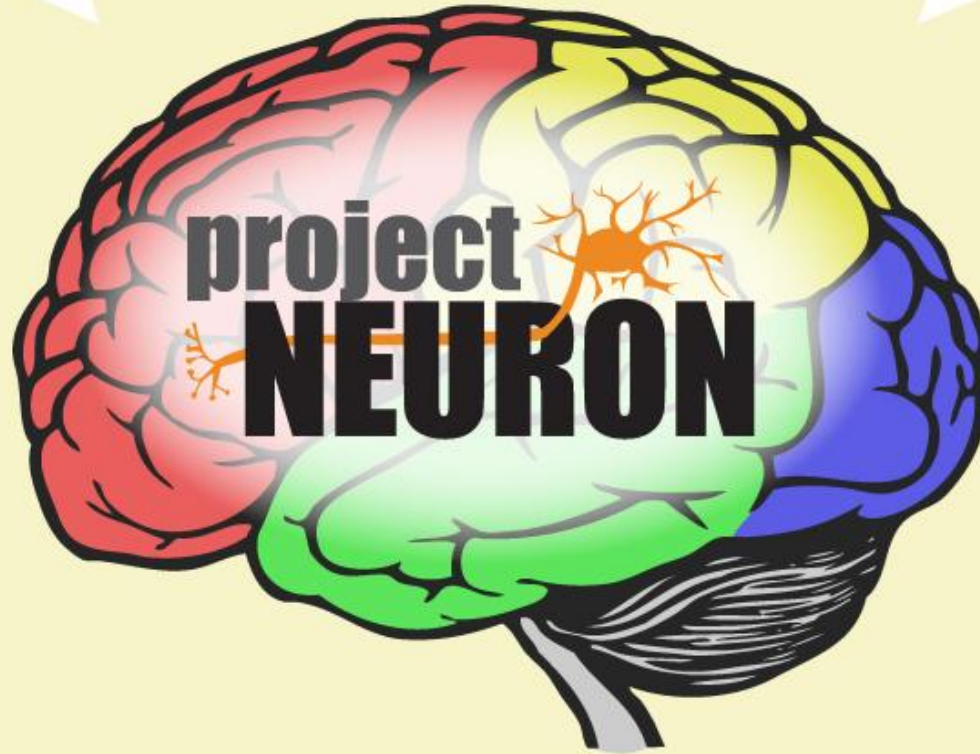


# Incorporating the claim, evidence, and reasoning framework into an engaging computer game and curriculum unit



*Chandana Jasti, Hillary Lauren, Barbara Hug*  
*University of Illinois*

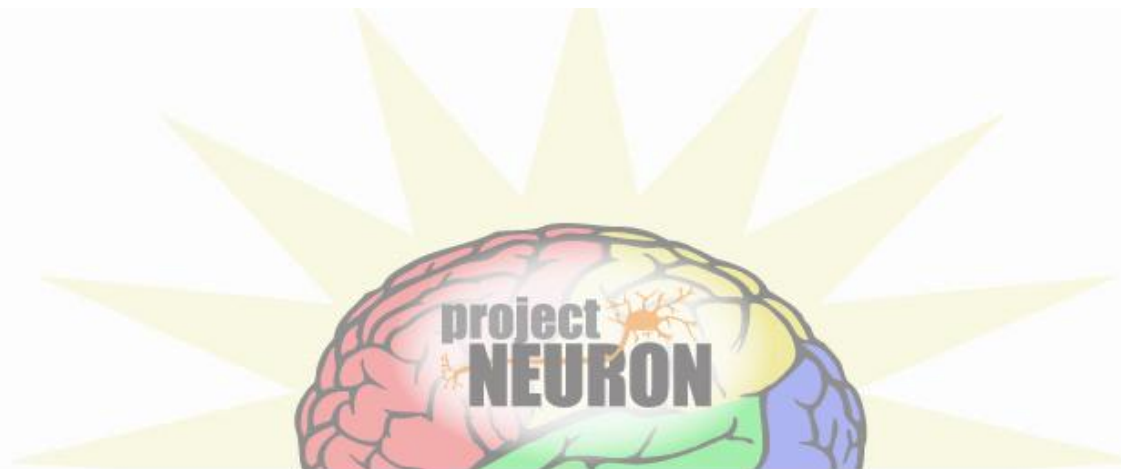


National Institutes  
of Health

**SEPA**  
SCIENCE EDUCATION  
PARTNERSHIP AWARD

# What is Project NEURON?

- Curriculum development
  - Inquiry-based
  - Connect to standards
- Professional development
  - Summer institutes
  - Conferences
- Educators, scientists, and students



# Project NEURON Curriculum Units

All available at <http://neuron.illinois.edu>

- **Do you see what I see?**
  - *Light, sight, and natural selection*
- **What can I learn from worms?**
  - *Regeneration, stem cells, and models*
- **What makes me tick...tock?**
  - *Circadian rhythms, genetics, and health*
- **What changes our minds?**
  - *Toxicants, exposure, and the environment*
  - *Foods, drugs, and the brain*
- **Why dread a bump on the head?**
  - *The neuroscience of traumatic brain injury (TBI)*



# Unit: Why dread a bump on the head?

## *The neuroscience of traumatic brain injury*

- Lesson 1: What is traumatic brain injury?
- Lesson 2: What does the brain look like?
- Lesson 3: How does a CT scan help diagnose TBI?
- Lesson 4: How to build a neuron
- Lesson 5: What happens to neurons after TBI?
- Lesson 6: Exploring the data behind brain injury
- Lesson 7: What can we tell others about TBI?



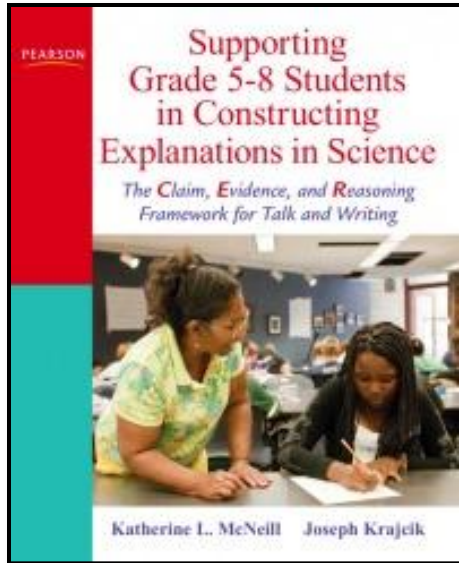
# Framework and NGSS

Disciplinary Core Ideas	Crosscutting Concepts	Scientific Practices
<ul style="list-style-type: none"><li>• <b>LS1.A: Structure and Function</b></li><li>• <b>LS1.D: Information Processing</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Patterns</b></li><li>• <b>Cause and Effect</b></li><li>• <b>Structure and Function</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Analyzing and interpreting data</b></li><li>• <b>Constructing explanations</b></li><li>• <b>Obtaining, evaluating, and communicating information</b></li></ul>



# Claim, Evidence, and Reasoning

*A framework for scientific explanation*



McNeill & Krajcik (2012)

## Claim

- A statement that expresses the answer or conclusion to a question or problem

## Evidence

- Scientific data that supports the claim

## Reasoning

- The justification that links the evidence to the claim





# Goals in creating the game

- Link to new Framework for K-12 Science Education
  - Constructing explanations
  - Neuroscience content
- Engaging and fun
- Use in or out of classroom
- Simulate a realistic medical case



# What is “The Golden Hour”?



- Named for a medical term
- Educational computer game
  - Play as a medical student
  - TBI case study
  - Indications of TBI
  - CT scan analysis
  - Surgical procedure
  - Medical professions





# Medical mentors



Susan Picotte,  
Lead Physician



Peter Safar,  
EMT



Allana Cormack,  
CT Technician



Charles Drew,  
Neurosurgeon

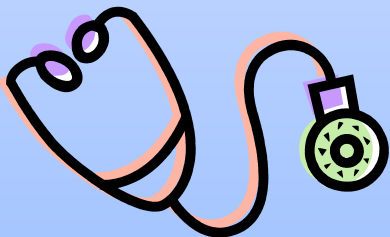


# The Golden Hour Game

As the “super” medical student, the player must...

## Scene 1: EMS

- Respond to 911 call
- Check vital signs
- Assess consciousness

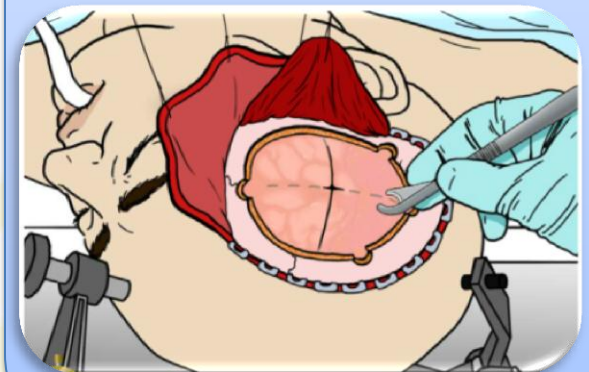


## Scene 2: CT Scan

- Review brain anatomy and function
- Interpret CT scans
- Identify TBI location and type

## Scene 3: Surgery

- Conduct brain surgery



# Assessment Scenes

- After each main scene
- Summative report
  - Data collection
  - Medical tablet
- Multiple choice dialogue
- Open response: scientific explanation

med-reader

Patient: Quinn Shepard

**GLOSSARY**  
Enter search term

**Notes**  
EMS  
CT scan  
Surgery

**Reports**  
EMS report  
CT report  
Post-surgery

**CT REPORT - HEAD**

**DIAGNOSIS**  
 Normal  
 Concussion  
 Diffuse Axonal Injury  
 Mass Tumor  
 Foreign Object  
 Hematoma  
 Subdural  
 Epidural

**LOCATION**  
**Side**  
 Left  
 Right  
**Lobe**  
 Frontal  
 Temporal  
 Parietal  
 Occipital

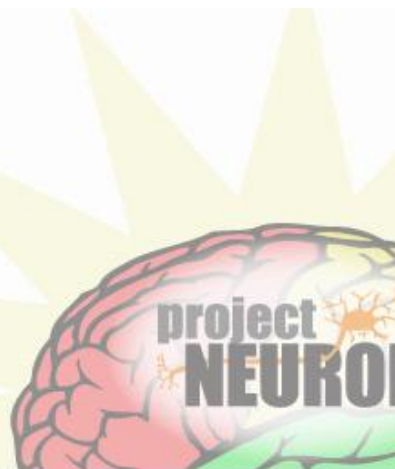
**SUMMARY**  
The CT scans show the presence of [dropdown] on the [dropdown] side of the head, indicating the occurrence of a [dropdown] near the [dropdown] lobe of the brain. The [dropdown] shape indicates that the hematoma is [dropdown] located between the [dropdown] and the [dropdown].

Page 1 Submit



# How to play

- Menu
  - Select scene 2
- Navigation
  - Messages
  - Toolbar
    - Tablet
    - Menu



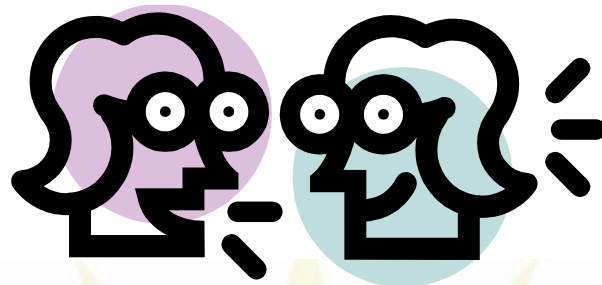
# Play time!

- Available on computers today
  - Click on desktop icon
  - Start at Scene 2
  - Fill out paper reports
- Online: <http://neuron.illinois.edu/games/>
  - Select “The Golden Hour”



# Share out

- What were your CERs?
- Discuss in groups: 1 minute





# CER through dialogue

- Claim
  - “What should be the next step in treatment?”
- Evidence
  - data in tablet report
- Reasoning
  - “How does...?”
  - “Why do you think...?”
- Rebuttal



# Rubric for CER

(High Level)

Claim	Evidence	Reasoning	Rebuttal
Makes an accurate and complete claim.	Provides appropriate and sufficient evidence to support claim.	Provides reasoning that connects the evidence to the claim. Includes appropriate and sufficient scientific principles to explain why the evidence supports the claim.	Recognizes alternative explanations and provides appropriate and sufficient counter evidence and reasoning when making rebuttals.

McNeill & Krajcik (2012)



# Student Responses

## Student Example #1

- CLAIM: The patient needs to be sent in for an emergency surgery.
- EVIDENCE: The CT scan showed that the patient had suffered a subdural hematoma.
- REASONING: The subdural hematoma could increase pressure on the brain, and inflict more damage.

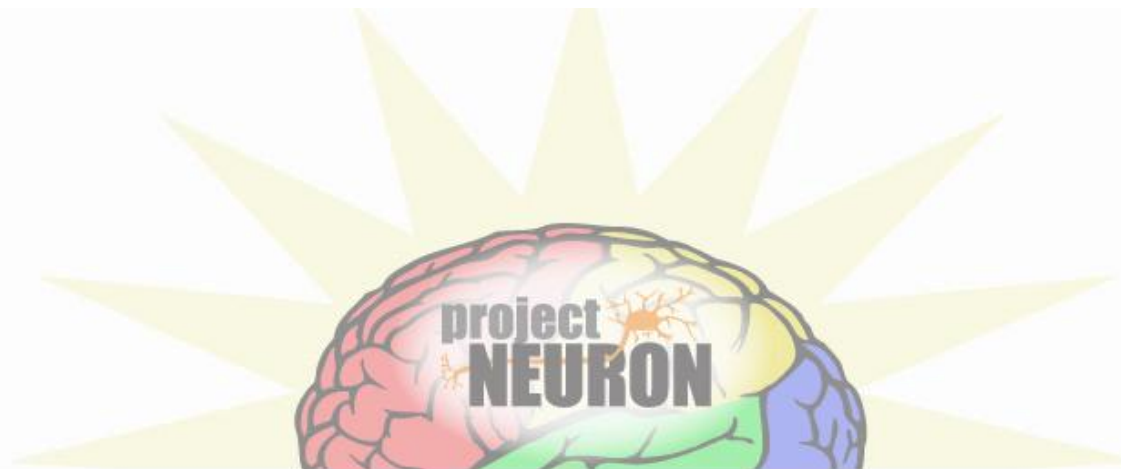
## Student Example #2

- CLAIM: Bleed in the brain.
- EVIDENCE: We did a cat scan.
- REASONING: The cat scan showed a subdural hematoma.



# Discussion

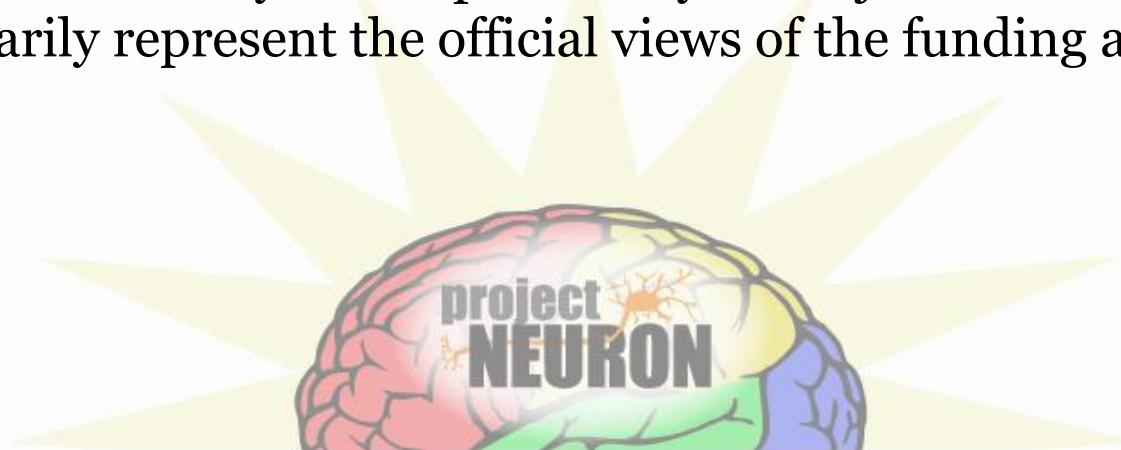
- How could you use this game in your classroom?
  - To teach scientific practice (constructing explanation)?
  - To teach content?



# Acknowledgements

- NIH, SEPA
- University of Illinois

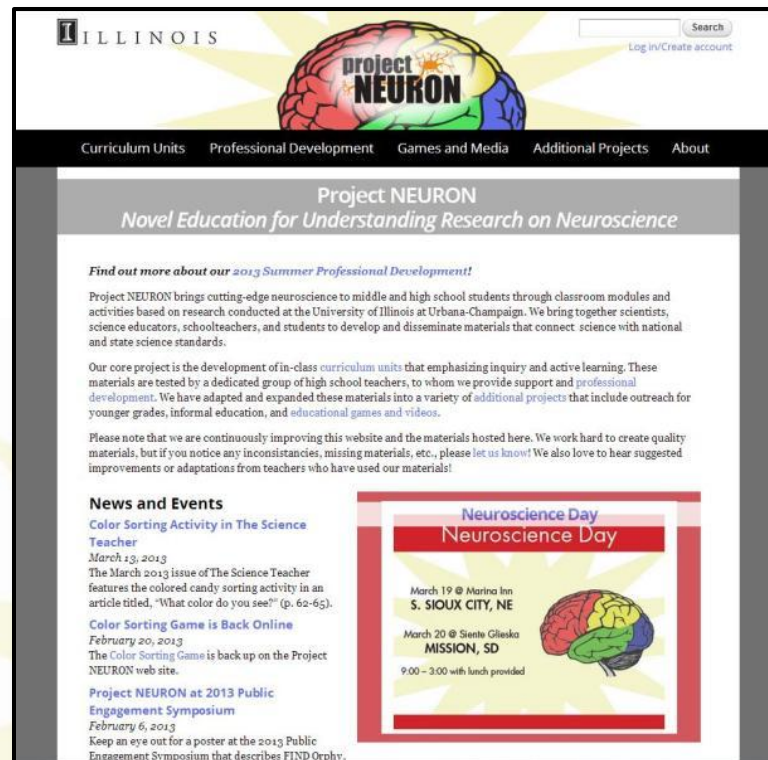
This project was supported by SEPA and the National Center for Research Resources and the Division of Program Coordination, Planning, and Strategic Initiatives of the National Institutes of Health through Grant Number R25 RR024251-03. The contents of this presentation are solely the responsibility of Project NEURON and do not necessarily represent the official views of the funding agencies.



# Thanks!

For additional information visit:  
**<http://neuron.illinois.edu>**

E-mail:  
**[neuron@illinois.edu](mailto:neuron@illinois.edu)**



The screenshot shows the Project NEURON website homepage. At the top left is the University of Illinois logo. In the center is a stylized brain with the text "project NEURON" overlaid. To the right is a search bar and a "Log in/Create account" link. Below the header is a navigation menu with links for "Curriculum Units", "Professional Development", "Games and Media", "Additional Projects", and "About". The main content area features the title "Project NEURON" and the subtitle "Novel Education for Understanding Research on Neuroscience". A section titled "Find out more about our 2013 Summer Professional Development!" contains text about the project's goals and core activities. Below this is a "News and Events" section with three items: "Color Sorting Activity in The Science Teacher" (March 23, 2013), "Color Sorting Game is Back Online" (February 20, 2013), and "Project NEURON at 2013 Public Engagement Symposium" (February 6, 2013). On the right side of the news section is a "Neuroscience Day" poster for two events: one in Sioux City, NE (March 19) and one in Mission, SD (March 20), both from 9:00-3:00 with lunch provided. The poster includes a small brain icon.