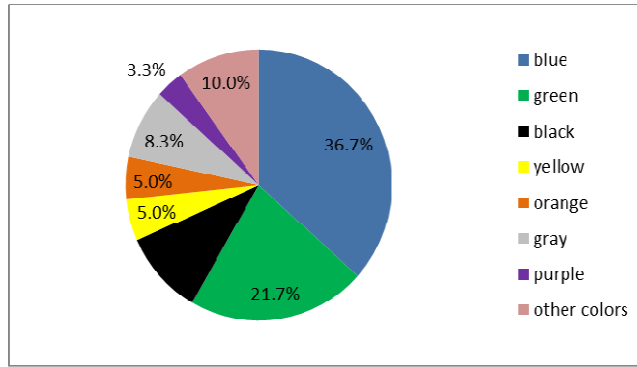
Fig.9 The proportion of the main color in network platform

multimedia class, information technology, English, economics, management and other network courseware. Blue color is much in use which neglects the theme of courseware in the process of color design. Figure 10 shows that the courseware interface is formed by the collocation of deep blue and yellow, as is shown in the "network course in 2D animation". The collocation of deep blue and yellow embodies energy and the sense of strength, but it fails to meet the sense of lovely and dynamic which is often shown in the animation; Network courses of "University Sports" are adopted solemn rational gray color. This collocation shows a metallic texture, however, it fails to reflect the physical sense of movement, power and the spirit of tenacity.

Network instructional platform of two dimensional animation   Network instructional platform of university sports

Fig.10: examples of Inconsistent of color and the theme in network instructional platform

2. Not uniformity is existence in the color collection of network instructional platform

Network instructional platform has the characteristics of flexible interaction, so students can jump to another page from one page. Therefore, the pages in the teaching web site are relatively independent [5]. However, for the whole network instructional platform, each page has the integrity. Therefore, uniform color and the overall of color collocation are required in the color design of network instructional platform. There are 8 network instructional platforms that are not unified in the color design accounting for 13.33%of the proportion of the total. As is shown in Figure 11, there are two interfaces based network instructional platform in the "management". The front page uses red and black color and the content page uses the collocation of green and blue .From this we can know, the colors are not uniform whether from the hue, lightness, purity. If you do not see the specific learning content, you even think these are two courseware interfaces. Through analysis of color from 60 network instructional platforms, it comes to a conclusion that the number of color used in the higher winner order is three. The requirement of the proportion of three colors is that the main color is one color or a color system and other colors are embellishments.

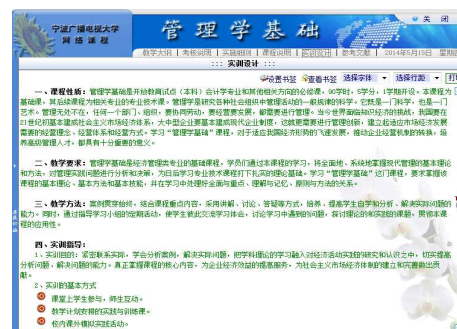Index page   content page

Fig.11: the interface of network instructional platform of basic management

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In addition, although complex color is not included in the problems of collocation color in the network courseware, we also need pay attention to it. There exists the problem in the design of individual courseware. For example, seven or eight kinds of colors are included in the network courseware which results in color confusion; a variety of contrasting colors, and blocks are obvious which lead to the whole messy.

3. The weaker color contrast in network instructional platform

Color contrast means that the difference of color. The greater in the difference, the stronger in the contrast .On the contrary it is weak. But the contrast in the page can cause the attention of students, highlight the theme and play the role of stress. But the discovery in statistics that there are some comparative weak pages in the 10 platforms from 60 network instructional platforms. These websites that do not have contrast in the contrast are easy to cause the difficulties of students' reading or ignore certain teaching content. Gray text with high brightness goes with white background whose brightness is relatively high, so the overall content is too bright and gray which is not conducive to read. The weaker color contrast example in network instructional platform is shown in figure 12.

Fig.12 Example of improper selection of background and text colors

4. Disharmony in color harmony of network instructional platform

The harmonious color in network instructional platform is that the collocation of colors is harmonious, natural and unity and the collocation of colors is beautiful. Color harmony refers to more than two kinds of colors organize together in phase and orderly, which makes people happy [6]. In the color design, colors that are different obviously are combined together effectively which can get a harmonious effect. A good coordination is that the colors are harmonious among hue, lightness and purity. The research is made in the network instructional platforms that have been collected. 16.7% of the all network coursework have the problems of disharmony color. As is shown in Figure 13, the network courseware of "automatic control principle" choose the collocation of solemn, dull black and smart, lightweight, mysterious purple blue color. Purple blue with white has a magic feeling and the sense of color is light. Thick black is too heavy and the top-heavy color give people a sense of disharmony. Although the title color and body color is consistent, the color is too impetuous, and it did not achieve good coordination with the black background.

Fig.13 Interface example of color collection in network instructional platform of "automatic control"

THE PRINCIPLE OF COLOR DESIGN IN NETWORK INSTRUCTIONAL PLATFORM
1. The color design of network instructional platform should be distinctive and pay attention to the theme

Network instructional platform deliver teaching information to the learner and create the environment of learning or exchanging for learners. The information and method will be transmitted by network instructional platform interface should be unified. Different contents of network instructional platform should be conveyed by different colors [7]. Color design of network instructional platform is based on the learning object and teaching content. So it reflects the

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distinctive features and teaching subject. Color tone refers to the feeling of overall color. The color has the symbolic. Different colors have different feelings giving people different feelings. The network instructional platform tone is determined according to the symbolic color. Through interviews with the users, we can know that cold tone gives people the feeling of quiet helping to create a learning environment and though we watch the cold tone for a long time, it is not easy to cause visual fatigue. Therefore, the selection of color tone in the network instructional platform is general cold tone and it is purity is slightly low.

2. The network instructional platform is designed with the overall color
Network instructional platform is composed of a series of webpages. When a user browses a website, the first concern is the overall feeling of platform. Then he will pay attention to detail. Color is one of the visual elements, mainly reflecting the style of the network instructional platform. Therefore, design style of interface color should be holistic. Determining the standard of the network instructional platform is the first step. The standard color for logo, title, navigation and other content of network instructional platform should be selected according to the color tone of the network instructional platform. The selected standard color is changed by other colors used for the embellishment, foil, so as to highlight the theme or to create learning environment for the students. We should pay attention to the application of various colors and they should not be over standard color and not overwhelming.

3. The contrast of network instructional platform
Network instructional platform is formed by web pages with a variety of elements. The importance of various elements is not the same. The importance of some elements is higher than that of other elements. Some elements are correlative but some are not. In the process of the platform design, various elements within the Webpage are reflected through the contrast of colors. Color contrast can highlight or underline something. In the development process of network instructional platform, teachers usually use a change in hue, lightness, purity and color, color, shape, area and position changes to highlight some course content or the teaching link. Two mutually contrasting colors, such as red and green, are near and put together, then their saturation of color is visually enhanced. Their hue and purity are more strongly [8]. In the design process of the network instructional platform, generally, dark text is used on a light background, or light text is used on a dark background. The blue text is easy to be identified on a black background, while it is not easy to identify in the red background. The color contrast can effectively attract the attention of the learner, and it should be used properly in the design process of network platform.

4. The harmony of the network instructional platform is harmonious
The coordination of harmonic color is also paid attention to when we contrast the color in the color design of network instructional platform. Harmonic is the most basic form of the beauty of color. Color harmony is not to make the color same, but make significantly different colors harmonious and unified according to certain order giving people a feeling of harmony and beauty [9][10]. Color harmony is designed to make the network instructional platform coordinate and unite in the contrast. In the process of color design of network instructional platform, if the contrast of hue is strong, we can achieve coordination between color through adjusting the color brightness and purity. The unity and harmony of the color include the harmonic of color, purity and brightness.

EXAMPLE OF COLOR DESOGN IN THE NETWORK INSTRUCTIONAL PLATFORM OF THE MORDEN EDUCATIONAL TECHNOLOGY
1. Introduction of the morden educational technology course
The capability of educational technology is one of the basic qualities of modern teachers. its core is the information instructional design ability which contains reasonable use of new technologies (mainly the multimedia and network technology), scientific and specific planning of the teaching process, teaching activity and teaching step based on the teaching theory and learning theory, promoting the cultivation of innovative talents.

Around the public course of education technology opened in Pedagogic specialty of Hebei Normal University of Science and Technology. Research group developed the "educational technology" network instructional platform, which has won the second prize in the Hebei province education software competition and the third prize in Design Award in the Thirteenth National multimedia courseware competition. This courseware not only services for the classroom teaching as a demo courseware, but also can be used as learning courseware assisted autonomous learning "in the network instructional platform of educational technology" course. It's core is to concern about the ability of educational technology of students in Pedagogic specialty .It refers to the aspects of basic education, information technology, campus information, instructional design, design and development of digital resources. It simultaneously has the strong artistic.

2. The example of color design in the network instructional platform of "modern educational technology "based on the color-ring
Color design of network instructional platform is to pursue the visual effects "harmonious, unified and strongly

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contrastive" visual effects. Analog color will have a harmonious effect. Complementary color can produce contrast effect. Use the color wheel, choice of analogy and complementary color, color design, the design of network instructional platform. Color wheel of the highest saturation is shown in figure 14. It is obtained from in 12-color ring through adding white color circle and black circle.

Fig.14 Color wheel of the highest saturation

How to design color collection in network instructional platform by the color wheel colors? We will have a try in color design in the network instructional platform of "modern educational technology". The line draft of the platform is shown in figure 15.
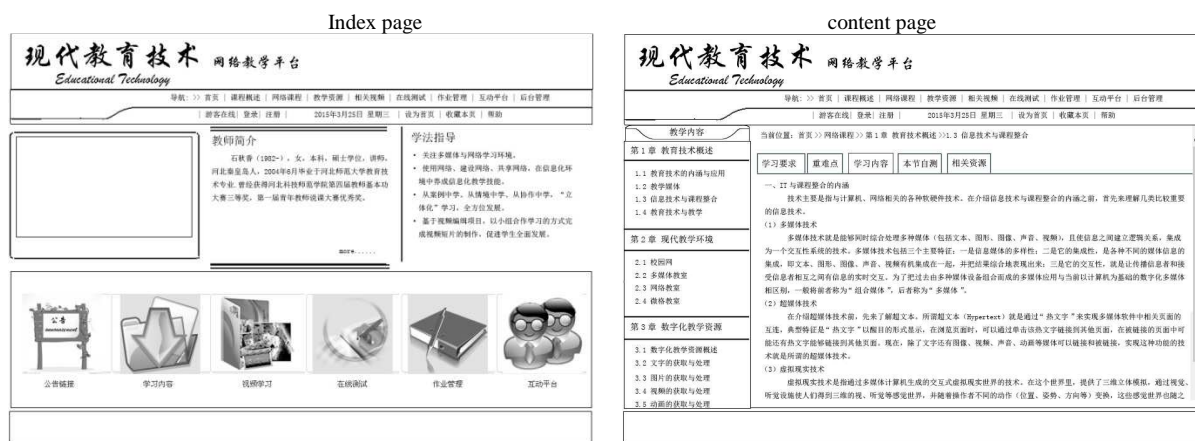

Fig.15 Line draft of network instructional platform of "morden educational technology"

The selection of color is based on the content of "morden educational technology" course. The core of this course is the application of information technology in teaching processing, which emphasizes science and technology. Therefore, we design that the background color is the grass green color and the contrast color is red. The complementary analogy in the hue disc is shown in Figure 16. This is a very youthful hue, like the scene of the
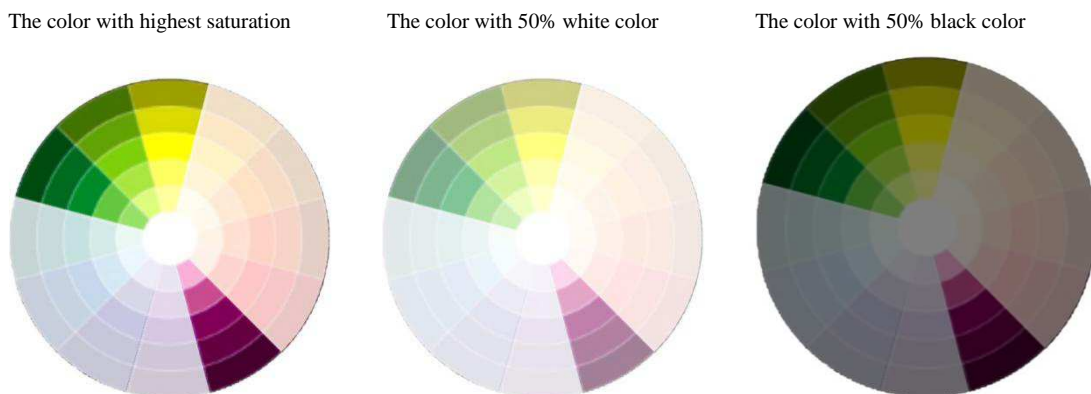

Fig.16 different color wheel with different saturation

flowers in spring. The changes of lightness and darkness form the beautiful grey tone. This tone coincides to the nature scene .Colors from the nature. Now we try to mix colors on fig 15. The color of large area uses as the background color used the color darker green; then we choose light green with high brightness. Finally we will use the red on the region to indicate emphasis or contrast. For the color of the text, we select light green with red. So, the basic color collection of network instructional platform of educational technology was designed. We attempt to construct the color of network instructional platform of "modern educational technology" as is shown in the figure 17.

Fig.17 The example of color collection in network instructional platform of "morden educational technology"

CONCLUSION

In this paper, it is realized that the importance of color design in the network teaching platform. Try to design the color collection in the network instructional platform based on the hue circle. Color matching principles are introduced firstly. Then, the principles of color design in network instructional platform are showed. By combining analysis of the actual case ，the problems in the color collocation of the courseware is a more intuitive, but also we would have a good application of the principle. Finally we will also discuss the application of color matching software on the network courseware, to further understand the principle of color collocation in the design of network courseware, expecting to further discuss and solve the problem of the network courseware design of color matching.

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