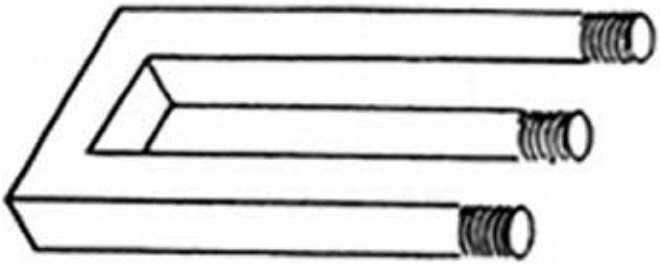
OPTICAL ILLUSIONS : IS WHAT WE SEE, WHAT WE GET?

Introduction

This module deals with white light and its role in the formation of our colourful world. The students through experimental investigations will acquire the scientific knowledge concerning why we see our world the way it is and how this colourful world influences our lives and the environment around us. Through group discussions, the students will be encouraged to understand situations where other people use the emotional influence the colour has on us, to propose ways for economic benefits based on the concept of the module, and to relate the idea "optical illusions" to other situations in everyday life.

The Impossible Trident

How many prongs are there?



Educational Objectives:

Students are expected to be able to:

1. To decide with justification whether "what you see is what you get".

2. To design and conduct experiments for getting different coloured lights.

3. To design and conduct experiments to investigate the relation between different light sources (depending on the colour –wavelength) and different coloured, white and black materials.

4. To acquire communication skills and to support a position with valid arguments.

5. To cooperate as a member of a group, contributing to a decision making process

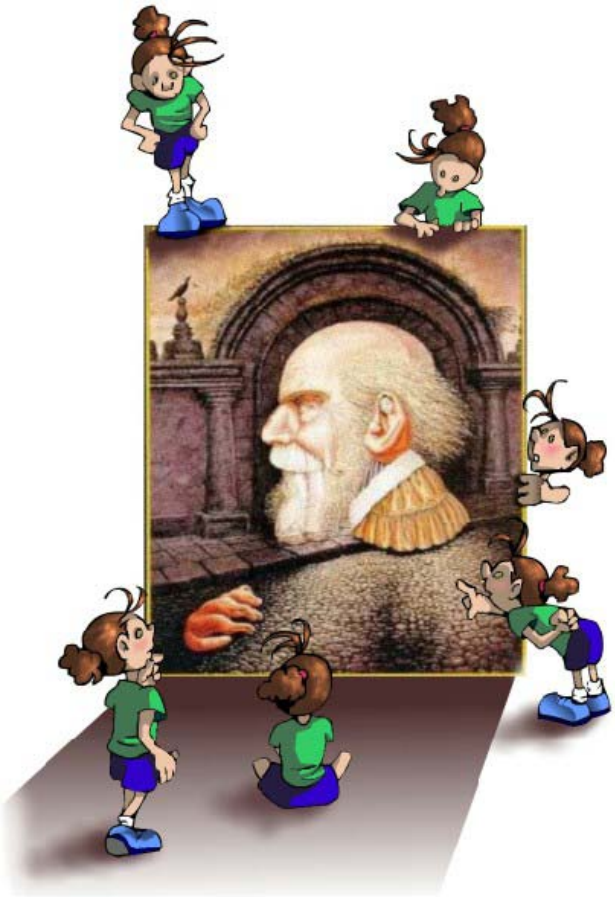
6. To explain the electromagnetic spectrum, the properties of the white and coloured lights.

7. To explain how light may lead to impressions that differ from reality, and how these impressions influence our lives.

Science Concepts

1. Electromagnetic spectrum
2. Properties of white light
3. Primary and secondary colours

How many people in the picture ? Look carefully. Altogether there are 15.



Students' Guide

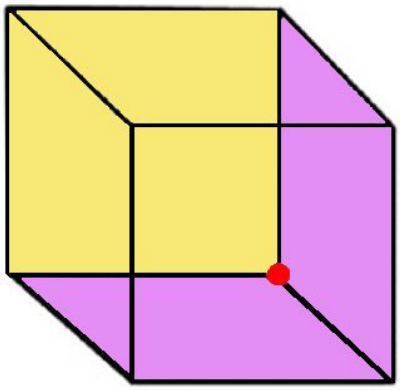
Scenario

Look at the pictures.

red blue orange purple
orange blue green red
blue purple green red
orange blue red green
purple orange red blue
green red blue purple
orange blue red green
green purple orange red

Say aloud the ink colour of each word?
How quickly can you do it?
Did you slow down?

The Necker Cube



Is the red dot on the near or far corner?
Stare at it for a while, what happens?

Your Tasks

1. The students discuss within groups and describe in front of the class why this particular picture is given. Students discuss their personal experiences.
2. The students work in groups. They observe and explain their observations of the different colour of cloths (of different colour) when using different coloured light sources.
3. Each group presents the results of its experiments
4. The students design and conduct further experiments on the effects of mixing different coloured lights. Students develop a table of effects and explain the meaning of primary and secondary colours.
5. To look at “illusions” using light. Develop simple explanations of the phenomena that would be appropriate for use with younger students
6. Students consider whether coloured lights could be used as a money making venture. The students make proposals how to use the above idea for an economic profit.
7. Discuss how people in our society use the effects of light illusions?

Teacher's Guide

Suggested teaching strategy

1. Students examine the cartoon of a disco and discuss in groups their own experiences. The students decide whether the effects in the disco could be reproducible in the school laboratory.
2. Students undertake experiments on the effects of different coloured lights on various white and coloured cloths. The students are guided to try to explain their observations, but no attempt s made to introduce the concept of primary colours at this stage.
3. Each group makes a presentation to the rest of the class about their explanations. From this the teacher tries to draw conclusions about the effects of coloured lights and allows students to make predictions.
4. Students, n groups, are asked to predict what would be observed when different coloured lights are mixed. The students devise experiments to test their predictions and create a table of results.
5. From the table students draw conclusions about the effects of mixing coloured lights and from the ways in which white light is obtained deduce develop the concept of primary and secondary colours.
6. Students examine some optical "illusions" using light and try to develop simple explanations of the phenomena that would be appropriate to give to younger students. Students record their explanations in their notebooks.
7. Based on the use of disco lights, the optical illusions or otherwise, students are challenged to consider whether coloured lights could be used as a money making venture. In groups students make proposals how to use the above idea for an economic profit. The ideas are presented to the rest of the class who act as judges as to whether they predict the ideas would be profitable
8. Discuss how people in our society use the effects of light illusions and whether what you see is really what you get?

Achieving the Objectives

Objective	Achieved by:
Deciding with justification whether "what you see is what you get".	*Discussion within the group and whole class discussion*
Designing and conduct experiments for mixing different coloured lights.	*Working as a member of a group to plan experiments and carry them out*
Conduct experiments to investigate the relation between different light sources (depending on the colour –wavelength) and different coloured, white and black materials.	*Working as a member of a group in carrying out of experiments and recording the results.*
Enhance oral and written skills through the use of valid arguments and sound explanations.	*Discussing within the group, making presentations to the whole class and recording explanations in the notebook*
Cooperating as a member of a group, contributing to the success of the group	*Undertaking groupwork in planning and carrying our experiments*
Explaining the electromagnetic spectrum, the properties of the white and coloured lights.	*include explanations in the report of the experiments written in the notebook*
Explaining how light may lead to impressions that differ from reality, and how these impressions influence our lives.	*include explanations in the report of the experiments written in the notebook.*

Assessment

Award of social value grade (objective1)

The teacher listens to the students putting forward their points of view during class discussion and in the whole class discussion

x Student unable or unwilling to put forward ideas related to optical illusions

√ Student is able to put forward useful ideas and able to reach a decision on optical illusions.

√√ Student is able to lead the discussion and put forward important ideas to be considered. The student is able to make an appropriate decision with justification.

Award scientific method grade (objectives 2 and 3)

Teacher observes the students and notes their plan and observations

x Student not able to contribute to the planning and carrying out the experiments.

√ The student is able to contribute to the planning and able to carry out the experiments. The student is able to make appropriate observations with the aid of the teacher.

√√ The student is able to put forward good experimental plans and undertake the experiments given, leading to meaningful observations and analysis

Award of a personal skill grade (objectives 4 and 5)

Teacher observes the students in their groups

x Student is neither cooperative, leaving the work to others and not joining in the discussions in a meaningful way.

√ Student cooperates as a member of a team and is able to discuss the procedures to adopt and put forward useful suggestions for making a decision.

√√ Student is able to cooperate and help other students to join in the work of the group. The student is able to put forward useful suggestions to the group and encourage others to put forward their ideas.

Award a science concept grade (objectives 6 and 7)

Teacher marks the students report

x Student is unable to explain the electromagnetic spectrum in a meaningful way, nor optical illusions.

√ Student can explain the electromagnetic spectrum with the help of the teacher and put forward some explanations of optical illusions.

√√ Student has a good understanding of the electromagnetic spectrum and can explain the optical illusions using scientific terminology.

Notes for the Teacher

Many other illusions can be obtained from the internet e.g.
http://www.optillusions.com/
http://www.indianchild.com/3d%20mainpage.htm
http://www.ads-online.on.ca/illusion/directory.html

This is probably the most famous illusion of all time! What do you see at your first glance of this illusion! Do you see an old lady, or do you see a young women? They are both there!!