

The background features a pattern of overlapping green circles of varying shades, from light to dark. There are also larger, semi-transparent circular shapes in shades of light green and white, creating a layered, abstract effect.

Disease-Oriented Collaborative Research Projects

Based on the California State Standards in Biology

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Context for Learning

- College Prep Biology Class
- Holt, Rinehart, & Winston's Modern Biology
- Class Size: 35
- ELL students in class: 10
- Students with IEPs: 5
- 2 classes of Academy Art Students

My Research

- I worked with Jayna Jones in the Safinya Lab on the problems that L-Dopa, a popular Parkinson's drug, has with continued use
- I chose to focus on the genetics of Parkinson's disease and the research I did through scientific journals and the web
- I will incorporate a DNA technology lab using gel electrophoresis, a molecular separating technique used in my research
- I will combine the themes of researching diseases, researching treatments, and conducting labs into 4 research projects that enhance 4 of my Biology units

Learning Objectives

- SDAIE research shows that students are more successful at retaining new information if they are able to “demonstrate real-world applications”
 - (Gulack, J. and Silverstein, S. , SDAIE Handbook)
- Students will apply science standards to real-life medical applications
- Students will research and present their findings in pairs while collaborating with other pairs
- Student research will support the academic content and standards taught in the class

Biology 9-12 Standards

- *Cancer research*
 - CA Standard 1
 - National Standard A, C (the cell)
- *Genetic disorder research*
 - CA Standards 2,3,4,5
 - National Standard A, C (genetics, behavior of organisms)
- *Virus, fungal, bacterial, parasitic, fungal infections*
 - CA Standards 1c & 10 c, d, e
 - National Standard A, C (genetics, biological evolution, behavior of organisms)
- *Organ/Tissue failure*
 - CA standards 9 & 10
 - National Standard A, C (behavior of organisms)



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Addressing Student Backgrounds

- About 1/3 of my CP Biology class is designated ELL of some level
- About 5 out of 35 students have IEPs
- 2 classes will be focused on visual arts
- These elements demand SDAIE-designed lesson plans including:
 - Visual aids
 - Graphic organizers
 - Rubrics
 - Clearly stated objectives
 - Cooperative learning
 - Art

Formal and Informal Assessments

- Formal Assessments
 - Research project grading rubrics
 - Oral Presentations
 - Exams on content
 - Quizzes on content
- Informal Assessments
 - Topic Sheet
 - Research worksheet
 - Journal article worksheet
 - Oral presentation checklist
 - Peer review worksheet
 - Quick writes on content

Instructional Strategies to Support Student Learning

- SDAIE strategies will be an integral part of addressing my students learning needs, using:
 - Into, Through, Beyond (quick writes, visuals)
 - Higher level thinking skills (application, curiosity)
 - Group Work (cooperative and collaborative)
 - Using multiple intelligences (visual presentation, oral presentation, interpersonal collaboration on research)
 - Teaching them to be self-directed learners through the group projects & presentations

Resources and Materials

- Holt, Rinehart, & Winston's Modern Biology text
- Cancer cell slides
- Karyotype slides of different genetic disorders
- Journal articles on medical disorders accessible to CP students
- Bacteria slides
- Sphagmometers & stethoscopes

Lesson Plan for Cancer Research Project

Day	Activity	Assessment	Length
1	Intro, handouts, choose partner, choose cancer	cancer topic sheet	30 min
2	Research in computer lab using web sites provided	research worksheets	55 min
3	Meet with partner to delegate further research	self evaluation rubric	10 min
4	Instruction on power point poster & brainstorm commercial topic collaborative groups	commercial topic sheet	10 min
5	Meet w/ collaborative group-share facts	self-evaluation rubric	20 min
6	Meet w/ group-dissect article & assign poster responsibilities	article worksheet & job worksheet	55 min
7	Meet in groups & show slides for poster to teacher	printed power point slides	20 min
8	Meet in groups for problem solving	none	10 min
9	Meet w/ groups to finalize presentation	poster checklist	10 min
10	Presentation of poster commercials	peer reviews & rubric	55 min

Lesson Plan for Genetic Disorder Research Project

Day	Activity	Assessment	Length
1	Intro, handouts, choose partner, choose genetics	genetics topic sheet	30 min
2	Research in computer lab using web sites provided	research worksheets	55 min
3	Meet with partner to delegate further research	self evaluation rubric	10 min
4	Instruction on power point & meet w/ collaborative groups & assign power point responsibilities	power point topic sheet	10 min
5	Meet w/ collaborative group-share facts	self-evaluation rubric	20 min
6	Meet w/ group-dissect article	article worksheet & job worksheet	55 min
7	Meet in groups & show slides for power point to teacher	printed power point slides	20 min
8	Meet in groups for problem solving	none	10 min
9	Meet w/ groups to finalize presentation	power point checklist	10 min
10	Presentation of power points	peer reviews & rubric	55 min

Lesson Plan for Bacterial/ Viral/ Parasitic/ Fungal Infection Research Project

Day	Activity	Assessment	Length
1	Intro, handouts, choose partner, choose infection	infection topic sheet	30 min
2	Research in computer lab using web sites provided	research worksheets	55 min
3	Meet with partner to delegate further research	self evaluation rubric	10 min
4	Instruction on illustrated sequential story (comic strip, book, computer animation)& brainstorm medium in collaborative groups	sequential story topic sheet	10 min
5	Meet w/ collaborative group-share facts	self-evaluation rubric	20 min
6	Meet w/ group-dissect article & assign sequential story responsibilities	article worksheet & job worksheet	55 min
7	Meet in groups & show pages/strips/animations to teacher	printed power point slides	20 min
8	Meet in groups for problem solving	none	10 min
9	Meet w/ groups to finalize presentation	story checklist	10 min
10	Presentation of sequential stories	peer reviews & rubric	55 min

Lesson Plan for Organ/Tissue Failure Research Project

Day	Activity	Assessment	Length
1	Intro, handouts, choose partner, choose organ/tissue failure	Organ/tissue topic sheet	30 min
2	Research in computer lab using web sites provided	research worksheets	55 min
3	Meet with partner to delegate further research	self evaluation rubric	10 min
4	Instruction on 3-D book or infomercial & brainstorm medium in collaborative groups	Book/video topic sheet	10 min
5	Meet w/ collaborative group-share facts	self-evaluation rubric	20 min
6	Meet w/ group-dissect article & assign book/video responsibilities	article worksheet & job worksheet	55 min
7	Meet in groups & show pages/video to teacher	printed pages/video	20 min
8	Meet in groups for problem solving	none	10 min
9	Meet w/ groups to finalize presentation	Book/video checklist	10 min
10	Presentation of books/videos	peer reviews & rubric	55 min

Formal and Informal Assessments

- Each of the four projects use the same formal and informal assessments
- These assessments served as a template for all of my research projects and were modified according to each emphasis
- The following slides highlight all of the assessments used for the Genetic Disorder Project only

Genetics Disorder Research Project

This unit project focuses on how genetics affects humans directly. Many people are affected by genetic disorders; you may even have some family members or friends with some of these diseases. I suggest that you choose a disorder that affects someone you know or intrigues you because it is strange or interesting. The goal is to research the disorder and orally present information and recent research through a group PowerPoint.

Genetic Disorder	Description	Websites
Alzheimer's Disease	A progressive brain disorder that gradually destroys a person's memory and ability to learn, reason, make judgments, and communicate.	http://www.ygyh.org/?syndrome http://www.alz.org http://www.alzheimers.org http://www.alzheimers.org.uk http://www.nlm.nih.gov/medlineplus/alzheimersdisease http://www.mamashealth.com/Alzheimers http://www.alzforum.org http://www.alzinfo.org/

Genetics Disorder Topic Sheet

- What genetic disorder do you want to research? _____
- Who is your partner? _____

Genetics Disorder Project Sign-Up

Partner Names	Genetic Disorder	Article	Presentation Format

Genetics Disorder Research Sheet

Research Site: _____

Presentation Requirements	Research
Definition of the disorder ✓What happens to the body? ✓What part of the body does it generally affect?	
Description of the symptoms ✓List all of the possible effects on the body	
Cause of the disorder ✓What happens <u>in the body</u> to cause the disease? ✓Is it a mutation? A genetic tendency triggered by other factors?	
How the disorder is inherited •Is it sex-linked? •Is there a particular chromosome it is located on? •Is it recessive or dominant?	
How the disorder is treated ✓Medications? Gene therapy?	
How the disorder is diagnosed ✓What tests are done? Is genetic counseling an option?	
How many and what type of people are likely to have the disorder ✓Is it more common in a certain group of people? ✓How common is it?	

Genetics Disorder Self Evaluation

Presentation Requirements	Cumulative Research	Points
Definition of the disorder What happens to the body?		20
What part of the body does it generally affect? List all of the possible effects on the body		10
Cause of the disorder Sites: _____ What happens <u>in the body</u> to cause the disease?		20
Is it a mutation? A genetic tendency triggered by other factors? How the disorder is inherited Sites: _____ Is it sex-linked? _____ Is there a particular chromosome it is located on?		30
How the disorder is treated Is it recessive or dominant? Sites: _____ Medications? Gene therapy?		10
How the disorder is diagnosed Sites: _____ What tests are done? Is genetic counseling an option?		10
How many and what type of people are likely to have the disorder Sites: _____ Is it more common in a certain group of people?		20
How common is it? Application of research article Sites: _____ What new information did you learn from your research?		10

Total Points Earned

120

Genetics Disorder Job Worksheet

Partner	Slides to Make & Present in Given Order
1	<p><u>Title Slide</u>: Project Title, team members</p> <p><u>Definition Slide</u>: what happens to body; part of body affected</p>
2	<p><u>Symptom Slide</u>: list of all effects on body</p> <p><u>Cause Slide</u>: what happens in body to cause disease; mutation? or genetic tendency triggered by other factors?</p>
3	<p><u>Inherited Slide</u>: sex-linked-yes or no; particular chromosome; recessive or dominant</p> <p><u>Treatment Slide</u>: medications? Gene therapy?</p>
4	<p><u>Diagnostic Tests Slide</u>: what tests are done; genetic counseling?</p> <p><u>Frequency in Population Slide</u>: more common in certain group; how common it is</p>
1	<p><u>Article Slide</u>: new information found from research</p>

Genetics Disorder Article Worksheet

~Directed Reading Thinking Activity~

Directions: In this activity, you will read and discuss the content of the scientific article in your large group together. Choose one person to be the recorder.

Predicting:

- 1. What is the title of the article? _____
- 2. What journal (magazine) is the article found in? _____
- 3. What do you predict the article is about, just by looking at the title, graphics, and the first sentence?
- 4. What question or questions do you predict the article will try to answer?

Reading:

- 1. Read the article in your large group; take turns having one person read a paragraph out loud and write down new information you learned about your disorder. Use note format. (*If there is new information that does not make sense, ask the teacher for help or skip the information.*)

Check Predictions:

- 1. Look at the Predicting section and discuss what predictions were correct and what predictions were incorrect.

Genetics Disorder Power Point Checklist

Team Members: _____ Genetic Disorder: _____

✓	Slides to Make & Present in Given Order
	<u>Title Slide</u> : Project Title, team members
	<u>Definition Slide</u> : what happens to body; part of body affected
	<u>Symptom Slide</u> : list of all effects on body
	<u>Cause Slide</u> : what happens in body to cause disease; mutation? or genetic tendency triggered by other factors?
	<u>Inherited Slide</u> : sex-linked-yes or no; particular chromosome; recessive or dominant
	<u>Treatment Slide</u> : medications? Gene therapy?
	<u>Diagnostic Tests Slide</u> : what tests are done; genetic counseling?
	<u>Frequency in Population Slide</u> : more common in certain group; how common it is
	<u>Article Slide</u> : new information found from research

Genetics Disorder Peer Review

Presentation Requirements	Earned Points	Possible Points	Comments -How liked -How to improve
Introduction ü Name the disorder Introduce team members		20	
Definition of the disorder ü What happens to the body? What part of the body does it generally affect?		20	
Description of the symptoms List all of the possible effects on the body		10	
Cause of the disorder ü What happens <u>in the body</u> to cause the disease? Is it a mutation? A genetic tendency triggered by other factors?		20	
How the disorder is inherited ü Is it sex-linked? Is there a particular chromosome it is located on? Is it recessive or dominant?		30	
How the disorder is treated Medications? Gene therapy?		10	
How the disorder is diagnosed What tests are done? Is genetic counseling an option?		10	
How many and what type of people are likely to have the disorder ü Is it more common in a certain group of people? How common is it?		20	
Application of research article What new information did you learn from your research?		10	
Total Points Earned		140	

How to address misconceptions

- Inevitably, there are some objectives that are not taught well or are not relevant to a large group of students
- When research sheets and oral presentations are reviewed by the teacher misconceptions should surface
- If a large group has similar misconceptions, the task or concept will be taught again to the class

Examples for students

- The following slides are examples of posters that will serve as creative inspiration for their first research project, the Cancer Poster
- These anti-smoking posters will serve as examples of persuasive posters used to prevent lung cancer

Infection Poster Ideas...





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Conclusion

- I look forward to applying these unit research projects to my lesson plans and see how my students respond to the assignments
- I predict I will have great changes in the actual time frame, but my goal is to have the projects give structure and meaning to the curriculum, not just add something else to cover