

Erasmus+ Cultural connections : Enhancing EU heritage, Social Inclusion and Digital Literacy through our Pupils' hearts
 Scientific and Creative Thinking Workshop
 7-12 December 2025, Ukmerges, Lithuania



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SCIENTIFIC EXPERIMENT 7.12

Experiment Title

Seeing the World Differently: How Glasses and Filters Change Perception

Type of Activity

Hands-on scientific experiment exploring **vision, perception, and optical illusions** using glasses, color filters, and restricted fields of view.

Grade Level

Ages **10–14** (upper primary / lower secondary)

Learning Objectives

Scientific Objectives

1. Observe how different lenses and filters affect vision.
2. Explore **depth perception, color perception, and peripheral vision**.
3. Test hypotheses about how visual modifications affect task performance.

Interdisciplinary Objectives

1. **Biology / Zoology:** Understand how eye placement affects vision (e.g., predators vs. prey).
2. **Physics / Optics:** Learn about light, color, and lenses.
3. **Art / Design:** Explore color filters and 3D effects for creative outcomes.
4. **Civic / Health Education:** Understand how sunglasses protect eyes.
5. **Mathematics:** Measure distances and angles for visual tasks.
6. **Literature / Philosophy:** Understand how perspective shapes interpretation.
 Discuss the moral of “The Blind People and the Elephant.”
7. **Life Skills/ SEL:** Connect visual perception experiments to real-life decision-making.
 Reflect on bias, assumptions, and the importance of multiple perspectives.

Reflect on self-awareness and how others perceive you.

Connect sensory perception to understanding social perspectives.

Materials

- 3D glasses (red/cyan or standard)
- Sunglasses of various tints
- Transparent colored filters (red, blue, green)
- Small objects to place at different distances (blocks, cups, or printed patterns)
- Ruler or measuring tape
- Observation worksheets
- Blindfolds or partial covers for peripheral vision simulations
- Classical story handout or short reading

Variables

- **Independent Variables:** Type of lens/filter or vision restriction (3D, tinted, peripheral blocked)
- **Dependent Variables:** Accuracy in judging distance, color, or shape; speed of object recognition
- **Controlled Variables:** Same objects, same lighting, same distance

Experimental Procedure

Step 1: Story Introduction

- Read the story “**The Blind People and the Elephant.**” A group of blind people touches different parts of an elephant and each concludes the elephant is something different: a wall, a rope, a tree trunk, etc.
- Discuss: What did each blind person experience? How did their limited perspective shape their conclusion?
- **Moral:** Each person’s perspective is limited; to understand reality, multiple perspectives are needed.

Part A: 3D Glasses / Stereoscopic Vision

1. Place objects at various distances.
2. Students wear **3D glasses**.
3. Estimate distance or identify object size.
4. Record observations on perception differences.

Observation Focus:

How does 3D perception enhance or alter distance estimation?

Compare with unaided vision.

Part B: Sunglasses / Color Filters

1. Students wear **sunglasses** or **colored filters**.
2. Observe colored objects or patterns.
3. Record changes in color perception or brightness.
4. Discuss which colors appear stronger or weaker through different filters.

Observation Focus:

Which filters enhance certain colors?

How does tint affect clarity, comfort, or recognition?

Part C: Peripheral Vision Simulation

1. Cover part of the student's vision using blindfolds or narrow openings to mimic **lateral-only or front-focused vision**.
2. Place objects to the sides and front.
3. Ask students to identify objects without moving their heads.
4. Record success rate in seeing objects laterally vs centrally.

Observation Focus:

How does vision placement affect awareness?

Discuss why prey animals may rely on lateral vision and predators on frontal vision.

Observations

Students record for each trial:

1. Which objects were easy or difficult to see
2. Differences in depth perception or color perception
3. Time or accuracy differences
4. Personal reflections on visual experience
5. Compare this to how the blind people experienced only part of the elephant.

Results / Patterns

- 3D glasses improve depth perception but may distort color.
- Tinted lenses or filters alter color recognition.
- Peripheral vision restriction reduces lateral awareness, mimicking predator vs prey adaptations.

Scientific Explanation

- ★ **3D glasses** use color separation to trick the brain into perceiving depth (stereopsis).
- ★ **Colored filters** selectively block or pass certain wavelengths, altering perception.
- ★ **Lateral vs frontal vision** affects how much of the environment can be monitored at once; eye placement in animals reflects ecological adaptation.

Health / Practical Applications

- ★ Sunglasses protect eyes from UV damage.
- ★ Understanding visual perception is critical in sports, driving, and safety.
- ★ Knowledge of eye placement in animals helps understand behavior and survival strategies.

Transdisciplinary Connections

Subject	Connection
Biology / Zoology	Eye placement and field of view in animals
Physics / Optics	Light, color filters, lenses, and 3D perception
Art / Design	How colors and perception create illusions or visual effects
Health / Safety	UV protection, visibility awareness
Mathematics	Measuring angles, distances, and field of vision
Civic / Ethics	Understanding animal adaptations, environmental awareness

Reflection Questions

1. How did 3D glasses change your perception of distance?
2. Which colored filter made objects easiest or hardest to see? Why?
3. How did blocking peripheral vision affect your awareness of objects?
4. Why might animals have eyes on the sides vs. front of their heads?
5. How could understanding this help in real life (sports, driving, or safety)?

Johari Window Connection

Johari Window Overview:

1. **Open Area:** What you know about yourself and others know about you.
2. **Blind Area:** What others see about you that you don't realize.
3. **Hidden Area:** What you know but don't share.
4. **Unknown Area:** What neither you nor others know yet.

Procedure:

1. Students reflect on themselves: skills, habits, feelings.
2. Peers provide anonymous feedback on what they notice about that student.
3. Compare the student's self-perception to peers' feedback.

Link to Vision Experiment:

Just like the 3D or filtered vision experiment shows that **perspective changes perception of objects**, the Johari Window shows that **other people may perceive things about us**

that we don't notice ourselves, and vice versa.

Students compare their **own observations of objects** with peers' observations.

1. How can perception be limited or biased?
2. How does this relate to self-awareness and social interactions?
3. How could misunderstandings arise if we only rely on one perspective?
4. How did your perspective of objects differ from your peers'?
5. How is this similar to how people perceive each other?
6. What surprised you about others' feedback?
7. How can understanding these differences help reduce misunderstandings or conflicts?
8. How can you "expand your Open Area" to improve communication and empathy?

Johari Area	Examples / Notes
Open	Things you and others know about you
Blind	Things others notice but you didn't
Hidden	Things you know but don't share
Unknown	Things neither you nor others know yet

Key Learning Points

1. Perception is subjective and influenced by filters, vision, and attention.
2. Awareness of how others perceive you can reveal your **Blind Area**.
3. Empathy develops when we **consider multiple perspectives**, like comparing multiple observations in the vision experiment.
4. Just as objects may appear differently through 3D glasses, people and situations may look different depending on your viewpoint.

Empathy-Focused Conclusion

This experiment and the story of *The Blind People and the Elephant* show us that **our perception is always limited by our perspective**. Just as each blind person touched only one part of the elephant and misunderstood the whole, we often see only a small part of other people's experiences.

By wearing 3D glasses, colored filters, or restricting our vision, we saw how reality can **appear different depending on how we look at it**. Similarly, in school or everyday life, we may judge others based on partial information — a rumor, a single action, or an assumption. This can lead to **misunderstandings, exclusion, or bullying**.

Putting ourselves **in other people's shoes** helps us to **expand our view** and see the "whole

elephant” of their experiences. For example:

- A classmate who seems quiet may be struggling with confidence or family challenges.
- A student who acts out may be feeling hurt or excluded.

Conclusion:

True understanding and empathy require **seeing beyond our limited perspective**. Just as in our experiment, exploring multiple “views” lets us make fairer, kinder decisions — in science, in school, and in life.

Student Observation Worksheet

Experiment: Seeing the World Differently – Glasses, Filters, and Vision

Name: _____

Date: _____

Class: _____

1. Experiment Title

Seeing the World Differently: How Glasses and Filters Change Perception

2. Research Questions

1. *How do 3D glasses, colored filters, and sunglasses change the way we see objects?*
2. *How does restricting peripheral vision affect what we notice?*

3. Prediction (Before the Experiment)

Circle one or explain your own idea:

I think 3D glasses will make objects look closer / farther / the same.

I think colored filters will make objects look brighter / darker / different colors.

I think covering side vision will make it easier / harder to see objects.

Explain your prediction:

4. Materials Used

Circle the materials you used:

1. 3D glasses
2. Sunglasses
3. Colored filters (red, blue, green)
4. Objects at different distances
5. Ruler / measuring tape
6. Blindfolds / vision covers
7. Observation sheet

5. Observation – Part A (3D Glasses)

1. Look at objects at different distances while wearing 3D glasses.
2. Record your observations:

Object	Distance (cm)	How it looked without 3D glasses	How it looked with 3D glasses	Did it seem closer/farther?
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Reflection:

6. Observation – Part B (Colored Filters / Sunglasses)

Filter Type	Object Color	Appearance Without Filter	Appearance With Filter	Notes / Differences
Red				
Blue				
Green				
Sunglasses				

Reflection:

7. Observation – Part C (Peripheral / Lateral Vision)

1. Cover part of your vision to simulate restricted side vision.
2. Place objects to your sides and front.
3. Record which objects you could see:

Object Position	Seen with Full Vision? (Yes/No)	Seen with Restricted Vision? (Yes/No)	Notes
Left side			
Right side			
Front			
Other			

Reflection:

8. Results / Patterns

→ Which type of glasses or filter changed your perception the most?

→ How did restricting peripheral vision affect what you could notice?

→ Did any object appear closer or farther than it really was?

9. Scientific Explanation

Explain why glasses, filters, and vision restriction changed your perception:

Hint: Consider **light, color, lenses, depth perception, and field of vision.**

10. Life / Biology Connection

1. How does eye placement affect animals' vision (side vs front eyes)?

2. Why might prey animals have lateral vision and predators have frontal vision?

3. How can understanding human vision and perception help us in sports, driving, or daily life?

11. Art / Creativity Connection (Optional)

Draw or color one object as it **appears differently** through a colored filter or 3D glasses.

12. Conclusion

Complete the sentence:

This experiment teaches me that _____,
and that _____.

Teacher Observation (Optional)

Criteria	Observed	Notes
Student followed instructions	<input type="checkbox"/> Yes <input type="checkbox"/> Somewhat <input type="checkbox"/> No	
Accurate recording of observations	<input type="checkbox"/> Yes <input type="checkbox"/> Somewhat <input type="checkbox"/> No	
Participation in reflection	<input type="checkbox"/> Yes <input type="checkbox"/> Somewhat <input type="checkbox"/> No	
Understanding of interdisciplinary connections	<input type="checkbox"/> Yes <input type="checkbox"/> Somewhat <input type="checkbox"/> No	

Name: _____ Date: _____

Experiment

Write the name of your experiment in the blank space above. Then, complete the rest of this page with information about your experiment.



Question: What are you testing?

Hypothesis: What do you think will happen?



Observations: What happened during the experiment? Draw a picture or record data below.



Conclusion: What conclusions can you draw based on the results of your experiment?

Observation sheet source: WeAreTeachers, 2024