DR. KIRCHHOFF OHM'S FANTASTIC LAB OF ELECTRICAL DISCOVERY

Multimedia Courseware Design Proposal

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Spring 2015

Overview

Program Title: **Professor Kirchoff Ohm's Fantastic Lab of Electrical Discovery**

Grade or age level(s): Fifth Grade

While at first glance, this topic may seem beyond the ability of fifth graders, they have the required math skills and reasoning skills with which to complete it successfully. At its core, the application of Kirchhoff's and Ohm's laws are simply a matter of rudimentary addition, subtraction, multiplication and division. The topic will be presented in such a way that circuit analysis is condensed down into simple math problems. Thus this simulation will prove useful for both the math and science skills of fifth grade students.

Major Goal:

To serve as a practical application of Fifth Grade Math skills as well as introduction electrical circuits. Following this lesson, a Fifth Grade teacher would be able to put together "bread board" circuits such that the students would observe the physical manifestation of what they learned in the simulated environment.

Amount of Time to Learn the Content: Eight hours

System Requirements: Microsoft Windows XP SP2 or higher, 2GB RAM, High Speed Internet Connection, Flash player 17, speakers. Latest Version of Chosen Browser

Program Description

Characteristics of Target Learners:

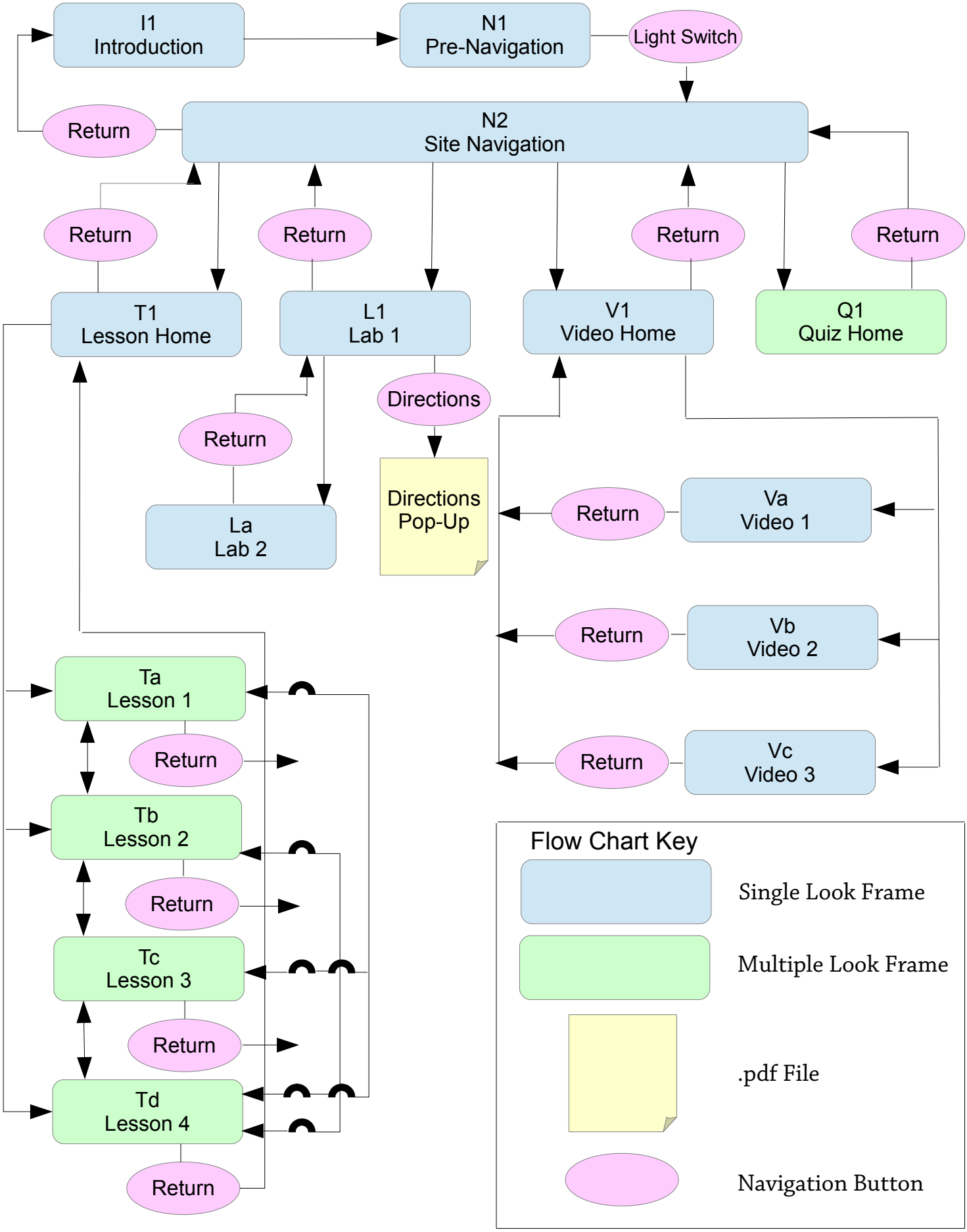
While at first glance, this topic may seem beyond the ability of fifth graders, they have the required math skills and reasoning skills with which to complete it successfully. At its core, the application of Kirchhoff's and Ohm's laws are simply a matter of rudimentary addition, subtraction, multiplication and division. The topic will be presented in such a way that circuit analysis is condensed down into simple math problems. Thus this simulation will prove useful for both the math and science skills of fifth grade students.

Instructional objectives:

Upon completion of this lesson, the learner will be able to:

1) Define the terms voltage, current and resistance as they apply to an electrical circuit.
2) Calculate the equivalent resistances of both series and parallel resistive circuits
3) Apply Kirchhoff's Current Law to determine the amount of current flowing through each leg of a resistive circuit.
4) Apply Kirchhoff's Voltage Law and Ohm's Law to determine the voltage drop across various components of a resistive circuit.

Site Flowchart



Site Storyboards

Unit Title: Introduction **Page:** 1 of 15
Lesson Title: Prof. KOhms Lab
Frame #: I1
Date: (4/1/15)

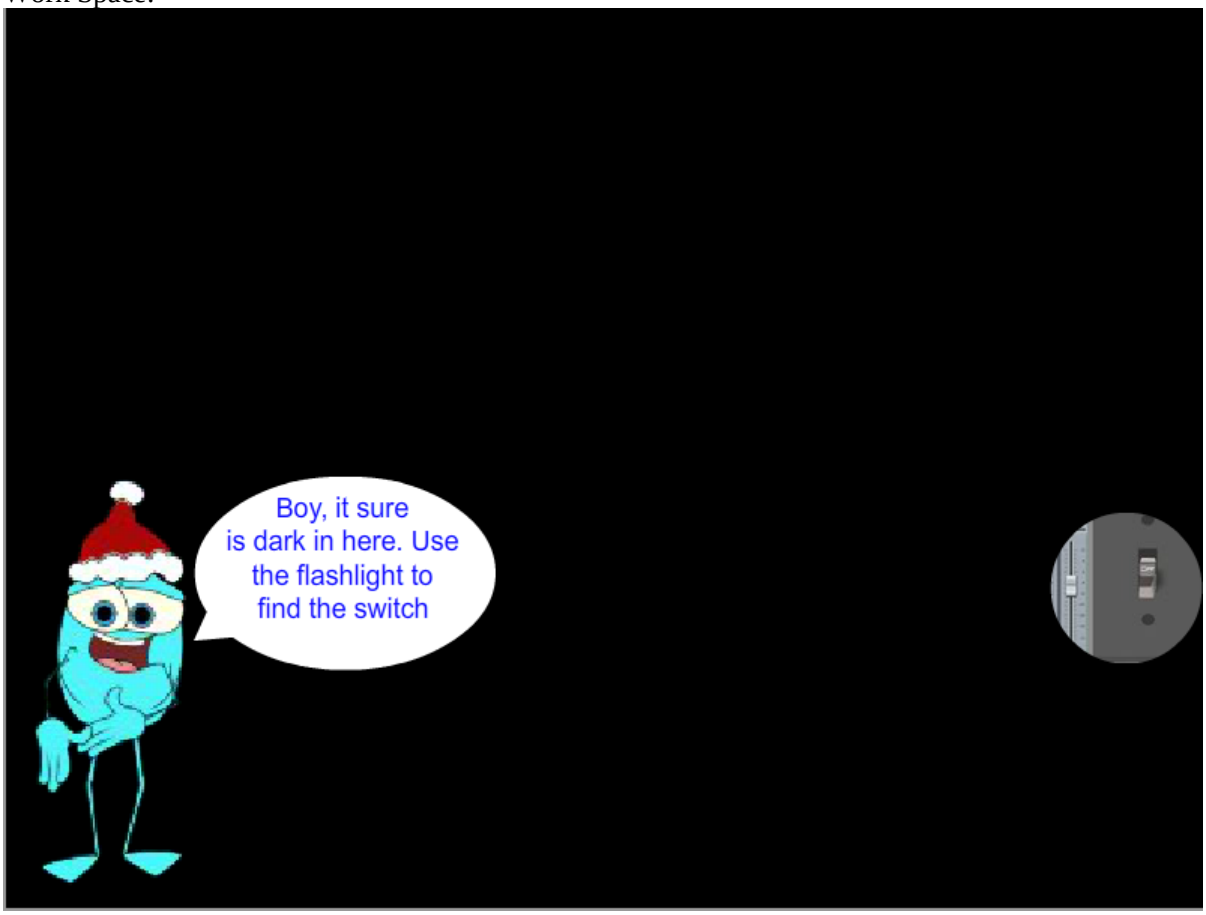
File Name: Project Final.fla
Screen Description: Intro Scene / Music: Intro.MP3

Text Outline: Opening Scene for the site.

Work Space:

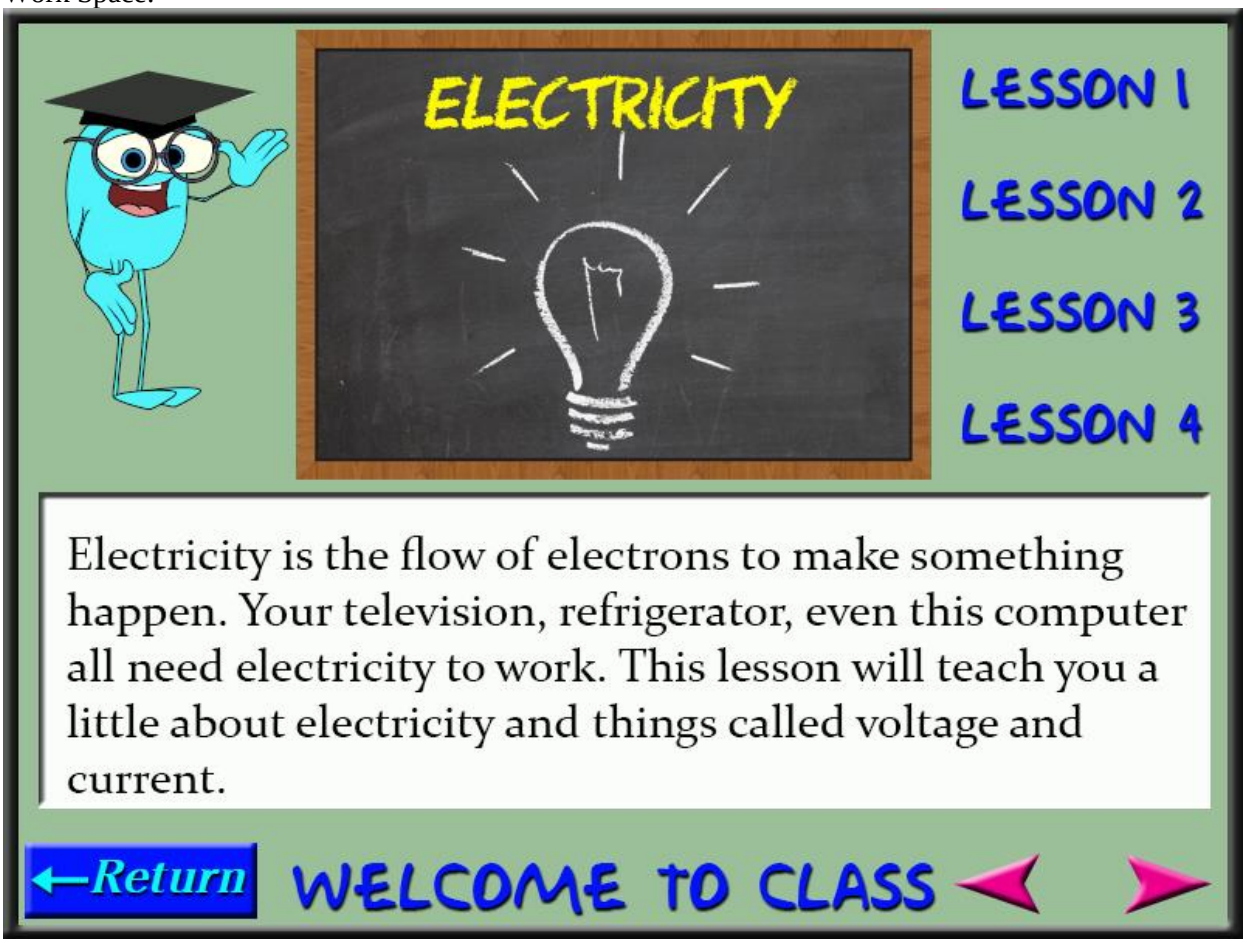
Using the opening theme music because it's non-threatening, inviting.

Additional Notes: Enter Button links to the blacked out scene in the navigation panel

Unit Title: Navigation 1 **Page:** 2 of 15 **Lesson Title:** Prof. KOhms Lab **Frame #:** N1 **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** Intro Navigation Panel/Music: Navigator MP3	**Text Outline:** First navigation panel, uses a mask for the user to find a light switch and turn it on.
Work Space: 		
This is a quick introduction to re-affirm that this is a lesson about electricity.		**Additional Notes:** Clicking the light switch will reveal entire navigation panel

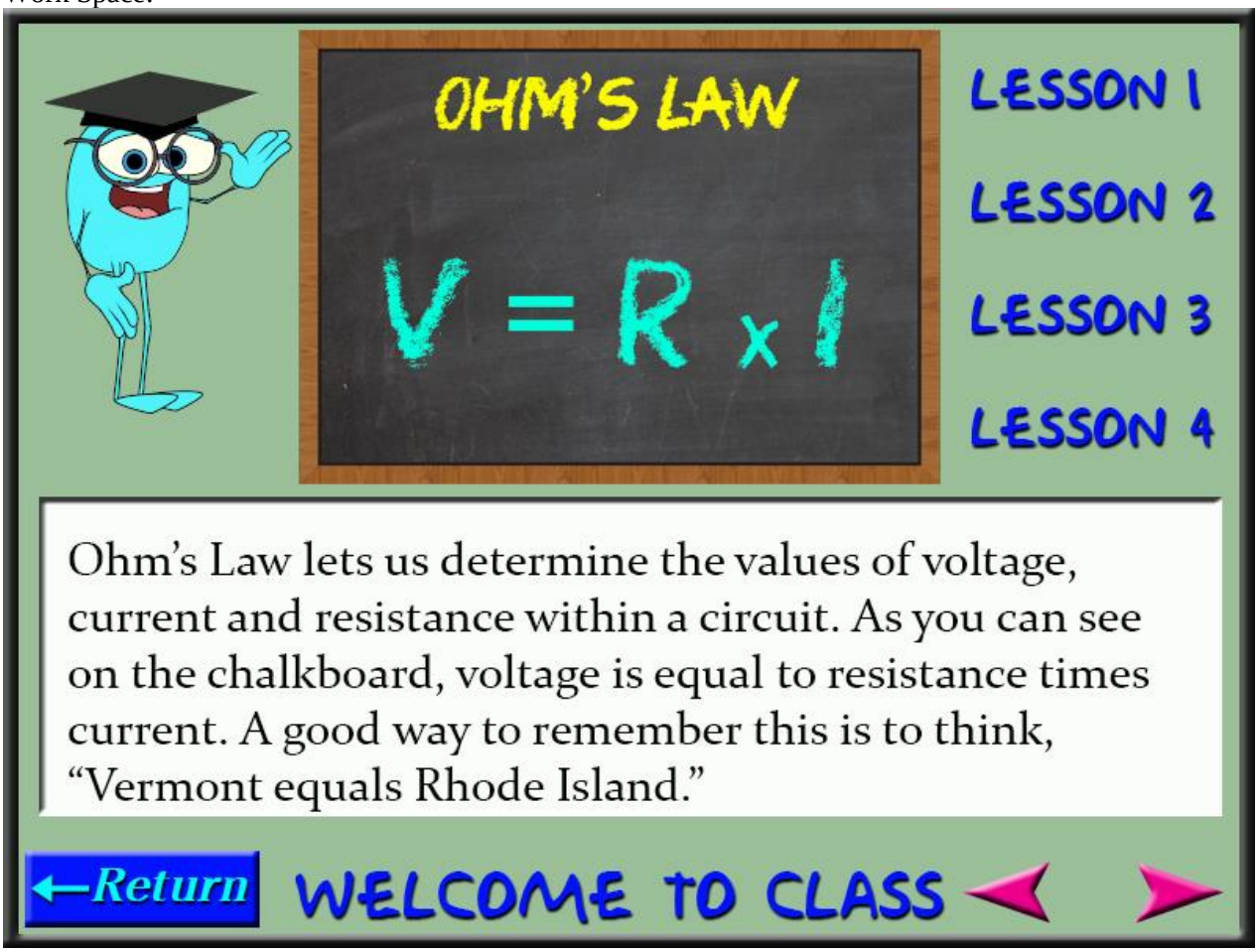
Unit Title: Navigation 2 **Page:** 3 of 15 **Lesson Title:** Prof. KOhms Lab **Frame #:** N2 **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** Navigation Panel/Music: Navigator1 MP3	**Text Outline:** This is the navigation hub of the lesson. All returning pages return to this page. The Green message panel will flash messages to the user. The frequency indicator will change frequencies below. The Lesson Button will take the user to the Lesson Page. The Lab Button will take the user to an interactive electrical lab. The Video Button will take the user to a series of 3 You Tube Videos explaining the various lessons and the Quiz button will take the user to an interactive Quiz.
Work Space:  		
Music was written to give a lab like feel to things (staccato and electronic) The messages, provide a human element, in that users do not have to guess what to do.		**Additional Notes:** Return button returns user to intro page.

Unit Title: Lesson Home Page: 4 of 15 **Lesson Title:** Prof. KOhms Lab **Frame #:** T1 **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** Lesson Navigation Page	**Text Outline:** Simple Navigation page.
Work Space: 		
Initial Lesson Navigation Page allows learner to choose lesson to take		**Additional Notes:** Return button returns user to navigation page

Unit Title: Lesson 1 **Page:** 5 of 15 **Lesson Title:** Prof. KOhms Lab **Frame #:** Ta **Date:** 4/1/15	**File Name:** (Project Final.fla) **Screen Description:** (This lesson will introduce the learner to electrical concepts. The arrow keys will control lesson navigation)	**Text Outline:** (The text area will be a movie symbol, the blackboard will be as well. One thing of note, each lesson button on the right will take the user to page 1 of that particular lesson. Naturally the goal is that they perform the lessons in series, but free navigation is provided to let them explore on their own.)
Work Space:  		
The blackboard motif offers the learner a degree of comfort. This portion of the project is written for the more traditional learner. The goal is to allow the learner to combine the written lesson with the videos and experimentation in the lab to allow them to greater understand the physics behind electricity. Since the lessons are based on standard math concepts, addition, multiplication and division, they should see the practical application of the math skills they have been learning		**Additional Notes:** Return button returns user to Lesson Home Page.

Unit Title: Lesson 2 **Page:** 6 of 15 **Lesson Title:** Prof. KOhms Lab **Frame #:** Tb **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** This lesson will introduce the learner to Ohm's Law. The arrow keys will control lesson navigation	**Text Outline:** The text area will be a movie symbol, the blackboard will be as well.

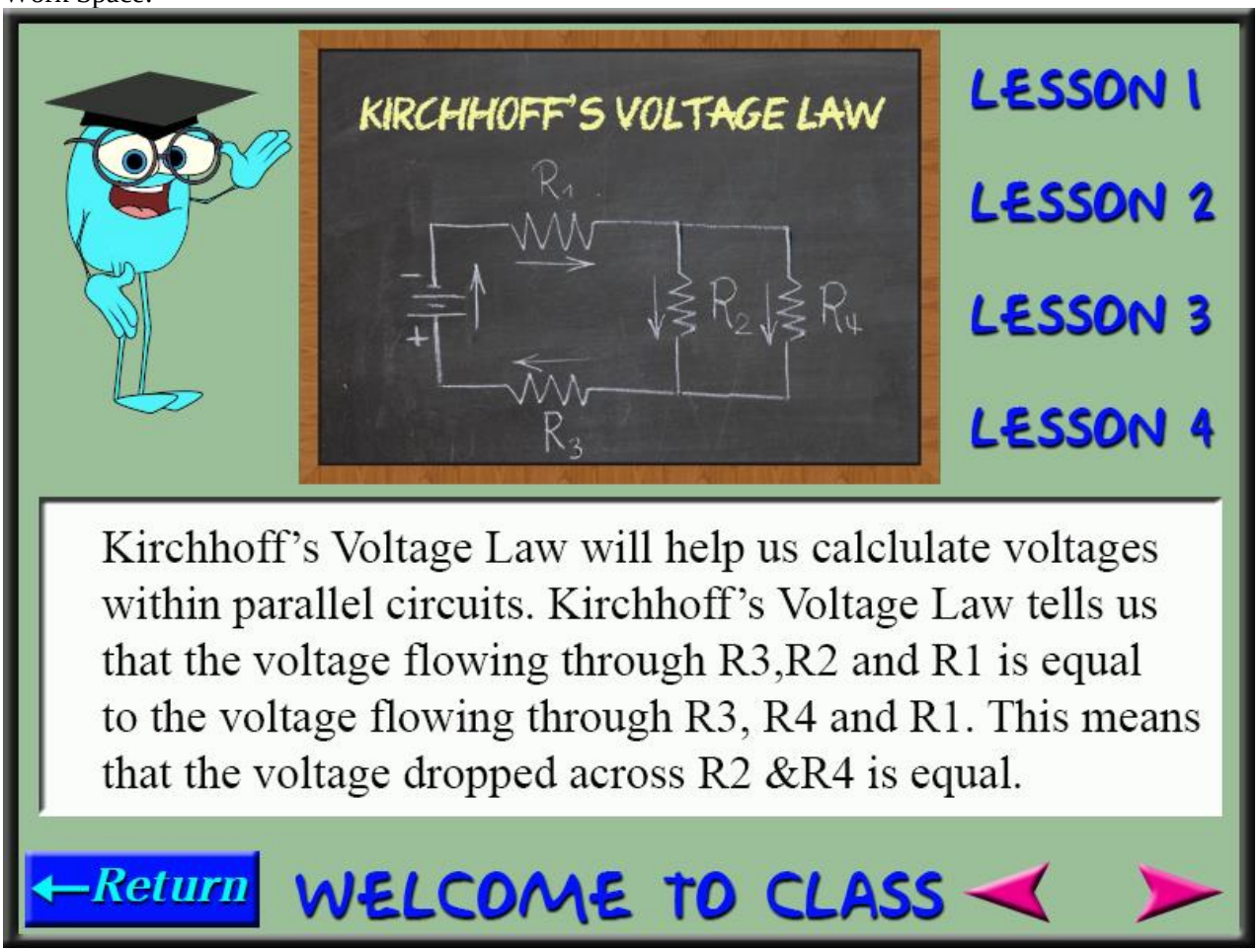
Work Space:



Each lesson is in the same format to allow the user to develop a degree of comfort with the way the lesson is created. One thing of note, each lesson will only be a few slides long. The goal is for multifaceted learning to take place. I don't want the learners to become bogged down in the written lessons. I want to introduce the concepts, give them an example and have them move on to the video for the lesson.	**Additional Notes:** Return button returns user to Lesson Home Page.

Unit Title: Lesson 3 Page: 7 of 15 **Lesson Title:** Prof. KOhms Lab **Frame #:** Tc **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** This lesson will introduce the learner to Kirchhoff's Voltage Law. The arrow keys will control lesson navigation	Text Outline: The text area will be a movie symbol, the blackboard will be as well.

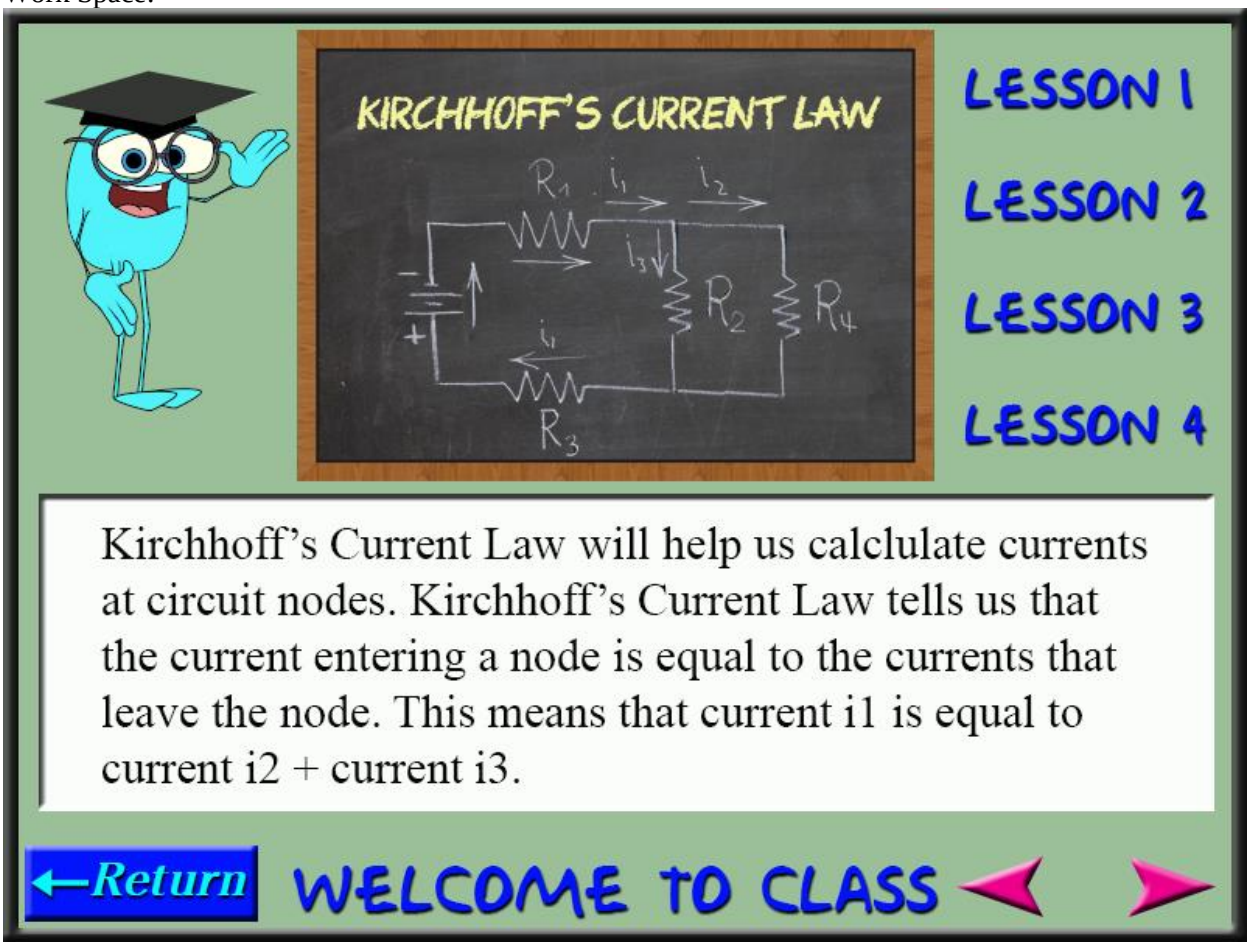
Work Space:



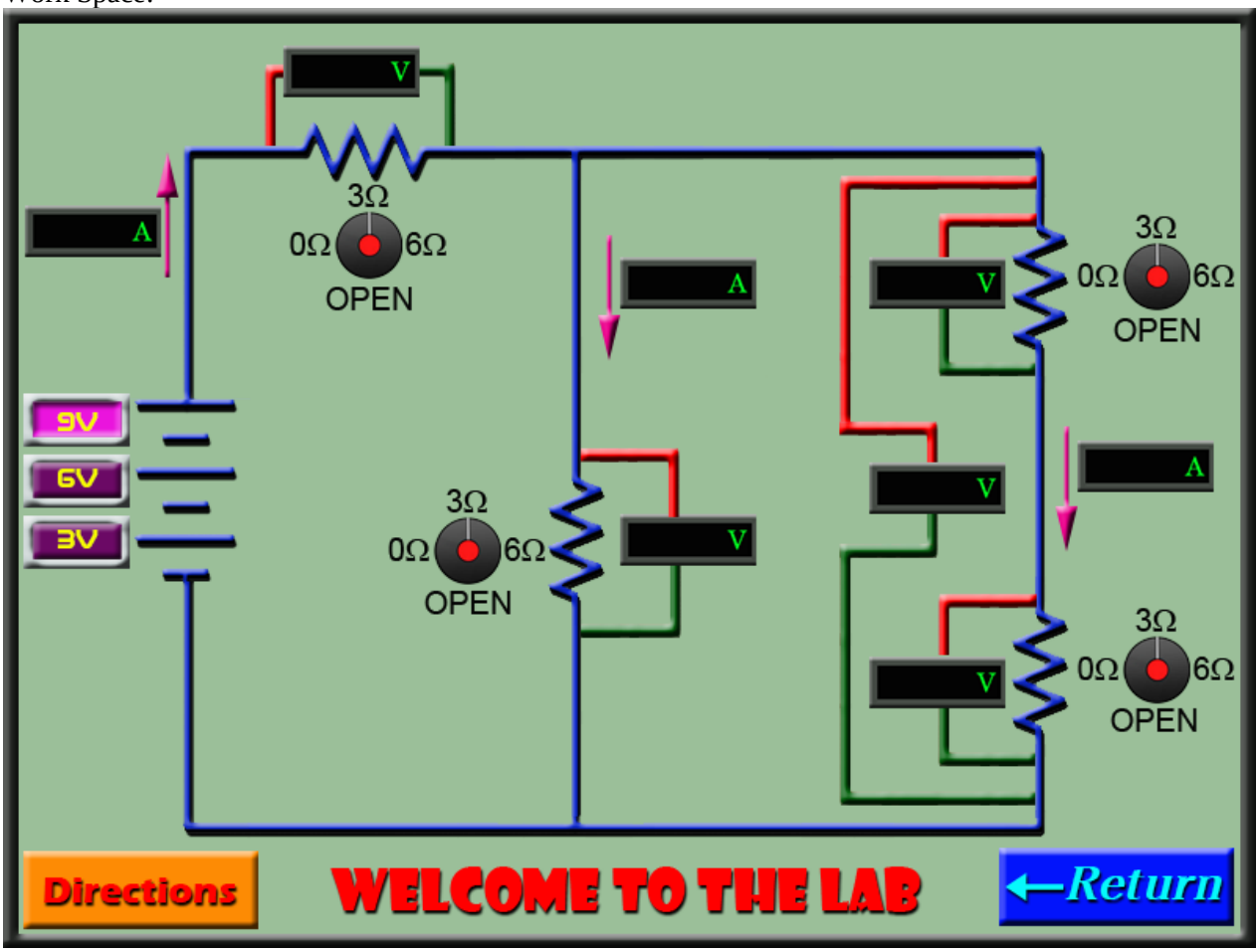
Each lesson is in the same format to allow the user to develop a degree of comfort with the way the lesson is created. One thing of note, each lesson will only be a few slides long. The goal is for multifaceted learning to take place. I don't want the learners to become bogged down in the written lessons. I want to introduce the concepts, give them an example and have them move on to the video for the lesson.	**Additional Notes:** Return button returns user to navigation page.

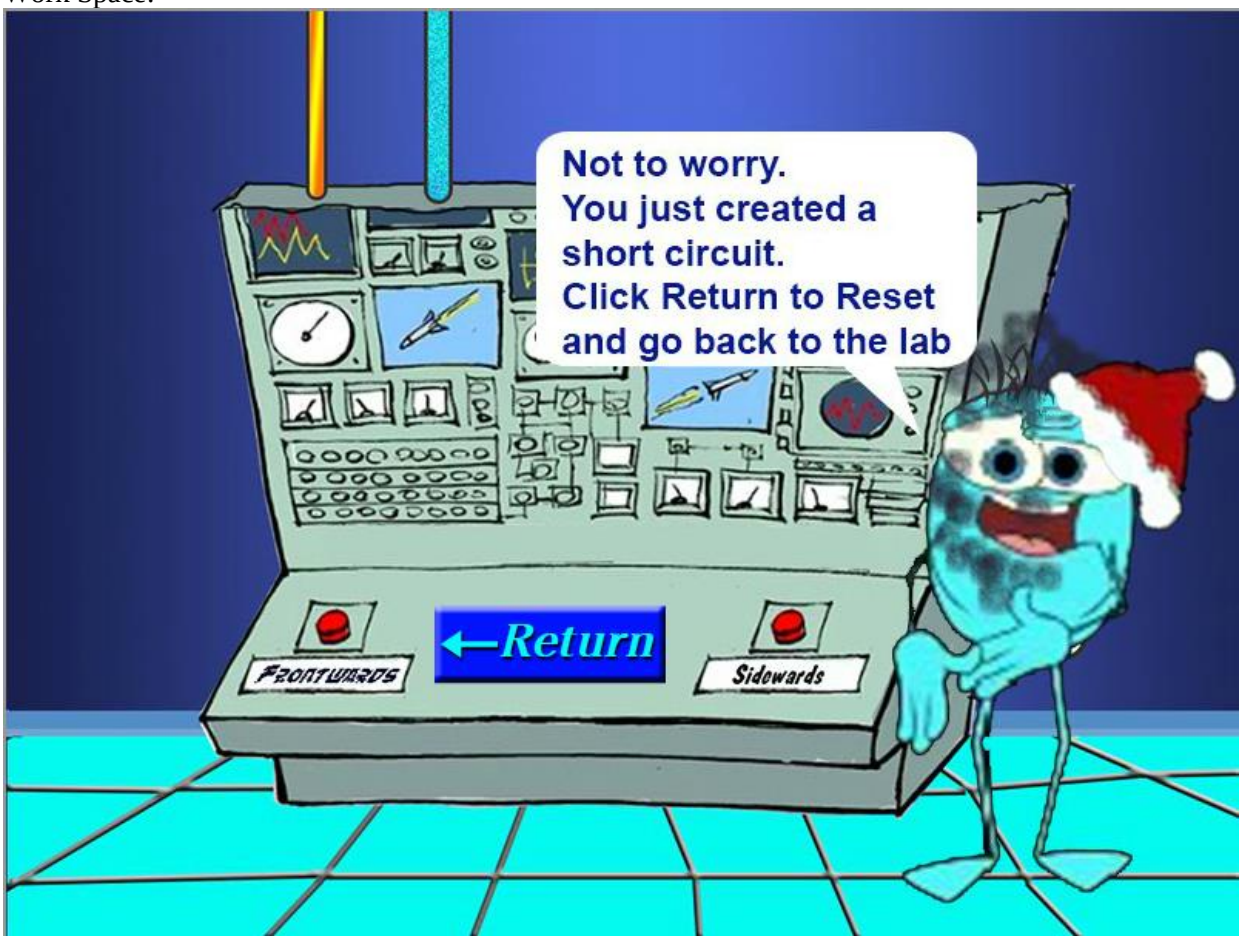
Unit Title: (Lesson 4) **Page:** 8 of 15 **Lesson Title:** Prof. KOhms Lab **Frame #:** Td **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** This lesson will introduce the learner to Kirchhoff's CurrentLaw. The arrow keys will control lesson navigation	**Text Outline:** The text area will be a movie symbol, the blackboard will be as well.

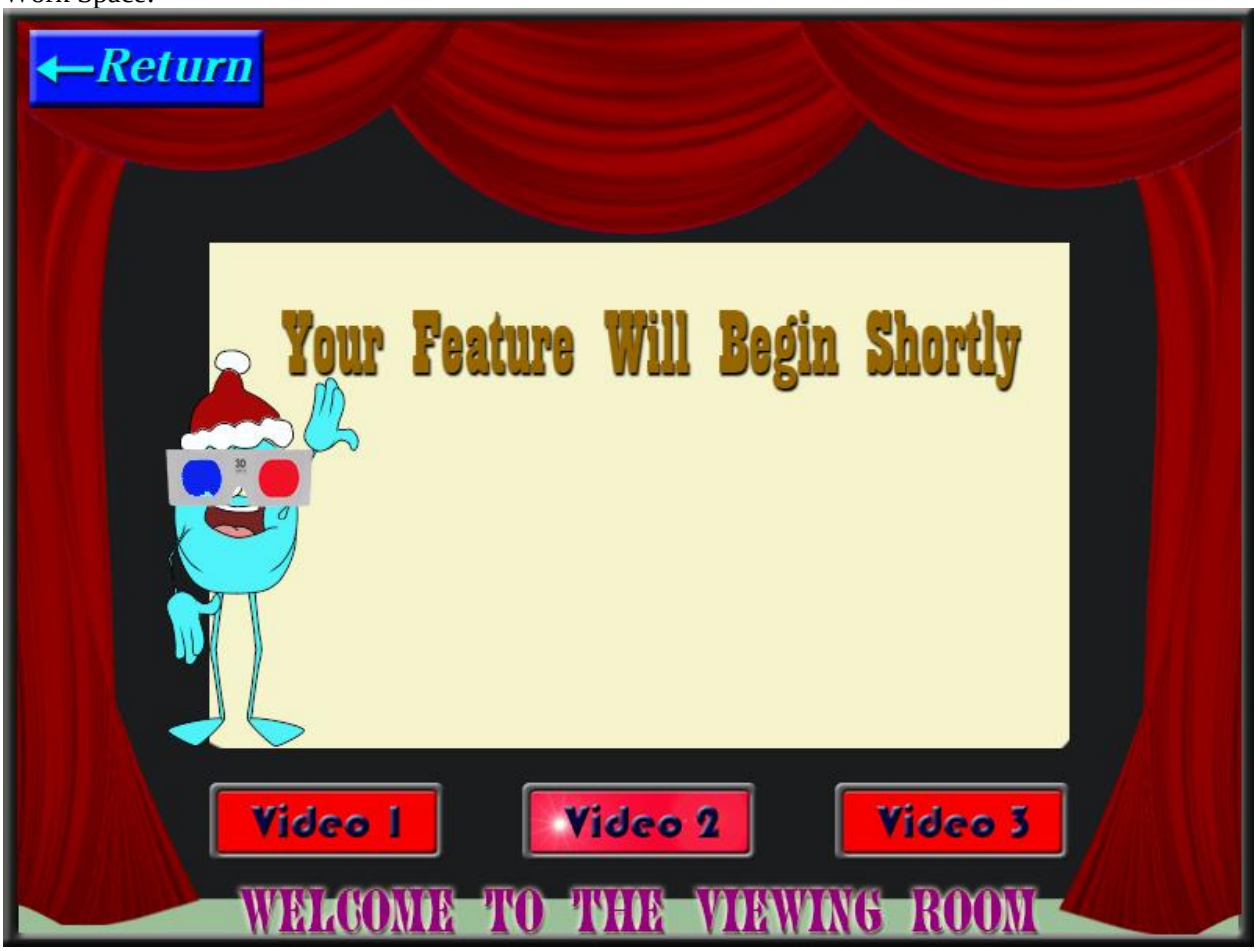
Work Space:



Each lesson is in the same format to allow the user to develop a degree of comfort with the way the lesson is created. One thing of note, each lesson will only be a few slides long. The goal is for multifaceted learning to take place. I don't want the learners to become bogged down in the written lessons. I want to introduce the concepts, give them an example and have them move on to the video for the lesson..	**Additional Notes:** Return button returns user to navigation page.

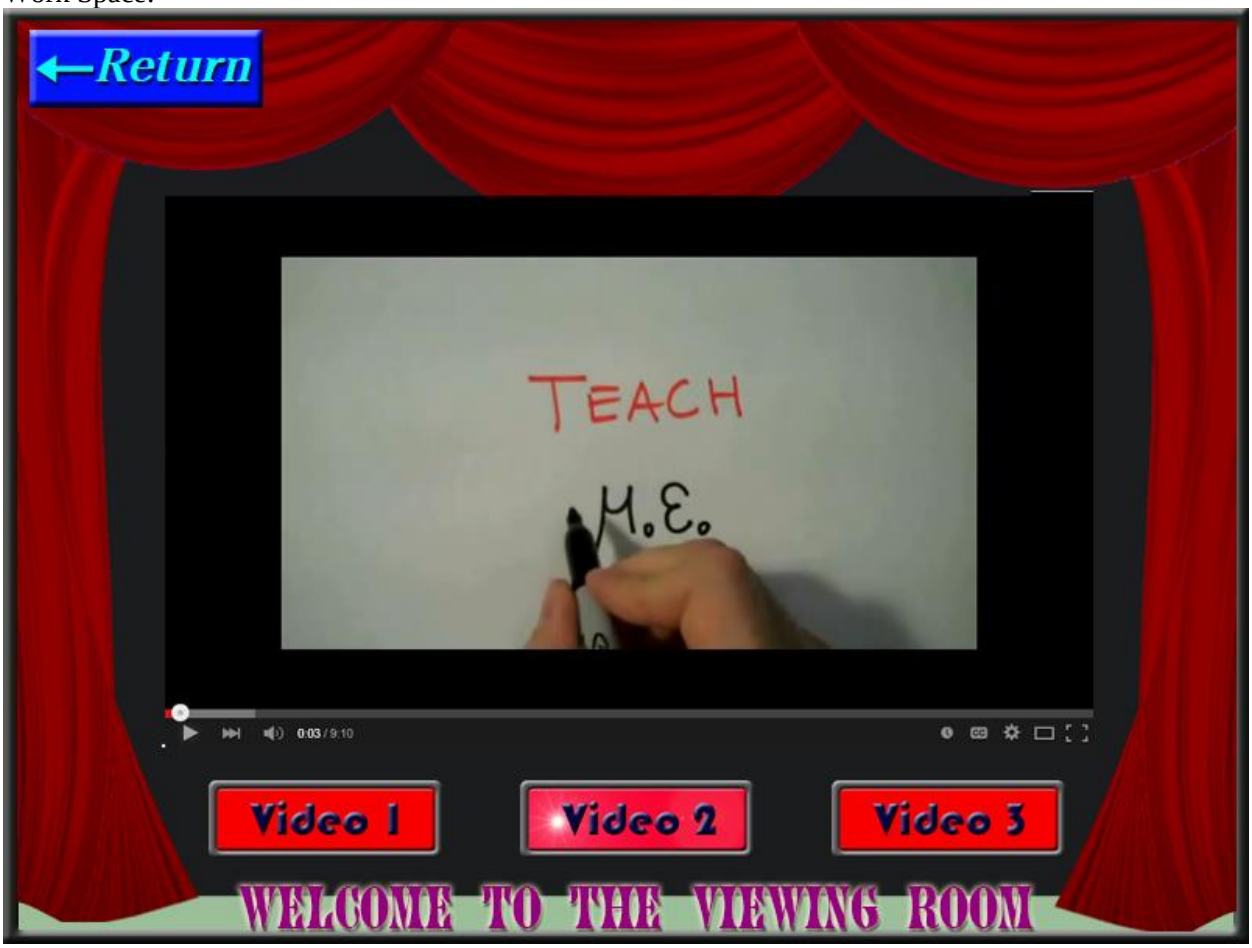
Unit Title: The Lab **Page:** 9 of 14 **Lesson Title:** Prof. KOhms Lab **Frame #:** L1 **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** This is a fully interactive lab designed to allow the learner to vary resistances and voltages to experiment with Kirchhoff's Voltage and Current laws.	**Text Outline:** The goal of this page is exploration and play. The lab is designed so that the learner can quiz themselves about what they learned. Ideally, they will perform the calculations before testing them in the lab. There is also a short circuit designed into the lab such that when a learner creates a short, they know that it damages components.
Work Space:  		
The goal here is learning through experimentation. There is, however a Directions link that will take the learner to a pop up PDF page which explains how the lab works.		**Additional Notes:** Return button returns user to navigation page.

Unit Title: The Lab 2 **Page:** 10 of 14 **Lesson Title:** Prof. KOhms Lab **Frame #:** La **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** A flag screen that appears when learner creates a short circuit.	**Text Outline:** This is an interim screen that displays when the user creates a short circuit.
Work Space:  		
By creating consequences for a short circuit, the user learns to avoid them. This is better than demonstrating infinite current.		**Additional Notes:** Return button returns user to The Lab.

Unit Title: Viewing Room Page: 11 of 15 **Lesson Title:** Prof. KOhms Lab **Frame #:** V1 **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** This is the Video entrance screen with links to all three You Tube Videos.	**Text Outline:** This screen will allow access to the three You Tube videos that go with the course. They will explain Ohm's Law and Kirchhoff's two laws.
Work Space: 		
The goal here is to have the videos back up the material that was presented in the lessons. By presenting the same topics two different ways, it increases the probability that the student will take away the necessary lessons.		**Additional Notes:** Return button returns user to navigation page.

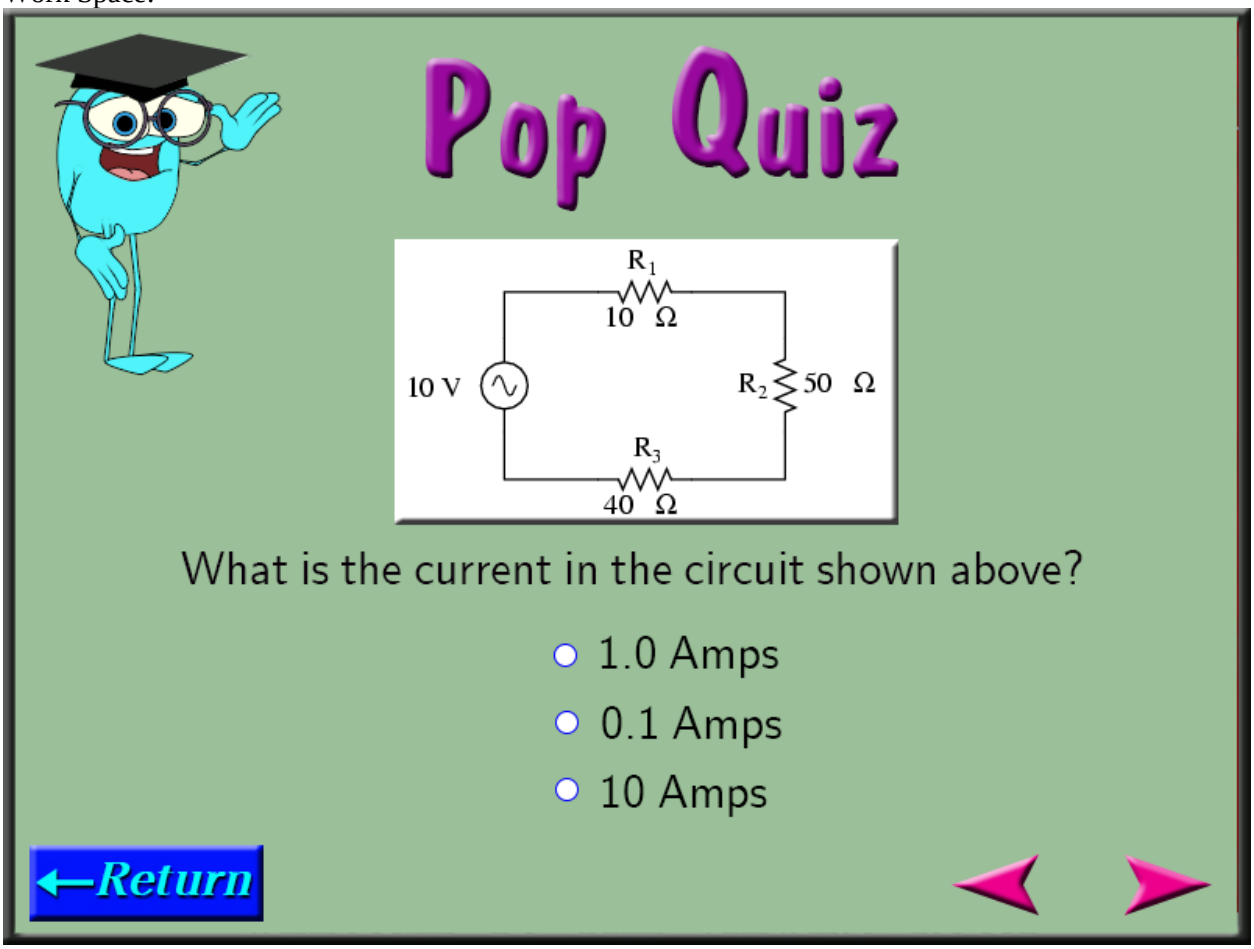
Unit Title: View Room1 **Page:** 12 of 154 **Lesson Title:** Prof. KOhms Lab **Frame #:** Va **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** First in a three video series.	**Text Outline:** The first video explains the basics of electricity including voltage and current and electrical safety.
Work Space: 		
Video Link = https://www.youtube.com/watch?v=EJeAuQ7pkpc This is a good simple introduction to electricity. It explains short circuits and current and voltage and mentions safety so that the students won't be shorting out batteries in their homes. While the voice is fairly sleep inducing, the graphics and explanations are good.		**Additional Notes:** Return button returns user to video page.

Unit Title: View Room2 **Page:** 13 of 15 **Lesson Title:** Prof. KOhms Lab **Frame #:** Vb **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** Second in a three video series.	**Text Outline:** Video explains Ohm's Law well and is entertaining. It's a good introduction to the topic and compliments the written material.
Work Space:  		
Video Link = https://www.youtube.com/watch?v=-mHLvtGjum4 This video is more entertaining and acts as a good contrast to the first while still staying on topic.		**Additional Notes:** Return button returns user to video page.

Unit Title: View Room3 **Page:** 14 of 15 **Lesson Title:** Prof. KOhms Lab **Frame #:** Vc **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** Final in a three video series.	**Text Outline:** The video provides a worked example using Ohm's and both of Kirchhoff's Laws.
Work Space:  		
Video Link = https://www.youtube.com/watch?v=Z2QDXjG2ynU By providing a worked example, this video brings the skills and calculations required for the students to perform successfully in the lab.		**Additional Notes:** Return button returns user to video page.

Unit Title: Quiz Home **Page:** 15 of 15 **Lesson Title:** Prof. KOhms Lab **Frame #:** Q1 **Date:** 4/1/15	**File Name:** Project Final.fla **Screen Description:** Self-paced Quiz	**Text Outline:** Navigation Quiz which will report score upon quiz completion.

Work Space:



The Quiz allows multiple retakes. The goal is that the learner keep going until they are completely successful.

Additional Notes: Return button returns user to navigation page.)