

Work Sample – Denise C. Allen

The following document was written for a certification program for technology education teachers. I researched materials and resources, based on given domains and competencies, and created overviews and assignments as you will see in the document. This document represents 10 pages from a 100+ page document covering six domains and 28 competencies.

DOMAIN V ENERGY, POWER, AND TRANSPORTATION

Overview of Module Content

In our society, people and cargo need to move from one location to another. Transportation technology involves vehicles to move the passengers and the freight by various means. Cars, boats, trains and planes are obvious signs of transportation. Escalators, pipelines, and ship locks are also part of the transportation system.

People need to travel for all sorts of reasons: school, work, personal errands, vacations; businesses rely on transportation to move their products from raw materials to finish goods. Transporting a product can affect its economic value. Both types of transportation rely on ways and routes such as highways and pipeline right-of-ways. They also depend on support facilities, for example, gas stations and warehouses.

People use transportation but also provide an important input as deliverers of the transportation service. Transportation workers rely on information to do their jobs safely and accurately. The system also relies on materials, tools and machines appropriate to the work to be done. Energy is also a key component in the transportation industry; gasoline, diesel fuel, and electricity provide power to fuel transportation technology. All of these components are controlled through management and production processes to help people move and businesses grow.

Energy and power run transportation technology, machines in factories, home and business technology, and more. The source of the power releases its energy, making it available to other systems. Common types include gasoline, diesel fuel, and electricity. Alternative sources of power include wind, solar, and alternative fuels. Transportation technology uses a prime mover to supply power. These movers include engines that produce their own energy from fuel and motors that use energy supplied by another source. The design of the vehicles can affect how efficiently the engines and motors can run.

Energy, power and transportation technology keep our society moving while producing negative side effects including pollution and the use of limited energy resources. The challenge of technology is to reduce the negative feedback while improving on the positive effects.

DOMAIN V ENERGY, POWER, AND TRANSPORTATION

Competency 020

The Technology Education teacher demonstrates knowledge of scientific concepts related to energy and power.

The beginning teacher:

- A. Identifies scientific concepts and principles (e.g., conservation of energy, mechanical advantage, Pascal's principle, Bernoulli's principle) related to energy and power.*

ASSIGNMENT:

20a(1). Briefly explain the following scientific principles or concepts. Give an example of classroom demonstration or student project that makes the connection between the principle or concept and technology / technology education. Describe how the demonstration or project shows the principle or concept.

- a. Bernoulli's Principle
- b. Mechanical advantage
- c. The relationship of force, resistance and work
- d. Pascal's Principle
- e. Conservation of energy

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Competency 020

The Technology Education teacher demonstrates knowledge of scientific concepts related to energy and power.

The beginning teacher:

B. Identifies types of energy (e.g., chemical, electrical) and methods of converting one form of energy to another (e.g., gas turbine, internal combustion engine, photovoltaic cell).

ASSIGNMENT:

20b(1). Identify three types of energy and, for each, a method of converting that form of energy to another form, or another form of energy into the identified type. Diagram each process of energy conversion (3 diagrams).

DOMAIN V ENERGY, POWER, AND TRANSPORTATION

Competency 020

The Technology Education teacher demonstrates knowledge of scientific concepts related to energy and power.

The beginning teacher:

- C. Applies concepts and units of force, work energy, and power to solve problems in technology.*
- D. Applies scientific concepts and principles to solve problems related to energy, power, and transportation systems.*

ASSIGNMENT:

20c,d(1). Imagine that all of the transportation systems in major U.S. city was wiped out and you had unlimited funds and authority to redesign the entire transportation system. Your job is to figure out the best modes of transportation for people and goods, both within the city and between cities. You can create systems based on any existing energy, power and transportation technology. Your goal is to create the most efficient and effective system with the least amount of negative economic, environmental and safety impacts. State which type of transportation system you would implement and how it works in relation to the energy and power which fuel it. Discuss the scientific principles and concepts behind your proposal and how this solves existing problems in our transportation systems of today.

DOMAIN V ENERGY, POWER, AND TRANSPORTATION

Competency 021

The Technology Education teacher understands issues related to energy consumption and conservation.

The beginning teacher:

- A. Identifies sources, availability, and uses of renewable (e.g., solar, wind) and nonrenewable (e.g., coal, oil) energy.*
- B. Understands issues (e.g., consumer choices, costs, impact on the environment) related to conserving natural resources and promoting sustainable development through techniques such as reusing, reducing, and recycling.*
- C. Demonstrates knowledge of processes used in extraction, production, transportation, and storage of energy resources.*

ASSIGNMENT:

21a,b,c(1). Interview one or more experts on:

- a. Energy: types, sources, availability, uses of renewable and nonrenewable energy, and processes related to energy including extraction, production, transportation, and storage of energy resources
- b. Conserving natural resources and promoting sustainable development.

Prepare for the interview by developing a list of at least 10 questions on past, current, and future developments in the field of energy consumption and conservation and how they impact technology. Ask what topics in energy consumption and conservation are critical to provide the students with a good knowledge and understanding to use in their future careers and personal lives. Cover the various topics listed in *a* and *b* above. Develop your own list of questions that will help you shape your future lesson plans in these areas. During the interview, be sure to sort fact from opinion and make notes after the interview to present both sides on controversial issues, if any.

Your expert(s) can be from the community, industry, education, or government. If one expert is knowledgeable on all topics, you can

interview only one. Otherwise, interview enough people to cover all topics. Interviews can be conducted in person or by telephone.

The submitted assignment will include the list of questions, the answers, and notes written after the interview which will help you in future lesson planning. Also include the interviewee name(s) and roles that qualify them as the subject matter expert.

DOMAIN V ENERGY, POWER, AND TRANSPORTATION

Competency 022

The Technology Education teacher understands characteristics of thermal, electrical, fluid, and mechanical power systems and methods of control, transmission, and storage of energy and power.

The beginning teacher:

- A. Identifies characteristics of thermal, electrical, fluid, and mechanical power systems.*
- B. Demonstrates knowledge of methods of control, transmission, and storage of energy and power (e.g., pneumatic and hydraulic systems, flywheels, batteries, dams).*
- C. Analyzes the design of thermal, electrical, fluid, and mechanical power systems and recognizes advantages and disadvantages of systems designed for given functions.*
- D. Understands the role of mechanical parts such as levers, cams, gears trains, belts, and pulleys in controlling and transmitting power.*

ASSIGNMENT:

- 22a(1). As you go through your week, observe and record uses of thermal, electrical, fluid, and mechanical power systems. These examples can be from work, home, schools, or other places you visit. If you do not find one type in your particular travels, seek it out. For each example, record the characteristics of the type of system that make the system applicable for the use.
- 22b(1). For one example applying each type of system, list how the power is controlled, transmitted, and stored.
- 22c(1). For one example in using each type of power system, write an analysis of the design. List the advantages and disadvantages of the design functions.
- 22d(1). If your chosen example contains mechanical parts, explain how their role in controlling and transmitting power. If your chosen examples do not contain mechanical parts, choose another example which does and explain their role.

DOMAIN V ENERGY, POWER, AND TRANSPORTATION

Competency 023

The Technology Education teacher demonstrates knowledge of principles and applications of electronics.

The beginning teacher:

- A. Identifies types and characteristics of basic electronic components (e.g., resistors, inductors, transistors).*
- B. Interprets schematic diagrams (e.g., determines function of a given circuit, determines the role of components in circuits) of AC and DC circuits and of analog and digital circuits.*

ASSIGNMENT:

23a,b(1). Create and explain a schematic diagram OR interpret a schematic diagram from the internet, a book or a journal for the following:

- a. AC circuit
- b. DC circuit
- c. Analog circuit
- d. Digital circuit

Your assignment should include the schematic and the explanation. Identify basic electronic components on the schematic and briefly state the function each provides.

DOMAIN V ENERGY, POWER, AND TRANSPORTATION

Competency 023

The Technology Education teacher demonstrates knowledge of principles and applications of electronics.

The beginning teacher:

C. Analyzes voltage, resistance, current, and power in series and parallel AC and DC circuits.

ASSIGNMENT:

23c(1). Build a simple circuit on which you could demonstrate how to analyze voltage, resistance, current, and power. You may research to find a specific circuit to build. Describe the function and components of your circuit and how you would do your analyses. One website that might be helpful is <http://www.allaboutcircuits.com/>.