

## “Eye See, You See:” Problem Based Learning Unit (PBL)

Section of Lesson	Unit Plan	
<b>Title</b>	<b>Lesson One</b>	The Faces of Medicine
	<b>Lesson Two</b>	Alert! “Eye” See an Issue!
<b>Introduction</b>	<p>A hospital is an integrated system of physicians, other hospitals, outpatient services, and more. Each element is connected and significant in providing an exceptional healthcare experience. Quality and service measures are necessary in the provision of quality healthcare for the community, including the use of technology, personal connections, and care. As a result, the transparency, validity, and expertise by the staff is important in understanding and providing proper patient care. It is up to your students to assess the right treatments and procedure measures for patients in order to secure the best possible outcome for the patients’ health. Their mission, vision and values is based upon recognizing the diversity of the patients, committing to personal excellence, and collaborating with their team to provide quality service.</p> <p>Through a series of lessons, students will serve as members of the hospital team, utilizing the mission, vision and values of the healthcare system to solve a patient puzzle related to the eye including:</p> <ol style="list-style-type: none"> <li>1. Group roles set as Medical Technologist (MT), General Supervisors, Cytotechnologists (CT), and Histologists.</li> <li>2. Lessons on career roles to understand the proper procedure in handling sample specimens, performing the tests, and ensuring the results they provide to the doctor are accurate reliable, and timely.</li> <li>3. Quality Safety measures to ensure the proper functioning of the laboratory tools necessary to complete patient samples and tests.</li> <li>4. Investigations on the functions and structures of the eye through microscopic observation, specimen reports, and collection of samples.</li> <li>5. Dissection of an eye to develop, and prepare tissue slides for signs of pathology, processing tissue biopsies and assisting fellow peers.</li> </ol> <p>Upon completion, students will report out the results, communicating with peers to determine the condition of the patient, infection results, and treatment plans if necessary.</p>	

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<b>Real Science Application</b>	<p>The above lessons serve as a series which relate to the Novant Health System, including the understanding of the healthcare systems mission, vision, and values. In addition, it serves to exemplify the shared diversity and services which patients receive upon visit to any of quality facilities. Furthermore, students will partake in the following, in no particular order, thus exemplifying and practicing applicable skill sets by use of those in the healthcare systems:</p> <ol style="list-style-type: none"> <li>1. Preparation of tissues for microscopic examination.</li> <li>2. Processing of tissue biopsies.</li> <li>3. Examination of cells under microscope for signs of pathology.</li> <li>4. Processing the day-to-day functions of the lab.</li> <li>5. Performing routine tests and quality control tests.</li> <li>6. Providing instructional training to trainees (i.e. peers).</li> </ol>
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<b>Learning Outcomes</b>	Students who demonstrate understanding, will be able to synthesize and address the following learning outcomes:		
	<b>Essential Questions</b>	<b>I Can</b>	<b>I Will</b>
	How do healthcare professionals contribute to the success of the patient care system?	Explain how different healthcare professionals impact patient care.	Investigate the role of different healthcare professionals.
	How do the laboratory specialists affect patient care?	Model the role of the laboratory specialists throughout patient care services.	Demonstrate proper laboratory techniques.
	How does the electromagnetic spectrum affect daily life?	Explain how the human eye functions and allows us to see.	Interpret test results, presenting a patient care report and treatment plan.
<b>Time Required and Location</b>	Lesson One will be completed in approximately one (1) 60 minute class period, with additional time given pending formative assessments by the teacher. Lesson Two will be completed in approximately three (3) 60 minute class periods.		

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<b>Curriculum Alignment</b>	This section contains the curriculum alignment of each lesson in the module to the North Carolina Essential Standards and Next Generation Science Standards.	
	<b>The Faces of Medicine</b>	<p><b>RI.2</b> (Summary of Informational Text)</p> <p><b>RI.8</b> (Integration of Knowledge and Ideas)</p> <p><b>W.7</b> (Research to Build and Present Knowledge)</p>
<b>Alert! “Eye” See an Issue!</b>	<p><b>MS-PS4-2</b> (Develop or use a model to describe that waves are refracted, absorbed or transmitted through various materials.)</p> <p><b>MS-PS4-3</b> (Obtaining, Evaluating and Communicating Information)</p> <p><b>PS4.A</b> (Wave Properties)</p> <p><b>PS4.B</b> (Electromagnetic Radiation)</p> <p><b>6.P.3.2</b> (Electromagnetic Radiation)</p> <p><b>6.P.1.2</b> (Forces and Motion)</p> <p><b>W.5</b> (Production and Distribution of Writing)</p> <p><b>W.2</b> (Text Types and Purposes)</p>	

	<b>Teacher</b>	<b>Student</b>
<b>Materials Needed</b>	<p>Promethean Board (1)</p> <p>Cl-Ev-R Literacy Model (1 per student)</p> <p>Note Taking Model (1 per student)</p> <p>Cornell Note Model (1 per student)</p> <p>Kahoot</p> <p>Google Timer (1)</p> <p>Scapel (1)</p> <p>Dissection Tray (1)</p> <p>Cow Eye (1)</p> <p>Microscope (1)</p> <p>Cover Slide (3)</p> <p>AirPlay</p> <p>Google Sketch-Up (5 subscriptions)</p> <p>MakerBot 3-D Printer (1)</p>	<p>iPad</p> <p>Mobicip</p> <p>SmartNotebook App</p> <p>ClassFlow (1 per class)</p> <p>piratepad.ca or titanpad.com</p> <p>infoagr.am/</p> <p>Twiducate</p> <p>Scapel (2 per group)</p> <p>Dissection Tray (1 per group)</p> <p>Cow Eye (1 per group)</p> <p>Microscope (1 per group)</p> <p>Cover Slide (3 per group)</p> <p>Google Sketch-Up (5 subscriptions)</p> <p>MakerBot 3-D Printer (1)</p>

## “Eye See, You See:” Problem Based Learning Unit (PBL)

<b>Student Prior Knowledge</b>	<p>Students must have a strong foundation of the following:</p> <ol style="list-style-type: none"><li>1. Properties of waves to the wavelength property of energy in light.</li><li>2. The relationship between visible light, electromagnetic spectrum and sight.</li></ol> <p>Through the following lessons and unit, students will expound upon conceptual understanding of the medium through which properties of waves travel, impacting daily life. Such would also include identifying the source of light, scattering properties, and absorption effects. These lessons will build upon previous knowledge through application of content in a real world setting.</p>
<b>Teacher Preparations</b>	<p>Teacher preparation would include the following:</p> <ol style="list-style-type: none"><li>1. Awareness and understanding of North Carolina Essential Standards, Next Generation Science Standards.</li><li>2. iPad Cart, and tutorial E-Books through AirPlay for students on related Apps for the Unit (if available.)</li><li>3. Preparation of the dissection tables including: cow eye, scapel, dissection tray, paper towels, slides, coverslips, microscope, water, goggles, gloves, lab coats.</li><li>4. Alignment of Proscope digital microscope for iPad to demonstrate perceptions (if available.)</li><li>5. Career role cards (or iPad if available for independent research) related to Medical Technologist (MT), General Supervisors, Cytotechnologists (CT), Pathologist, and Histologists.</li><li>6. Lab Supervisor report on Quality Control Tests to run each day of the unit.</li><li>7. Diagram of the eye (if available, posted on NeuAnnotate.)</li><li>8. Books and/or articles on the eye (if available, E-books through Destiny Quest or NC Virtual Library.)</li><li>9. Reflection/Concept guides to gauge and track student learning.</li><li>10. Literacy strategies for vocabulary, research, and written portions of the unit.</li><li>11. Patient Care Report blank sheet (if available, posted on NeuAnnotate.)</li></ol>

## “Eye See, You See:” Problem Based Learning Unit (PBL)

	Tier II	Tier III
<b>Critical Vocabulary</b> <i>(See Appendix for definitions.)</i>	Adapt Analyze Anticipate Artifact Compose Conclusion Consequence Contribute Evaluate Exhaust Frequent Persuade Repetition Similar Variable Strategy Recount Realistic Priority	Emit Reflection Refraction Electromagnetic Waves Visible Light Transverse Waves Absorption Scattering Angle of Incidence Angle of Reflection Optical Illusion Transparent Impairment Concave Lenses Convex Lenses Concave Mirror Convex Lenses Translucent Opaque Cornea Pupil Retina Optic Nerve Optic Rod Optic Cones Iris

### Unit Vocabulary Notes:

Vocabulary related to this concept has not been discussed in great detail before, but builds upon prior knowledge gain from Grade 4, the discussion of light as energy. Therefore, it is important to focus on possible Tier I, Tier II, and “linking word” vocabulary deficits by students, as well as previous Tier III vocabulary. A possible assessment on such may need to occur prior to the unit so as to understand where student vocabulary deficits may lie. From there, one can build a foundation of understanding beyond scientific discourse through instructional methods meeting student needs. For example, understanding the overarching idea of a light as an “energy,” may mean using previously mentioned vocabulary strategies (such as “KIM”) for such terminology, as well as discussing with students “What energy? How do energy travel through a system? How does energy relate to the transmission of information?” Helping students through such will develop a foundation that is carried into Grade 7 and 8 to High School.

## “Eye See, You See:” Problem Based Learning Unit (PBL)

### Lesson One: The Faces of Medicine

#### Engagement (15 Min.):

- (1) Using ClassFlow (or written on the WhiteBoard), students will each complete the following upon entering the room: “Respond to the given prompt using prior knowledge to support your claim: *Is one healthcare professional more important than another?*” The teacher will use Google Timer to set on odd amount of time for students to complete such. (If posted on the WhiteBoard, students may respond on Post-It notes and place where the question is hosted in the room.)
- (2) As students are responding to the given prompt, recording of the EQ and Focus Statements will occur in their Eye See, You See Notebook within the SmartNotebook App (or, if not technology is present, in their Science Interactive Notebook.) *At this time, the teacher will walk-around for clarification and guidance if needed.*
- (3) After the passing of the allotted time, facilitation of a whole-group discussion will occur in which the teacher will use ClassFlow (or Post-Its) to review the given responses, as well as reviewing Tier II/III vocabulary words. These words can be pre-made on cardstock, or posted on the board for review. It is important to guide the students to understand that the healthcare professional includes an array of individuals. Further exploration of such will occur throughout the lesson. *Vocabulary is up to teacher discretion here.*

#### Activities

#### Explain (20 Min.):

- (1) Via the provided 3-2-1 strategy cards (see Appendix), the teacher will distribute to each group an image of a healthcare professional. Students will be asked to reflect on the following characteristics depicted within the image: mood, tone, and conflict using the 3-2-1 strategy (3 items I noticed about the role of the individuals, 2 questions I have about the profession, and 1 connection I made to science.)
- (2) The students will annotate and record their responses about the image using ClassFlow (if not available, the teacher can provide each card at a specific table, and the students can record their responses to share out with the class.)
- (3) Each group will send their responses back to the teacher, and present it to their peers via ActivInspire. *It is important for teachers here to facilitate the literacy prompt, and provide support, guidance and probing questions when necessary. Probing questions could include, but are not limited to, the following: How are the settings similar/different? How is lab safety depicted within each profession? Etc.*
- (4) Using whole-group facilitation, the teacher will ask the students common themes depicted in each image, guiding them to further understand the multi-faceted relationship of healthcare professionals being diverse, yet similar.

## “Eye See, You See:” Problem Based Learning Unit (PBL)

### Activities

#### Exploration (55 Min.):

- (1) The teacher will have each student group (*based on preferential arrangement by the teacher*) research, and develop an argument on the following prompt: “How do healthcare professionals contribute to the success of the patient care system?” Each student group, or “Learning Team,” will be assigned a specific professional role from the following: Medical Technologist, General Supervisor, Cytotechnologist, Histologist, Pathologist, etc.
- (2) Students will develop their claims to the prompt utilizing evidence from statistics, primary and secondary sources. *Collaboration with the Media Specialist is encouraged here.* The use of literacy strategies such as OPTIC, chunking the text, and a graphic organizer is encouraged throughout the research process (such as the Note Taking Model or Cornell Notes. See Appendix for the guiding research sheet, and further literacy resources.)
- (3) Students will use GoogleDocs to collaborate on research. If such is not accessible, students may use piratepad.ca or titanpad.com. This will allow seamless collaboration on research. For editing, students may use the hemingwayapp.com to check errors in voice, adverbs and readability of sentences. If such is not available, use of student Science Interactive Notebook can occur, and peer editing rotations can result. *Teacher facilitation must occur as students research. It is important prior to discuss proper research skills and digital literacy prior to or throughout the lesson. Such research skills can include, but are not limited to, the following: citing textual evidence, scanning text, reading for understanding, and using different search engines. Collaboration with a Media Specialist is encouraged here.*
- (4) Students will address their Learning Team’s claim/evidence to the prompt by developing an infographic (infogr.am/) which utilizes statistics and information regarding the professional role (see Appendix for rubric.) In addition, students will evaluate the necessary skill set needed by the professional, and offer recommendations on how students can work towards becoming the specific professional. *Continued teacher facilitation is important.*

#### Elaboration (30 Min.):

- (1) Students will present their claim in a 5-10 minute presentation addressing the prompt by means of their infographic.
- (2) As groups are presenting, the students in the audience will use the Cl-Ev-R Model to record significant evidence as notes, as well as questions remaining for the presenters and/or teacher.
- (3) Following each presentation, questions will be addressed by the presenters, and if necessary, the teacher.
- (4) Using whole-group facilitation, the teacher will lead a discussion on the common themes observed throughout the healthcare professions. (*Note: This discussion will lead into a following inquiry lesson which looks at the quality safety measures, proper procedures, and accountability of each professional.*)

## “Eye See, You See:” Problem Based Learning Unit (PBL)

### Lesson Two: Alert! “Eye” See an Issue!

#### Engagement (10 Min.)

- (1) As students enter the room, they will be asked to “suit up!” Laboratory coats will be distributed at the door, and the teacher will be wearing one as well. The lights will be off, and students will be asked to take a seat, quickly as time is ticking! (*The teacher will be monitoring students as they come in to complete what has been asked in an appropriate manner.*)
- (2) The teacher will enter the room stating, “I have just received word of an emergency situation. Individuals in your own community are experiencing alarming health issues!” The teacher will then introduce a Novant Letter indicating the alarming health issues (available in the Appendix.)
- (3) Following such, the teacher will pose a question to the students a question on ClassFlow (or the WhiteBoard if such is note available) which states, “What issues do we have occurring in the community right now? What information and evidence do you have? What information do you still need?” Students will post responses on ClassFlow (or in their Science Interactive Notebooks) and send them back to the teacher. The teacher will facilitate a class discussion on the present situation, and the questions.

#### Explain (30 Min.):

#### Activities

- (1) Using Edmodo (if available), students will access the Novant Health Crisis Alert Letter (see Appendix) which will outline further the issue occurring. Students will utilize neuAnnotate to annotate the letter, utilizing the following techniques as posted on the ActivInspire: *KIM* (Vocabulary/Information), *Chunking the Text*, *Reading Road Map*. (For none 1-to-1 Districts, the use of printed, tiered documents can occur as well for discrete distribution.)
- (2) *The teacher will facilitate as such occurs, assisting struggling readers and gauging the time restraint for the students.* A *Google Timer* will be placed on the ActivInspire, and a timer will occur at the end of the allotted time.
- (3) Following the allotted time, the teacher will facilitate a class discussion using similar questions, pulling up the previous ClassFlow (or posted) questions, asking students to derive further issues occurring, information and evidence provided, as well as information still needed. Importantly, the teacher will serve to guide students to identify the necessary requirements, recording such on the ActivInspire Promethean Board (i.e.: What do we now know that we didn’t before? Etc.)
- (4) Following, the teacher will ask a probing question of, “your community needs you, so the question is, what will you do?” The teacher from there will guide students on the meaning/protocols for the Quality Control Measures and Patient Safety Report (see Appendix), and why such is important in the hospital setting. Students will brainstorm and record notes on the actions needing to occur in relation to Quality Control Measures within the classroom for this given problem.



## “Eye See, You See:” Problem Based Learning Unit (PBL)

### Exploration (120 - 180 Min.):

- (1) Student Learning Teams (i.e. groups) will be organized, roles discussed (based on previous knowledge gained from the Faces of Medicine Lesson) and assigned, as well as the Learning Team Portfolio modeled (see Appendix). The Learning Team Portfolio will address concepts of 6.P.1.2. *This will serve as a guided PBL (Problem Based Learning) for students, so independent inquiry with teacher facilitation is key to success.*
- (2) Students will be complete initial research on the following: eye structure, process of electromagnetic spectrum and sight through the eye, and medical issues impacting the eye. The research will be guided through the questions in the Concept Guide (see Appendix) and recorded in the Eye See, You See Notebook. The ultimate goal is for students to complete the question statements to guide their learning. Teacher facilitation and guidance of such will occur. Media and research tools will be available to students (*teachers need to collaborate with Media Specialists for most appropriate and available texts.*) As students are completing such, the teacher will assess growth, etc. This may include: flashcard vocabulary review, probing questioning, redirection, modeling, etc. The focus for the teacher is to individually assess each Learning Team, and likewise student, as research is being completed. This will allow for more personalization, etc.
- (3) Once complete, the students will be given the dissection materials, and complete the remaining portion of the PBL (Problem Based Learning.)
- (4) Each Learning Team, daily, must complete the following (see Appendix for Learning Team Portfolio): Patient Safety Report, daily reflections on performance and progress on the Concept Guide, blog prompts, and proper Quality Control Measures taken.
- (5) Students will develop the following to display their knowledge and solution to the given problem: Popplet, iMovie, Keynote, etc. *Teacher discretion depending on resources.*
- (6) Students report out patient updates each day through GoogleHangout with other classes and/or schools (i.e. Patient Safety Report). If such is not available, students report out updates on prognosis and examination with classmates. With such, this will serve to model the safety patient reports which occur each morning for updates. Department representatives are all present. The teacher will model for students as groups start, yet prior modeling will also occur (*Teachers, this may occur in the Faces of Medicine Lesson to discuss the relationships between the two.*)

### Activities

### Elaboration (30 Min.):

- (1) Each group will present their initial findings throughout the start of each class period, recording findings and initial notes throughout to model the safety report process of the hospital. Students need to keep such as concise as possible as most representatives for departments have only a minute to complete such. A debrief will also occur each morning for open-ended questions regarding the research process, etc. as is present in initial reports (an adaptation to the classroom environment.) As groups are presenting, the students in the audience will use the Cl-Ev-R Model to record significant evidence as notes, as well as questions remaining for the presenters and/or teacher.
- (2) Upon completion of the Learning Team Portfolio, the students will complete a oral laboratory report including dictation (if available) or written recording (see resources) on the following: initial specimen report, clinical report (cultural quadrants for AIG modification or time permitting), tissue biopsy, and biopsy report. This will be the final component to the learning process.
- (3) Using whole-group facilitation, the teacher will lead a discussion on the common themes observed throughout the reports related to the following: professional practice, interconnections between professional roles, effective communication, as well as findings related to content of 6.P.1.2.

## “Eye See, You See:” Problem Based Learning Unit (PBL)

<b>Modifications</b>	Students will be paired heterogeneously based upon comprehension levels as determined by prior testing and/or several forms of classroom data. Upon the administration of the common assessment, students will be re-arranged accordingly from such results. In addition visual, auditory and kinesthetic learning strategies will be utilized. Additional diagrams and vocabulary for ESOL students will be distributed.
<b>Alternative Assessments</b>	Students will complete an individual reflection and LOM (Level of Mastery) on Student Trackers using a Google Form, rating themselves 1-4. Students will also complete the Exit Activity of “Create a Higher Order Thinking question on the EQ of the day, answering such as well.” (Teachers are encouraged to have students use Blooms Question Stems in order to create such.)
<b>Safety</b>	The Safety section includes teacher and student safety precautions. MSDS sheets and they must be available. For educators, please be aware that the above dissection model unit should be done under proper classroom conditions of modeling how to handle supplies, and sanitize areas. If deciding to use the modified culture guide, make sure a hood is present in the classroom to do such.
<b>Assessment</b>	Per Lesson One, student assessment will occur through a rubric upon presentation of the infographic, as well as the infographic itself. Additional assessment will occur through teacher facilitated directives throughout walk-arounds. Per Lesson Two, student assessment can occur through continuous blogging via <i>Gaggle</i> (if available), updated specimen reports, as well as formative teacher-checks in the Learning Team Portfolio. Further assessment will occur through teacher facilitated directives throughout walk-arounds which include probing questions and vocabulary questioning.

## “Eye See, You See:” Problem Based Learning Unit (PBL)

<p><b>References</b></p>	<p><a href="https://www.novanthealth.org/">https://www.novanthealth.org/</a>          Microbiology Department, Environmental Services Department (Salisbury Novant Health System)  <i>Negotiating Science: The Critical Role of Argument</i>, Brian Hand          Laboratory Role/3-2-1 Strategy Card Images:  <a href="http://depts.washington.edu/labweb/Education/MedTech/index.htm">http://depts.washington.edu/labweb/Education/MedTech/index.htm</a>  <a href="http://pathology.iupui.edu/education/graduate/graduate-tracks/pathologists-assistant/">http://pathology.iupui.edu/education/graduate/graduate-tracks/pathologists-assistant/</a>  <a href="http://work.chron.com/cytotechnologist-certification-2344.html">http://work.chron.com/cytotechnologist-certification-2344.html</a>  <a href="http://tvmdl.tamu.edu/2013/02/07/spouses-of-am-systems-top-leaders-learn-how-diagnostics-solve-animal-health-cases/">http://tvmdl.tamu.edu/2013/02/07/spouses-of-am-systems-top-leaders-learn-how-diagnostics-solve-animal-health-cases/</a>  <a href="http://berkshireagle.mycapture.com/mycapture/enlarge.asp?image=13715635&amp;event=209039&amp;CategoryID=0">http://berkshireagle.mycapture.com/mycapture/enlarge.asp?image=13715635&amp;event=209039&amp;CategoryID=0</a>          Culture Media Technique Image: <a href="http://atccmicrobiology.blogspot.com/2012/06/tips-for-aseptic-technique-in.html">http://atccmicrobiology.blogspot.com/2012/06/tips-for-aseptic-technique-in.html</a>          Infographic Rubric adapted from Mr. Kaiser Web 2.0          Eye Diagram <a href="http://www.exploratorium.edu/learning_studio/cow_eye/eye_diagram_print.html">http://www.exploratorium.edu/learning_studio/cow_eye/eye_diagram_print.html</a></p>
<p><b>Supplemental Information</b></p>	<p>See Appendix for additional information for the Eye See, You See Problem Based Learning Unit.</p>
<p><b>Comments</b></p>	<p>The entirety of this unit can be adapted for non-technology oriented classrooms through jigsaws, carousels, affinity diagrams, etc. Furthermore, adaptation and deletion of components can occurring according to time restraints.</p>
<p><b>Author Info</b></p>	<p>Rachel Lawrence is a graduate of High Point University in Middle Level Education, completing culminating research on Transitional Issues in Middle Level Students and Instructional Strategies in AIG Students. Currently, she is working towards her Masters degree in Educational Leadership, as well as serving as a 2014-2015 Kenan Fellow for Curriculum and Leadership Development through North Carolina State University (NCSU.) She currently shares her passion for learning with the students and staff of Southeast Middle School in Salisbury, NC, serving as a Science and Social Studies teacher. She has presented on the use of Twitter at the NCMLE Conference, upcoming 2014 AMLE Conference, in addition to leading the integration of its use within her local school district. Furthermore, she is involved in the development of PBL and STEM curriculums through Rowan-Salisbury Schools, Novant Health of Rowan, Lenovo Inc., and the Kenan Fellowship Program at NCSU.</p> <p>Gary Blabon is the director of operations for the Novant Health Rowan Medical Center. He has worked in health care since 1991, first in physical therapy as an orthopedic physician assistant and has been in healthcare administration since 2000.</p> <p>Sam Morris serves as the WorldWide Education Executive for Lenovo. He is dedicated to improving learning outcomes by the effective use of technology while working to ensure Lenovo creates the best digital solutions for education; he also develops professional development and support resources for teachers and administrators.</p>

## “Eye See, You See:” Problem Based Learning Unit (PBL)

<b>Community Engagement</b>	<p>Community engagement can occur by means of the following:</p> <ol style="list-style-type: none"><li>1. Teacher outreach to the local hospital to provide Mystery Skype, GoogleHangout, or visitors to the local school. Such individuals would provide insight into their profession, allowing students to ask questions, seeking feedback in real-time manner.</li><li>2. Teacher outreach to local hospitals or laboratories with educational outreach personnel who would participate in a blogging challenge with students. Students would post their personal experiences with the Eye See, You See PBL Unit, where professionals would respond providing insight into such experiences.</li><li>3. Teacher outreach to the local hospital or laboratories for CampMed opportunities to shadow health care professionals beyond.</li><li>4. Teacher outreach to neighboring classrooms, schools, and districts who would participate in the PBL. Such would allow for students to partake in a GoogleHangout with classrooms beyond their county border, allowing them to mimic “off-site” personnel conferences present in the health care field.</li></ol>
<b>Extension Activities</b>	<p>Additional activities may include, but are not limited to, the following:</p> <ol style="list-style-type: none"><li>1. Shadowing of healthcare professionals.</li><li>2. Google SketchUp activities related to biotechnology practices. This may include regenerative medicine, and the partnership with Wake Forest Regenerative Institute. Additional research on 3-D printed organs, such as the eye, can occur. Primary sources and editorials of such are important for students to then generate evidenced based opinions of such. Modeling of the techniques can occur through the MakerBot 3-D Printer.</li><li>3. How to create a culture using (impersonated) Media if provided in the proper conditions for the school. This is more important to understand the proper stroke techniques than to actually use real Media, therefore, such can be modeled time permitting.</li></ol>

**“Eye See, You See:” Problem Based Learning Unit (PBL)**

# Appendix

Resource Documents for “Eye See, You See”  
Problem Based Learning Unit

# “Eye See, You See:” Problem Based Learning Unit (PBL)

## Literacy Strategies

Literacy Strategies:	Literacy Instructional Tools:
<p>(1) Students will derive inferences from content specific vocabulary within a complex text, data tables and images. Students will use context clues and prefixes/suffixes in order to assess unknown phrases and words.</p> <p>(2) From texts, students will develop a storyboard of sequenced events, and outcomes to assist in outlining the general themes present.</p> <p>(3) Students will develop support for claims by means of evidence from text, and additional research. As a result, students will convey an informed solution to a given problem.</p> <p>(4) Students will create media and visual displays of gathered data and information.</p> <p>(5) Bridge personal experiences with situations within the text, including social issues and how such effect groups.</p> <p>(6) Critique authors incorporation of literary devices such as illustrations, infographics, etc.</p> <p><i>Please note, it will be necessary to focus on possible Tier I and Tier II vocabulary deficits by students. A possible assessment on such may need to occur prior to the unit so as to understand where student vocabulary deficits may lie. From there, one can build a foundation of understanding beyond scientific discourse through instructional methods meeting such a need.</i></p>	<p>(1) Cornell Notes or Three Column Notes (<i>SmartNotebook</i> or <i>Evernote</i> App, and <i>Popplet</i> App for graphic organizers of initial content and vocabulary.)</p> <p>(2) Word Analysis (i.e.: Unicellular: “uni-,” meaning one, “-cellular,” cells, or one celled.) Students can record such using <i>Flippity.net</i> or the <i>SAS Notecard App</i> to access for continuous, yearly use.</p> <p>(3) Quick Writes for Bell Work and/or Exit Activities through <i>Gaggle</i> or <i>Goggle Docs</i>.</p> <p>(4) Frayer Models through the <i>Notebook, Pages,</i> or <i>Keynote</i> App when summarizing concepts or vocabulary.</p> <p>(5) Group summarizing and Question the Author when analyzing text throughout research (<i>eBook annotation</i>.) Teacher facilitated directives during such collaborative and independent practice.</p> <p>(6) Students will research, outline, edit and refine writings to present information to an audience. Completed through <i>Gaggle Blog</i> and <i>Pages</i>.</p> <p>(7) KIM (Key Idea/Word, Information, Memory Clue) Strategy for vocabulary (Tier I, II, III.)</p> <p>(8) Critique written text, developing literacy devices for a given text using items such as <i>Tellagami, Aurasma, infographics, etc.</i></p> <p>(9) Reading Road Map using <i>neuAnnotate</i> to gauge the level of understanding of a complex text, and assist the teacher to facilitate areas of weaknesses (Red), strengths (Green), or hesitations (Yellow.)</p>

*The below resources and strategies can be adapted throughout the unit to best suite student needs.*

- (1) Prior to reading, depending on the student demographics, a teacher may desire to use any of the following:
- OPTIC
  - Previewing the Text
  - Reading Aloud
- (2) During reading, within student Learning Teams, whole-group discussions, or 1-on-1 guided instruction, a teacher may desire to use any of the following:
- Chunking the Text
  - Context Clues
  - Graphic Organizer

# “Eye See, You See:” Problem Based Learning Unit (PBL)

## Vocabulary Strategies

### iPad Apps

Popplet Lite  
SAS Notecard  
iBook  
Book Creator  
Pages  
Adobe Reader /PDF  
Reader  
Diigo  
Evernote  
Skitch  
Notes  
Flashcard Analytics  
Google Apps

### Online Tools

Flippity  
Google Docs  
Padlet  
ThingLink  
Word Hippo  
Flashcard Stash  
SAS Flash Cards  
Aurasma

### Instructional Strategies

KIM and/or PAVE Model  
Frayer Model  
Word Analysis  
Text Annotation  
Word Sort  
Concept Map  
Context Clues  
Three Column Notes  
Cornell Notes  
Give One, Get One, Move On  
Interactive Word Wall

# “Eye See, You See:” Problem Based Learning Unit (PBL)

## Cl-Ev-R Literacy Model

*Group members each develop one claim from a given informational text, providing the supporting evidence of why the claim is significant. Each member then develops question(s) related to the claim including, but not limited to, the following: (1) for the author (2) the claims relationship to the overall meaning of the text or (3) vocabulary.*

<b>Group Member</b>	<b>Claim</b> (One Sentence)	<b>Evidence:</b> (Bullet what you think is significant)	<b>Questions:</b> (What questions do you still have?)



## “Eye See, You See:” Problem Based Learning Unit (PBL)

### Note Taking Model

*Students generate a number of questions related to a concept. Using a number of informational texts, students cite the source, evidence, and answer from the text.*

<b>Topic</b>	<b>Question 1</b>	<b>Question 2</b>	<b>Question 3</b>
Source 1	Evidence/Answer	Evidence/Answer	Evidence/Answer
Source 2	Evidence/Answer	Evidence/Answer	Evidence/Answer
Source 3	Evidence/Answer	Evidence/Answer	Evidence/Answer
Source 4	Evidence/Answer	Evidence/Answer	Evidence/Answer

# “Eye See, You See:” Problem Based Learning Unit (PBL)

## Research Resources

*The following are resources that can be utilized for students. Whether the following are used or not, it is important to discuss with students proper research techniques such as: evaluation of domain and online credibility, proper use of search engines, citations, how to smart search via symbols, etc.*

Infographic Generator: <http://infogr.am/>

Culture Grams

WorldBook Britannica

DestinyQuest

FolletShelf

# “Eye See, You See:” Problem Based Learning Unit (PBL)

Learning Team Portfolio Resources

## Team Members:

\_\_\_\_\_ , \_\_\_\_\_ ,  
\_\_\_\_\_ , \_\_\_\_\_ ,  
\_\_\_\_\_ .

## Team Roles:

**General Supervisor:** \_\_\_\_\_ .

**Histologist:** \_\_\_\_\_ .

**Pathologist:** \_\_\_\_\_ .

**Medical Technologist:** \_\_\_\_\_ .

**Cytotechnologist:** \_\_\_\_\_ .

# **“Eye See, You See:” Problem Based Learning Unit (PBL)**

## **Concept Guide**

*The following guide will help you formulate questions to search as you and your team diagnosis the patient!*

**Concept #:** 6.P.1.2 **Concept:** Light

### **Essential Problems**

How can the human eye respond to emitted light?

### **Focus Problems**

How do the ranges of electromagnetic waves (visible light) impact the eye?

Compare/contrast the effect varying properties have on the scattering of light.

What makes up the eye?

How does the eye function based on its structure?

### **Throughout the Dissection:**

Investigate conditions that impair vision through dissection and research.

Investigate the structure of the eye through dissection.

### **Guiding Vocabulary**

Wave, transverse waves, longitudinal waves, potential energy, trough, crest, amplitude, frequency, wavelength, rarefaction, compression, seismic waves, EM spectrum, visible light, energy, sound, vibration, medium, vacuum, pitch, hertz, intensity, decibel, amplification, acoustics, echolocation, sonar, ultrasound, Doppler effect, mechanical wave, law of resonance, EM wave, radio waves, microwaves, UV light, infrared light, x-rays, gamma rays, prism, primary pigments, primary colors, reflection, optics, image, convex, concave, focal point, lens, focal length, cornea, pupil, retina, optic nerve, cones, rods.

**Remember, you ARE responsible for  
YOUR teams success in learning!**

# “Eye See, You See:” Problem Based Learning Unit (PBL)

## Concept Log Week 1

Date	Concept #	What Did We Learn?

# “Eye See, You See:” Problem Based Learning Unit (PBL)

## Reflection Week 1

Date	Assignment Score	On Task Score	Teacher Comments

## **“Eye See, You See:” Problem Based Learning Unit (PBL)**

### **Reflection Scoring Guide**

#### **Assignment Score**

- 1** - Too easy, could do this by myself. No partners needed.
- 2** - Easy, but needed partners to complete tasks.
- 3** - Perfect fit! We were able to move forward with essential problems and assignments.
- 4** - Too difficult, was unable to complete essential problems and assignments.

#### **On Task**

- 1** - Off task all the time, no progress made.
- 2** - Off task some of the time, with a little progress made.
- 3** - On task, but several group members were not participating to the best of their ability.
- 4** - On task, we accomplished above and beyond of what we needed to do! Everyone participated equally.

## **“Eye See, You See:” Problem Based Learning Unit (PBL)**

### **Daily Blogger Prompts**

**Daily:** Explain the challenges, successes and failures of your Learning Team in relation to the goals.

**Day 1:** How can your team improve in the research process? Do you have a learning plan in place?

**Day 2:** What changes have you had to make in the research process? How have you and your team adapted to meet the time restraint? What success and challenges are you coming across in relation to the “profession?”

**Day 3:** What skills have you found necessary in completing the learning objective? In relation to this profession? Why?

**Day 4:** Self reflect on the unit. What did you learn about yourself? What areas of growth and improvement have you identified?



## **“Eye See, You See:” Problem Based Learning Unit (PBL)**

### **Objectives**

Using your knowledge gained through the “essential problems” (objectives), create the following:

1. Daily patient safety report write-up and communication.
2. A completed oral (if available) and written pathology report after dissection.
3. A unique means of displaying the knowledge gained! (Make sure to include the essential problem log and vocabulary list!)
4. Daily Blogger responses on Gaggle (if available), including Concept Log and Reflection Log responses. If no online device for blogging is present, use of Student Interactive Notebooks can occur.

# “Eye See, You See:” Problem Based Learning Unit (PBL)

## Novant Healthcare System

\_\_\_\_\_ (Pathologist)  
Box 1570

Report Copies to:  
\_\_\_\_\_ (Pathologist)

### Oral Pathology Report

**Clinical Data** (Medical Technologist \_\_\_\_\_ report):

**Gross Description** (Pathologist \_\_\_\_\_ examination):

**Microscopic Description** (Histologist \_\_\_\_\_ and Cytotechnologist \_\_\_\_\_ examination report):

**Final Diagnosis:**

A)

B)

**Comments:**

A) Director informed of the diagnosis on \_\_\_\_\_ .

# “Eye See, You See:” Problem Based Learning Unit (PBL)

## HealthCare Profession Guiding Research Sheet

### Lesson 1: The Faces of Medicine

**Overarching Question:** How do healthcare professionals contribute to the success of the patient care system?

**Brainstorm:** With your Learning Team, record several aspects of the professional role you were given that you desire to know more about. For instance, such could be “what skills does my professional need to have to be successful at his/her job?”

1.

2.

3.

4.

**Research:** Research your professional role, and respond to the guiding questions you brainstormed. Prior to doing so, make sure your teacher has checked your brainstorm. Record your researched information below.

1.

2.

3.

4.

**References:** It is important for any professional to site credit where it is due. Make sure to properly site your sources below.

**“Eye See, You See:” Problem Based Learning Unit (PBL)**



**General Supervisor**

**Laboratory Roles  
and  
3-2-1 Strategy  
Cards**



**Histologist**

**“Eye See, You See:” Problem Based Learning Unit (PBL)**



**Cytotechnologist**



**Pathologist**

**“Eye See, You See:” Problem Based Learning Unit (PBL)**



**Medical Technologist**

## **“Eye See, You See:” Problem Based Learning Unit (PBL)**

### **Novant Health Crisis Alert Letter**

Dear Microbiology Department,

We have come into contact with a MRSA, a multi-strain resistant infection as a result of bacteria resistant to antibiotics, which has been infecting several patients within the hospital. While our Environmental Services Department (ESD) is taking all precautions to stop such from occurring, we are in need of your help to quickly identify if such has occurred in several other patients who have, due to specific patient reasons, had to have their eye surgically removed, known as enucleation. The patients have all experienced the similar symptoms, as indicated in your Patient Report, too (see attached document.)

Such symptoms include sever inflammation of unknown cause, likely due to the bacterial infection. In addition, further symptoms that resulted are immediate blindness, and intolerable pain in the blind eye from uncontrolled. It is up to you and your team to help assist our Doctors in the identification of the cause for the intolerable pain, and immediate blindness. Make sure to have a complete examination of the eye structures prior to the identification of such. In addition, please make sure to use proper Quality Control measures so our results are accurate, and reportable. This is a crucial component for our ESD so that we may move forward on how to remove such from our hospital grounds.

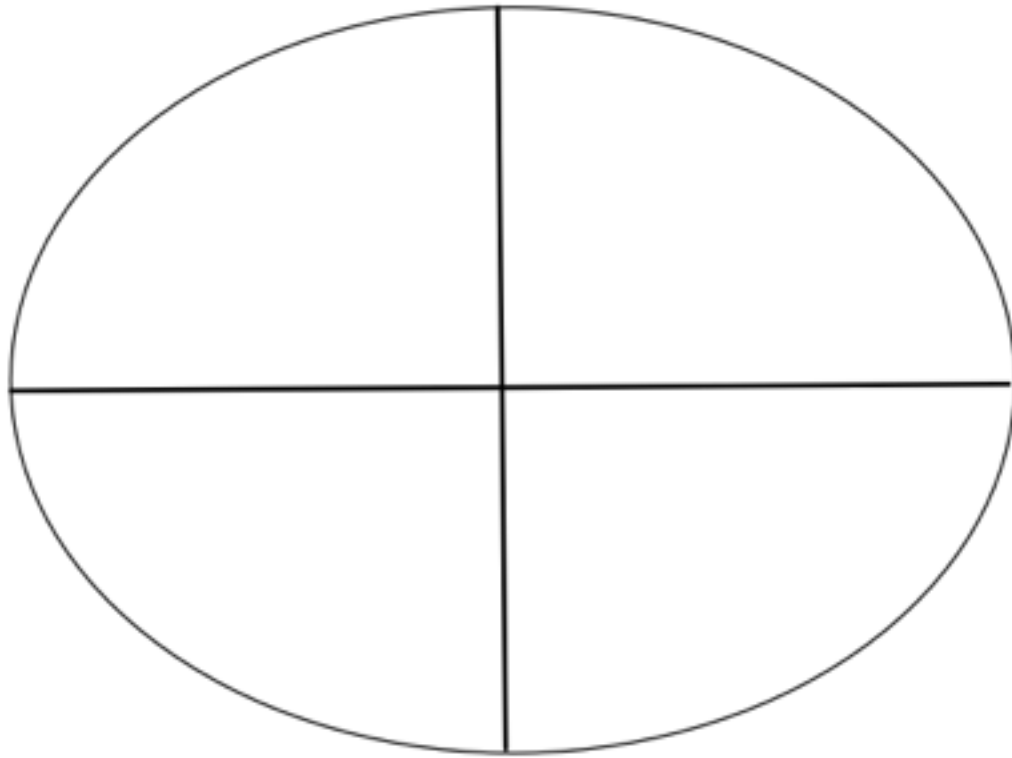
Sincerely,

Mary Hampfield

President, Novant Health System

## “Eye See, You See:” Problem Based Learning Unit (PBL)

### Culture Guide



1. In creating a culture, it is important to separate it into 4 quadrants, and to use similar brush strokes so as to properly agitate the media.
2. You can gather a culture with the appropriate tools: sterile petri dish, glass rod, scalpel, media.
3. In order to prepare a slide, you must take the specimen as collected by the Medical Technologist, and properly stain the culture slide.
4. Wait 24 hours to see if any reaction has occurred, therefore citing the infection cause.

**Teacher Note:** *It is important to stress that proper technique is emphasized here over using true media for the cultures. It is more imperative to stress why the technique must occur consistently as opposed to actually analyzing the media. (Such can not occur in a general classroom setting due to OSHA protocol.)*



## “Eye See, You See:” Problem Based Learning Unit (PBL)



### Proper Culture Techniques

**Specimen A** (Proper Stroke Technique)



**Specimen B** (Improper Stroke Technique)



# **“Eye See, You See:” Problem Based Learning Unit (PBL)**

## **Patient Safety Report Meeting**

Daily Write Up

**Care Team Members** (Microbiology Team):

**Individual Reports** (Update on Present Examinations):

**Laboratory Results** (Update on any Laboratory Results):

**Needs** (Requests for Additional Assistance):

## “Eye See, You See:” Problem Based Learning Unit (PBL)

### The Faces of Medicine of Infographic Rubric

Category	4	3	2	1
Content	Covers topic in-depth with details and examples. Subject knowledge is excellent.	Includes essential knowledge about the topic. Subject knowledge appears to be good.	Includes essential information about the topic but there are 1-2 factual errors.	Content is minimal OR there are several factual errors.
Graphics	All graphics are related to the topic and make it easier to understand.	All graphics are related to the topic and most make it easier to understand.	All graphics relate to the topic.	Graphics do not relate to the topic.
Attractiveness	Makes excellent use of font, color, graphics, effects, etc. to enhance the presentation.	Makes good use of font, color, graphics, effects, etc. to enhance to presentation.	Makes use of font, color, graphics, effects, etc. but occasionally these detract from the presentation content.	Use of font, color, graphics, effects etc. but these often distract from the presentation content.
Mechanics	No misspellings or grammatical errors.	Two or fewer misspellings and/or mechanical errors.	Three misspellings and/or grammatical errors.	Four or more spelling or grammar errors.

Total:

## **“Eye See, You See:” Problem Based Learning Unit (PBL)**

### **Quality Control Measures**

You and your Learning Team must undergo “Quality Control Measures” each day at the start of class. These are internal checks performed by the laboratory staff on measurement tools, supplies, and sample collection.

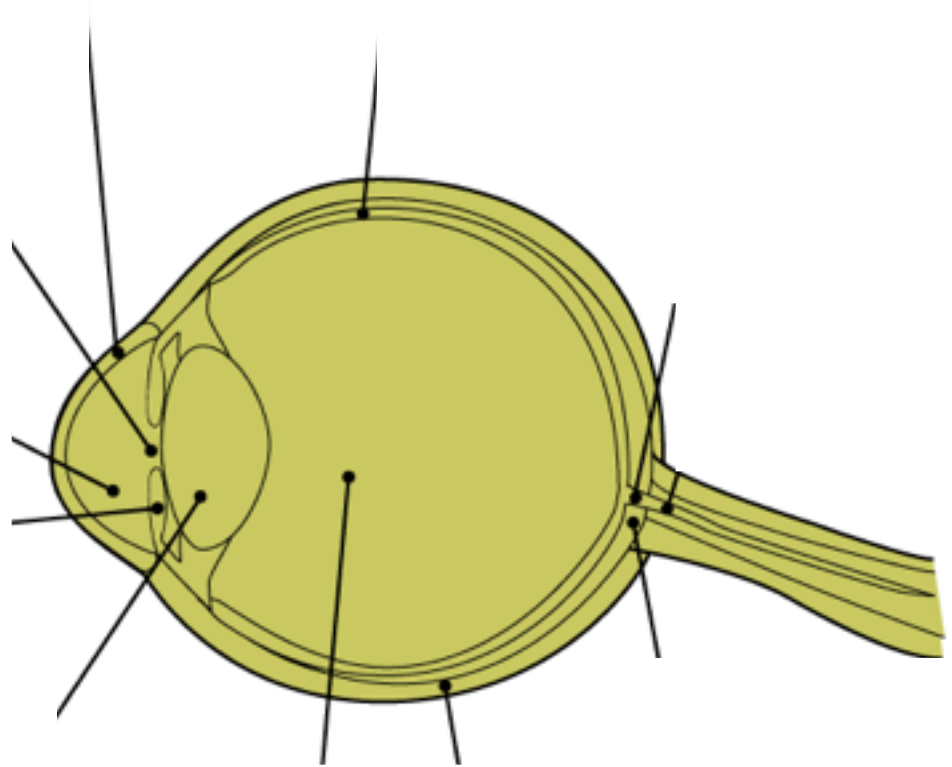
Please make sure prior to each day, make sure to complete the following:

- 1.** Check and measurement tools are properly balanced and calibrated (i.e. Triple Beam Balance.)
- 2.** Check that you have needed supplies for your portion of the exploration.
- 3.** Check that your samples are properly stored, recovered, and interacted with.

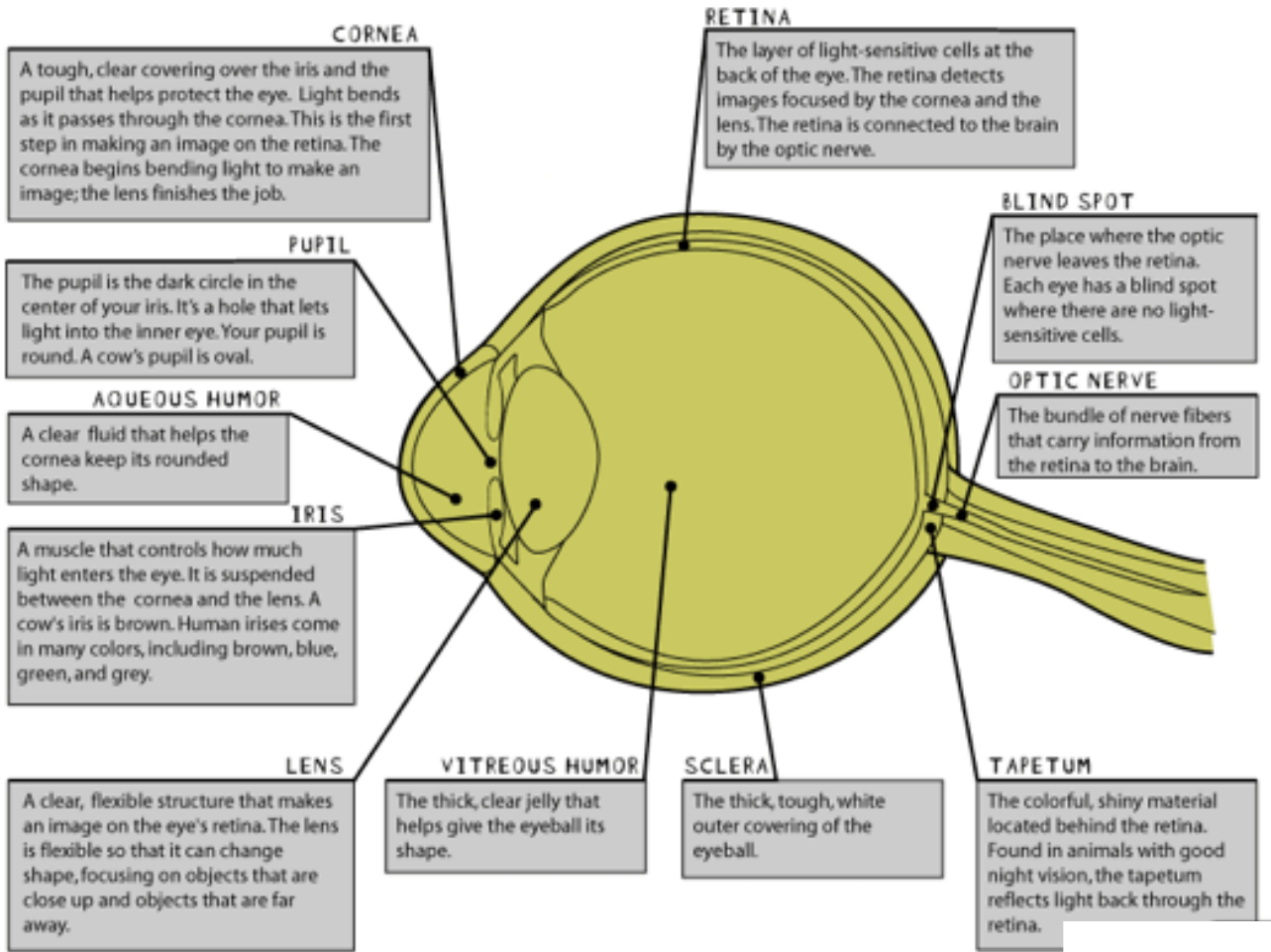
If all the above are not complete, your samples and evidence may not be properly analyzed, and an error occur. If such occurs, you can misdiagnosis the patient. Be careful!

# “Eye See, You See:” Problem Based Learning Unit (PBL)

## Eye Diagram



## “Eye See, You See:” Problem Based Learning Unit (PBL)



# **“Eye See, You See:” Problem Based Learning Unit (PBL)**

## **Learning Team Roles (Guiding Roles for Teachers)**

**General Supervisor:** Complete the communication of the patient safety report.

**Histologist:** Create tissue biopsy slides for the Pathologist.

**Pathologist:** Complete the oral and/or written pathology report.

**Medical Technologist:** Prepare the laboratory tools, complete routine testing, as well as quality control measurements.

**Cytotechnologist:** Examine the slides created by the histologist.

In a typical hospital setting, all laboratory medical roles complete quality control tests, as such is integral to the validity of results. Make sure students are aware that the roles are interwoven and overlap in responsibilities, yet key differences are important as noted above.

## “Eye See, You See:” Problem Based Learning Unit (PBL)

### Rubric for Patient Safety Report

Category	4	3	2	1
Quality Control Measures	Quality control measures are included, well-described, and accurate.	2 out of 3 quality control measure are recorded, and described in detail.	1 out of 3 quality control measures are recorded, but are not described in detail.	No quality control measures are recorded, and detail is lacking in the response given.
Individual Reports	Present examinations are well described, and include input from every team member.	Examinations are lacking detail, but include a report from every team member.	Examinations are lacking in detail, and 1 or more report from a team member is missing.	No examination is present.
Laboratory Results	Laboratory reports are described in detail, and include a qualitative and quantitative analysis.	A laboratory report is described, but but lacking in detail for both the qualitative and quantitative report.	Laboratory repots are described in detail, but a qualitative or quantitative analysis is missing.	No laboratory report is provided.
Needs Assessment	A needs assessment is provided in detail, along with a quantity of what is provided. If assistance is not needed, a description as to why is provided.	A needs assessment is provided in detail, but no quantity is listed. If assistance is not needed, a description as to why is provided.	A needs assessment is provided, but not in detail. If assistance is not needed, such is stated, but no description is provided.	A needs assessment is not provided, or a statement as to why it is not needed.

Total:



# “Eye See, You See:” Problem Based Learning Unit (PBL)

## Essential Vocabulary Definitions

### ESL (Spanish) Translations

<p><b>Adapt</b> (<i>adaptar</i>): to modify, make suitable</p> <p><b>Analyze</b> (<i>analizar</i>): examine in detail</p> <p><b>Anticipate</b> (<i>esperar</i>): expect or predict</p> <p><b>Artifact</b> (<i>artefacto</i>) something observed in a scientific investigation, or experiment</p> <p><b>Compose</b> (<i>componer</i>): to write or create</p> <p><b>Conclusion</b> (<i>conclusion</i>): the end or finish of a process</p> <p><b>Consequence</b> (<i>consecuencia</i>): a result or effect of an action or condition</p> <p><b>Contribute</b> (<i>contribuir</i>): give in order to help achieve or provide something</p> <p><b>Evaluate</b> (<i>valorar</i>): assess an idea or an amount</p> <p><b>Exhaust</b> (<i>agotar</i>): use up completely a resource</p> <p><b>Frequent</b> (<i>frecuente</i>): occurring or done on many occasions</p> <p><b>Persuade</b> (<i>persuadir</i>): to cause someone to believe something, especially after an event</p> <p><b>Repetition</b> (<i>repeticion</i>): the action of repeating something</p> <p><b>Similar</b> (<i>similar</i>): resembling a person or thing</p> <p><b>Variable</b> (<i>variable</i>) : a factor in a scenario</p> <p><b>Strategy</b> (<i>plan de accion</i>): a plan of action</p> <p><b>Recount</b> (<i>relatar</i>): giving an account of an event or experience</p> <p><b>Realistic</b> (<i>realista</i>): representing a familiar thing, accurate, true</p> <p><b>Priority</b> (<i>prioridad</i>): a thing that is more important than another</p>	<p><b>Emit</b> (<i>emitir</i>): to produce or discharge</p> <p><b>Reflection</b> (<i>observacion</i>): the throwing back by a body or surface of light</p> <p><b>Refraction</b> (<i>refraccion</i>): light passing through a medium</p> <p><b>Electromagnetic Waves</b> (<i>radiacion electromagnetica</i>): waves which carry energy by a magnetic/electric field</p> <p><b>Visible Light</b> (<i>visible</i>): light which has a wavelength between the infrared and the ultraviolet</p> <p><b>Transverse Waves</b> (<i>transverso</i>): a wave vibrating at right angles; a ripple on a pond is an example</p> <p><b>Absorption</b> (<i>absorcion</i>): something being engrossed or absorbed by another</p> <p><b>Scattering</b>: electromagnetic particles are deflected or diffused</p> <p><b>Angle of Incidence</b>: the angle that a ray makes to the surface at the point it hits</p> <p><b>Angle of Reflection</b>: the angle made by reflected light with a surface</p> <p><b>Optical Illusion</b>: the experience of seeing something other than it appears</p> <p><b>Transparent</b> (<i>translucido</i>): allowing light to pass through so that objects behind can be seen</p> <p><b>Impairment</b>: the state of being impaired</p> <p><b>Concave Lenses</b>: a lens having a curved surface, where it is thinnest in the center</p> <p><b>Convex Lenses</b>: a lens having a curved surface, where it is thickest in the center</p> <p><b>Translucent</b>: allowing light to pass through</p> <p><b>Opaque</b>: not being able to see through</p> <p><b>Cornea</b>: transparent layer forming the front of the eye</p> <p><b>Pupil</b>: the opening in the center of the iris where light enters</p> <p><b>Retina</b>: the innermost part of the eyeball where visuals are transmitted</p> <p><b>Optic Nerve</b>: a bundle of nerves that carries visual messages</p> <p><b>Iris</b>: a thin structure in the eye, containing color, controlling the amount of light reaching the retina.</p>
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# **“Eye See, You See:” Problem Based Learning Unit (PBL)**

## **Technology How-To-Guides**

Please note that technology alternatives are provided as written in the context of the lesson plans.

Classflow: <https://classflow.com/about/>

Google Docs: <https://support.google.com/docs/answer/49008?hl=en>

Edmodo: <https://blog.edmodo.com/2013/06/28/a-guide-to-getting-started-with-edmodo/>

NeuAnnotate: [http://www.neupen.com/static/guides/neuAnnotate/neuAnnotate\\_Guide.pdf](http://www.neupen.com/static/guides/neuAnnotate/neuAnnotate_Guide.pdf)

MakerWare for Digitizer: <https://www.tes.co.uk/teaching-resource/3D-Printing--Makerware-student-guide-6374755>