STEMED 411 - Curriculum and Methods
Unit #2 Assignment
Part 2 Curriculum Design

The Process/Assignment

*Use the Standards for Technological Literacy to document the driving standards for the unit you have developed and how the benchmarks will be addressed using **one** of the following methods:*

1. *Detailed list of the standards and their descriptions*

Develop an assessment rubric that will accurately measure the student performance and achievement of the standards and benchmarks. Using the information presented in the reading assignment, review your lesson and identify areas of improvement regarding gender equity issues. Areas should be identified that could cause a potential for gender problems and how you addressed them in the construction of your lesson.

Fold the above items into the TLC format template where appropriate.

STANDARDS FOR TECHNOLOGICAL LITERARCY

Standard 1: Students will develop an understanding of the characteristics and scope of technology

- J: The nature and development of technological knowledge and processes are functions of the setting.
- L: Inventions and innovations are the results of specific, goal-directed research.
- M: Most development of technologies these days is driven by the profit motive and the market.

Since our project is dedicated to creating an operating cost business analysis system (where we can see the revenue, profits, loss, and overhead of a company), then the students will be able to implement these Standards by understanding the "market", and what those terms mean. Once students begin to input their data for their company, they will realize how profit-driven the current market tends to be.

Standard 2: Students will develop an understanding of the core concepts of technology.

- W: Systems thinking applies logic and creativity with appropriate compromises in complex real-life problems.
- DD: Quality control is a planned process to ensure that a product, service, or system meets established criteria.
- EE: Management is the process of planning, organizing, and controlling work.

This entire project will be focused around the concept of "real world analysis", which will require the students to understand the underlying technologies that we use to solve these real-life problems. Quality control will be implemented by ensuring that the data input by the students is correct, ensuring that their end result is correct (thus the quality control). Finally, planning and organizing is going to be key for this assignment, as students will be "controlling the work" and finding any short-comings where overhead is concerned.

Standard 10: Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

- Research and development is a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.

Again, our project will focus on students using "real" data to simulate the owner of a company, inputting data and reading the output. Students will be asked, during the post-assessment, on what types of systems outside of the current system (Microsoft Excel) that could be used to improve efficiency. Students will also be asked to

research improvements in the field of their company and to apply that information to their post-assessment. (For example, if Student A has a trucking company, the student will be asked to research new developments that improve workflow and decrease cost in the trucking industry.)

Valley City State University
Teaching for Learning (TLC) Template
Revised August 10, 2013
ITEMS IN YELLOW NEED TO BE COMPLETED IN STEMED 411. ITEMS IN GREEN ARE FYI AND WILL BE COMPLETED WHEN STUDENT TEACHING

General Information

UNIT AUTHOR	
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UNIT OVERVIEW	
Unit Title	Using Microsoft Office in an Enterprise Environment
Content Area	Microsoft Excel, PowerPoint, and Word
Grade Level	Secondary (9-12)

TLC Requirements

PLAN—Planning Instruction and Assessment

Purpose: Describe your plans for the learning segment and explain how they are appropriate for the students and content you are teaching. Demonstrate your ability to select, adapt, design, and organize curriculum, instruction, and assessment to help diverse students learn and meet the standards the for curriculum content as well as develop academic language related to that content. (InTASC #7 Planning for Instruction)

A. Unit Foundation

1. Unit Summary (connects with Rubric 1 in Planning)

Students often work within the confines of a given set of instructions when operating the Microsoft Office suite, but never truly are able to understand the ramifications of their work outside of the classroom. With this assignment, I plan on having students step outside of the classroom, when it comes to their thinking, and actually build and plan a monthly overhead for a fictional company. The fictional company will be assigned to each student (created by me) and the data will be put in for their overhead (including how much each employee makes, how much revenue the company pulls in during a day, and how much loss the company takes on).

My hopes with this lesson plan is that students will apply what they are learning in the classroom and understand the applications in the real world environment. We always hear students say that they "don't know how they will use this in their life". This assignment will hopefully show students how to apply these things to their every day life.

Depending on how the content is emphasized, a variety of standards may be addressed. There are not a specific number of standards and benchmarks required to be included in each unit lesson. However, too few may raise questions regarding necessity and quality of the lesson, A reasonable amount to work toward would be 5 standards and 1-3 benchmarks per standard. Make sure to state the standard and its definition and then the benchmark and its definition that is appropriate to the grade level you are instructing.

2. Standards to be met (List and write out. Identify source: National standards, state standards, core standards, etc.) (connects with Rubric 1 in Planning)

STANDARDS FOR TECHNOLOGICAL LITERARCY

Standard 1: Students will develop an understanding of the characteristics and scope of technology

- J: The nature and development of technological knowledge and processes are functions of the setting.
- L: Inventions and innovations are the results of specific, goal-directed research.
- M: Most development of technologies these days is driven by the profit motive and the market.

Standard 2: Students will develop an understanding of the core concepts of technology.

- W: Systems thinking applies logic and creativity with appropriate compromises in complex real-life problems.
- DD: Quality control is a planned process to ensure that a product, service, or system meets established criteria.

- EE: Management is the process of planning, organizing, and controlling work.

Standard 10: Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

- Research and development is a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.

3. Objectives/Learning outcomes (based on above standards) (connects with Rubric 1 in Planning)

The students will:

- Learn the beginning concepts of business (including how to utilize technology inputs to make the process of operating a business easier)
- Learn the concepts of profit margins versus loss on a micro-level
- Develop the skills to accurately input data into a spreadsheet
- Search for software that already exists that could make the job of data input and profit

4. Academic Language to be emphasized (List and define in student-friendly terms) (connects with Rubric 4 in Planning)

Overhead - an overhead cost or expense.
Profit - a financial gain, especially the difference between the amount earned and the amount spent in buying, operating, or producing something.
Losses - an amount of money lost by a business or organization.
Employee(s) - a person employed for wages or salary, especially at nonexecutive level.
Revenue - income, especially when of a company or organization and of a substantial nature.

5. Unit questions

a. Essential "overarching" or "big idea" questions (connects with Rubric 1 in Planning)

- "What does it mean to operate a business profitably, and how much goes into ensuring that the company is running at a profit?"

b. Questions for students (developed using Bloom's taxonomy, Kaplan's icons for depth and complexity, English Learner Oral Language Questioning Techniques, etc.) for all levels of thinking (connects with Rubric 4 in Planning)

- "What is profit?"
- "How do ensure that we're reaching the maximum profit for our company?"
- "What types of software exist that could make this data entry easier?"
- "Is the data entered correct?"

B. Context for learning (all of section B connects with Rubric 2 in Planning)

1. Complete the context for learning form (Appendix A)
2. Describe what you know about your students.

a. Describe what students know, what they can do, what they are learning to do (e.g., prior knowledge, key skills, developmental levels).

Give this your best estimate of your future classroom. This will need to be adjusted when you are student teaching. This section could include a description of any previous knowledge not included in this unit that is necessary to complete what is required. This would most likely be something covered in a previous course or lesson that has given a base of knowledge necessary for completing the required activity or assignment.

b. Describe your students' language development, including abilities to understand and produce oral and written language in English.

Complete during Student Teaching (ST

c. Describe students' social and emotional development (e.g., relationships with each other; abilities in self expression, collaboration, etc.).

Complete during Student Teaching (ST)

d. Describe family/community/cultural assets (e.g., cultural norms, student interests, relevant experiences and resources).

Complete during Student Teaching (ST)

e. Describe subgroups and individual requiring differentiated instruction (SPED, Title 1, ELL, Gifted and Talented, etc.).

Complete during Student Teaching (ST)

3. Describe how this knowledge influenced your planning.

a. Describe how this knowledge influenced your choice of strategies to engage all students.

b. Describe how this knowledge influenced your choice of strategies for scaffolding academic language. (Rubric 4 in Planning)

c. Describe how this knowledge influenced your choice of activities for differentiating instruction.

C. Instructional Technology and Materials to be used in Unit (Section C connects with Rubric 1 in Planning)

a. Technology to be used by the teacher (hardware, software, websites, etc.)

- Teacher assigned MacBook
- Microsoft Office (including Word [for outlining and planning] and PowerPoint [for presentations])
- Microsoft Excel as a demonstration for the students
- Video detailing software that exists for Excel data entry (https://www.youtube.com/watch?v=-1N0L-FDWCs)
- Video that shows the concept of running a business (something such as an episode of The Profit or Shark Tank)

b. Technology to be used by the students (hardware, software, websites, etc.)

- School assigned MacBook and/or PC in a computer lab (the school system I work for utilizes both)
- Microsoft Excel (as the primary material for the students to complete the assignment)
- Microsoft Office (including Word [to read any information provided by the teacher] and PowerPoint [to view the presentation to begin the class]
- Possible: Learning Management System to submit assignment (In my school system we use Canvas, but there are others such as Google Sites or Blackboard

c. Materials and supplies

- Students will be provided with a detailed company fact sheet, providing information about their fictional company (the idea is to provide two students the same information, so that there is an easy way to discern/compare what is missing from the company information in Excel)
- Teacher provided company information will include:
  Company Name
  Company Type
  Number of Employees
  Employee Salaries
  Revenue during the months of Jan-Mar
  Revenue during the months of Apr-June
  Losses

d. Other resources

- X

D. Assessment Tools and Criteria (all of Section D connects with Rubric 3 in Planning)

1. Explain your thought process for planning a post-assessment, a pre-assessment, and at least one formative assessment within the learning segment.

PRE-ASSESSMENT

- Students will be asked to create an Excel sheet with their weekly expenditures, and then use the SUM function to total those items up, then create another column that takes in what the students are given as an allowance and/or earn from their job.

FORMATIVE ASSESSMENT

- The formative assessment that I will use will start by having students turn in a short 2-3 sentence paper after the beginning lecture having the students repeat, in their own words, what the assignment is. This will ensure the students understand the assignment in their own way, and that the project isn't going over their head.

POST-ASSESSMENT

- The post-assessment will include two parts:
- First, students will check with the other classmate that has the same company as they do to see if their data matches
- Second, the Excel database will be submitted and checked for accuracy
- This way, students will be given the opportunity to interact with their peers AND have their assignment graded by the teacher.

2. Provide samples of the assessments you will use.

a. Sample pre-assessments

b. Sample formative assessments

c. Sample post assessments

3. Describe how you will use formal and informal assessments in order to monitor growth and provide feedback for students toward meeting the objectives.

4. Describe any modifications or accommodations you have planned in the assessment tools to allow students with specific needs to demonstrate their learning.

E. Classroom Management Considerations (supports Rubric 6 in Implementation Section)

1. Detail the management strategies and procedures that will support the implementation of this unit.

- The students will be initially given a PowerPoint presentation detailing what the assignment is, and what the final product will look like
- After the lecture, students will be given a formative assessment to sum up the PowerPoint into their own words, using a quick 2-3 sentence summary in their own words, to ensure they understand the assignment.
- During the assignment, there will be periodic check-ins with each student.
- Students will then be broken into groups to share their work and peer review before presenting their final assignment.

F. Lesson Plans (connects in various ways with Rubrics 1-4 in Planning)

1. Provide lesson plans for 3-5 days of your unit.

Day 1

- Pre-Assessment Assignment (30minutes)
- Students will be given a PowerPoint lecture detailing the assignment (30minutes)
- Students will be asked to complete a formative assessment summing up the PowerPoint lecture (and the assignment) in their own words to ensure they understand the concept of the task. (15-20minutes)
- Materials will be given to students with their fake company information (5minutes)

Day 2

- Students will be shown the video on inventory management (and some of the types of data input available in Excel (~30minutes)
- Students will start the process of laying out/designing their data input system (it can be as basic as numbers in a column, or something that the students have researched on the internet) (~30minutes)
- Students will be shown the video on how businesses seemingly operate (either The Profit or Shark Tank video) (30minutes)

Day 3

- Students will continue working on their data input, with questions being answered by the teacher, including check-ins with the teacher to ensure that progress is being made (1hr)
- Students will pair off with the student who has the like company as themselves and compare their data (~30minutes)

Day 4

- Students will submit the assignment for grading

2. Explain how key learning tasks are sequenced in the learning segment to build connections from prior knowledge to new knowledge. Include how you will help students make connections between and among prior and new content knowledge and reasoning strategies to deepen student learning.

- The scaffolding takes place by transitioning from the pre-assessment -> formative assessment (to ensure that the students understand the assignment on a basic level) -> beginning the assignment
- After the assignment is in full swing, the students will be given breaks to show clips of how a) other companies operate their data input/profit management and b) how companies work in general, but with an entertaining spin (Shark Tank is great for this). This will build on the students perceptions of what data input and business management is.
- Finally, students will pair off with other students to find out how their peer went about their work, which would help give perspective on what Student A could do to improve their assignment (by viewing Student B's work, and vice versa).

G. Overall Reflective Commentary on Planning (connects in various ways with Rubrics 1-4 in Planning Section)

1. Communicate what you learned about planning and the role of planning in teacher effectiveness.

From this point on, the TPA will be completed during Student Teaching

Second Teacher Candidate Sample

TECH ED 411
Unit #2 Assignments: Instructional delivery and learning; Curriculum design

For this assignment, I have chosen to work with an existing Project Lead the Way (PLTW) unit from their course Principles of Engineering. Specifically, I am utilizing the unit lesson 1.2: Energy Sources. The unit is laid out in full on their website, both in teacher and student formats. I have added PDF copies of the teacher resources, teacher notes, lesson framework, content standards, and a presentation rubric to my submission for this assignment. The unit is to be completed in a 9-day time frame, modified to 11 days with my alterations. The unit breakdown, minus activity 1.2.6 but with my added lesson, with corresponding assignment types, is listed below. Each activity contains formative assessment questions related to the activity's content.

- Lesson 1.2: Energy Sources
    - Activity 1.2.1: Energy Sources
        - Team presentation on energy sources: nonrenewable, renewable, and inexhaustible.
    - Activity 1.2.2: Energy Distribution
        - Class field trip to a local utility, or guest speaker in the classroom.
    - Activity 1.2.3: Electrical Circuits – Physical or Simulation
        - Physical or virtual circuit construction with voltage, current, and resistance measurements.
        - Practice calculations with real-world scenarios.
    - Activity 1.2.4: Circuit Calculations
        - Application of Ohm's law to derive circuit parameters.
    - Activity 1.2.5: Mechanical System Efficiency – Vex or Simulation
        - Physical or virtual mechanical system efficiency activity. Students acquire or are given data from a winch system to calculate system efficiency.
    - Flashlight deconstruction
        - Disassemble, analyze, and document a flashlight.
        - Design elements and their relation to efficiency are discussed.

The unit lesson is set up quite nicely. There are a variety of activities and methods through which students can utilize their strengths to learn and contribute, such as teamwork and presenting, physical construction of systems, and mathematical calculations. The formative questions for each activity help underscore the important points of each lesson. PLTW has also implemented advice for remote instruction for each lesson in their courses, such as watching virtual tours in lieu of taking a class fieldtrip to a local utility.

It is reasonably likely that I will be teaching courses from a PLTW curriculum. I am currently observing four PLTW classes as part of a fieldwork requirement for EDUC 250. I chose to modify this lesson as a result. I think overall the lesson fits nicely within the template requirements that VCSU uses for its Teaching for Learning Capstone. Working through the lesson and seeing how it aligns with this template has been helpful in analyzing a fully developed unit lesson.

The modifications I have chosen to make are to utilize ideas from other courses I've taken at VCSU. First, I will bring additional focus to vocabulary in the PLTW lessons using ideas from the Marzano method for teaching academic vocabulary. I will also have students utilize an engineering notebook to create a concept map for the unit lesson. The map will be updated twice, mid-way and at the end of the lesson, and shared with a partner, to facilitate discussion about what has been learned and to practice new vocabulary. I also hope this can allow me to better connect existing student knowledge to the lessons. Finally, I will have the lesson's last activity change from the PLTW Activity 1.2.6 to a design analysis where students will take apart a flashlight and analyze its design elements. The unit lesson focuses on themes of energy conservation and efficiency. Flashlights employ methods to increase usefulness such as a reflective surface to increase light intensity. This ties into the unit topic and the project will also allow students to practice disassembling and assembling technology. The activity fits well with regard to the predefined Standards for Technological Literacy for this unit.

Finally, some steps towards gender equity that can be taken are first, to ensure randomized selection of students when asking for input during class. I would like to utilize a method such as drawing names from a cup to make sure any implicit bias of my own does not factor into who I call on. If a student is drawn too frequently during a single class period, I will draw another name. I will also be sure to encourage input regarding connections to students' home lives to the lesson, especially from female students. I would also like to make sure that any guest speakers or the individuals on field trips with whom we interact have an equal female to male representation. I want students to be able to see themselves in the roles that are represented by these individuals. Finally, throughout the year, I will work to ensure that students take on different roles in team efforts. This way, everyone has a chance to be a team leader, time-keeper, note taker, or however the roles may be divided.

Valley City State University
Teaching for Learning (TLC) Template
Revised August 10, 2013
ITEMS IN YELLOW NEED TO BE COMPLETED IN STEMED 411. ITEMS IN GREEN ARE FYI AND WILL BE COMPLETED WHEN STUDENT TEACHING

General Information

UNIT AUTHOR	
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UNIT OVERVIEW	
Unit Title	Lesson 1.2: Energy Sources – taken from Project Lead the Way course: Principles of Engineering
Content Area	Engineering education – energy
Grade Level	10-12

TLC Requirements

PLAN—Planning Instruction and Assessment

Purpose: Describe your plans for the learning segment and explain how they are appropriate for the students and content you are teaching. Demonstrate your ability to select, adapt, design, and organize curriculum, instruction, and assessment to help diverse students learn and meet the standards the for curriculum content as well as develop academic language related to that content. (InTASC #7 Planning for Instruction)

A. Unit Foundation

1. Unit Summary (connects with Rubric 1 in Planning)

"Technological systems are not possible without energy, work, and power. In the past, power that was created was often used immediately. These systems did not consist of many steps or processes between the energy source and its end use. Most power used today is stored or made available to the end user when needed. When energy and power changes form, some of it is lost along the way to elements like friction and heat. Engineers are being challenged to find creative ways to generate energy and to make systems more efficient.

In this lesson students will learn that as energy and power are converted, losses occur in the system. Students will understand that such losses affect the overall efficiency of the system." PLTW PoE Lesson 1.2 Teacher Resource Preface

2. Standards to be met (List and write out. Identify source: National standards, state standards, core standards, etc.) (connects with Rubric 1 in Planning)

See document "PoE Lesson 1.2 Standards." Standard sources: Next Generation Science Standards and Standards for Technological Literacy

3. Objectives/Learning outcomes (based on above standards) (connects with Rubric 1 in Planning)

The students will:
"Select a solution path from many options to successfully address a problem or opportunity."
"Interpret and analyze data for a single count or measurement variable."
"Measure forces and distances and calculate mechanical advantage, work, power, and efficiency in mechanical systems."
"Analyze parallel and series circuits resistance, current, and voltage using Ohm's law."
"Identify appropriate applications of fuel and solar cells based on characteristics and function."
"Identify engineering disciplines and engineering expertise that are critical to the solution of a specific problem."
"Assess an engineering ethical dilemma."
"Communicate effectively with an audience based on audience characteristics."

PLTW PoE Lesson 1.2 Course Curriculum Framework

4. Academic Language to be emphasized (List and define in student-friendly terms) (connects with Rubric 4 in Planning)

Nonrenewable energy – a resource that cannot be replaced once used
Renewable energy – A resource that can be replaced when needed
Inexhaustible energy – An energy source that will never run out
Energy – The capacity for doing work – the production of physical change within a system
Efficiency – The ratio of useful energy output to the total energy input, i.e. the percentage of work input that is converted to work output
Electricity – The flow of electrical power or charge
Electrical energy – Energy caused by the movement of charged particles
Thermal energy – The use of heat from within the Earth of from the atmosphere near oceans
Current – The net transfer of electric charge (electron movement along a path) per unit of time.
Voltage – The potential difference measured in volts. The amount of work to be done to move a charge from one point to another along an electric circuit
Resistance – The opposition that a device or material offers to the flow of direct current
Series circuit – A circuit in which all parts are connected end to end to provide a single path of current.
Parallel circuit – A close electrical circuit in which the current is divided into two or more paths and then returns via a common path to complete the circuit.
Ohms Law - States that the direct current flowing in an electric circuit is directly proportional to the voltage applied to the circuit.
Energy conversion – Changing one form of energy to another
Friction – The resistance that one surface or object encounters when moving over another
Electromagnetic induction – The production of electricity conductors with the use of magnets
Power – The rate at which work is performed or energy is expended

Terms and definitions take from PLTW PoE Lesson 1.2

5. Unit questions

a. Essential "overarching" or "big idea" questions (connects with Rubric 1 in Planning)

These basically replace objective statements. The daily units found in Section "F" of the TPA are driven by these "questions".

What is the engineering design process and how does it affect the design of technology?
How do we construct a system from which to obtain data to make engineering decisions?
What are the main ideas of Ohm's law?
What are some of the subdisciplines of engineering?
What is an example of an ethical concern that an engineer could face?
How do we effectively communicate technical information?

b. Questions for students (developed using Bloom's taxonomy, Kaplan's icons for depth and complexity, English Learner Oral Language Questioning Techniques, etc.) for all levels of thinking (connects with Rubric 4 in Planning)

1.2 - 1 Choose a specific energy production source. Explain why it is considered "clean." In what ways may it not be so "clean?"
1.2 - 2 How might innovation of current technology involved with energy production provide energy more efficiently?
1.2 - 3 What alternative energy source would be best implemented in your community? Explain why.
1.2 - 4 Choose a specific energy production source. What is one possible way that "lost" energy might be collected in your home or school and transformed for a usable purpose?
1.2 - 5 What are the advantages and disadvantages of wiring a house with either series or parallel circuits?

B. Context for learning (all of section B connects with Rubric 2 in Planning)

1. Complete the context for learning form (Appendix A)
2. Describe what you know about your students.

a. Describe what students know, what they can do, what they are learning to do (e.g., prior knowledge, key skills, developmental levels).

Give this your best estimate of your future classroom. This will need to be adjusted when you are student teaching. This section could include a description of any previous knowledge not included in this unit that is necessary to complete what is required. This would most likely be something covered in a previous course or lesson that has given a base of knowledge necessary for completing the required activity or assignment.

b. Describe your students' language development, including abilities to understand and produce oral and written language in English.

Complete during Student Teaching (ST)

c. Describe students' social and emotional development (e.g., relationships with each other; abilities in self expression, collaboration, etc.).

Complete during Student Teaching (ST)

d. Describe family/community/cultural assets (e.g., cultural norms, student interests, relevant experiences and resources).

Complete during Student Teaching (ST)

e. Describe subgroups and individual requiring differentiated instruction (SPED, Title 1, ELL, Gifted and Talented, etc.).

Complete during Student Teaching (ST)

3. Describe how this knowledge influenced your planning.

a. Describe how this knowledge influenced your choice of strategies to engage all students.

b. Describe how this knowledge influenced your choice of strategies for scaffolding academic language. (Rubric 4 in Planning)

c. Describe how this knowledge influenced your choice of activities for differentiating instruction.

C. Instructional Technology and Materials to be used in Unit (Section C connects with Rubric 1 in Planning)

a. Technology to be used by the teacher (hardware, software, websites, etc.)

Project Lead the Way main website
Electronics equipment
VEX robotics kit
Circuit construction kit simulation by University of Colorado at Boulder
Calculator

b. Technology to be used by the students (hardware, software, websites, etc.)

Project Lead the Way main website
Electronics equipment
VEX robotics kit
Circuit construction kit simulation by University of Colorado at Boulder
Calculator
PowerPoint or other presentation software or medium
Purdue OWL for APA format or school library resource:
https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/general_format.html

c. Materials and supplies

Multimeter
Power supply
Breadboard
Resistors
LEDs
Pushbutton switch
Leads and/or lead kit
VEX robotics kit
Calculator

d. Other resources

Contact and coordinate a field trip to a local utility if possible. Work with school administration to facilitate.
Bring in someone who works at an electric utility if no fieldtrip is possible. Work with school administration to facilitate.

D. Assessment Tools and Criteria (all of Section D connects with Rubric 3 in Planning)

1. Explain your thought process for planning a post-assessment, a pre-assessment, and at least one formative assessment within the learning segment.

Pre-assessment – students will generate a concept map of ideas connected to electricity generation, storage, usage, and energy efficiency. Students will share this map with a partner and each can update their maps based on what they learn from one another. We will then come back as a class to share what each pair has learned. This provides an interactive way to access prior knowledge and also to facilitate collaboration and teamwork. Partners could be those who will present in the same group later in the unit lesson. The map will be written into their engineering journal.

Formative assessment – PLTW has formative assessment questions for each lesson in the unit lesson. These will help provide written feedback as the unit progresses. PLTW also has calculations that the students will be completing as part of this unit. Any mathematical work will be entered into the engineering journals. Students will also update their concept map half-way through the unit as homework and share their map with a new partner. Throughout the unit, we will often discuss concepts covered as a class.

Post-assessment – Students will update their concept map for a final iteration. They will once again share their map with a different partner and we will discuss as a class the updated maps. Students will write a summary of the unit lesson to be written directly into the engineering journal or typed and subsequently taped in. The unit culminates with a group presentation on the energy source chosen by the groups to present on as well as a final activity that ties all content learned together.

2. Provide samples of the assessments you will use.

a. Sample pre-assessments

b. Sample formative assessments

c. Sample post assessments

3. Describe how you will use formal and informal assessments in order to monitor growth and provide feedback for students toward meeting the objectives.

4. Describe any modifications or accommodations you have planned in the assessment tools to allow students with specific needs to demonstrate their learning.

E. Classroom Management Considerations (supports Rubric 6 in Implementation Section)

1. Detail the management strategies and procedures that will support the implementation of this unit.

The unit packs a lot of information into 11 days. Explicit vocabulary instruction will be implemented each day in a shorthand Marzano method. This will help students stay engaged during readings and content discussion when new vocabulary words are utilized. The activities completed throughout the lesson provide differentiation through content reading; hands-on experimentation; mathematical calculation; collaborative team analysis; and interaction with experts during the field trip. This variety of experiences will help keep students engaged. Adaptation of the plan to student achievement will also be key. Not all activities have to be completed verbatim if the class is struggling with a particular concept.

F. Lesson Plans (connects in various ways with Rubrics 1-4 in Planning)

1. Provide lesson plans for 3-5 days of your unit.

Day 1

Content used and modified from PLTW PoE Lesson 1.2

a. Lesson overview – conduct pre-assessment concept map activity
b. Explain Activity 1.2.1 and its rubric

c. Assign teams for 1.2.1
d. Announce presentation day dates
e. Explain Activity 1.2.2 to prepare students for the fieldtrip

Day 2

a. Guide students through the Introduction to Electricity module

Day 3 - 4

a. Finish Introduction to Electricity module
b. Guide students through the breadboarding or simulation presentations.
c. Have students complete the breadboarding or simulation activities.
d. Discuss the outcomes of the activity as a class.

Day 5

a. Explain activity 1.2.4
b. Have students update their concept map and share their updates with a new partner from their group.
c. Have students complete 1.2.4 as homework

Day 6

a. Evaluate activity 1.2.4
b. Take the field trip to the local utility company and have students complete activity 1.2.2

Day 7

a. Class presentations for Activity 1.2.1

Day 8

a. Guide students through the Work, Energy, and Power presentation

Day 9

a. Explain activity 1.2.5, physical or simulation
b. Students will complete activity 1.2.5
c. Assess activity 1.2.5

Day 10-11

a. Explain flashlight deconstruction activity.
b. Students will work in their presentation teams to complete the activity.
c. Have students write their findings in their engineering notebooks and informally present their results to the class.
d. Have students update their concept map one last time and report out as a class.

2. Explain how key learning tasks are sequenced in the learning segment to build connections from prior knowledge to new knowledge. Include how you will help students make connections between and among prior and new content knowledge and reasoning strategies to deepen student learning.

The first step in this unit lesson is a pre-assessment discussion of students existing knowledge related to energy and efficiency. From there, students work together to research an energy source of their choice to present as a team later in the unit. While students are working on that, class periods are used to learn about electricity and Ohm's law. Students learn about the theory behind electricity and then subsequently build an actual circuit and measure the parameters that they have learned about, thus building on their prior knowledge and reinforcing what they have learned in class. The activities in this unit are hands-on. As students are working, I will be walking around the room and monitoring their progress, stopping to talk with them as they work. Class discussions at the end of class will provide an opportunity for me to disseminate what I found during class monitoring. Students will be writing in their engineering journals throughout the unit lesson, updating a concept map that they created at the start of the lesson. This will help them see how their ideas are growing as we learn together. The field trip will help them understand what the utility looks like that provides electricity to the school and their homes, connecting their home lives to the lesson. The final lesson activity allows students to take apart a flashlight and document what aspects of the flashlight increase its usefulness and connect that idea back to the term "efficiency" which was touched on previously in the unit lesson. Overall, multiple connections to their home lives and also repeated references to concepts learned during the lesson allow students to form connections between existing and new knowledge.

G. Overall Reflective Commentary on Planning (connects in various ways with Rubrics 1-4 in Planning Section)

1. Communicate what you learned about planning and the role of planning in teacher effectiveness.

From this point on, the TPA will be completed during Student Teaching

PLTW Engineering

Activity 1.2.1 Energy Sources Rubric

Topic	3 Points	2 Points	1 Point
Content	Thoroughly and clearly states the main points. Text and/or visuals highlights the main points and is easy to read.	Adequately states the main points. Text and/or visuals highlights most main points, but is a little too wordy and is easy to read.	States few main points and details. Text and/or visuals highlights some main points, but is too wordy and is difficult to read.
Time Length	The presentation is between three and four minutes.	The presentation is between two and three minutes or four to five minutes.	The presentation is either less than two minutes or more than four minutes.
Organization	Is clearly organized into a logical sequence.	Provides adequate evidence and a logical sequence of information.	Has little logical organization.
Delivery	Effectively and creatively delivers the information while staying on the topic and considering the audience. Uses voice variation; interesting and vivid to hear. Preparation and practice is evident.	Adequately delivers the information while staying on the topic and considering the audience. Speaks clearly and confidently. Preparation and practice is not evident.	Demonstrates little or no attempt to stay on the topic. Does not consider the audience. Difficult to understand. Preparation and practice is not evident.
Preparation	Demonstrates detailed preparation and practice for delivery. Interesting and vivid.	Demonstrates satisfactory preparation as well as practice for delivery.	Demonstrates a lack of preparation and practice for delivery.
References	Provides the correct domain name, author, or creator under each image The reference page includes appropriate APA citations.	Provides some incorrect domain names, authors, or creators under images. The reference page includes mostly appropriate APA citations.	Is missing some domain names, authors, or creators under images. The reference page includes many APA citation errors.