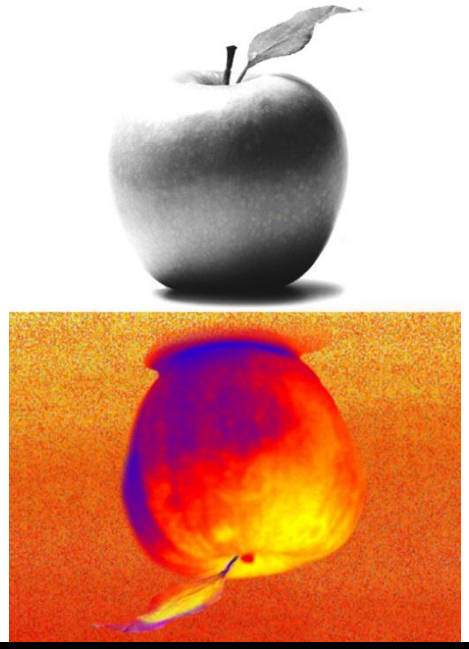

Blended & Flipped Learning: Theory Overview

Presented by MATEC NetWorks

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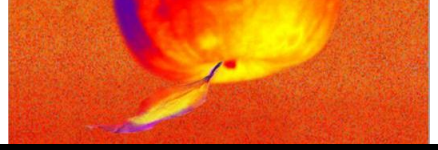

NETWORKS

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MARICOPA COMMUNITY COLLEGES

NetWorks is a part of MATEC,
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National Science Foundation

Advanced Technological Education program
DUE 1104159

Our Presenters

Eva Erdosne Toth
Assistant Professor of Science Education

West Virginia University-
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Instruction

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Director

Maricopa Advanced Technology
Education Center (MATEC)

Host: **Laura Sanchez**

Objectives

Objective 1: Develop a common understanding of *blended* learning terminology and technology.

Objective 2: Explore how to develop *blended* approaches to instruction.

Objective 3: Consider how to implement blended learning using active learning, such as *inquiry based* learning.

Objective 4: Apply instructional design principles to *blended learning.*

CYBERSECURITY STUDENTS DEPLOY ROUTING. SWITCHING, AND VIRTUAL NETWORKING. Source: www.atecenters.org

Blended Learning Poll

When you hear the term Blended Learning, you think:

A. That is something I am doing right now.

B. I probably incorporate blended learning without realizing it.

C. I wish I understood blended learning concepts in more detail.

D. My college does not provide resources in the area of blended learning.

Blended-What Do We Mean?

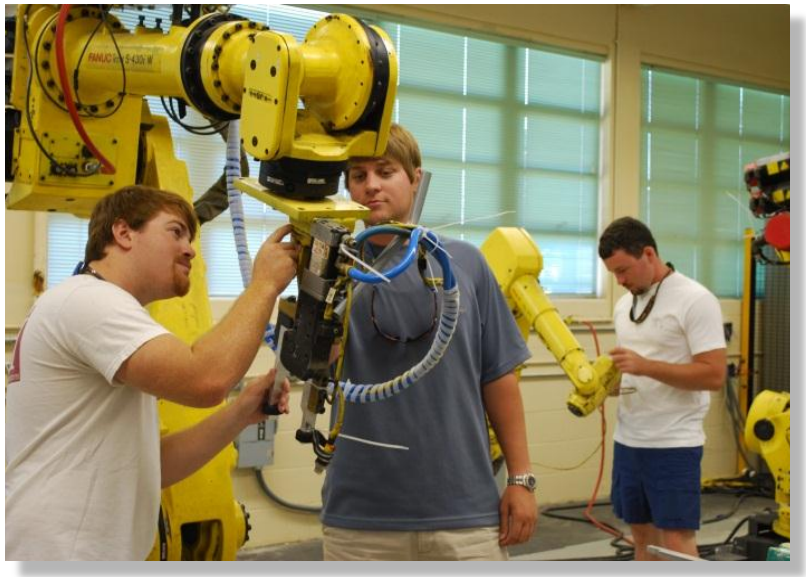
Blended learning is the thoughtful fusion of face-to-face and technology mediated learning experiences.

STUDENTS AT THE MARICOPA COMMUNITY COLLEGES EXPERIMENT WITH A FIELD-PROGRAMMABLE GATE ARRAY ACTIVITY OBTAINED FROM THE MATEC NETWORKS DIGITAL LIBRARY. Source: www.atecenters.org

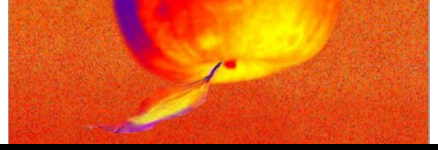
Basic Principle

- Oral and written communication, as well as interaction and engagement with many different types of resources
  - audio, video, graphics, simulations, immersive environments, etc.
  - blended into a unique learning experience congruent with the context

- Most importantly, blended learning is a fundamental redesign that transforms the structure of, and approach to, teaching and learning.



STUDENTS CREATE AND TEST ROBOT PROGRAMS WITHIN THE ROBOTICS LAB. Source: www.atecenters.org



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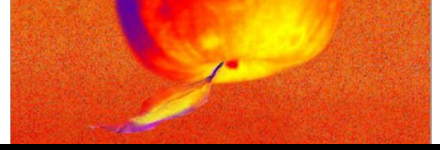
Key Assumptions

- Thoughtful integration of face-to-face and technology mediated learning
- Fundamentally rethinking the course design to optimize student engagement
- Restructuring and replacing traditional class contact hours
- Optimizing technology resources; not-adding an additional expensive layer



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Conventional Approach: Acid Base Titration

In Class

- Acid Base Reactions
- Calculation of Normality
- Concept of a Titration and End-Point

At Home

- Home Work Problems

In Lab

- Lab Exercise

Blended Approach: Acid Base Titration

In Class

- Examples of how Acid Base Titrations are used in the real world.

Online

- View Videos
  - http://www.youtube.com/watch?v=sFpFCPTDv2w&feature=related
- Practice Simulation
  - http://faculty.concordia.ca/bird/java/Titration/Titration_demo.html

In Class

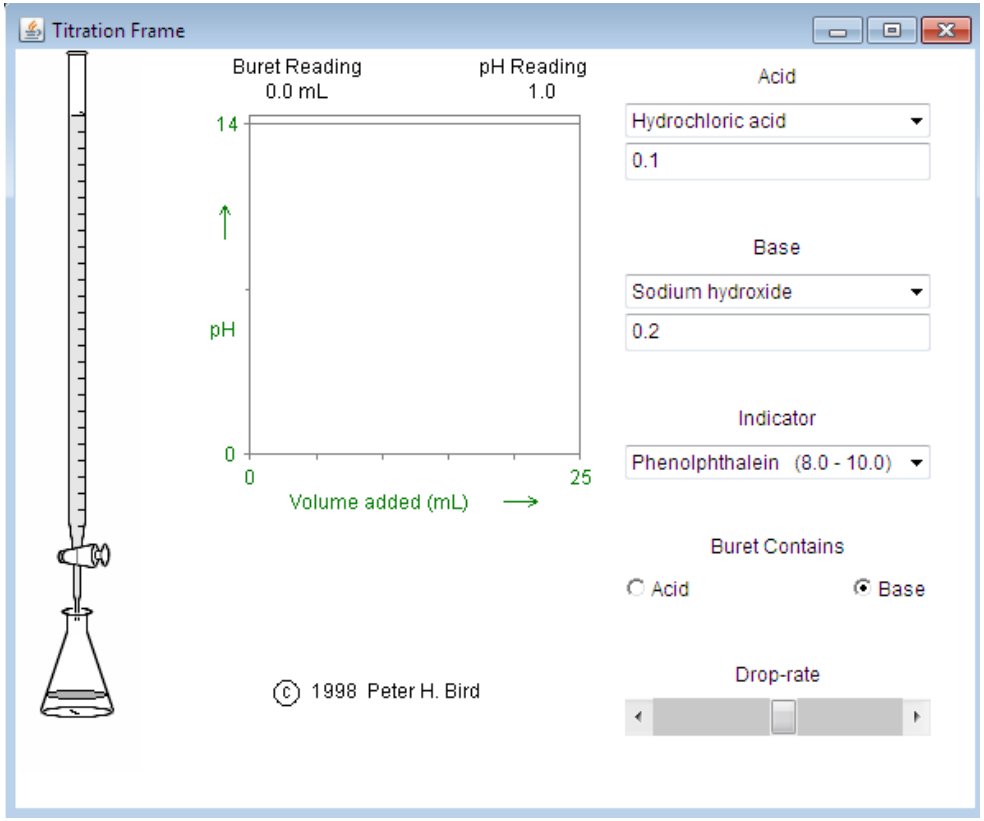
- Practice Calculations in Small Groups

In Lab

- Performance Assessment

View Acid Base Simulation

http://www.youtube.com/watch?v=B3Phu2HUENA&feature=g-upl



This desktop screen cast was developed with Screen Flow.

- http://www.telestream.net/screen-flow/

Keys to Success with Blended Inquiry Learning

Eva Erdosne Toth, Ph.D.

Assistant Professor of Science Education

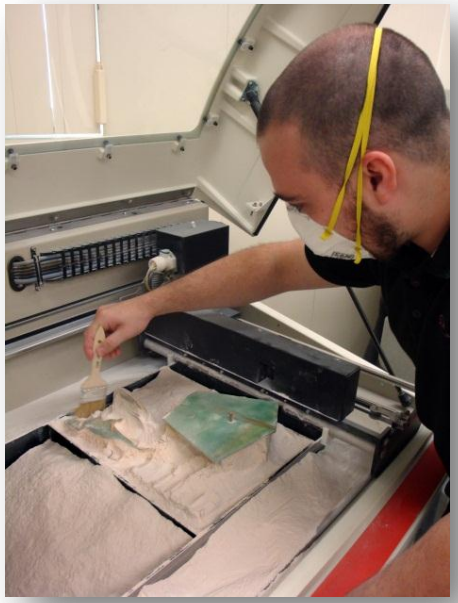
West Virginia University

Questions We Will Consider

- What ways can we optimize existing technology resources for learning?

- What is inquiry learning?
  What are “levels” of inquiry?

- What are instructional design decisions that complement interactive simulations & virtual laboratories?

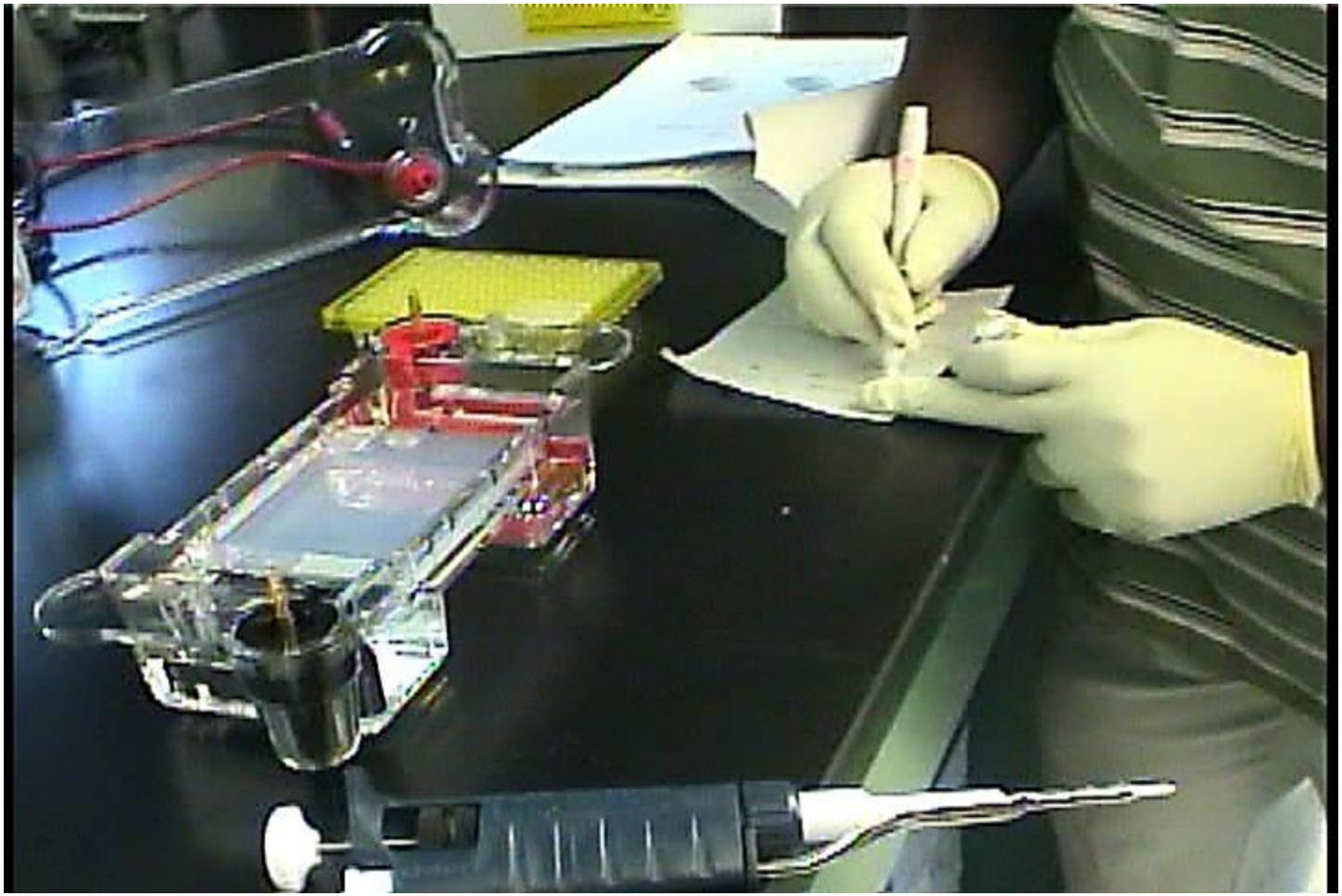


WITH BRUSHES AND A VACUUM STUDENTS FINALIZE PARTS CREATED WITH 3-D TECHNOLOGIES THAT USE POWDER AND LASERS.
Source: www.atecenters.org

Consider this Common Classroom Lab

Give the materials at your station, use the following protocol (handout given) to perform DNA Gel Electrophoresis.

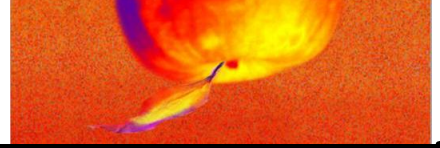
Example HOL: Gel Electrophoresis



Active Inquiry Poll

Is this activity Inquiry Learning?

A. Yes, Because students are doing hands-on work.
B. Yes, because students can check the quality of the outcome gel and learn how well you did the process.
C. No, because the activity does not have a clearly stated research question to guide data collection and analysis.



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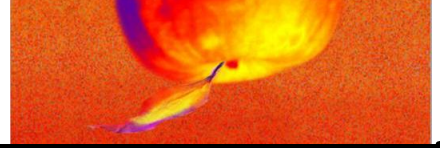
What is Inquiry Learning?

"Inquiry learning is an approach that provides learners opportunities to actively develop skills that enable them to **locate, gather, analyze, critique and apply information** in a wide range of contexts as they develop understanding."

http://ictnz.com



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What is Inquiry Learning?

Processes are:

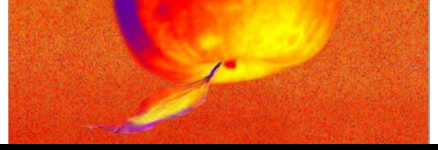
- Set goals / ask questions to answer with data
- Design experiments / design ways to collet data
- Analyze data results and form explanations / rationales

BUT: How to implement in practice ?? -> levels of inquiry

What Are The Levels Of Inquiry?

Levels of Inquiry	Question given	Method given	Solution given
1. Confirmatory			
2. Structured			
3. Guided			
4. Open Inquiry			

(Rezba, 1999; R. Bell et al. , 2005; A. Coburn, 2004.)



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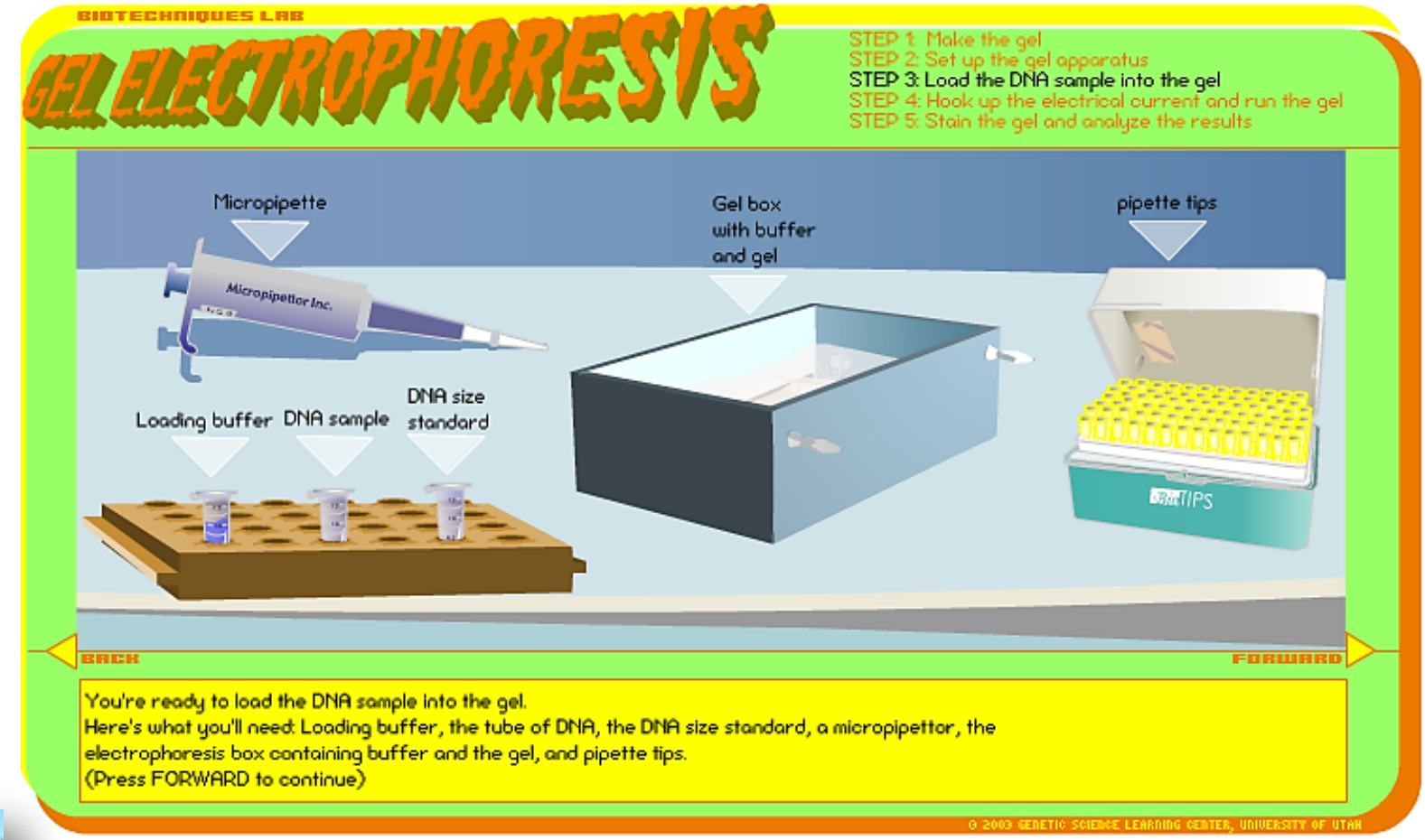
Two Examples to Illustrate:

- Inquiry support by existing software tools
- What learning goals would you be able to set for the use of this virtual laboratory/interactive simulation?
- How would you know whether you reached these learning goals?
  - What assessments would you be able to use?

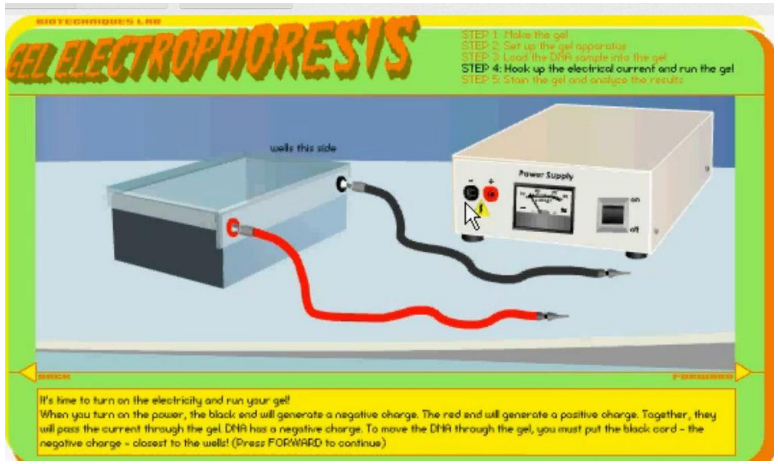
Example 1: GSLC Gel Electrophoresis VRL

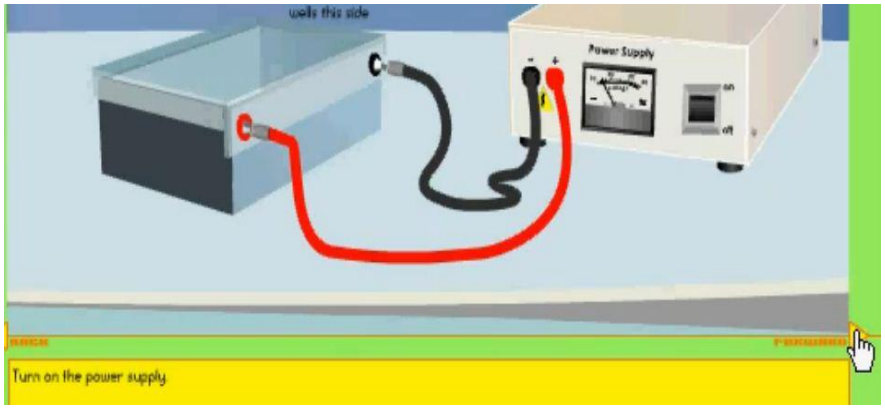


Funding was provided by a Howard Hughes Medical Institute Precollege Science Education Initiative for Biomedical Research Institutions Award

http://learn.genetics.utah.edu

Some Images from this tool





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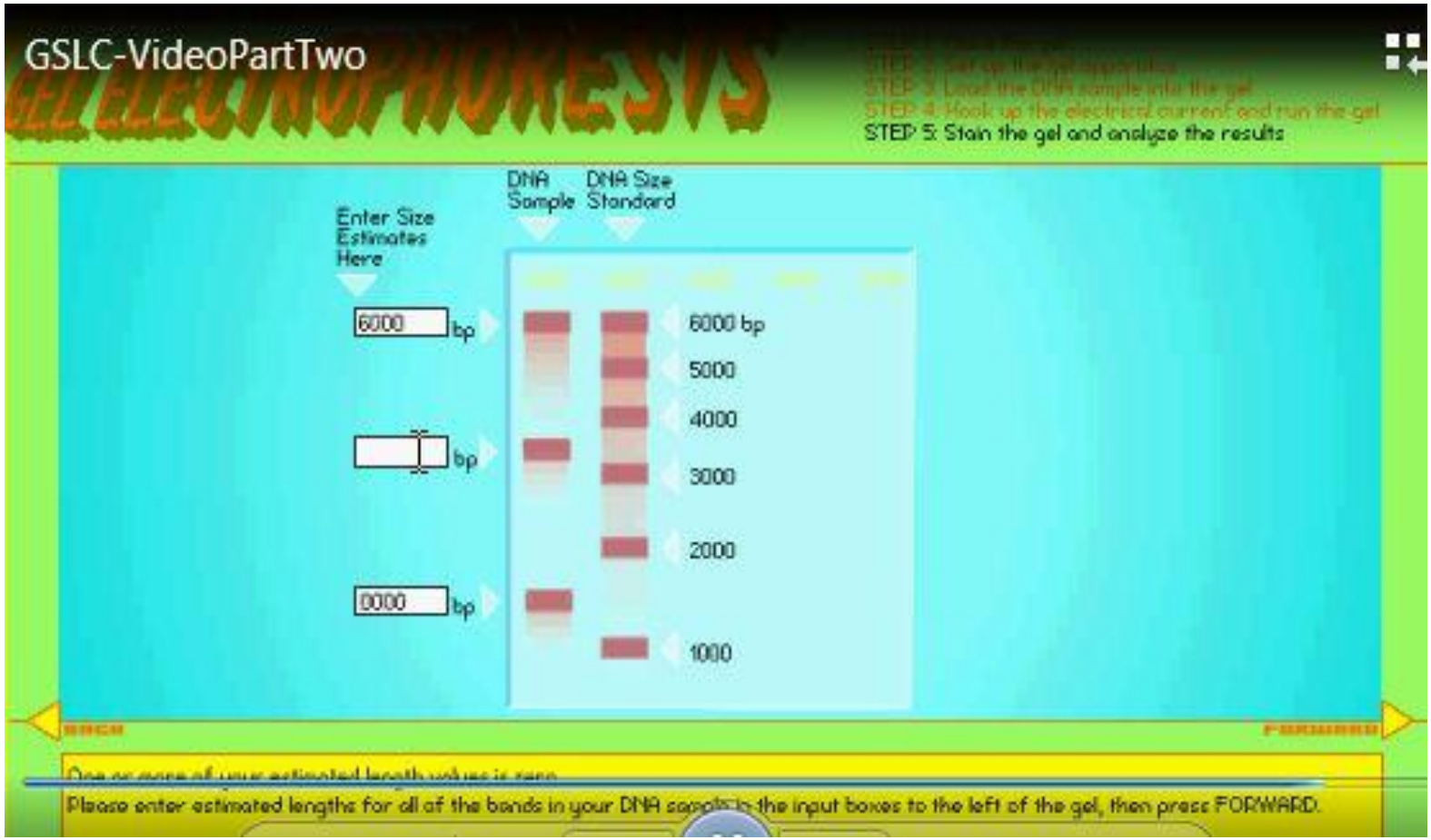
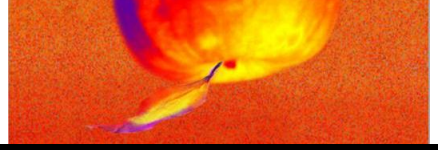


In the following video - Watch for…

- What inquiry supports did this software tool provide?
- What learning goals would you be able to set for the use of this virtual laboratory/interactive simulation?
- How would you know whether you reached these learning goals?
  - What assessments would you be able to use?

Video

http://www.youtube.com/watch?v=KGFQLkntPsQ



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What Inquiry characteristics did you see here?

Levels of Inquiry	Question given	Method given	Solution given
1. Confirmatory			
2. Structured			
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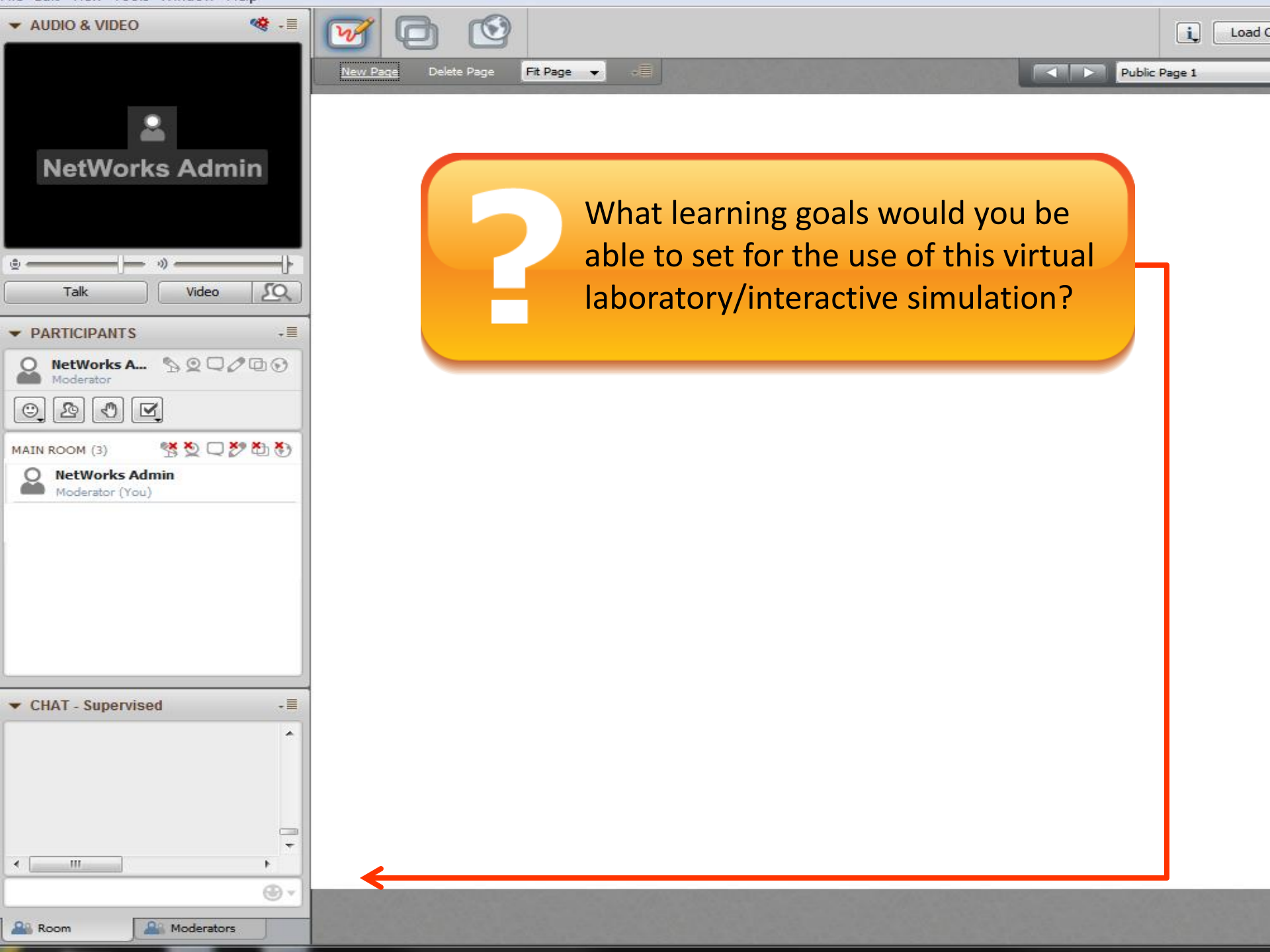
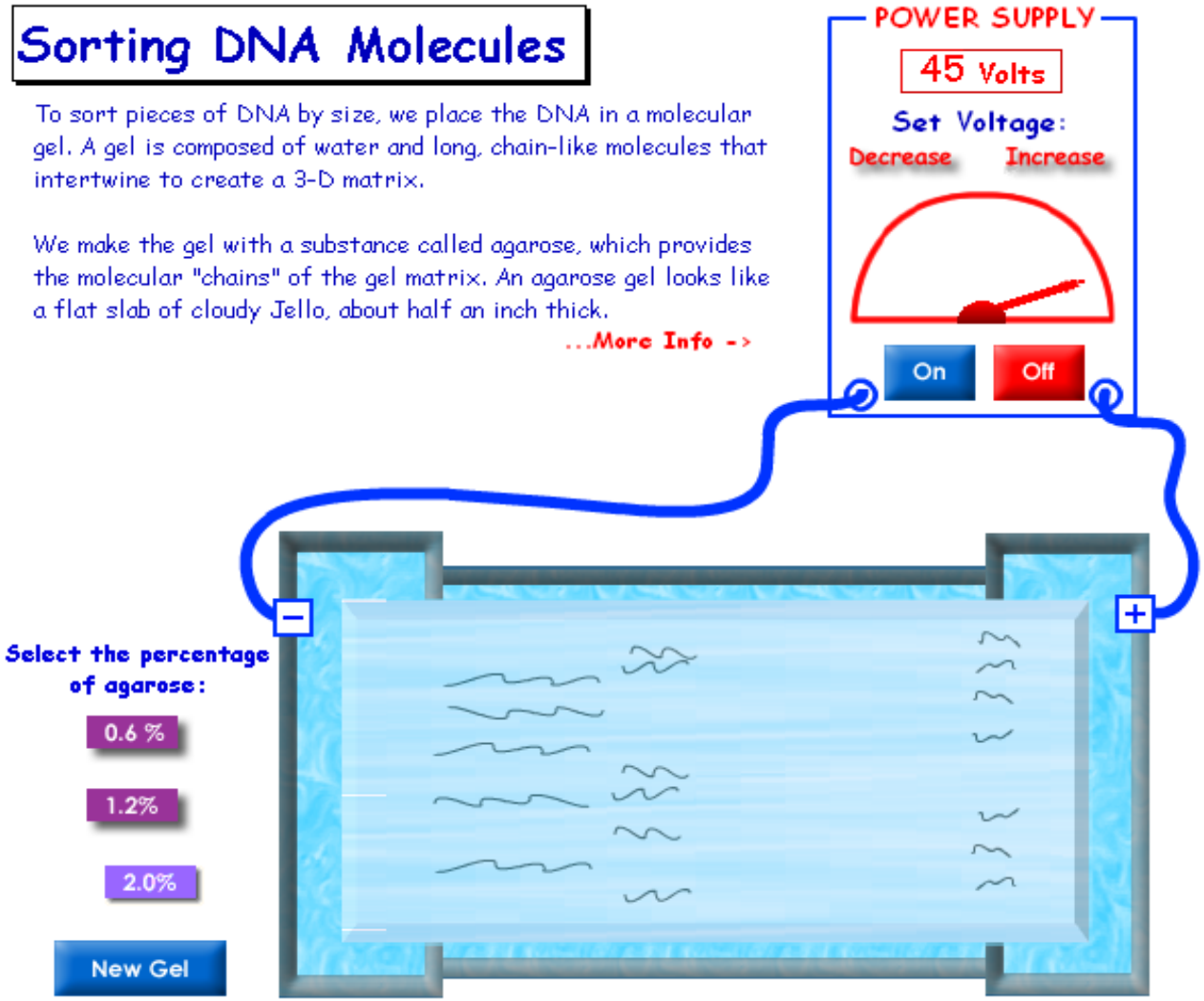
4. Open Inquiry			

(Rezba, 1999; R. Bell et al. , 2005; A. Coburn, 2004.)


AUDIO & VIDEO
NetWorks Admin
Talk
Video
PARTICIPANTS
NetWorks A...
Moderator
MAIN ROOM (3)
NetWorks Admin
Moderator (You)
CHAT - Supervised
Room
Moderators
New Page
Delete Page
Fit Page
Public Page 1
What learning goals would you be able to set for the use of this virtual laboratory/interactive simulation?

Example 2: Consider Another Way of Learning…



The MyDNA project is sponsored by a grant from the Camille Henry Dreyfus Foundation, Inc.

Video

http://youtu.be/cAvGAPGrgaE

What Inquiry characteristics did you see here?

Levels of Inquiry	Question given	Method given	Solution given
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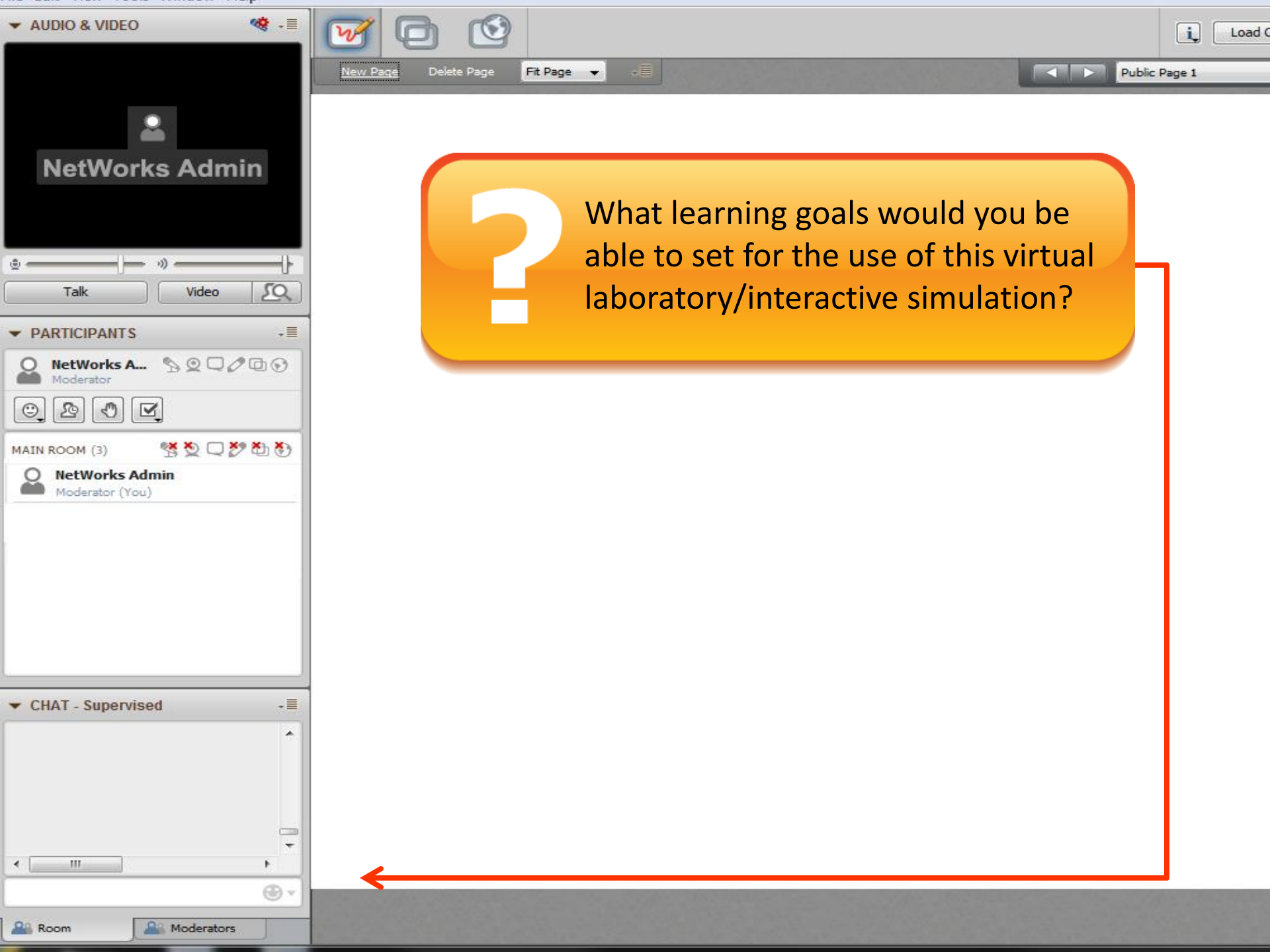
AUDIO & VIDEO
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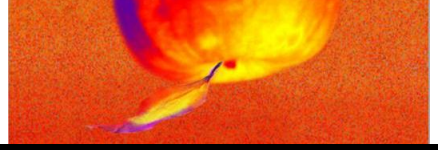
CHAT - Supervised
Room
Moderators
New Page
Delete Page
Fit Page
Public Page 1
What learning goals would you be able to set for the use of this virtual laboratory/interactive simulation?

Possible Structure For Blended Inquiry:

- Step One: Confirmatory inquiry with GSLC VRL
  - Can DNA fragments separated via gel electrophoresis?
  - Focus on reasons for processes
    - what is the mechanism of separation?

- Step Two: Use MyDNA to determine effect of CC & V

- Step Three: Use HOL to verify previous findings with VRL in hands-on setting
  - Focus on protocol precision, unbiased decision, avoiding contamination, evaluating output.



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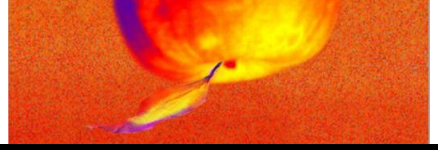
Next…

Let’s examine a software tool in a different domain…



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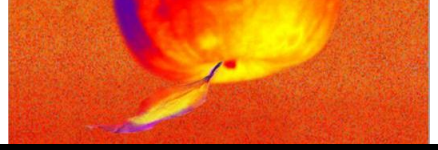
Example 3: RF Energy Simulation

Using a simulation, you will conduct six experiments to demonstrate different conditions for creation of a plasma.



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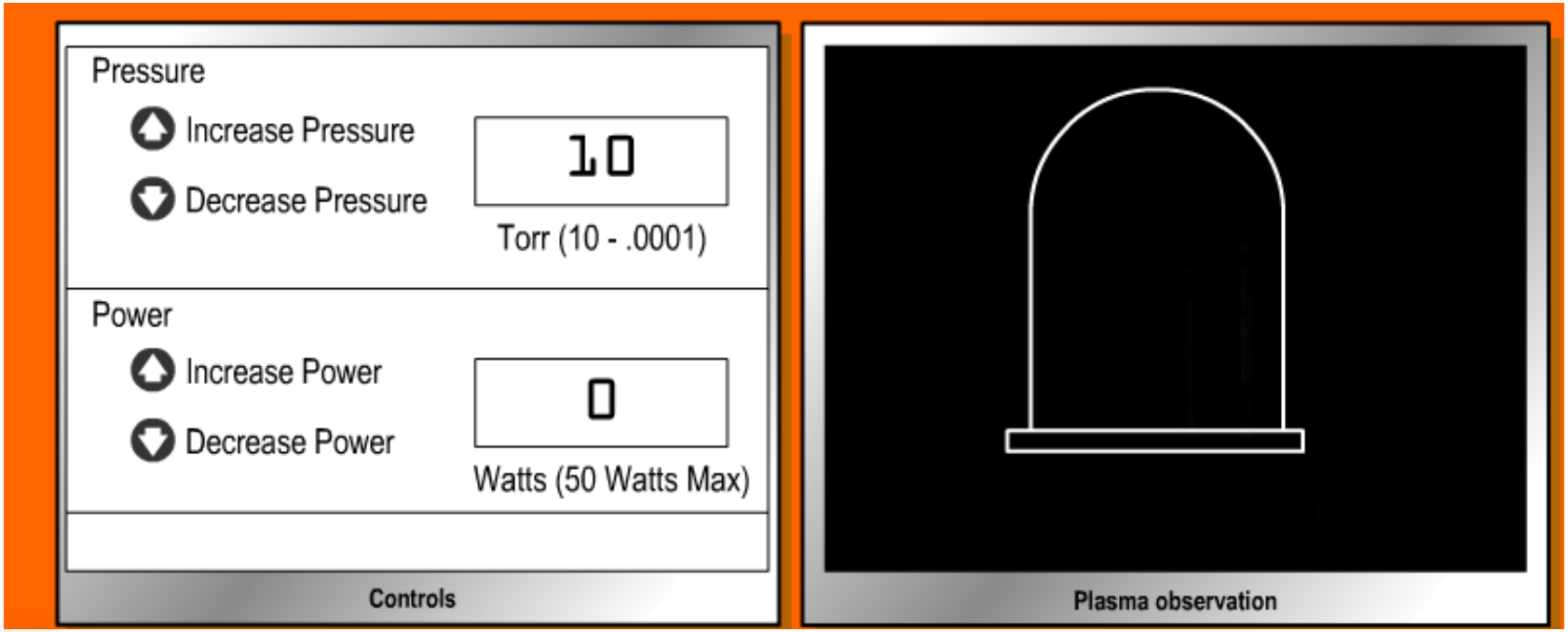
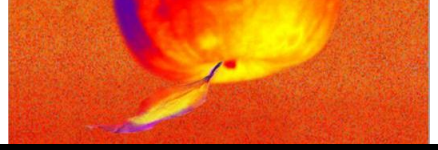
SIMULATION

Demonstrate the relationship between pressure and energy needed to initialize a plasma





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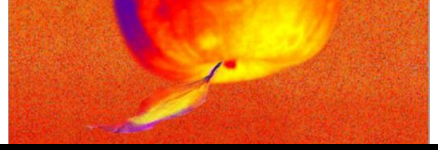
What did you see in the simulation?

- What learning goals?
- How can you structure?
- What assessments?



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CONCLUSION: Optimize Student Engagement

- Start with learning **goals** for the blended learning activity
- Select software tool for **level of inquiry** that is suitable for students
- Complement software features with instructional design
  - Set goals, add guiding questions
  - provide methods for data analysis
  - require student explanation and reasoning for solution
- Design assessments to determine whether you reached your learning goals – possible future topic for webinar?

Objectives

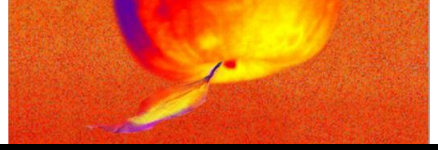
Objective 1: Develop a common understanding of *blended* learning terminology and technology.

Objective 2: Explore how to develop *blended* approaches to instruction.

Objective 3: Consider how to implement blended learning using active learning, such as *inquiry based* learning.

Objective 4: Apply instructional design principles to *blended learning.*

CYBERSECURITY STUDENTS DEPLOY ROUTING. SWITCHING, AND VIRTUAL NETWORKING. Source: www.atecenters.org



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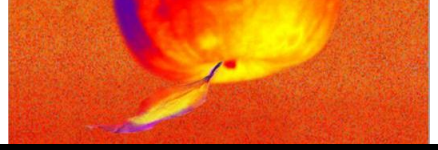
Short Survey

How Can We Better Serve You?

Whether you are joining us live or watching the recorded version of this webinar, please take 1 minute to provide your feedback and suggestions.

http://http://www.questionpro.com/t/ABkVkZJxRd

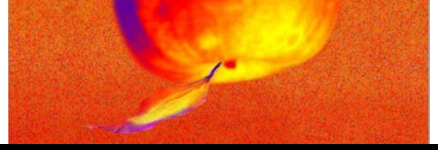


Thank You!

Thank you for attending the NetWorks webinar:

Blended and Flipped Learning:

Theory Overview



Webinar Resources

To access this recording, slides, and handout visit

www.matecnetworks.org,

Keyword Search:

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