



COLOUR BLINDNESS AND DESIGN

How to design for colourblind people or people with dyschromatopsia.

ideas for multimedia

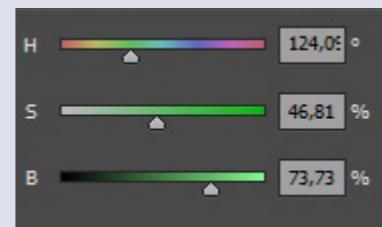
COLOUR BLINDNESS AND DESIGN scenario | Kristin Kreer

IDEA 1 (for learning stations / explain)

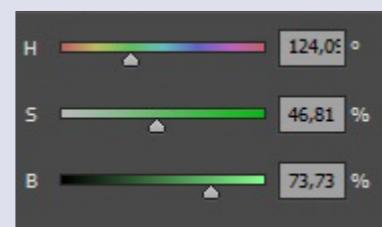
Creating a JavaScript tool with sliding bars for students to explore how brightness, saturation and hue can be used to improve the accessibility of texts (Thank you @Kristjan for the inspiration and further reading on <https://webaim.org/resources/contrastchecker/>)

Given:

- Text on a background
- For fore- and background three sliding bars each (for hue, saturation, brightness)



Text



Background

IDEA 1 (for learning stations / explain)



By exploring, students should realize not only which color combinations work well and should come to the conclusion that contrast is vital, but also, that accessibility can be reduced for people with normal vision if bad color combinations are chosen and that the effect is even worse for visually impaired people.

Maybe there could be two main tasks:

- a) Given: a really bad combination. Task: Improve it.
- b) Given: a good combination. Task: Make it worse.

- c) Compare results with other student and talk about it.
Summarize results and phrase rules.

IDEA 2 (for learning stations / explain or even for explore)

Creating some sort of 3D surrounding that can be explored while wearing glasses with color filters. Idea: Some objects and signs can be easily read, others can't. Of course we can't make the students color blind to give them a true to life experience, but we can simulate some sort of „color blindness“ by making them wear a filter (for Red or Cyan).

Based on: Andrew Whited, Color Blindness Research Foundation (fictitious)

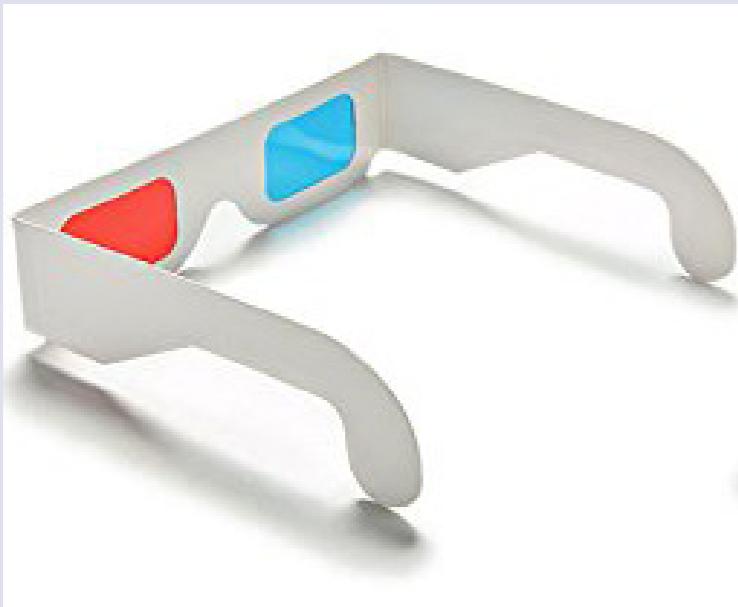


IDEA 2 (for learning stations / explain or even for explore)

Maybe there can be tasks that they should complete, e.g. a subway map is given and they should find out which line to take, or maybe there is a menu at a restaurant, that they want to read. Or it's a 3D model of some package and they want to read about the nutrition facts (because they are not only color blind but also allergic...).

Of course this can also be achieved without producing some sort of digital environment (printing out maps, menus etc.).

Really interesting would be a game where they have to navigate through a world full of obstacles and would have to complete quests to get to the next level, to really experience how it feels not to be able to see everything and sometimes fail because of that. But I wouldn't know how to produce that...



Note:

The glasses would have to be altered so that both sides had the same filter.
Or the students need to mask off one side.
(good because cheap and easily accessible to most students).

Further ideas will hopefully pop up while I try to learn JavaScript.
But so far it's hard for me to imagine what is possible and creativity
is not flowing as easily with a deadline (November 20th) ahead.
Still, I find it difficult to incorporate multimedia since many of the things
I want to teach in this scenario, can also be achieved without the help
of multimedia. And for most of the things I want to teach, multimedia
tools already exist.
So, hopefully creativity will flow again during the Christmas break :)

Thank you to Kristjan for the awesome link collection! Love it!
Great source of inspiration!

Task: Check all of your scenarios using the questions below.

1. Are the target groups of your scenario design students aged 15-25 in applied/vocational/college-level design schools & their teachers; and secondary and vocational school students aged 15-18 studying STEM subjects, and their teachers - as set out in the goals of the project. What is the ratio of design & stem students in your scenarios' target group, 50/50 or sth else?

My target groups are mainly design students and the extend phase can be addapted to the level/age of the students. For STEM students the working station about the eye and color models could be more detailed and the task in the extend phase could be simplified (e.g. choose colors for a chart about color blindness that vision impaired people can also easily read).

2. Which real-life design phenomena, accessible & engaging for the target groups, are or can be linked to your scenario? For reference, the list of design fields in our project is the following: graphic design, multimedia design, 3D design, decorator-stylist craft, textile craft, leather craft, ceramics & pottery, woodworking, furniture and interior design. The design phenomenon addressed in your scenario can be any tangible or intangible object from the above fields that interfaces with people.

My real-life design phenomenon is accessibility. Especially when it comes to digital interfaces or communication of information in print (e.g. through printed infographics, maps, charts). But it can also be useful to know for game design (some games already include a mode for vision impaired). For biology teachers it could also be interesting to look at the evolution of the human eye since we not always could see the way we see now and how it changes the chances for survival. And maybe to think analyse where it could be beneficial to be partially colorblind (e.g. as far as I know people with partial colorblindness can differentiate more hues of a color - military?).

Task: Check all of your scenarios using the questions below.

3. Which real-life problem, accessible & engaging for the target group, in human experience is (or can be) your scenario focused on? Is or can your scenarios be focused on improving the human experience? How, in which areas of human experience?

My real-life problem - color blindness - is, of course, not a real life problem for everyone. Therefore the aim is to create understanding by changing perspective and raising the students awareness for the problems colorblind people face.

4. Which STEM field does your concept belong to: science, technology, engineering or math?

I think it's biology?

5. How does your scenario integrate a design phenomenon and STEM concept? (It could be helpful to think what would the separate learning of the same phenomenon and concept be like). For reference, integrated learning is an approach that brings together content and methods from more than one subject discipline, supporting connections that deepen understanding. Please state the answer in one sentence:)

See 2. and 3. ?

Task: Check all of your scenarios using the questions below.

6. In one sentence, what is the original, innovative quality of your proposed scenarios? In the sense, e.g, that such a problem has not been addressed before, or such an approach has not been applied to the concept and phenomenon before, or this target group has not been taught this way before, etc?

There might not be any innovation in my scenario. I think the „originality“ lies in the fact that color blindness is not taught or discussed anywhere. People just don't think about it when they design products. Therefore the innovation lies in the attempt to raise people's awareness. But as far as I see it there is no innovation in the way I approach it.

7. Please divide 100% to the following statements: my scenarios provide the student with

a) a knowledge of how STEM functions in design 30%

b) a skill how to make design using the knowledge of STEM 70% ???

8. To be as clear as possible for yourself and anybody else, please state all the above in one sentence:

The scenario called **Accessibility for partially colorblind people** [not sure about the name] is aimed at **design students** to address the problem of **the accessibility of information through the use of color combinations** by integrating the knowledge about **color blindness** and the skill of **choosing color combinations for design objects (digital or printed)** that not only focus on aesthetics but also on **accessibility & usability**.

engage



- Show picture of food in ripe and unripe state where a color blindness filter has been applied.
(like red and green strawberries, green and yellow bananas, red and green tomatoes)
- Make them guess which one is the ripe tomato and then show the original photo (without any filter) so to see if they picked the right one



- use this momentum to start a discussion about the challenges people with colour blindness face in everyday life.
- let them think about further areas where problems might occur.
- For designers:
Hook students with design example gone wrong...



First Name	John
Last Name	Doe
Email	john@email
Password	*****
Submit	

NORMAL

First Name	John
Last Name	Doe
Email	john@email
Password	*****
Submit	

COLOR BLIND (DEUTERANOPIA)

explore

Colorblind Web Page Filter

What are color blind anomalies? ⓘ

GUTENBERG
SCHULE



Please indicate a resource to be viewed, and a color filter to be applied to that resource.

Type a URL:

<http://www.mbro.ac.uk/home/index.aspx>

And then pick a color filter:

Protanopia

FETCH AND FILTER!

The screenshot shows the Colorblind Web Page Filter interface. On the left, there is a text input field containing the URL <http://www.mbro.ac.uk/home/index.aspx>. Next to it is a dropdown menu labeled "And then pick a color filter:" with the option "Protanopia" selected. To the right of the dropdown is a green button labeled "FETCH AND FILTER!". Below these controls, the main content area displays two versions of the Middlesbrough College website side-by-side. The left version is the original site, while the right version is the site with color filters applied. Both versions show the college logo, navigation menu, and course sections. The color filters have changed the text color from red to brown and the background color from blue to white.



- If possible, create/find a device (glasses) that simulate optical deficiencies and make the students feel/experience how colour blindness affects everyday life.

Idea: Get glasses with red filters and create a document that includes red and green graphics and texts so that the students feel how it is to not be able to see everything perfectly (though this way they won't experience how the world looks like for a colourblind person).

- Let students examine different websites by applying different color filters for Protanopia, Deutanopia, Tritanopia and Achromatopsia through the website

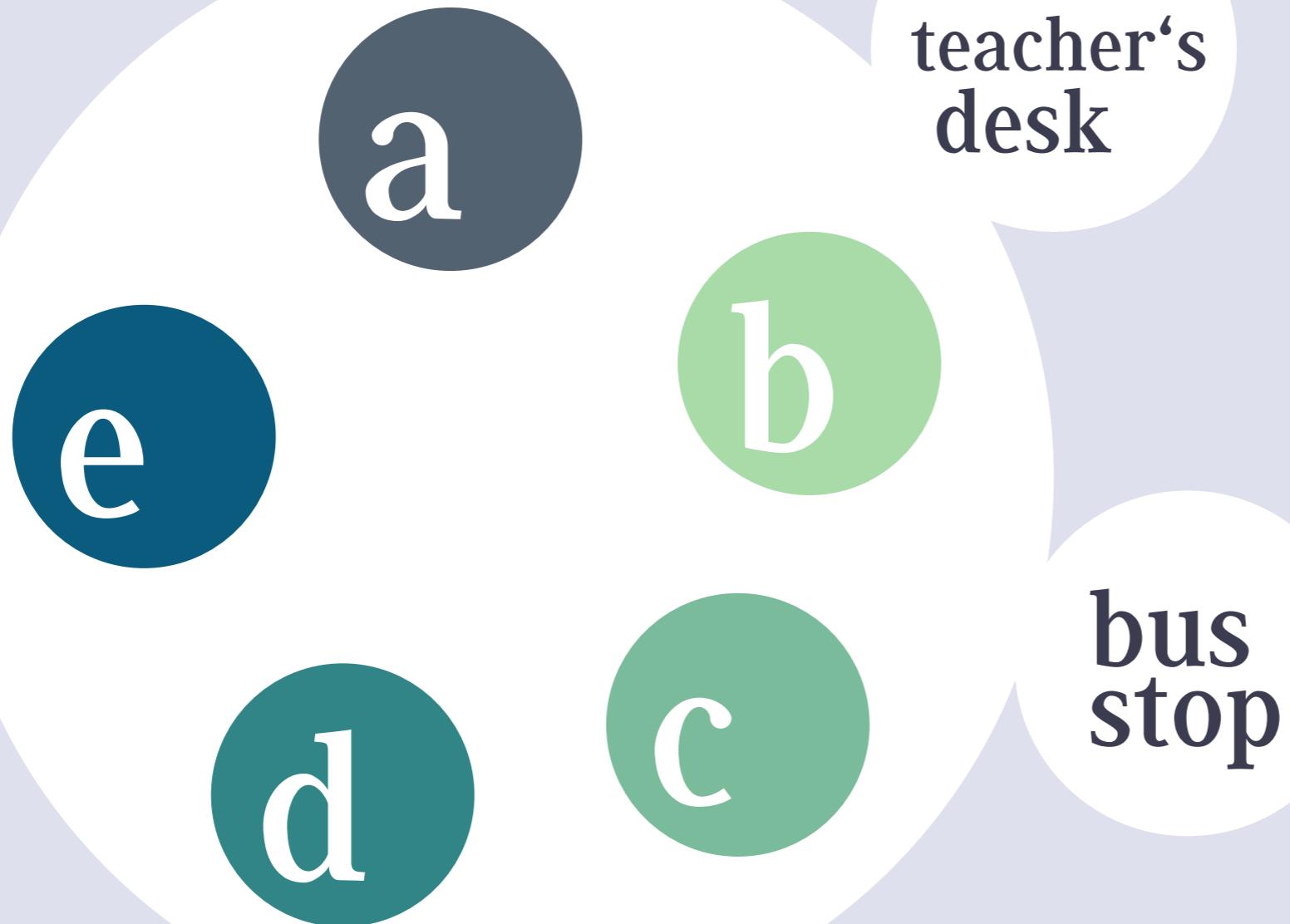
<https://www.toptal.com/designers/colorfilter>

- They should not only find out where there are problems, but also what kind of problems there were.
- Stronger/quicker students can already think of alternatives to make it work for a colorblind person.

explain



Learning Stations



Learning Station Session on:-

- information about accessibility in general (why is it important to bear in mind; what do laws say about it; implementation)
- Theory of colour blindness
- Colour Basics I
(colour models and their three dimensions (Munsell))
- Colour Basics II
(colour contrasts and harmonies (Itten))
- DOs and DON'Ts when designing for colourblind



- students start by picking the topic they are most interested in, then continue rotating,
- they can work together, discuss and exchange information with fellow students,
- teacher is free to answer specific questions and to help.

extend



Students should use and combine what they've learned
in/for a small design project
(e.g. *diagram, infographics, poster, print campaign,*
corporate design, webdesign etc.)

Aim:

Choosing the right colors that fit the product/topic and at
the same time work well for colorblind people.

evaluation



- present their results in class and explain their design with regard to color blindness
- time for feedback and exchanging experiences
- further discussion about other means to improve designs than only choosing better colour combinations (e.g. patterns, symbols).

thank you.