



# STAR-LITE: An Innovative Method of Delivering Laboratory Safety Training to Students

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# The Research Question

- How can we *effectively train students in laboratory safety principles?*

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## Why Focus on *Students*?

- OSHA and NIOSH recognize the unique qualities of this population, focus attention on student workers
- Risks
  - 77,000 emergency room visits/year (under age 18) <sup>1</sup>
  - 67 fatalities/year (under age 18) <sup>1</sup>
  - Injury rate (adjusted for time) = 4.9/100 FTE <sup>2</sup>



# Why Focus on *Students*?

- Hazards <sup>1</sup>
  - Sharp objects
  - Heat sources
  - Slips, trips, falls
  - Energized sources
  - Dusts and fumes
  - Biological and chemical hazards



# How to *Effectively Train* Our Audience?

First, we need to keep in mind our audience

- Students remember 90% of what they learn if they do the job themselves, even if only as a simulation <sup>3</sup>
- On average, students (up to age 18) spend ~50 min/day playing video games <sup>3</sup>



# How to *Effectively Train Our Audience?*

Then, we need to consider features that would interest our audience

## Educational Features

- ✓ Information synthesis
- ✓ Problem assessment
- ✓ Strategic thinking
- ✓ Decision-making
- ✓ Self-direction



# How to *Effectively Train* Our Audience?

Additional features...

## Video Game Features

- ✓ Engaging, interactive environment
- ✓ Consequence-driven tasks
- ✓ Goal-oriented direction
- ✓ Immediate feedback to the user
- ✓ Personalized characters



# What *Laboratory Safety Principles* Should We Include in this Training?

- Potential biological, chemical, and physical hazards
- Routes of exposure
- Safety reference materials
- Emergency preparedness and response basics
- Measures of protection





# How can we *effectively train students in laboratory safety principles?*

- Combine the educational content with gaming art/programming to create an interactive, engaging, educational computer-based training with video game-type qualities and features

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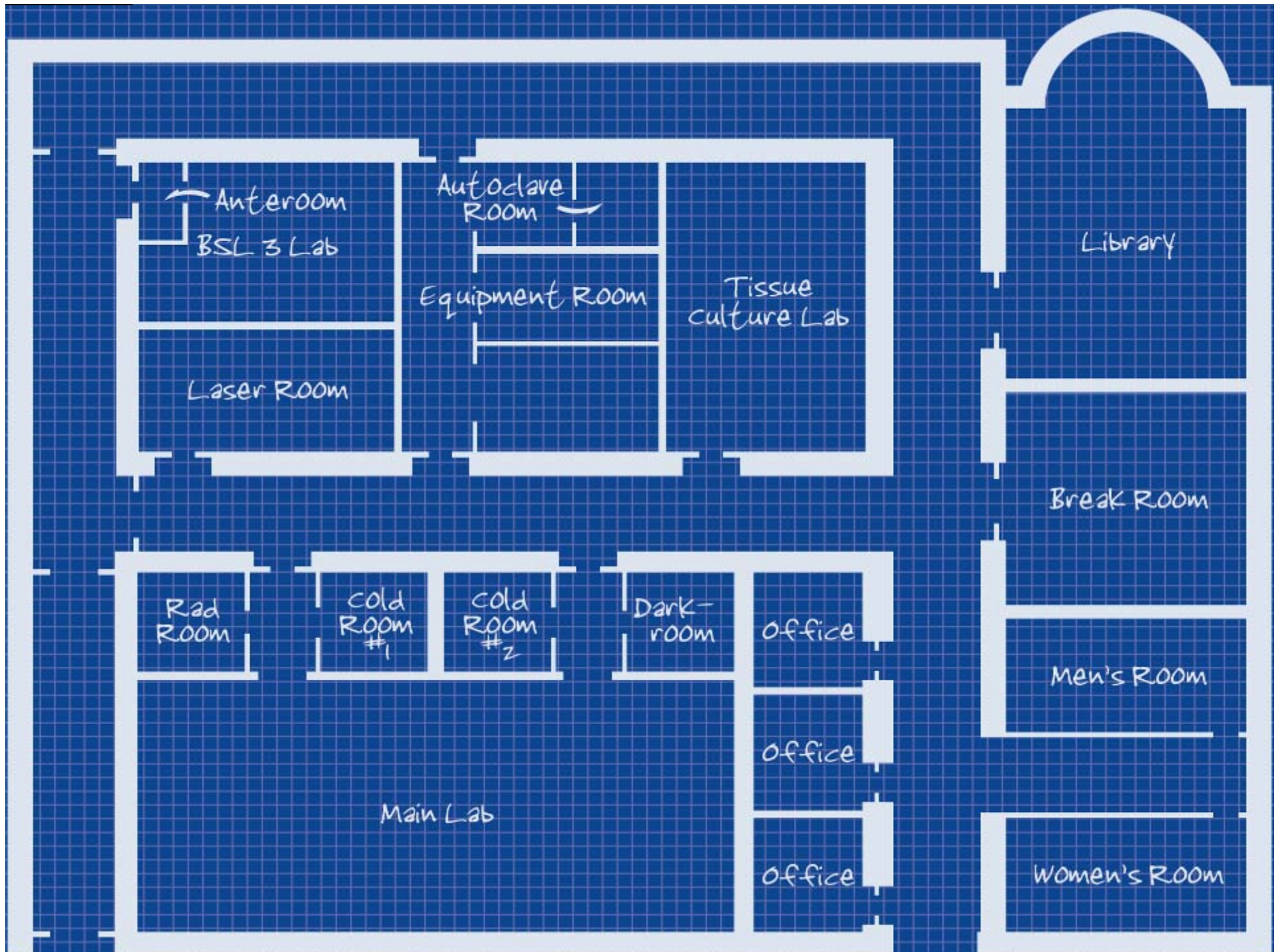
# The Training Interface

- Features of the display are engaging and educational

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# AVATAR CREATOR

Body    Clothing    Accessories    Body Art

Height           

Body Type       

Skin Color       

Hair Color       

Hair Style       

Eye Color       

CAMERA

Zoom In



Zoom Out



Rotate Left



Rotate Right



Reset



## QUEST LOG

**LAB  
101**

### LABORATORY 101 - Part 1

Tour the lab with Mackenzie. Learn about where you work, the items in the lab and the tools that you will use.



**LAB  
101**

### LABORATORY 101 - Part 2

Visit the bad Behavior Museum in the Library.

**LAB  
101**

### LABORATORY 101 - Part 3

Meet your lab colleagues in the corridor. Learn about their roles in the lab.



ACTIVATE

**LAB  
101**

Meet your lab colleagues in the corridor. Learn about their roles in the lab.

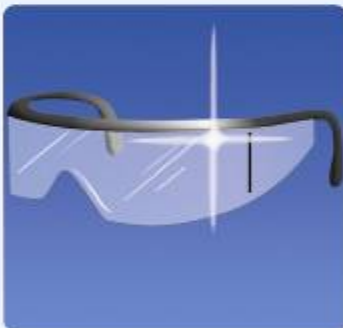


Complete - Meet your lab safety training tour guide.

Complete - Visit the bad Behavior Museum in the Library.

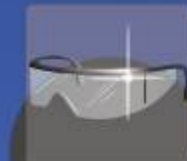
In Progress - Meet your colleagues and learn their lab roles.

## INVENTORY



### IMPACT GLASSES

Personal protective equipment (PPE) that shields the eyes from projectile objects, but not from liquid splashes. The lenses of impact glasses are typically made from polycarbonate plastic and provide some protection from ultraviolet light.



CLOSE



## LAB NOTEBOOK

LEXICON POTENTIAL LABORATORY HAZARDS LAB SAFETY REFERENCE MATERIALS PROTECTIVE MEASURES

- Engineering Controls
- Exposure Control Plan (ECP)
- Laboratory Waste Management



### ENGINEERING CONTROLS

Equipment that removes the hazard from the laboratory environment or places a barrier between the worker and the hazard (e.g., a chemical fume hood, a biosafety cabinet, or a centrifuge safety cup).



# The Thinkers: Critical Thinking Skills



- “What am I working with?”



- “What are the potential hazards?”



- “How can I prevent potential harm to myself, others, and the environment?”



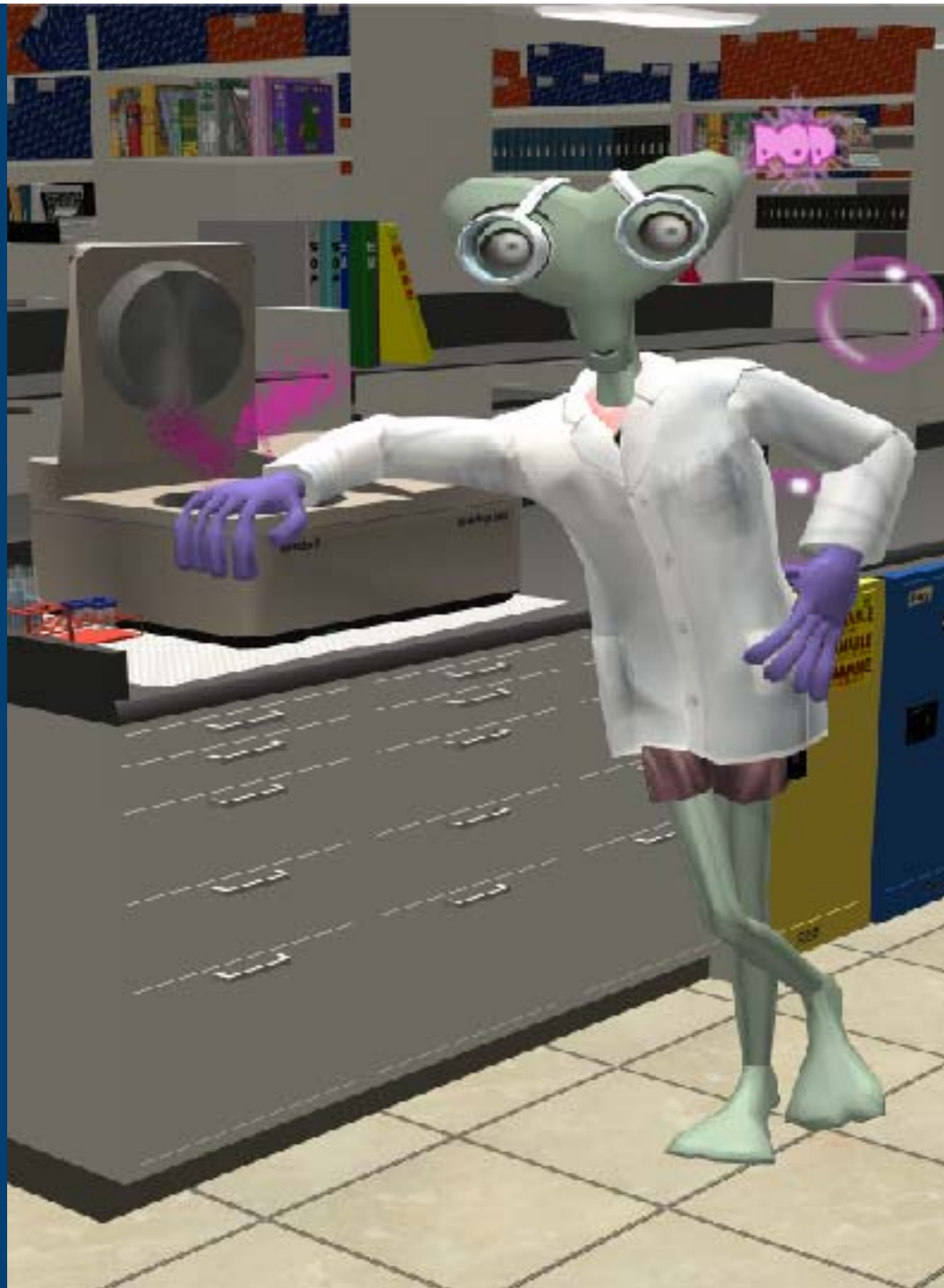
- “How can I protect myself, others, and the environment from potential hazards in the lab?”



# Training Content Flow

- Avatar Creator
- Lab 101
- Quests
  - Quests as the primary delivery method of laboratory safety knowledge and skills
  - Expect: 13 Quests that cover biological, chemical, and physical hazards







1. What Biosafety Level is assigned to laboratories that work with microorganisms that are not known to consistently cause disease in healthy adults?

A) Biosafety Level 1

B) Biosafety Level 2

C) Biosafety Level 3

D) Biosafety Level 4

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## Beta Testing

- Who
  - ~70 students and teachers
- What
  - Bug finding and product testing with feedback
- When
  - June through November 2007

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## References

- <sup>1</sup> NIOSH Alert: Preventing deaths, injuries, and illnesses of young workers. Publication No. 2003-128. July 2003.
- <sup>2</sup> Wegman DH, Davis LK. Protecting youth at work. *Am Jrnl Ind Med.* 1999; 36:579-583.
- <sup>3</sup> Harnessing the power of video games for learning. Proceedings of the Summit on Educational Games; 2005 Oct 25; Washington, DC.





**Thank You**

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