



The colour conundrum

MOST OF us know someone who exhibits clear signs of being colour-blind. In fact, colour-blindness has traditionally been something of a joke between men – one in 12 of whom suffers from this condition – and their long-suffering female cohorts. The problem is that colour-blindness is no laughing matter and can cause serious learning difficulties.

This is no exaggeration. Consider how colour is used in the classroom. Students are encouraged to colour maps and graphs; colour is used to highlight material, and as keys in instructions; it is used in the science lab, the art room, in maths, food technology, ICT and history; teachers use it on whiteboards, and often use different colours for marking. For the average student, colour is a useful tool. For colour-blind students, who do not see many of the colours in question, it can be a nightmare – undermining confidence, encouraging basic errors and causing frustration and even anger.

What is colour-blindness?

In most cases, colour-blindness is a genetic condition, usually inherited from our mothers (who probably are not colour-blind themselves). It is believed that faulty “cones” in the retina (which are responsible for colour discrimination) are at the root of the problem and there is no cure. Our ability to see colour is characterised as follows:

Trichromacy: Effectively “normal” colour vision. Trichomats use all three types of light cones in their retinas correctly.

Anomalous trichromacy: Occurs when one of the cones in the retina is slightly out of alignment, so there are three possible effects. Protanomaly is a reduced sensitivity to red, deuteranomaly (the most common type) is a reduced sensitivity to green (see images), and tritanomaly is a reduced sensitivity to blue. There are different degrees for each of these, meaning some people will have a total absence of one colour.

Monochromacy: Involves seeing no colour whatsoever, just shades of black, white and grey.

Blue blindness and monochromacy are very rare but red/green colour blindness is quite common and generally people with red or green colour blindness have difficulty distinguishing between red, green, brown, orange, yellow and grey, which all appear to be varying shades of murky green. Blue and yellow can be seen, but shades of blue and purple are confused.

The impact

When colour-blind students are faced with a variety of different options based on colour, they will not only struggle to distinguish between them, but they will

Spot the difference: The image below is an illustration of how someone with deuteranopia (no ability to perceive green) would see the image above



Approximately 380,000 boys and 23,500 girls in the UK education system are colour-blind. **Karen Sullivan** looks at supporting colour-blind children in the classroom

make basic errors that will compromise their work – and their ability to learn. When they are taught using colour, they will spend precious time trying to work out what is being explained or highlighted, and fail to absorb the information either efficiently or correctly.

Career choices are also limited (fireman, pilot, electrical engineer, and many types of medical professional are out, for example). While colour-blind children can learn to identify some colours through their hue and saturation – and experience – they cannot actually see them. Colour-blindness will affect performance and understanding in many subjects. As an example, in science, colour-blind students:

- Cannot read litmus paper accurately.
- Cannot tell the colours of different chemical solutions and have difficulty undertaking chemical titrations in practical chemistry exams.
- May be unable to identify metals by the colour of the flame produced when a metal is burnt.
- Are unable to accurately read stained slides.
- May not be able to identify species of plants.
- Will have difficulty fully understanding coloured diagrams in textbooks, particularly in biology.
- Will have difficulty with coloured wiring and use of prisms in physics.

More generally, students will not be able to discern between the charging, standby, on and off switches on computers; they will not see a red or green ball in the grass; they cannot tell if fruit is ripe, or if meat is fully cooked; and they may seem slow or hesitant, because they need more time to distinguish between colours.

Taking a stand

Kathryn Albany-Ward’s son Ross suffers from the severe form of deuteranopia. Aghast that there is no training in colour-blindness for teachers, and no clear understanding of its implications, she set up Colour Blind Awareness, a community interest project.

In her work (which includes textbooks and educational games), she discovered that kids are not screened for the condition at school entry, it is not considered an SEN (despite placing children at serious disadvantage), and there is little provision to support students.

She said: “Ross was seven when I realised that he might have a problem with colour. And, even once I knew, I was shocked to find out (like a quarter of all colour-blind boys) that he had a severe condition that would prevent him from seeing so many colours.”

Ross often becomes embarrassed or angry if someone asks him to describe the colour of something, but Kathryn says that it is important to use colour descriptively, to enable him to work out the saturation and brightness of colours, which helps him to marry what they say with what he actually sees.

Kathryn notes that many children do not admit to struggling with colours. They would rather attempt to join in than draw attention to themselves. This can, however, lead to frustration and anger, when the measures designed to support learning actually undermine it.

Schools taking note

As a result of Kathryn’s efforts, a number of schools have begun to screen students at entry point, in order to offer appropriate support. This month, Kathryn will be helping to screen 1,275 boys from Aylesbury Grammar School in Buckinghamshire using the Ishihara test (see further information).

Suzanne Kennedy, deputy head and SENCO, said: “For boys who are identified, we will notify their parents and, depending on the extent of the condition, put an Individual Education Plan (IEP) in place so that teaching staff are aware of their condition.

“The IEP will give guidance to the teacher as to how to modify resources to help the student to access the work more effectively. We will also consider exam access arrangements.

“We believe that colour-blindness should be a recognised SEN. As with other SENs, there is a spectrum from mild to severe, but schools should be made more aware of the condition and how to support students.”

By secondary school, many children have become adept at covering up their condition – not only failing to bring it to the attention of teachers and even parents, but also learning quite sophisticated coping strategies that mask their difficulties.

Anne Greenwood, matron at Magdalen College School in Oxford, added: “We recognise colour-blindness as a medical condition, so that as long as parents have informed us that an Ishihara test has been carried out, or we’ve done our own, boys can be given extra time for chemistry practicals, etc. We screen everyone in our first intake. On average, we pick up one or two in each class of 20.”

What can you do?

First of all, consider screening children as they enter your school. A local optician may be able to arrange this, as can the visual impairment team in your local authority. Alternatively, contact Kathryn (see further information) for details of online testing.

Bright light can make it easier for children to recognise colour so colour-blind children should be seated in good natural light. Also, avoid using colour-on-colour books and other support materials. Black on white is most appropriate for colour-blind children.

In sports and games (including board games), ensure that children can see who is on their team, and that they can see the ball or the “men” on the board.

Checking computer settings, web pages and computer-based teaching aids to ensure that the child can pick out the relevant information is important. Colour-blind children may struggle with coloured keys that provide instructions and information.

Use strong contrast on white or chalkboards; red, green or pastel colours should not be used to highlight teaching points (and avoid using red for warning signs or important messages). Also, label felt-tips, paints, pencils, fabric and any other coloured items, so that colour-blind children can immediately access them. Use patterns rather than colours for maps, and ensure that they are well labelled rather than being solely dependent upon colour.

Be aware that coursework presented by colour-blind students may seem drab due to the restricted colour palette that they have and the student may lose marks for presentation without understanding why.

Buddies should be organised for colour-blind students to help with colour choices, science experiments, art and DT projects, and anything else that involves colour. Schools should also talk to parents about how they can support their children at home and must take care to ensure that no child is teased or bullied for using incorrect colours.

What about the future?

Colour-blindness is an under-recognised and little understood condition, but awareness is growing. It remains rather perplexing that this condition is not considered an SEN, as it has a clear impact upon a child’s ability to learn. In the meantime, however, it is worth taking on board the guidelines suggested, to ensure that any colour-blind students at our schools make the most of the opportunities available to them. SecEd

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Further information

- Colour Blind Awareness: www.colourblindawareness.org
- Ishihara: www.colorvisiontesting.com/ishihara.htm

