EDU 755: CTE Lesson Plan Template (Module 5)
For CTE lessons including the use of literacy strategies

Lesson topic: Welcome to Ohm's Law
CTE program area: Live Sound Technology
Instructor's name: Edward Goguen

Purpose/objective of the lesson:

1. Students will utilize their understanding of the major elements/components of electricity by working with Ohm's Law.
2. Students will create an Ohm's Law problem for others to solve.

Content/program/literacy standards addressed in the lesson:

Program Standards and Outcomes:

Live Sound Technology Programmatic Outcomes
LST – 4. Apply theoretical and operational knowledge of industry standard professional audio technology.
LST – 12. Demonstrate knowledge of electricity fundamentals, grounding, and power distribution.
LST – 14. Utilize knowledge of event safety, including the recognition of electrical, rigging, and equipment transportation hazards.
LST – 16. Demonstrate skill in professional communication with musicians and other audio professionals.

From Common Career Technical Core:

A/V Technology & Film Career Pathway
AR–AV – 1. Describe the history, terminology, occupations and value of audio technology.
AR–AV – 3. Demonstrate technical support skills for audio productions.

From Common Core State Standards:

College and Career Readiness Anchor Standards for Reading
#4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
#7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
#10. Read and comprehend complex literary and informational texts independently and proficiently.

College and Career Readiness Anchor Standards for Writing
#2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
#4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
#6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

#8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
#9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

College and Career Readiness Anchor Standards for Speaking and Listening
#1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
#2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

College and Career Readiness Anchor Standards for Language
#1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
#2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
#4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.
#6. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Brief description of the lesson:

It is imperative that audio students have a thorough understanding of Ohm's Law. It's not enough to understand just the theory but to actually be able to use it in practice starting with Ohm's law problems in this lesson. In later courses students will be building small power supplies, building circuits, and even integrating PA system design with Ohm's Law to determine the proper speaker load to present to an amplifier. It all starts with this lesson.

1. The lesson begins with a review of six key vocabulary terms (pressure, voltage, current, amps, power, and watts) that are crucial to understanding Ohm's Law. The teacher will lead the class in a focused review of those six terms using the vocab graphic organizer (link below).
(https://drive.google.com/file/d/0B6H614cEDmLTN0FvU2NmNXFOaEk/view?usp=sharing)

2. Now students will be split into groups of 3-4 and each student will read a section or page of the following article working together to read the entire piece:
(https://drive.google.com/file/d/0B6H614cEDmLTWEpXeW1yWVdVejA/view?usp=sharing)

Students should review the cue question sheet (link below) before reading the article so they can preview what the main ideas, topics, and questions are from the reading.
(https://drive.google.com/file/d/0B6H614cEDmLTSC1YRlJsTWlxQlE/view?usp=sharing)

As students work in small groups, both through the article and through the cue questions, the teacher should monitor progress, answer questions, elaborate on specific items if necessary, and check for understanding by asking additional questions.

3. Students should remain in their small groups while the teacher leads the class in a Think-Aloud over a set of 7 Ohm's Law problems. The set should include 3 simple examples: 1 for finding "V" (voltage), 1 for finding "I" (current), and 1 for finding "R" (resistance), followed by 4 more complex problems: 1 with voltages in series, 1 with resisters in series, 1 with voltages in parallel, and 1 with resisters in parallel. A set of 7 possible Ohm's Law Think-Aloud problems are below: (https://drive.google.com/file/d/0B6H614cEDmLTVEFsRTdVdWtwMHM/view?usp=sharing)

4. Still in their small groups, the students now have the information they need to tackle the Ohm's Law problems (link below). The teacher should monitor progress, offer help when needed, answer any questions, keep students (and groups) on track, and be available to rotate around the room throughout this exercise. This is imperative to make sure all students and groups make appropriate progress through the worksheet. (https://drive.google.com/file/d/0B6H614cEDmLTTVZWZm1KdGJrdjA/view?usp=sharing)

This activity should take up the remaining time of the class period. Students with problems leftover need to finish them for homework before next week's class and quiz, as there will be an Ohm's Law problem on that quiz.

5. Additionally for homework, the students need to complete the following (link below) "short" write assignment. It is a reflection paper over this 2-week unit that also needs to include an Ohm's Law problem created by the student. The student-submitted problems will be compiled together in a fun in-class activity, if time allows, at the end of the semester. (https://drive.google.com/file/d/0B6H614cEDmLTNXNBY2lvbjFOY2c/view?usp=sharing)

Key vocabulary terms:

Ohm's Law
Pressure
Current
Resistance
Impedance
Power
Voltage (Volts)
Amperage (Amps)
Ohms (Ω)
Wattage (Watts)
Circuit
Series
Parallel
Resister

Anticipated length of the lesson:

2 hours of class time (1st class period)
3 hours of homework (completed between classes)
20 minute in-class quiz (2nd class period)

To deepen understanding of content and support literacy development, the lesson will include (circle all that apply):

- **Reading**
- **Writing**
- **Speaking/Presenting**
- **Research**
- **Vocabulary**
- **Critical Thinking**

Specific literacy strategies that students will use during the lesson and reason for using each (attach or link to required templates):

Vocab Graphic Organizer:
(https://drive.google.com/file/d/0B6H614cEDmLTN0FvU2NmNXFOaEk/view?usp=sharing)

This graphic organizer focuses the beginning of this lesson on six key vocab terms that are essential to understanding and working with Ohm's Law. It is also organized in such a way that the student can see the relationship between the electrical term and its unit of measure. It also demonstrates a future mathematical formula called Joule's Law for calculating the Power in a circuit. Those three things exist in a single graphic organizer making it extremely useful for students.

Cue Question Sheet:
(https://drive.google.com/file/d/0B6H614cEDmLTSC1YRlJsTWlxQlE/view?usp=sharing)

This cue sheet focuses the students on what the teacher has outlined as important from the article. It provides clarity to the student of what the important topics are from the reading and gives them a focus for learning. Each student in his or her small group will work together on this sheet.

Think-Aloud:
https://drive.google.com/file/d/0B6H614cEDmLTVEFsRTdVdWtwMHM/view?usp=sharing)

Our students have a serious aversion to Math. The Think-Aloud is designed to scaffold the students with a teacher-led activity into some group collaboration ending with independent student practice. The Think-Aloud prepares the students for the more rigorous independent work.

"Short" Write Assignment:
(https://drive.google.com/file/d/0B6H614cEDmLTNXNBY2lvbjFOY2c/view?usp=sharing)

This is the cumulative assessment for the unit (besides the short quiz). It assesses comprehension, understanding, evaluation and integration of knowledge, and learning. The student has the opportunity to digest the wealth of information contained in the unit and write solely about how the unit impacted them. It also allows the student to provide some well needed feedback to the teacher on the value and success of the unit itself.

Texts, materials, or other instructional resources needed for the lesson and Quicklinks to items on Google Docs:

– The Live Sound Manual: Getting Great Sound at Every Gig

– Article - *A Little About Electricity*:
(https://drive.google.com/file/d/0B6H614cEDmLTWEpXeW1yWVdVejA/view?usp=sharing)
– Calculator
– Laptop, tablet, smartphone
– Internet access
– Vocab Graphic Organizer:
(https://drive.google.com/file/d/0B6H614cEDmLTN0FvU2NmNXFOaEk/view?usp=sharing)
– Cue Question Sheet:
(https://drive.google.com/file/d/0B6H614cEDmLTSC1YRlJsTWlxQlE/view?usp=sharing)
– Think-Aloud:
(https://drive.google.com/file/d/0B6H614cEDmLTVEFsRTdVdWtwMHM/view?usp=sharing)
– Small-Group Ohm's Law Problems:
(https://drive.google.com/file/d/0B6H614cEDmLTTVZWZm1KdGJrdjA/view?usp=sharing)
– "Short" Write:
(https://drive.google.com/file/d/0B6H614cEDmLTNXNBY2lvbjFOY2c/view?usp=sharing)

Formative or summative assessment (describe and attach or link to rubric):

Ohm's Law Lesson Plan Rubric:
(https://drive.google.com/file/d/0B6H614cEDmLTdHB3M0pXSlY4Tlk/view?usp=sharing)