

# Interactive Media for Illustrating and Testing Color-Deficient Vision By Using the Color Grading Technique

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## ABSTRACT

The purpose of this research is to create illustrating and testing color-deficient vision by using the color grading technique. The color grading technique is a process of adjusting - changing colors, creating exotic images and colors, doing some or all portions of a picture to match the mood and story of the image or video, based on the ability and creativity in color adjustment to convey that need to be recognized. This research has 4 specialists who was evaluated contents, media by ophthalmologists and optometrists from Thammasat Hospital. The sample of this research is students in grade 10-12 who study capacity building programs in science, math, technology and the environment from Pibulsongkram School in Lopburi that has 122 students. The result found that the quality content by specialists on interactive media for illustrating and testing color-deficient vision by using the color grading technique have overall average score 4.43 in strongly agree level and quality interactive media has overall average score 4.67 in strongly agree level. Besides, the satisfaction of the sample towards the interactive media was also in strongly agree level at overall average score 4.66. Moreover, the research exhibited that the interactive media was able to interact and provide clearer vision of color deficiency by using the color grading technique. In conclusion, 100 percent of the experts and 98.36 percent of the samples suggest to use the interactive media as an instructional media and color deficiency test.

**Keywords:** Colorblind / Color Deficiency / Color Grading Technique / Interactive Media

## 1. INTRODUCTION

Human color vision is based on the ability of the cone cells in retina. Normally, the cone cells are classified into three categories according to their primary light sensitivity: green, red, and blue. If the cone cells are disorder, the person could be color blind. [1] Color blindness is a condition in which a person cannot distinguish colors because of the unusual color vision. It makes it impossible to see the difference in color schemes that are similar or sometime cannot see any color at all. Colorblindness is more common in men, approximately 8% women only about 0.4% of the total population [2].

Interactive media communicates by the result that the program is shown the input data by viewers. It can make viewers engaging and interacting with it. Examples of interactive media that can be found in general is social networking site. It uses graphics and text to allow viewers to share photos or information about themselves, also playing games or chat. Interactive media is a combination of digital media, text, graphics, sound, images, and video media, which can present texts or images. The viewers can understand the information that need to be presented it very well through the interactive media. [3]

The current survey found that the media which presents the information about color blindness is only a few and not widespread. As a result, people misunderstand about color blindness by thinking people with color blindness cannot see the color or can only see just black and white. Medically, color blindness is caused by problems with the color distinction of certain objects, such as people with protanopia can sometimes distinguish red color because they were taught to call that color is red. In fact red in their vision is different from people with normal vision. This can cause harm to themselves and others if they have a career that use colors to tell the different. [4]

From the above mentioned, we made interactive media for illustrating and testing color-deficient vision by using the color grading technique for people without color blindness to acknowledge how people with color blindness see different from normal vision. Using Color Grading Technique is a process of adjusting - changing colors, creating exotic images and colors, doing some or all portions of a picture to match the mood and story of the image or video, based on the ability and creativity in adjust colors to convey that need to be recognized.

## **2. OBJECTIVES**

1. To create interactive media for illustrating and testing color-deficient vision by using the color grading technique.
2. To evaluate the quality of interactive media for illustrating and testing color-deficient vision by using the color grading technique by specialists.
3. To evaluate the satisfaction of interactive media for illustrating and testing color-deficient vision by using the color grading technique by sample.

## **3. SCOPE OF RESEARCH**

Interactive media for illustrating and testing color-deficient vision by using the color grading technique is useful to be tested for people with color blindness. Also, it is a media that can educate people about color blindness, to understand the different type of conditions. Using the color grading technique is a process of adjusting - changing colors, creating exotic images and colors, doing some or all portions of a picture to match the mood and story of the image or video, based on the ability and creativity. Using color is to convey the meaning that media want to be produced. Interactive media designed as a medium where users can engage and interact with the media by pressing the Space bar and press the mouse through the media, with the result that the user presses.

## **4. PROCEDURES**

### Participants

#### 1. Specialists

Specialists used to determine the content, including ophthalmologists, optometrists specialists from Thammasat Hospital 4 people and specialist media 4 people.

#### 2. The samples

The samples were selected from the population by purposive sampling [5] from capacity building programs in science, math, technology and the environment, Pibulsongkram School that has 122 students in Lopburi Province.

The process of creating tools have process design and create by 1) Defining the purpose and content of the guidelines for the implementation project in compliance with the scope

specified 2) Study and research information that involved on purpose and content offered through the testing color-deficient vision 3) Determine the content and scope of work. 4) Exploring information about testing color-deficient vision from ophthalmologists, optometrists specialists. 5) Study color grading technique 6) Design tool by analysis information to design the layout of the presentation. It is divided into two parts: one part design the content and another part design the format of presentation. The design includes of graphics, colors and fonts and interactions with users.

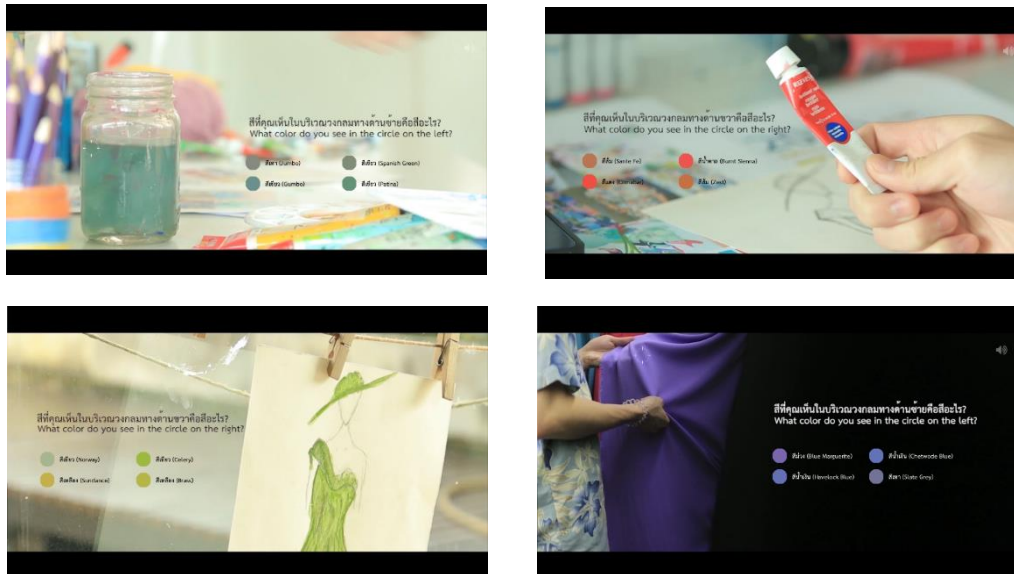
Interactive media designed as a medium where users can engage and interact with the media by pressing the Space bar and press the mouse through the media, with the result that the user presses. When the user selects the color that is visible to match the visualization of the story on the interactive media, all the events will display the user's color vision defects.



**Figure1** Show design in first pages of interactive media for illustrating and testing color-deficient vision by using the color grading technique.



**Figure2** Show the sample of content about color deficiency in interactive media.



**Figure3** Show sample about selective colors and test color deficiency in interactive media



**Figure 4** Show the results of the initial screening color-deficient vision in interactive media

### 3. RESULTS AND DISCUSSIONS

The evaluation results of interactive media for illustrating and testing color-deficient vision by using the color grading technique can be divided into 2 areas (content, media)

Basis of the average of each measure against criteria that have been set up to interpret for their quality of interactive media for illustrating and testing color-deficient vision by using the

color grading technique [6]

4.21 – 5.00 = strongly agree

3.41 – 4.20 = agree

2.61 – 3.40 = neither agree nor

1.81 – 2.60 = disagree

1.00 – 1.80 = strongly disagree

**Table 1** Show quality of content from interactive media for illustrating and testing color-deficient vision by using the color grading technique, which evaluated by 4 specialists.

Questions	Mean	SD	Scale
1. Content is suitable for the media.	4.50	0.58	Strongly agree
2. Content is suitable for viewers.	4.75	0.50	Strongly agree
3. Content is accurate.	4.50	0.58	Strongly agree
4. Proper content presentation sequence.	4.75	0.50	Strongly agree
5. Content has a suitable difficulty level.	4.50	0.58	Strongly agree
6. Content is useful to viewers.	5.00	0.00	Strongly agree
7. The number of tests in the color deficiency test is suitable.	4.25	0.96	Strongly agree
8. The color deficiency test pattern is suitable.	4.50	0.58	Strongly agree
9. The difficulty level of color deficiency test is suitable.	3.75	0.50	Agree
10. Content used to test for color deficiency test is accurate.	4.25	0.50	Strongly agree
11. The color of the color deficiency test in the media is accurate.	4.00	0.00	Agree
<b>Average Score</b>	<b>4.43</b>	<b>0.27</b>	<b>Strongly agree</b>

The content quality evaluated by specialists on interactive media for illustrating and testing color-deficient vision by using the color grading technique has shown that the specialists

were very satisfied. The interactive media shows how people with normal vision and people with color blind see. It is useful and filled with content about color blind. It is suitable for testing people who have the condition. It is easy to access and use, also has Ishihara test.

**Table 2** showing media quality results of interactive media for illustrating and testing color-deficient vision by using the color grading technique, which evaluated by 4 specialists.

Questions	Mean	SD	Scale
<b>1. Video</b>			
1.1 The video is beautifully suitable for the media.	4.83	0.41	Strongly agree
1.2 The sharpness of the video is suitable.	4.50	0.55	Strongly agree
1.3 The video is clearly meaningful.	4.67	0.52	Strongly agree
1.4 The placement of the video is suitable.	4.50	0.55	Strongly agree
1.5 The video sequence is suitable.	4.67	0.52	Strongly agree
1.6 Camera angle is suitable.	4.50	0.55	Strongly agree
<b>2. Content Layout</b>			
2.1 The font size is clear and easy to read.	4.50	0.55	Strongly agree
2.2 The font format is suitable.	4.67	0.52	Strongly agree
2.3 The font color is suitable.	4.83	0.41	Strongly agree
2.4 The font arrangement is suitable.	4.83	0.41	Strongly agree
2.5 The background color in each text is suitable.	4.83	0.41	Strongly agree
2.6 The media usage explanation is clear and perspicuous.	4.50	0.55	Strongly agree
<b>3. Sound</b>			
3.1 The sound volume is consistency.	4.50	0.55	Strongly agree
3.2 The sound volume is suitable.	4.67	0.52	Strongly agree
<b>Questions</b>	<b>Mean</b>	<b>SD</b>	<b>Scale</b>
3.3 The sound is suitable.	5.00	0.00	Strongly agree
3.4 The sound is clear.	4.83	0.41	Strongly agree
<b>4. Interactions</b>			
4.1 Allow viewers to interact with the media.	4.67	0.52	Strongly agree
4.1 Allow viewers to interact with the media.	4.67	0.52	Strongly agree
4.2 The form of interactive media is suitable with the content.	4.83	0.41	Strongly agree
4.3 The form of interactive media is convenient and easy to use.	4.50	0.55	Strongly agree

<b>5. Interactions design</b>			
5.1 Buttons are suitable and convey the meaning clearly.	4.50	0.55	Strongly agree
5.2 Photos are suitable with media.	4.50	0.84	Strongly agree
5.3 Colors in the media are suitable.	4.83	0.41	Strongly agree
<b>Average Score</b>	<b>4.61</b>	<b>0.05</b>	<b>Strongly agree</b>

The media quality evaluated by specialists on interactive media for illustrating and testing color-deficient vision by using the color grading technique has shown that the specialists were very satisfied, due to its usefulness and also gives viewers new experience because can test color blindness for people and educate people about color blindness, to understand the different type of conditions . All media specialists agreed that it is suitable for the media to educate people because there is content on the subject and also let people see the difference between normal vision and the vision of the people with color blind. The media can also test people who may have risks to be color blinded. Some specialists thought the media should be developed and used in variety of locations that need to have eye examination for color vision, such as hospitals, medical centers, or in the industry, to screen people for work in the factory. The media is suitable for and suitable for testing for risk because there is a test that uses the Ishihara test [2], which has international standards and is recognized by medical experts. It is also easy to use and accessible to let viewers know their risks.

**Table 3** showing media satisfaction results of interactive media for illustrating and testing color-deficient vision by using the color grading technique which evaluated by sample.

<b>Questions</b>	<b>Mean</b>	<b>SD</b>	<b>Scale</b>
1. The content is clear and easy to understand.	4.80	0.44	Strongly agree
2. The content arrangement is suitable.	4.74	0.49	Strongly agree
3. The content is useful.	4.80	0.41	Strongly agree
4. The techniques presenting in the media are interesting.	4.72	0.50	Strongly agree
5. Allow viewers to interact with the media.	4.60	0.60	Strongly agree
6. The form of interactive media is suitable with the content.	4.73	0.46	Strongly agree



7. The form of interactive media is convenient and easy to use.	4.65	0.63	Strongly agree
8. The length of the video is suitable.	4.48	0.63	Strongly agree
9. The composition of the images are suitable.	4.75	0.49	Strongly agree
10. The video sequence is suitable.	4.69	0.52	Strongly agree
11. The sound volume is suitable.	4.51	0.61	Strongly agree
12. The sound is suitable.	4.52	0.65	Strongly agree
<b>Average Score</b>	<b>4.66</b>	<b>0.08</b>	<b>Strongly agree</b>

Based on the satisfaction by samples showed that color grading techniques helped to understand the feelings of people with visual impairment, a technique used to convey meaning. The interactive medium is ideal for media literacy and to test people with visual impairment in the initial stage (color deficiency). There are useful and interesting content. In addition, there are interactive forms that are interesting to access as well.

#### 4. CONCLUSIONS

The results interactive media for illustrating and testing color-deficient vision by using the color grading technique is showing different styles and techniques which make it easier for the viewers to see the difference color visions by pressing spacebar during watching the interactive media by using color correction and color grading, help to adjust colors in the video to allow viewers to acknowledge the difference between a normal color vision and color blind vision. Moreover, the media can also test the people with color blind by using Ishihara test which is widely used around the world. After the viewer's took the test, they will be able to know the results immediately. Interactive media for illustrating and testing color-deficient vision by using the color grading technique suitable for knowledge because content makes visuals visible in people with visual impairment in preliminary testing. This media should be developed and used in various places such as hospitals, medical centers or in the industry to screen people for work in the factory and suitable for testing for risk or treatment because the preliminary screening is a test that uses the Ishihara test strip [7], which has international standards and is recognized by medical experts. It is also easy to use and accessible to know its risks.

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