

Our Eyes: How we see and what is the best option for vision correction?

WebQuest Description: With the use of technology, more and more students are experiencing issues with their vision, for example being nearsighted. To correct nearsightedness, there are three choices: glasses, contact lenses, and laser eye surgery. Students will evaluate these three choices and make an argument for the best choice. This project should take 7 one-hour long sessions. The skills mainly covered in this project are: Collaboration, Communication, and Critical Thinking/Problem Solving.

Grade Level: 6-8

Curriculum: Science

Keywords: Eye; Nearsightedness; Vision; Glasses; Contact lenses; Laser eye surgery

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Introduction

You are sitting in class during a lecture and you can hear your teacher perfectly, but you observe that the words on the board are kind of fuzzy (blurry). It is not a big deal because squinting seems to help; maybe you are just tired. When class has ended you walk up to the board to make sure you copied the notes properly. Surprisingly you notice the notes are easier to read, and you missed a few details. Your teacher asks you if everything is alright and you explain your issue. Your teacher then asks if you forgot your glasses. Dumbfounded you say that you don't wear glasses or have contacts. Then you realize, maybe you need to... As you walk to your next class the only thing you notice are students wearing glasses – you do NOT want to wear glasses. Your mom wears contacts, but everyday she has to put them in and take them out; the thought of touching your eye freaks you out. And there is NO way you would ever let a laser cut your eye. You seem to have run out of options, but know you will eventually have to make a choice, or forever be known as "The Squinter". Then you ask yourself, "If I am having trouble seeing, what vision correction choice is best for me?"

Tasks

A Basic Outline of What is Required of You for This Project

Process

1. First, teacher will give a PowerPoint lecture on "The Structure of the Eye" and show a short video from YouTube about this. Each student is responsible for knowing the parts of the eye and their particular functions (see study guide for what to focus on). Link: The Structure of Human Eye Part I <http://www.youtube.com/watch?v=XkLnpPi3JpU2>. Second, teacher will continue PowerPoint on "How We See" and show a short video from YouTube about this. Each student is responsible for understanding how our eyes see (see study guide for what to focus on). Link: A Journey Through the Human Eye: How We See <http://www.youtube.com/watch?v=gvozcv8pS3c3>. Third, teacher will continue PowerPoint lecture on "How Nearsightedness is Caused and How to Correct it" and then show the students a short video from YouTube about this. Each student is responsible for understanding how nearsightedness is caused and how to correct it (see study guide for what to focus on). Link: Nearsightedness <http://www.youtube.com/watch?v=PHFm0R4d0Vg>; How To Prevent Nearsightedness http://www.youtube.com/watch?v=rSvu_6P6AmUN. Note: At the end of Day 7, there will be a quiz on this mini lesson (see study guide for what to focus on).

1. Your teacher will put you into a team of 5 people. Each member has strengths and weaknesses. Get to know each other and how each of you can help the group. 2. Each of you will be responsible for doing research. In addition, each of you will have a special job: Researcher, Recorder, Presenter, Editor. 3. Remember the anchor and driving question? In this scenario you are nearsighted, and you have three choices to correct your vision. You can either wear glasses, contact lenses, or under go laser eye surgery. Using the internet, look into these possibilities, discuss them with your group and answer them together on the worksheet provided below. (A) What are concave lens (normal glasses), contact lens, and laser surgery? (B) What is the cost of each choice? (C) What are the advantages and disadvantages of each choice? (D) How long does each type last? Use these links to help you in answering the driving question: Eyeglasses1. What are glasses? <http://www.physicsclassroom.com/class/refrn/u14l5a.cfm> <http://en.wikipedia.org/wiki/Glasses> <http://www.amazon.com/class/refrn/u14l5a.cfm> Contact Lens1. What are contact lenses? http://en.wikipedia.org/wiki/Contact_lens <http://www.contactlensdoctor.com/>

http://www.emedicinehealth.com/contact_lenses/article_em.htm2
<http://health.whatitcosts.com/contact-lenses.htm>
http://vision.about.com/od/contactlenses/f/Contacts_Cost.htm
<http://www.allaboutvision.com/contacts/faq/contact-cost.htm3>
<http://www.xtremesystems.org/forums/showthread.php?58245-Contact-lenses-their-benefits-and-risks>
<http://voices.yahoo.com/risks-benefits-wearing-contact-lenses-4981340.html>
<http://www.news-medical.net/news/2009/05/06/49240.aspx4>
<http://www.youtube.com/watch?v=2jHedMh4FLw>
<http://www.youtube.com/watch?v=pDeS0Z5ZytK>
<http://www.youtube.com/watch?v=QFzSppvSgtULaser>
http://en.wikipedia.org/wiki/Eye_surgery
<http://www.eye-laser-surgery-info.com/eye-laser-surgery/eye-laser-surgery.php>
<http://www.trustyguides.com/laser-eye-surgery.html>
<http://www.youtube.com/watch?v=-x4YZO4itDY2>
<http://www.trustyguides.com/laser-eye-surgery4.html>
<http://www.youtube.com/watch?v=LBvZbfWRnTw>
<http://www.youtube.com/watch?v=38fnrlQXbrg&feature=3>
<http://www.eyehelp.co.uk/theprosconslasereyesurgery.html>
<http://www.buzzle.com/articles/laser-eye-surgery-risks-and-benefits.html>
<http://www.youtube.com/watch?v=KDgZZhARLsQ>
<http://www.youtube.com/watch?v=1re0x0Harj4>
<http://www.youtube.com/watch?v=eRzqswMtyNk&feature=relmfu4>
<http://www.trustyguides.com/laser-eye-surgery3.html>
<http://www.besthealthmag.ca/get-healthy/health/is-laser-eye-surgery-right-for-you>
<http://www.youtube.com/watch?v=UkRJAcA9Rfg>

Each group will make a final decision on the best vision correction option and create a PowerPoint presentation to persuade the students who suffer from nearsightedness which option is best choice. The PowerPoint must include the following: (1) What are eyeglasses, contact lenses, and LASIK? (2) What are the advantages and disadvantages of each vision correction option? (3) What is your final choice? (4) Explain the final choice in detail. *See rubric for PowerPoint presentation under the "Evaluation" tab for more details.

Each group will design a pamphlet to inform the students who suffer from nearsightedness which vision correction option is best choice. The pamphlet must include the following parts: (1) What are eyeglasses, contact lenses, and LASIK? (2) What are the advantages and disadvantages of each choice? (3) Advice for the students who are nearsighted as to what vision correction option is the best choice. (4) Advice for all students in order to prevent them from vision problems like nearsightedness. Note: See rubric for Pamphlet under the "Evaluation" tab for more details.

1. Each group will give a 10-15 minute PowerPoint presentation. Each group member will play a role in this presentation. You will be evaluated as a group and also individually on the presentation. 2. Each group will present their pamphlet to the other groups and provide a copy for each person. You will be evaluated as a group on the pamphlet. 3. During the last 30 minutes of class, each group will debate their vision correction choice. Note: See rubric for each of these tasks under the "Evaluation" tab for more details.

1. For the first 20 minutes, each student will be given a multiple choice quiz to evaluate their understanding of the mini lesson. 2. Then during the next 20 minutes, student will complete a peer evaluation (see "Evaluation" tab for more information). 3. Lastly, for the remaining 20 minutes, the teacher will evaluate and summarize this big group project.

Evaluation

What is a rubric? A rubric is a scoring guide that seeks to evaluate a student's performance based on the sum of a full range of criteria rather than a single numerical score. A rubric is a working guide for students and teachers, usually handed out before the assignment begins in order to get students to think about the criteria on which their work will be judged. Your grade will be comprised of the following five tasks. Their weight on your grade is shown in percents: 1. Presentation evaluation (20%) 2. Pamphlet evaluation (20%) 3. Debate evaluation (20%) 4. Peer evaluation (20%) 5. Quiz evaluation (20%) Please refer to the rubrics below for tasks 1-4, so you will know how you will be evaluated. If you are unsure of what is being asked of you, be sure to ask your teacher for clarification.

| Category and Score | | | | | Score |
|--------------------|--|--|--|-------------|-------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | Total Score | |

Conclusion

Now that you have researched the the human eye, how we see, and the three choices of correcting nearsightedness, your group will present a PowerPoint and pamphlet to the other groups. Lastly, your group will debate why your vision correction choice is the best.

Teacher Page

This is a unit project designed for an 8th grade science class. The project includes a biological aspect on the structure of the human eye with a physics aspect on the optics of lenses. The project is mainly focused in the biological sciences. Considering the eye is essentially an extremely optic device, the physics part is supplemented to help the students understand how the eye works. All of these aspects are contained in the project to aid in the understanding of nearsightedness and its possible treatments.

Time Frame: The project will last about seven one-hour periods. Here is a basic breakdown of the project: Hour 1: A mini-lesson concerning the structure of human eyes, is given. All students are required to have a clear idea as to what are the main components of a human eyeball with the central task of understanding how the eye see and why vision can be jeopardized by near-sightedness. The students will also learn how concave lenses help to correct nearsightedness. They will also research the cause of nearsightedness and investigate the various ways vision can be corrected. Hour 2-3: Students will research the working mechanisms of glasses, contact lenses, and LASIK. They will also investigate the costs and relevant advantages and or disadvantages in order to analyze the results.

Hour 4: Students will compile their results and perform an intra-group discussion. They will draw conclusions and create the slides in preparation for the PowerPoint presentation. Hour 5: Further intra-group discussion will take place, while students compile the information for their pamphlets. They will also be designing the pamphlet in preparation for the presentation. Hour 6: Group presentation and Q&A. Students will compare their conclusions with those of other groups. Special attention should be given to their explanation for the conclusions, which reflect their understanding of the biology and physics concepts. Hour 7: Quiz on mini lesson concepts, group discussion/debate, and teacher summary. Quiz will cover what is on the study guide and can be made to suit your preferences. Students will be asked out the possible defects in the arguments of other groups, meanwhile defending theirs. The teacher will make closing remarks on the projects of the students.

Standards

California Standards:

- 9.e Students know the roles of sensory neurons, interneurons and motor neurons in sensation, thought and response.
- IE1.i Analyze situations and solve problems that require combining and applying concepts from more than one area of science.
- IE1.m Investigate a science-based societal issue by researching the literature, analyzing data and communicating the findings.

Credits

All images are from Google. All videos are from YouTube.

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