

INTRODUCTION

As you consider the design or curation of learning resources for your course, keep in mind that some learners – 8 percent of males and .5 percent of females – view colors in ways that vary from those of the mainstream, and that the way this occurs differs. A very small percentage of variance is to see no colors at all; the remaining variants are best characterized as color vision deficiencies. Color deficiencies range in intensity, and they take essentially two forms: **red-green** deficiency and **blue-yellow** deficiency (this second is sometimes more accurately called “blue-green” deficiency).

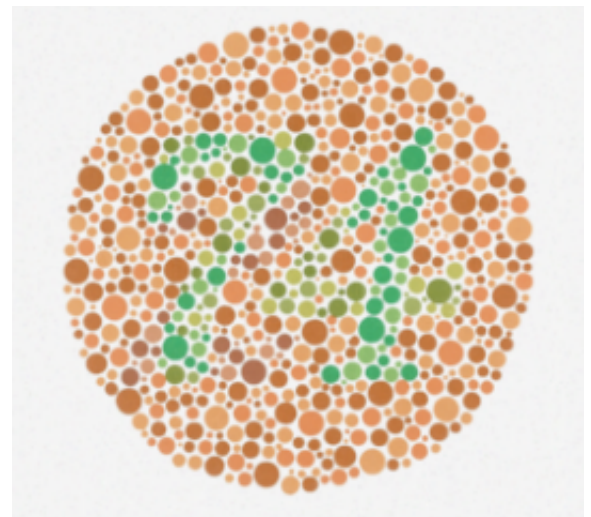
If you are not color blind, you may be curious about what someone with color blindness sees. In the images below, the image to the left is what someone without color blindness would see and the images in the middle and to the right are the same image as seen by, respectively, someone with red-green deficiency and someone with blue-yellow deficiency.



A CLOSER LOOK

Testing for color deficiency is fairly easy, as demonstrated in a typical test for red-green color blindness.

What do you see in the image to the right? If you see the number “74,” you are not color blind. If you see the number “21” or no number at all, you probably have some form of color blindness.



DESIGN ISSUES

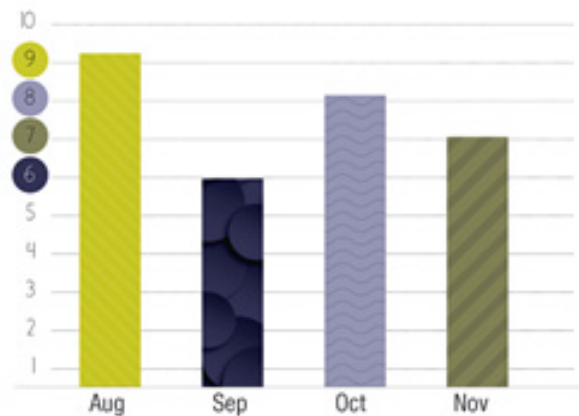
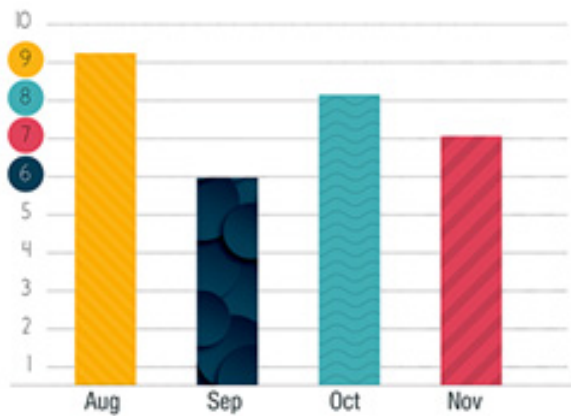
Consider these areas in course development where color is typically used to convey definition and/or meaning:

- **Links:** Use something other than color alone to highlight a clickable link. We recommend underlining.
- **Charts and graphs:** When using color to separate data in a chart or graph, consider using texture (e.g., lines, dots, hash marks) as well as, or in place of, color.
- **Maps:** Maps often use color to distinguish things like bus routes, highways, and rural roads, so use selectively.
- **Games:** Games often use color to distinguish teams or differentiate other aspects of gameplay. When designing games for your course, consider using additional indicators to distinguish between objects, teams, etc.

When designing course pages, consider adopting the following measures:

- **Avoid the following color combinations:** green-red, green-brown, blue-purple, green-blue, light green-yellow, blue-grey, green-grey, and green-black.
- **Use high contrast:** color blind learners can see differences in hue, saturation, and brightness, regardless of color.
- **Use texture:** in maps, charts, graphs, and infographics, include texture (e.g., lines, dots, hash marks) in addition to color to convey meaning.
- **View your created resources from the perspective of someone with color blindness:** Use a website to see how it will look to someone with color blindness. See the Additional Resources section for some suggestions.

Charts and graphs are frequently used to convey data and, as such, should be designed to appeal to color blind learners. The chart on the left below is one example of how to design a chart for all learners. The image on the right is the same graph as seen by someone with red-green deficiency. Notice how the inclusion of texture makes the data points on the chart readable, regardless of color blindness.



ADDITIONAL RESOURCES

Coblis – Color Blindness Simulator (<http://www.color-blindness.com/coblis-color-blindness-simulator/>): use this resource to upload your own image to see how it will look to learners with various types of color blindness.

Colour Contrast Visualizer (<http://www.stainlessvision.com/blog/projects/colour-contrast-visualiser>): experiment with different colors to find an appropriate contrast between colors for use in your images, graphs, charts, etc.

Colorblind Web Page Filter (<http://colorfilter.wickline.org>): use this resource to convert your entire web page so you can see how it will look to someone with color blindness.

An Introduction to Color Theory for Web Designers (<http://webdesign.tutsplus.com/articles/an-introduction-to-color-theory-for-web-designers--webdesign-1437>): this website provides a multitude of examples and suggestions for designing web-based resources.

We Are Colorblind (<http://wearecolorblind.com>): this website, designed by color blind graphic designers, contains helpful articles, examples, and reviews.