Bruner's E3: Explanation Lens

Process	4C Super Skill	Engine Management System Activity
2-1. Plug the single-phase 2P 240V power cord and apply to the normal power line DC 12V, which is rectified through direct-current power supply. **2-2**. Turn on the key switch, after turning on the emergency stop switch to clockwise direction, to activate the ECU, sensors, and actuator. **2-3.** Verify the sensor value change, trouble code, and system operation change (ignition time and fuel injection amount), when the injector is operated and a spark is formed at the ignition plug with adjustment of variable output control knob of TPS Vol. **[Reference]** - TPS Knob should be positioned at "0". (end to counterclockwise direction) - When TPS Vol. is turned to clockwise direction, the acceleration speed of intake/exhaust air is increased, and the injector and ignition plug, operation is changed.	Communicating	Explain to peers the process of activating the engine management system, including the connection of power, key switch operation, and sensor verification steps. Reinforce or challenge each other's understanding by discussing interpretations of sensor values and trouble codes. Conduct interviews with classmates to gather their understanding of engine management systems and report the outcomes to the class, facilitating discussion and clarification of concepts. Present reports on field trips to automotive workshops or factories, describing engine management technologies observed.
	Collaborating	Conduct round-robin interviews among team members to gather insights into engine management processes, then collaborate to discuss and synthesize the ideas generated. Use cooperative learning structures like Think-Pair-Square to explain engine management concepts to team members. Encourage equal participation within teams to ensure all members contribute to explaining engine management concepts, questioning each other to deepen understanding and challenge assumptions.
	Critical Thinking and Problem Solving	Demonstrate how the engine management system works by setting up experiments and explaining the process to the class. Use past learning about electrical systems to explain new knowledge about engine management and identify patterns in sensor data to troubleshoot issues. Apply previous knowledge of electrical systems to resolve current software problems in the engine management system.

		Use graphic organizers like Venn diagrams to compare and contrast different engine management strategies and their impacts on vehicle performance.
	Creating and Innovating	Link past learning about electrical systems to new learning about engine management by identifying common principles and applying them to new contexts. Develop hypotheses about engine tuning strategies and create theories to explain their potential effects on vehicle performance. Create glossaries of engine management terms and explain them to the class, enhancing understanding of technical vocabulary. Use digital imaging technology to create graphics illustrating engine management concepts for use in digital presentations or reports.

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Process	4C Super Skill	Engine Management System Activity
2-4. Verify the output value change, trouble code output, and system operation change (ignition time and fuel injection amount), using variable control knob of TPS, ATS, WTS, MAP and O2. **[Reference] How to set up** – The trouble code is produced and the warning lamp lights up when the setting is inadequate.	Communicating	Explain personal understanding of engine management concepts, such as the role of TPS, ATS, WTS, MAP, and O2 sensors in regulating engine performance. Reinforce, support, or challenge class discussions on engine tuning and diagnostics, providing detailed explanations based on personal understanding. Conduct interviews with classmates to gather perspectives on engine management concepts and report the outcomes to the class, facilitating discussion and deeper understanding of diagnostic procedures and system operation changes. Describe experiment results related to adjusting TPS, ATS, WTS, MAP, and O2 sensors and their impact on engine performance.
	Collaborating	Conduct round-robin interviews with team members to explore their understanding of engine management concepts and discuss ideas generated to develop a deeper explanation and understanding. Question each other's contributions to clarify and expand on explanations of engine tuning and diagnostic procedures. Use cooperative learning structures like Think-Pair-Square to explain engine management topics to team members, encouraging equal participation and collaboration in understanding system operation changes and trouble code diagnostics.
	Critical Thinking and Problem Solving	Demonstrate how adjustments to TPS, ATS, WTS, MAP, and O2 sensors affect engine performance and explain the underlying mechanisms to the class. Set up experiments to illustrate the effects of sensor adjustments on ignition timing and fuel injection amounts, providing clear explanations to classmates. Explain how past learning about engine management links to new knowledge about diagnostic procedures and trouble code interpretation. Look for patterns in

		engine performance data and use Venn diagrams to explain differences and commonalities in system operation changes. Apply previous knowledge to troubleshoot and resolve engine management software problems.
	Creating and Innovating	Link past experiences with engine diagnostics to new learning occurrences, developing hypotheses to test during diagnostic procedures. Come up with new theories to explain engine performance issues and develop glossaries of engine management terms to explain to the class. Use digital imaging technology to create graphics illustrating engine management concepts for use in digital presentations.

Bruner's E3: Explanation Lens

Process	4C Super Skill	Engine Management System Activity
2-5. When the equipment stops, set the TPS knob at the default position and turn the ignition key off.	Communicating	Explain the importance of setting the TPS knob at the default position when the equipment stops. Reinforce the concept of proper shutdown procedures and discuss potential consequences of neglecting this step. Conduct interviews with classmates to gather their understanding of the TPS knob's role in engine shutdown. Report the outcomes to the class, highlighting different perspectives and insights gained from discussions.
	Collaborating	Collaborate with team members to conduct Round-Robin interviews about the TPS knob's function in engine management. Discuss and probe each other's contributions to develop a comprehensive explanation of its significance. Utilize the Think-Pair-Square cooperative learning structure to explain the importance of setting the TPS knob at the default position to team members. Encourage equal participation in sharing insights and discussing the topic.
	Critical Thinking and Problem Solving	Demonstrate how the TPS knob affects engine operation and shutdown procedures. Set up experiments to simulate different TPS knob settings and explain their impact on system performance to the class. Explain how past learning about engine management systems and shutdown protocols links to new knowledge about TPS knob adjustment. Analyze data and patterns to understand the correlation between TPS knob settings and system behavior.
	Creating and Innovating	Develop hypotheses about the consequences of improper TPS knob adjustment and design experiments to test them. Create glossaries of engine management terms, including TPS,

		and explain their significance to the class. Compose narratives explaining the role of the TPS knob in engine shutdown scenarios and illustrate them using digital imaging technology. Encourage students to create graphics or digital presentations to visually demonstrate the concept.