**Unit Two: Diagrams and Description of Processes**

**Topic One: How Technology Works**

**Lesson Objectives:**

By the end of this topic, students should be able to:

1. Describe how technology functions using correct grammar and process-related vocabulary.
2. Explain diagrams related to technological systems and make inferences from these diagrams.
3. Read and write descriptive paragraphs about technological processes, identifying the key steps involved.
4. Communicate clearly when speaking about the functioning of technology.

**1. Discovering Language (Language Outcomes)**

**1.1 Grammar and Pronunciation**

* **Present Simple vs. Present Continuous**:

The **Present Simple** and **Present Continuous** tenses are used to describe actions or states, but they differ in terms of timing and context.

**Present Simple**

The Present Simple is used for:

1. **General Facts and Universal Truths**
   * Example: *Water boils at 100°C.*
2. **Regular Actions or Routines**
   * Example: *He studies every evening.*
3. **Permanent Situations**
   * Example: *She works as a mechanical engineer.*
4. **Instructions and Directions**
   * Example: *You press the button to start the machine.*

**Form:**

* **Affirmative:** Subject + base verb (add *-s* for third-person singular).
  + *She writes reports every day.*
* **Negative:** Subject + *do/does not* + base verb.
  + *He does not attend meetings regularly.*
* **Question:** *Do/Does* + subject + base verb?
  + *Do they work here?*

**Present Continuous**

The Present Continuous is used for:

1. **Actions Happening Now**
   * Example: *She is reading the manual.*
2. **Temporary Situations**
   * Example: *He is working in London for a few months.*
3. **Future Arrangements**
   * Example: *We are meeting with the supplier tomorrow.*
4. **Changes or Trends**
   * Example: *The climate is becoming warmer.*

**Form:**

* **Affirmative:** Subject + *is/am/are* + base verb + *-ing.*
  + *They are testing the prototype.*
* **Negative:** Subject + *is/am/are not* + base verb + *-ing.*
  + *She is not attending the seminar.*
* **Question:** *Is/Am/Are* + subject + base verb + *-ing?*
  + *Are they working on the project?*

**Comparison**

| **Aspect** | **Present Simple** | **Present Continuous** |
| --- | --- | --- |
| **Frequency** | Regular/routine actions. | Actions happening right now. |
| **Duration** | Permanent situations. | Temporary situations. |
| **Future Use** | Scheduled events. | Planned future arrangements. |
| **Example** | *He works every day.* | *He is working on a report now.* |

**Exercises**

**1. Fill in the blanks with the correct tense (Present Simple or Present Continuous):**

1. The Earth \_\_\_ (revolve) around the Sun.
2. She \_\_\_ (study) for her exams at the moment.
3. The machine \_\_\_ (not/start) unless you press the button.
4. We \_\_\_ (install) a new system in the office this week.

**Answers:**

1. revolves
2. is studying
3. does not start
4. are installing

**2. Rewrite the sentences using the correct tense:**

1. Right now, the team \_\_\_ (work) on a new project.
2. Engineers \_\_\_ (design) the prototype every year.
3. The equipment \_\_\_ (operate) at full capacity now.
4. The conference \_\_\_ (begin) at 9:00 AM tomorrow.

**Answers:**

1. is working
2. design
3. is operating
4. begins

* **Passive Voice**

The **Passive Voice** is used when the focus is on the action or the object receiving the action, rather than the doer (subject).

**When to Use the Passive Voice:**

1. **When the doer is unknown or irrelevant:**
   * *The report was completed yesterday.*
2. **To emphasize the action or object:**
   * *The prototype was tested thoroughly.*
3. **In formal or scientific contexts:**
   * *The results were analyzed using advanced software.*

**Form:**

1. **Present Simple Passive:**
   * Object + *is/am/are* + past participle.
   * *The device is assembled in this factory.*
2. **Past Simple Passive:**
   * Object + *was/were* + past participle.
   * *The project was completed on time.*
3. **Future Passive:**
   * Object + *will be* + past participle.
   * *The design will be finalized next week.*
4. **Present Continuous Passive:**
   * Object + *is/am/are being* + past participle.
   * *The system is being upgraded.*
5. **Past Continuous Passive:**
   * Object + *was/were being* + past participle.
   * *The documents were being reviewed.*

**Examples of Active vs. Passive Voice:**

| **Active Voice** | **Passive Voice** |
| --- | --- |
| The engineer designed the device. | The device was designed by the engineer. |
| They are testing the prototype. | The prototype is being tested. |
| The team will complete the project. | The project will be completed by the team. |

**Exercises**

**1. Rewrite the sentences in the Passive Voice:**

1. The technician repaired the machine.
2. Scientists are studying the new material.
3. The team will install the equipment tomorrow.
4. They tested the system last week.

**Answers:**

1. The machine was repaired by the technician.
2. The new material is being studied by scientists.
3. The equipment will be installed by the team tomorrow.
4. The system was tested last week.

**2. Identify whether the sentence is Active or Passive:**

1. The results were analyzed using advanced tools.
2. Engineers are building the new bridge.
3. The manual is written in English.
4. The experiment was conducted last month.

**Answers:**

1. Passive
2. Active
3. Passive
4. Passive

* **Relative Pronouns & Short-form Relative Clauses**:

**Relative Pronouns**  
Relative pronouns are words used to link clauses or phrases to a noun or pronoun. They introduce relative clauses, providing additional information about a noun without starting a new sentence. Common relative pronouns include:

* **Who**: Refers to people.  
  Example: *The engineer who designed the device won an award.*
* **Whom**: Refers to people (more formal, often used as the object of a verb).  
  Example: *The student whom I helped passed the test.*
* **Which**: Refers to animals or things.  
  Example: *The machine, which is brand new, is very efficient.*
* **That**: Refers to people, animals, or things (restrictive clauses).  
  Example: *The device that we tested works perfectly.*
* **Whose**: Refers to possession.  
  Example: *The student whose project was submitted early scored well.*

**Short-Form Relative Clauses**

A short-form relative clause is a simplified version of a relative clause where the relative pronoun and auxiliary verb are omitted, but the meaning remains clear. These are often used in technical or scientific contexts for brevity.

**Key Points**

1. **When to Use**:
   * Short-form clauses are typically used when the relative pronoun acts as the object of the verb in the clause.
   * The main clause subject must clearly refer to the modified noun.
2. **Formation**:
   * Omit the relative pronoun (**who, which, that**) and auxiliary verb (**is, was, etc.**) where possible.
   * The remaining verb is in its base or participle form.

**Examples of Short-Form Relative Clauses**

1. **Full Relative Clause**:
   * *The device* ***that is used*** *in the experiment is expensive.*
   * *The students* ***who were given instructions*** *completed the task.*
2. **Short-Form Relative Clause**:
   * *The device* ***used*** *in the experiment is expensive.*
   * *The students* ***given instructions*** *completed the task.*

**Using Relative Pronouns and Short-Form Clauses Together**

**Example Sentences:**

1. *The technician who repaired the printer was very skilled.*
2. *The diagrams which show the process are included in the report.*
3. *The results that we obtained were unexpected.*
4. *The parts used in the assembly were of high quality.*
5. *The student given the highest score will present first.*

**Exercises**

**Exercise 1: Fill in the blanks with the correct relative pronoun**

1. The engineer \_\_\_ designed the system is very talented.
2. The materials \_\_\_ we need are out of stock.
3. The process \_\_\_ we are following ensures accuracy.
4. The team \_\_\_ performance was outstanding received an award.

**Answers:**

1. **who**
2. **that/which**
3. **that/which**
4. **whose**

**Exercise 2: Convert to Short-Form Relative Clauses**

1. The instructions that were provided were unclear.
2. The motor which is used in this device is very efficient.
3. The components that were ordered arrived late.
4. The students who are working on the project need assistance.

**Answers:**

1. The instructions provided were unclear.
2. The motor used in this device is very efficient.
3. The components ordered arrived late.
4. The students working on the project need assistance.

**Exercise 3: Rewrite using Relative Pronouns or Short-Form Clauses**

1. The diagram explains the process. The process is complex.
2. The technician installed the new system. The system is faster.
3. The experiment involved the latest equipment. The equipment was tested thoroughly.
4. The professor is well-known. The professor teaches energy systems.

**Answers:**

1. The diagram explains the process, which is complex.
2. The technician installed the new system, which is faster.
3. The experiment involved the latest equipment tested thoroughly.
4. The professor, who teaches energy systems, is well-known.

* **Pronunciation: Focus on final -ed in past tense verbs.**

In English, the final **-ed** ending in regular past tense verbs has three different pronunciations depending on the last sound of the verb in its base form. Understanding these rules helps improve clarity and fluency.

**1. /t/ Sound**

The **-ed** is pronounced as **/t/** when the base verb ends in an unvoiced (voiceless) sound other than /t/.

**Unvoiced sounds:** These are sounds produced without vibrating the vocal cords. Examples include /p/, /k/, /f/, /s/, /ʃ/ (sh), and /tʃ/ (ch).

* **Examples:**
  + "Help" → "Help**ed**" = /helpt/
  + "Laugh" → "Laugh**ed**" = /læft/
  + "Stop" → "Stop**ped**" = /stɒpt/

**2. /d/ Sound**

The **-ed** is pronounced as **/d/** when the base verb ends in a voiced sound other than /d/.

**Voiced sounds:** These are sounds produced with vibration in the vocal cords. Examples include all vowels (a, e, i, o, u), and consonants like /b/, /g/, /v/, /z/, /m/, /n/, and /l/.

* **Examples:**
  + "Play" → "Play**ed**" = /pleɪd/
  + "Call" → "Call**ed**" = /kɔːld/
  + "Clean" → "Clean**ed**" = /kliːnd/

**3. /ɪd/ or /əd/ Sound**

The **-ed** is pronounced as **/ɪd/** or **/əd/** when the base verb ends in either /t/ or /d/.

This creates an extra syllable in the word.

* **Examples:**
  + "Wait" → "Wait**ed**" = /weɪtɪd/
  + "Decide" → "Decid**ed**" = /dɪˈsaɪdɪd/
  + "Start" → "Start**ed**" = /stɑːtɪd/

**Practice Exercises**

**1. Identify the Pronunciation**

Decide if the **-ed** in the following verbs is pronounced as /t/, /d/, or /ɪd/:

1. Stopped
2. Played
3. Needed
4. Fixed
5. Laughed
6. Visited

**Answers**:

1. /t/
2. /d/
3. /ɪd/
4. /t/
5. /t/
6. /ɪd/

**2. Fill in the Blanks**

Write the past tense form of these verbs and indicate the **-ed** pronunciation:

1. Help
2. Decide
3. Clean
4. Wait
5. Look

**Answers**:

1. Helped (/t/)
2. Decided (/ɪd/)
3. Cleaned (/d/)
4. Waited (/ɪd/)
5. Looked (/t/)

**3. Create Your Sentences (homework)**

Create sentences using the past tense of these verbs, focusing on correct **-ed** pronunciation:

1. Walk
2. Visit
3. Jump
4. Call
5. Start

**Tips for Mastery**

* Practice listening and repeating verbs with different **-ed** endings.
* Record yourself saying sentences with past tense verbs and compare with native speakers.
* Group verbs by their final sounds to make memorization easier.

This systematic approach ensures learners grasp the pronunciation of **-ed**, making their spoken English more natural.

**2. Vocabulary**

* **Technology-related Vocabulary**:

 **Sensor**

* *Definition*: A device that detects changes in its environment, such as temperature, pressure, or motion, and sends this information to other devices or systems.
* *Example*: The motion sensor activates the lights when someone enters the room.

 **Circuit**

* *Definition*: A closed path through which electric current flows, often including components like resistors, capacitors, and switches.
* *Example*: The circuit in the remote control allows it to send signals to the television.

 **Mechanism**

* *Definition*: A system of parts working together in a machine or device to perform a specific function.
* *Example*: The locking mechanism of the safe ensures its security.

 **Algorithm**

* *Definition*: A step-by-step set of instructions or rules designed to solve a problem or perform a task, especially by a computer.
* *Example*: The search engine uses a sophisticated algorithm to rank websites.

 **Automation**

* *Definition*: The use of machines and technology to perform tasks without human intervention.
* *Example*: The factory increased productivity by implementing automation in its assembly lines.

 **Actuator**

* *Definition*: A device that converts energy (electric, hydraulic, or pneumatic) into mechanical motion.
* *Example*: The actuator controls the movement of the robotic arm.

 **Bandwidth**

* *Definition*: The maximum amount of data that can be transmitted over a network connection in a given amount of time.
* *Example*: Streaming high-definition video requires a high bandwidth.

 **Microprocessor**

* *Definition*: A small electronic chip that performs the functions of a computer's central processing unit (CPU).
* *Example*: The smartphone is powered by a cutting-edge microprocessor.

 **Interface**

* *Definition*: A shared boundary or connection between two systems, devices, or software applications that allows them to communicate.
* *Example*: The graphical user interface makes the software user-friendly.

 **Prototype**

* *Definition*: An initial model or sample of a product used to test and refine the design.
* *Example*: The engineers built a prototype of the drone to test its flight capabilities.

 **Processor**

* *Definition*: The part of a computer that executes instructions to perform tasks and calculations.
* *Example*: The gaming laptop has a high-speed processor for better performance.

 **Semiconductor**

* *Definition*: A material that conducts electricity under certain conditions, essential in creating electronic components like transistors and diodes.
* *Example*: Silicon is the most commonly used semiconductor material.

 **Nanotechnology**

* *Definition*: The science of designing and manipulating materials at the molecular or atomic scale to create new products and processes.
* *Example*: Nanotechnology is used to develop more efficient solar cells.

 **Encryption**

* *Definition*: The process of converting data into a coded format to prevent unauthorized access.
* *Example*: Data encryption ensures secure online transactions.

 **Firmware**

* *Definition*: A type of software that is embedded in hardware to control its functions.
* *Example*: The printer’s firmware needs to be updated for better compatibility.

 **Server**

* *Definition*: A computer or program that provides resources, data, or services to other computers over a network.
* *Example*: The website is hosted on a high-performance server.

**3. Developing Skills (Skills and Strategies Outcomes)**

**3.1 Functions**

* **Drawing and Labeling a Diagram of a Technological System**:
  + Activity: Draw and label a simple diagram of a smartphone system, including components such as the processor, battery, and sensors.
* **Describing Technological Systems**:
  + Example:
    - "The processor handles all the instructions. The battery provides the necessary power. The sensors detect changes in the environment, such as movement or temperature."

**4. Listening & Speaking**

**4.1 Listening Activity:**

* **Listening to a Presentation of a Technological System**:
  + Audio about how a smartphone functions.
  + Question: "What is the main role of the processor?"

**Answer**: "The processor handles all the instructions and manages the overall operations of the device."

**4.2 Speaking Activity:**

* **Describing a Technological Device**: Explain how a washing machine works.

**Example**:

* + "First, the user selects a washing cycle. Then, the water fills the drum. After that, the drum spins to wash the clothes. Finally, the water is drained and the clothes are rinsed."

**5. Reading & Writing**

**5.1 Reading Activity:**

* **Skimming and Scanning**:
  + Read a passage about how 3D printers work. Identify the main steps in the process.

**Passage**:

* + "A 3D printer creates objects by layering material. First, a digital model is created. Then, the printer heats the material and extrudes it in layers to form the object."

**Answer**:

* + Main steps: Create digital model → Heat material → Extrude material in layers → Form object.

**5.2 Writing Activity:**

* **Describing a Technological Process**: Write about how a microwave works.

**Example Answer**:

* + "A microwave works by generating microwaves through a magnetron. These microwaves cause water molecules in the food to vibrate, producing heat. The heat cooks the food evenly."