**UXBRIDGE SECONDARY SCHOOL**

**SCIENCE DEPARTMENT**



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| **Subject / Course:** SPH 4U1 – Grade 12U Physics | **Name:** Lisa Cole (Lim-Cole) | |
| **Grade Level:** Grade 12 University | **Date:** December 16, 2010 | |
| **Topic:**  **THE POWER OF IDEAS**  ***Exploring what we have learned and what is still to come…*** | **Time of Class:** 75 minutes + presentation time | |
|  | **Room # / Location:** Computer Lab/Library | |
| **1. Curriculum Expectation(s) and Goal(s) for the Lesson** | |  |
| 1. **Expectations**:  |  | | --- | | A1.3 Identify and locate a variety of print and electronic sources that enable them to address research topics fully and appropriately.  A2.2 Describe the contributions of scientists, including Canadians (e.g., Elizabeth MacGill, Pierre Coulombe, Allan Carswell, Gerhard Herzberg), to the fields under study.  B1.2 Assess the impact on society and the environment of technological devices that use linear or circular motion (e.g., projectile weapons, centrifuges, elevators) [AI, C]  D1.2 Assess the impact on society and the environment of technologies that use gravitational, electric, or magnetic fields (e.g., satellites used in surveillance or storm tracking, particle accelerators that provide high-energy particles for medical imaging) [AI, C]  E1.2 Assess the impact on society and the environment of technologies that use the wave nature of light (e.g., DVDs, polarized lenses, night vision goggles, wireless networks) [AI, C]  F1.1 Analyse the development of the two major revolutions in modern physics (e.g., the impact of the discovery of the photoelectric effect on the development of quantum mechanics; the impact of thought experiments on the development of the theory of relativity), and assess how they changed scientific thought [AI, C]  F1.2 Assess the importance of relativity and quantum mechanics to the development of various technologies (e.g., nuclear power; light sensors; diagnostic tools such as magnetic resonance imaging [MRI], computerized axial tomography CAT], positron emission tomography [PET]) [AI, C] | | | |
| 1. **Goal(s) for the lesson:**  |  | | --- | | * Students will be provided an opportunity to investigate the Perimeter Institute for Theoretical Physics web resource: **“THE POWER OF IDEAS”** * Students will research their assigned areas of topics and develop an understanding of the relationships between the ideas presented. * Students will take the knowledge they have gathered and organize their information to create a “tableau” that demonstrates the links between their topics and how it affects society today. | | | |
| **2. Preassessment and Accommodations/Modifications** | | |
| |  |  | | --- | --- | | **Preassessment:** | **Accommodation/Modification:** | | **Behavioural/Social/Emotional Needs:**  **Diversity Needs:**  **Academic Needs:** | Students will be provided assistance to conduct research in an organized fashion. Any students who encounter difficulties will be encouraged to seek assistance.  Students will be grouped and assigned a specific topic for research. Each group will be responsible for developing and presenting the ideas of the assigned topic with the rest of the class. | | | |

**3. Learning Environment**

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| * The students will be exploring the ideas presented in this lesson in a computer lab/library. They will be provided with one computer per student and a group brainstorming area. * Each group will be provided with research note-taking sheets (attached), and whiteboard and markers (for brainstorming sessions) * Students will be required to bring in their OWN earphones for use during this session in order to hear the audio. |

**4. The Overview (Agenda) for your lesson:**

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| * Explore and research assigned topics in groups in the computer lab/library (Handout) * Discuss, summarize and brainstorm in groups to create a **“TABLEAUX”** of your ideas. (Handout) * Share your tableau with the class. (Deadline will be assigned) * A class tableaux connecting all the ideas will be completed. |

**5. Resources and Materials for your class**

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| * The Perimeter Institute for Theoretical Physics: THE POWER OF IDEAS Website (<http://perimeterinstitute.ca/power_of_ideas/index.html>) * Assigned group list * Note-taking sheets * Whiteboards and markers * Handout: Instructions on “What is a tableau?” and Rubric for evaluation * Video Camera to tape tableau presentations |

**6. Content, Teaching Strategies, for Lesson**

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| ***Time*** | ***Teaching or***  ***Assessment Strategy*** | ***Detailed Description*** |
| *5 min* | *Introduction* | * Provide students with the handout explaining the assignment. Go over the details of “What is a Tableau?” and the assessment rubric. |
| *40 min* | *Research (Individual)* | * Students are to log into their computers individually and explore the website. (<http://perimeterinstitute.ca/power_of_ideas/index.html>) * Students are to take notes carefully recording all their information. They are to also find two other sources to support their research. |
| *25 min* | *Presentation Preparation (Group work)* | * Students are to meet with their groups to discuss their research and brainstorm ideas for their tableaux scenes. * Students are to plan, prepare and practice their tableaux scenes. |
| *5 min* | *Closing Clean Up and Reminders* | * Students are to clean up their work areas and return any equipment borrowed. * Students are reminded of the criteria for this assignment and the deadline. |

**7. Reflections: To be completed after you have taught the lesson.**

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| **What was effective about your lesson or you as a teacher?** | **How do you know?** | **What steps will you take to improve?** |
| Students were interested in the topics they were to investigate and learned the necessary ideas. | Rough notes were accurate and group discussions were effective. The tableaux presented were creative and effective. | Provide additional information for students to increase student understanding of concepts assigned. |
| The activities completed in this lesson permitted students to organize ideas in a creative manner to demonstrate their understanding of key concepts. It also permitted students to see the connections between key physics concepts discussed during the 12U physics course. | When groups presented their tableaux, students in the audience were asked to take notes on what they observed. Their notes were collected so that I can get confirmation that key concepts were addressed in the tableaux in a fashion that other students were permitted to learn from. | The tableaux should have been presented in more of an orderly fashion. I didn’t have groups present in a chronological order. This can be improved next time. |

**b) Effectiveness as a Teacher:**

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| **What was ineffective about you as a teacher or your lesson?** | **How do you know?** | **What steps will you take to improve?** |
| Should have provided more guidance for the formation of “tableau”. | The tableau formations did not always span the whole space. Some students were not as animated in their positions. | Complete a class warm-up activity to get students comfortable with this activity. |
| Should have restricted what the students were permitted to say when they were “tapped”. Some groups read their statements. | Recorded tableaux | Restrict statements to one sentence only. Inform them that they are to memorize their statements. |

**NOTES:**

* An information sheet on “Tableaux” has been included for teacher reference. This handout was borrowed from our Drama Teacher at USS and Art/Music Department Head - Jeff Grujicich.
* The presentations will occur later on the assigned due date. Students must be prepared to present their tableau.
* On presentation day:

1. Teacher must come prepared with music that will be used to cue the tableau set up time.
2. Video was set up in the classroom.
3. Teacher must go over the rules of the presentations.
4. Teacher must have the rubric for assessment for each group so that assessment can be completed as the presentation occurs. Students will be required to submit their individual research notes.
5. HAVE FUN!

**SPH 4U1 – Grade 12 University Physics L. Lim-Cole**

**THE POWER OF IDEAS Student Handout**

**Exploring what we have learned and what is still to come…**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**TASK:**

To explore the six most power ideas in physics history and discover how these ideas have transformed our society today.

To consolidate what we have learned so far and to explore some ideas that are still to come.

**PROCEDURE:**

1. Go to the website: <http://perimeterinstitute.ca/power_of_ideas/index.html>
2. Use earphones for the website exploration to listen to the audio explanation.
3. You will be assigned to a group. Each group will be assigned a grouping of topics to research.
4. Use the note-taking sheets provided in the library to record all your researched information. You are to find and use two other resources to investigate your topic in greater detail.
5. You will meet with the group of students who were all assigned the same topic. With your group, you will discuss your topics and develop a plan to create a “tableaux” to demonstrate/present the information you have collected.
6. Use the guidelines below in your groups planning.
7. All groups must be ready to present on the due date.

**GUIDELINES:**

**WHAT IS A TABLEAU?**

A Tableau is a dramatic performance where the actors freeze into position to demonstrate their story and/or ideas.

**RULES:**

1. The actors are not permitted to talk during their performance.
2. Props will be permitted however you will only be permitted to have one prop per actor per scene. The props may be interchangeable between actor members between scenes.
3. You will be permitted 5 seconds to get into your position and you must keep the frozen position for 3 minutes.
4. The audience will close their eyes during the 5 second period to allow you to move into position. Music will be played during this 5 second period by the teacher.
5. A student from the audience will be permitted to touch actors, which permits the actor to state one statement about their role in the scene. The actor must talk in character.
6. Each group is to construct a minimum of 4 tableaux scenes up to a maximum of 6 tableaux scenes. (The minimum is 4 scenes since 2 ideas turned into 1 and you will need to also address how this idea has transformed society today)

**ASSESSEMENT RUBRIC:**

**Day 1: Research Notes/Group Discussion**

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| **Criteria** | **Level 1** | **Level 2** | **Level 3** | **Level 4** | **Total** |
| **Use of Resources [C]** | * Uses a limited range of research strategies | * Uses some effective research strategies | * Uses a workable research process | * Uses a systematic research process | /4 |
| **Resource Materials [C]** | * Only researches topics presented on the Perimeter Institute website | * Researches topics from the Perimeter Institute website and one other source. | * Researches topics from the Perimeter Institute website and two other sources. | * Researches topics from the Perimeter Institute website and three other sources. | /4 |
| **Recording Information [C]** | * Copies main ideas from resources | * Summarizes some main ideas from resources in own words | * Summarizes main ideas from resources in own words | * Reorganizes main ideas from resources to suit purpose | /4 |
| **Group Discussions [C]** | * The group is not focused on the task and requires frequent reminders to refocus. * The group inaccurately discusses the ideas assigned to them. * The group has great difficulty working together to brainstorm ideas. | * The group is mostly focused on the task and requires very little reminders to refocus. * The group discusses the ideas assigned to them with minimal errors. * The group has difficulty working together to brainstorm ideas effectively for their tableaux scenes. | The group is focused on the task at all times.  The group discusses the ideas presented effectively and most of the group members participate in the discussions.  The group has effective brainstorming techniques and most group members are actively participating. | * The group is focused on the task at all times. * The group discusses the ideas presented and works cohesively to formulate create tableaux scenes. * All group members are working together to effectively brainstorm ideas. | /12 |

**TOTAL MARKS: /24 Marks**

**Day 2: Tableau Presentation**

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| **Criteria** | **Level 1** | **Level 2** | **Level 3** | **Level 4** | **Total** |
| **Understanding of basic concepts (as reflected in the products and presentation) [K/U]** | Reflects limited understanding of the required concepts, principles, laws, and theories | Reflects partial understanding of the required concepts, principles, laws, and theories | Reflects a complete or nearly complete understanding of the required concepts, principles, laws and theories | Reflects an insightful understanding of the required concepts, principles, laws, and theories | /8 |
| **Presentation of Scenes [A]** | Reflects an incomplete interpretation of information | Reflects a partial interpretation of information | Reflects a complete interpretation of information | Reflects a complete interpretation of information with exceptional use of space and props. | /8 |
| **Presentation of Scenes [C]** | The group only presented less than 4 tableau scenes | The group prepared 4 to 6 tableau scenes but did not use the space and props effectively. | The group prepared 4 to 6 tableau scenes and used the space and props effectively. | The group prepared 4 to 6 tableau scenes with exceptional clarity. The use of props and space was outstanding. | /8 |
| **Impact of Product [A]** | Product achieves limited results. | Product partially achieves the intended results | Product achieves the intended results. | Product exceeds the intended results. | /8 |

**TOTAL MARKS: /32 Marks**

**COMMENTS:**

**/56 Marks**