

Transformation 2013

Design Challenge

Planning Form

Design Challenge Title: When Body Systems Get Drunk

Teacher(s): Stan Gabel

School: Taylor High School

Subject: Biology

Abstract:

working in teams, students create an informational brochure focusing on the short and long-term effects of alcohol on the organs in the respective body systems (circulatory, digestive, nervous, endocrine, reproductive, integumentary, skeletal, respiratory, muscular, excretory, and immune).

MEETING THE NEEDS
OF STEM EDUCATION
THROUGH DESIGN CHALLENGES

Begin with the End in Mind

- Does this design challenge meet the criteria for STEM student needs (21st century skills, TEKS, TAKS)?

Summarize the theme or “big ideas” for this design challenge.

- Students chose roles as medical professionals in researching the affects of alcohol on body organs.

Identify the TEKS/SEs that students will learn in the design challenge (two or three).

Biology

- 10A interpret the functions of systems in organisms including circulatory, digestive, nervous, endocrine, reproductive, integumentary, skeletal, respiratory, muscular, excretory, and immune
- 10B compare the interrelationships of organ systems to each other and to the body as a whole

Identify key skills students will develop in this design challenge.

- Students evaluate the impact of alcohol on body systems
- Students relate the impact of alcohol on body systems to the body as a whole

Identify the 21st century skills that students will practice in this design challenge (one or two).

- Critical Thinking and Problem Solving Skills
- Communication Skills
- Collaboration Skills

Identify STEM outcomes to be included in this design challenge.

- Students will become familiar with the process of dialysis.
- Students will understand the technology used in breathalyzers.

Craft the Driving Question

- *Have you posed an authentic problem or significant question that engages students and requires STEM knowledge to solve or answer?*

State the essential question or problem statement for the design challenge. The statement should encompass all design challenge content and outcomes, and provide a central focus for student inquiry.

Students, working in teams, will choose one of the body systems and create an informational brochure focusing on the short and long-term effects of alcohol on the organs in the respective body systems (circulatory, digestive, nervous, endocrine, reproductive, integumentary, skeletal, respiratory, muscular, excretory, and immune).

Plan the Assessment

STEP 1: Define the products and artifacts for the design challenge.

Early in the challenge: Students will research and be able to share the following:

1. What is alcohol?
2. What happens when you drink?
3. How does alcohol get into your body?
4. Why do you feel drunk?
5. How do you sober up?
6. How is alcohol detected by breathalyzers?

During the challenge:

1. Each group will pick one of the body systems and discuss the effects of alcohol in a brochure.
 - a. Heart- Increases and decreases heart rate, eventually causing heart failure
 - b. Brain- Stimulant/depressant, diminished inhibition.
 - c. Kidneys- Diuretic
 - d. Skin- Vasodilatation.
 - e. GI- Nausea, gastritis, ulcer, cirrhosis, liver failure
 - f. Sexuality- Increased arousal, decreased inhibition, decreased function.
 - g. BAL- describe and explain blood alcohol level.
 - h. What is legally drunk?

End of the challenge:

1. Presentation to a group of medical professionals
2. Visual aids
3. Compare and contrast healthy organs with ones, which are diseased by alcohol.

Plan the Assessment

STEP 2: State the criteria for exemplary performance for each product.

- *Do the products and criteria align with the standards and outcomes for the design challenge?*

Product: Students turn in research information on alcohol.

Criteria: Students should answer the following questions:

- What is alcohol?
- What happens when you drink?
- How does alcohol get into your body?
- Why do you feel drunk?
- How do you sober up?
- How is alcohol detected by breathalyzers?

Product: Groups will turn in a tri-fold brochure.

Criteria: Brochures should include the following information for the topic of choice:

- Heart- Increases and decreases heart rate, eventually causing heart failure
- Brain- Stimulant/depressant, diminished inhibition.
- Kidneys- Diuretic
- Skin- Vasodilatation.
- GI- Nausea, gastritis, ulcer, cirrhosis, liver failure
- Sexuality- Increased arousal, decreased inhibition, decreased function.

Product: Group presentations to medical professionals

Criteria:

- Students present information about the effects of alcohol on body organs.
- Power points, models, graphs or tables

Map the Design Challenge

Look at the major product for the design challenge and analyze the tasks necessary to produce a high-quality product. What do students need to know and be able to do to complete the tasks successfully? How and when will they learn the necessary knowledge and skills?

- Do the products and tasks give all students the opportunity to demonstrate what they have

Product:	(check appropriate box)		
Knowledge and Skills Needed <i>Elaborate on the knowledge and skills (TEKS student expectations) required to accomplish each step of the task.</i>	Already Learned	Taught before the project	Taught during the project
1. Interpret the functions of the digestive, circulatory and nervous systems.	X	X	X
2. Compare the interrelationships of organ systems to each other and to the body as a whole.			X
3. investigate and identify how organisms, including humans, respond to external stimuli;	X	X	X
4. Critical Thinking and Problem Solving Skills	X		X
5. Communication Skills	X	X	X
6. Collaboration Skills		X	X
7.			
8.			

What PBL tools will you use? (check appropriate box)

- | | |
|--|--------------------------------|
| <input type="checkbox"/> Know/need to know lists | <input type="checkbox"/> _____ |
| <input type="checkbox"/> Daily goal sheets | <input type="checkbox"/> _____ |
| <input type="checkbox"/> Journals | <input type="checkbox"/> _____ |
| <input type="checkbox"/> Briefs | <input type="checkbox"/> _____ |
| <input type="checkbox"/> Task lists | <input type="checkbox"/> _____ |
| <input type="checkbox"/> Problem logs | <input type="checkbox"/> _____ |
| <input type="checkbox"/> Project flow charts | <input type="checkbox"/> _____ |

<p>Title: When Organs Overdose</p> <p>TEKS: Biology 10 AB</p>	
<p style="text-align: center;">Engage Activity</p> <p>Identify/focus on instructional task, connect between past & present learning experiences, lay groundwork for activities (ex. Ask a question, define a problem, show a surprising event, act out a problematic situation)</p>	<ol style="list-style-type: none"> 1. Ask students to name as many forms of alcohol beverages as they can. 2. Show students models of a variety of body organs/organ systems and create a list their ideas of how alcohol affects the organ/organ system. 3. Lead a discussion with the students addressing: <ul style="list-style-type: none"> • Why do you feel drunk? • How do you get sober? • What does a breathalyzer measure? <p>Introduce the project to the students:</p> <p>Students, working in teams, will choose one of the body systems and create an informational brochure focusing on the short and long-term effects of alcohol on the organs in the respective body systems (circulatory, digestive, nervous, endocrine, reproductive, integumentary, skeletal, respiratory, muscular, excretory, and immune)</p>
<p style="text-align: center;">Exploration Activity</p> <p>Students get involved with phenomena and materials, students work in teams to explore through inquiry</p>	<p>Students begin researching their assigned topics.</p> <p>Brochures should include the following information for the topic of choice:</p> <ul style="list-style-type: none"> • Organ(s) involved in the assigned body system • Pictures of healthy organ(s) • Pictures of organ(s) with long-term alcohol exposure • The physiological and structural changes that occur at the organ level when alcohol is consumed • Describe how this system interacts with other body systems WRT alcohol exposure

<p style="text-align: center;">Explanation</p> <p>Students discuss observations, ideas, questions and hypotheses with peers, facilitators, groups. Learners apply labels to their experiences – thus developing common language, clarification/explanation of key concepts (ex. Writing, drawing, video/tape recordings)</p>	<ul style="list-style-type: none"> Students present in a round robin discussion format interim information about the effects of alcohol on body organs with the class
<p style="text-align: center;">Elaboration</p> <p>Expand on concepts learned, make connections to other related concepts, and apply understandings to the world. (ex. Extend & apply knowledge) Leads to more inquiry and new understandings.</p>	<p>Through the use and misuse of alcohol, what types of careers are needed?</p> <p>Students discover how many lives are impacted by alcohol misuse through investigation by conducting interviews with paramedics, doctors, police, firemen, family members of alcoholics, counselors, etc. and presenting their findings to the class. At least one interview per student team is required.</p>
<p style="text-align: center;">Evaluation</p> <p>Ongoing diagnostic process to determine if the learner has attained understanding of concepts & knowledge (ex. Rubrics, teacher observation with checklist, student interviews, portfolios, project products, problem-based learning products, assessments) Leads to opportunities for enrichment through further inquiry and investigation.</p>	<p>Students present findings and final brochure.</p> <ul style="list-style-type: none"> Research notes Brochure PowerPoint, tables, graphs, charts, illustrations. Investigation and understanding of related careers.
<p>Materials/Equipment: Computers, internet, library access, brochure materials, print resources</p>	
<p>Resources: Short term effects: http://en.wikipedia.org/wiki/Effects_of_alcohol_on_the_body Long term effects: http://en.wikipedia.org/wiki/Long-term_effects_of_alcohol http://www.alcohol.org.nz/BodyEffects.aspx http://www.buzzle.com/articles/effects-alcohol-human-body.html</p>	