

A Combined Approach to Web-Based Digital Color Design Education

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ABSTRACT

With digital color management a necessity for multimedia designers, this study proposes a university-level color design curriculum for digital color learning as well as traditional color learning. As an interactive design learning environment for the new curriculum, this study created a digital color design education environment that combines face-to-face instruction and web-based instruction. Through a case study of this combined approach to web-based digital color design education, this paper illustrates the effectiveness of the proposed digital color curriculum and the education environment.

1. INTRODUCTION

As a result of the rapid development of media technology, multimedia designers have become increasingly aware that existing skills cannot simply be transferred from print to screen-based design.¹ In particular, traditional theories and skills for using color are not enough for designers to be able to implement colors across a range of digital media in a relevant and sophisticated manner. For the above reasons, the traditional color curriculums and pedagogies, which are based on analog environments, are not sufficient to teach the emerging color theories in digital media; therefore, a new way of developing digital color curriculums and learning environments needs to be investigated.

2. DIGITAL COLOR DESIGN EDUCATION

The phrase “digital color” has been frequently used in recent years; however, its definition is still somewhat ambiguous. In this study, digital color is defined as the color which is generated, edited, displayed, or printed by a diverse range of digital devices. Digital color is described using numbers from different color models such as RGB, CMYK, HSB/V, and CIELAB, among others.²

As multimedia designers create visual, audible, tactile, and kinetic experiences with digital devices, they have to understand the following two principles: how colors are generated by a computer and then reproduced on screen, and how colors remain consistent when used in different programs and operating systems. For these reasons, designers need to learn the digital color principles, and practice digital color management in a diverse range of digital devices and graphic design software. However, in order to utilize digital colors in an effective way during the design process, knowledge of traditional color theories is a requisite as well as understanding color usage in various traditional contexts. Therefore, this study proposes a new digital color design curriculum that provides digital color learning, as well as traditional color learning.

Through the digital color design curriculum, which is provided in both analog and digital environments, students can learn about the multi-modal features of digital color in the following four steps: first, by studying traditional color theories, such as basic color theories and color psychology disciplines; second, by understanding digital color based on the comprehension of color features and digital color management in various digital devices; third, by practicing with digital color in two- to four-dimensional graphic design programs through integrating the visual, audible, and kinesthetic modalities of color; and lastly, by reviewing peer designs and methods of digital color application, and sharing diverse opinions and viewpoints about colors with peers. Figure 1 shows an overview of the digital color design curriculum.

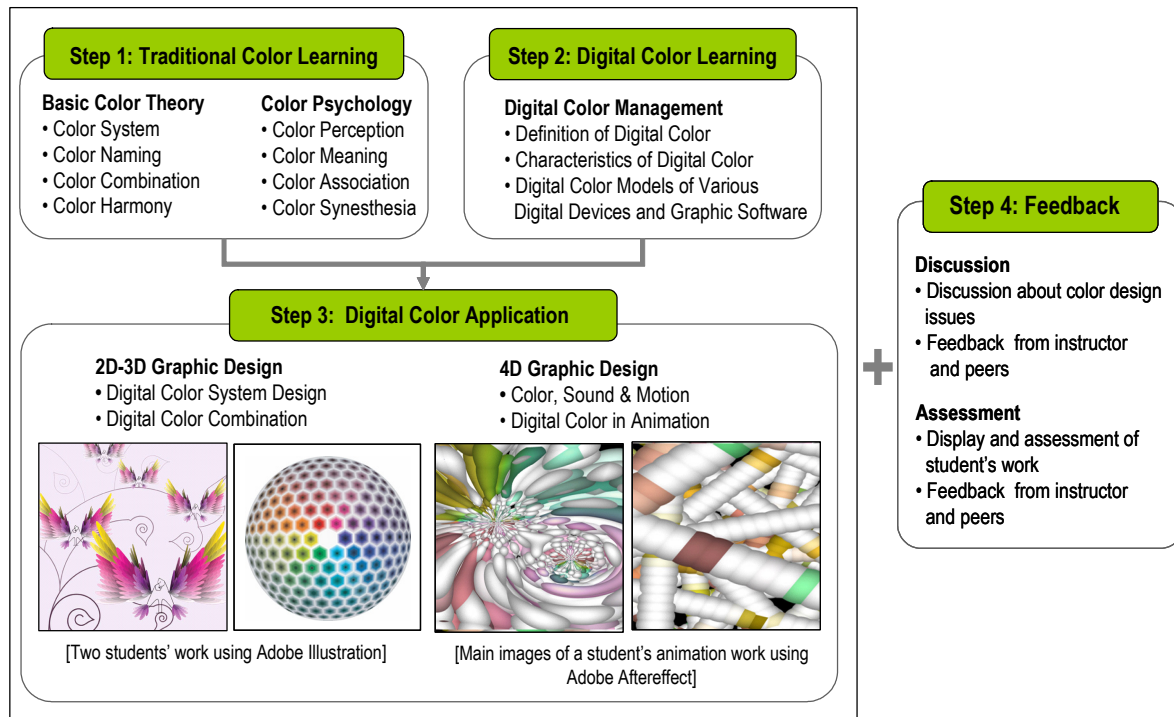


Figure 1: An overview of the digital color design curriculum

3. WEB-BASED DIGITAL COLOR DESIGN EDUCATION (WBDCDE)

The use of computers in educational contexts has caused significant changes from both perspectives of learning and teaching. Web-Based Instruction (WBI) can be used to supplement face-to-face teaching by providing a learner-centered environment where students can study with temporal and geographic flexibility, and communicate with lecturers, peers, and course materials in various ways.³ Although easy access to the web helps students to regulate their learning, students with low motivation tend to fail in the web-based education environment. In addition, even though there are many diverse online communication opportunities, there are not enough to create a close relationship between the instructor and the students. Therefore, in order to increase students' motivation and interactivity, this paper suggests a new education environment that combines face-to-face education and web-based education.

Meanwhile, the WBI can provide different approaches for design students to learn about digital color: instructors can provide lecture materials and online reference resources; students can more frequently discuss and share their comprehension of the use of digital color in different contexts; and students can display their work and receive more feedback from instructors and peers. In particular, the multi-modal experiences created by digital color cannot be taught by reading books or by learning through traditional lecture-based methods.⁴

4. CASE STUDY OF WBDCDE

In order to ascertain the effectiveness of the proposed digital color education curriculum and learning environment, a case study was conducted in two "Digital Color Design" classes at Hongik University in the Spring Semester of 2004.⁵ Twenty-three students majoring in multimedia design registered for a 16-week class which was then divided into two smaller classes of eleven and twelve students. As a venue for supporting students' digital color design processes, a website for WBDCDE was designed and created with four menus. Table 1 explains the tasks of each menu.

During the implementation of WBDCDE in both the online and offline environments, four assignments related to the four steps in the curriculum (Figure 1) were suggested. The assignments were suggested in order for the students to understand both traditional and digital color theories, as well as learn about digital color applications by practicing with the multi-modal features of digital

color. Table 2 explains each assignment in terms of the related curriculum steps, purpose, process, and tools. Figure 2 shows two students' work for the suggested Assignment 1 and Assignment 4 which were designed together using world-renowned graphic designer Neville Brody's color design strategies. In the process of each design project, students could receive feedback in three different ways: by discussing their work's design concept in the Communication menu, by presenting their work in a physical classroom, and by uploading their final designs in the Gallery menu. In particular, students were asked to participate in the assessment phase of learning by reviewing other students' work in the Gallery menu. The Gallery and Communication menus were used to build knowledge among students or between the instructor and students, emphasizing collaborative and social knowledge construction.

Table 1: The four menus on the website of WBDCDE

Menu	Tasks
Information	The instructor informs students of changed lecture schedules, deadlines of assignments, the current color news, etc.
Lecture Room	The instructor provides lecture materials, reference resources, and feedback on student questions.
Communication	Students discuss diverse color design issues such as color & emotion, talk about their design concepts, and receive feedback from the instructor and peers.
Gallery	Students archive their work with a short explanation so they can receive feedback from the instructor and peers, improve their work, and gauge their own progress.

Table 2: The four suggested assignments

Step	Assignment / Purpose	Process	Tool
Traditional Color Learning + Feedback	1. Color Analysis of Artist's Work: To understand basic color theories such as color combination and color harmony.	1. Research a famous artist's color strategies. 2. Extract color palettes used in the artist's work and the impression of the work. 3. Design a two-dimensional image (12cmX12cm) using the color palettes and the student's own design language.	Adobe Photoshop or Painter
	2. Color & Smell: To understand color psychology by testing synesthesia between color and smell.	1. Compare a perfume's real smell with the associated smell by seeing colors of the perfume's content, bottle, and package. 2. Compare the perfume's real content color with the associated colors by smelling the perfume.	Paper wrapped perfumes and unwrapped perfumes
Digital Color Learning + Feedback	3. Design of Digital Color Palette: To understand characteristics of digital color and to practice digital color models.	1. Draw an object and divide its surface into as many smaller parts as possible, while considering the cubic, perspective, and spatial effects. 2. Set up principles of Hue, Value, and Saturation, which are expressed on the objects. 3. Fill small parts of each object with colors from one of the color models RGB, CMYK, or HSV, according to the above principles.	Adobe Illustrator
Digital Color Application + Feedback	4. Digital Color in Animation: To practice multi-modal features of digital color.	1. Select color strategies to fit a design concept from artists' color strategies previously analyzed by classmates. 2. Design a four-dimensional digital content focusing on previous color learning such as color emotion & synesthesia, basic & digital color theory, color perception, etc.	Macromedia Flash, Adobe After Effect, or 3D Max

5. ANALYSIS OF THE CASE STUDY

As a design learning environment, the effectiveness of WBDCDE was analyzed by student work, peer reviews, and questionnaires. Student contributions and actions on the website were recorded and analyzed. The amount and quality of each student's participation in the Communication and Gallery menus were analyzed to identify the student's motivation and achievement. There was a strong relationship between the quantity and quality of a student's online participation and the student's success in the assignments. As a consequence, it can be assumed that the students who had a high participation rate came to know "how to learn" rather than "what to learn." For example, students who actively posted their opinions and critically reviewed peers' work created more appropriate design solutions than students who passively participated. However, the students who had a low participation rate were given extra motivation by the instructor in the offline classroom, and then they gradually improved their online participation and work quality.

From the analysis of the questionnaires, the result was that all students were very satisfied with the boundless interaction in the online and offline classes, while the instructor referred to the double burden of responding to students and reviewing their learning. Moreover, the instructor dedicated a great deal of effort and enormous amounts of time to planning and developing the WBDCDE website. In order to implement web-based learning and realize its benefits, time management and financial support must be considered as important factors.

6. CONCLUSIONS

This study focused on reconstructing the traditional color design curriculum to include digital color learning and re-addressing computer technology as an effective educational pedagogy and learning environment. The digital color curriculum helped students to expand their range of color usage and create their own special color palettes with greater comprehension of digital color and greater competence in skillful digital color management. The web-based instruction supported the face-to-face instruction by providing students with more opportunities to see, feel, and experience color, and then helping students to improve their sensitivity to color applications. It is hoped that this study will provide a new perspective on color education curriculums in the digital era and illustrate how the web environment can be used as an alternative platform for learning-centered digital color education.

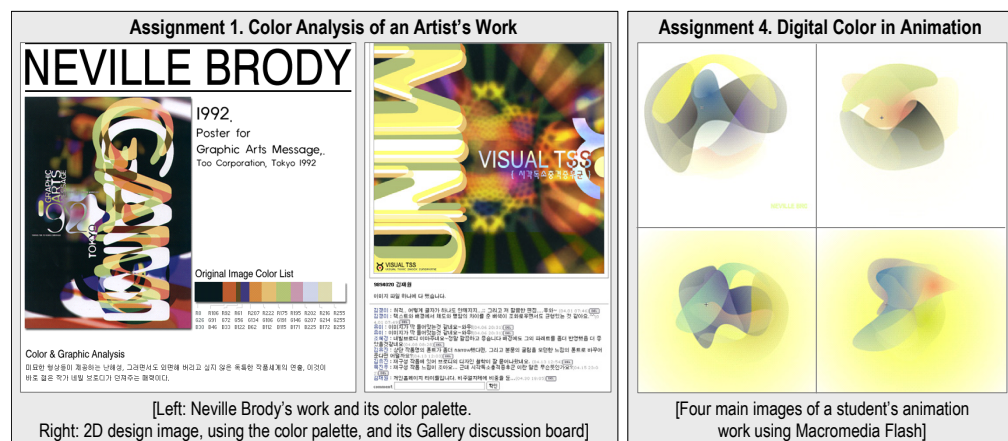


Figure 2: Assignment 1 and Assignment 4 which are based on Neville Brody's color design strategies.

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