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Is your ZEV program teaching both Product Knowledge and Technical Knowledge

See file attachment

Additional submitted attachment is included below.

Is your ZEV program teaching both Product Knowledge and Technical Knowledge?

With the emergence of Zero Emission Vehicle (ZEV) training from vehicle manufacturers, referred herein as original equipment manufacturers (OEM), it is valuable to understand the distinction between Product Knowledge and Technical Knowledge. Recognizing the differences can have a huge impact in high school and community college classrooms where future technicians apply what is learned, especially when many unforeseen circumstances arise, only to find out that this was not covered in the OEM curriculum. Augmenting student learning objectives (SLOs) to include both knowledge sectors are key.

How to distinguish Product Knowledge from Technical Knowledge? Product Knowledge is relatively broad in scope where the technician follows a directed procedure or series of tasks but is limited in scope and minimizes any higher-level cognitive understanding, which is necessary to increase the ability to begin to diagnose and attempt to solve problems. On a more advanced level, Technical Knowledge gives the technician greater problem-solving abilities and may give rise to a higher level of cognition – even metacognition - acquiring the ability of problem *finding*. This is an invaluable skill set that goes beyond “by the book” or textbook diagnostics – it is the ability to effectively find *root* causes, even challenging faults that are intermittent.

The emphasis and focus on Product Knowledge are found with OEMs, making sense as it is important to competently service and repair *their* product line. Relying on Product Knowledge alone has limited value and skill transferability to systems by other OEMs. Product Knowledge alone requires update training as products continuously change – again, limited to that single OEM. Schools that also offer training applicable across all vehicle electrification technologies can give technicians a better understanding and valuable ability to solve and *find* problems.

OEM-derived training typically focuses on directed processes as a way to service and repair vehicles. The technician is directed to perform pre-established tasks and checks and then follow steps to remedy the identified fault(s). This workflow is successful in cases where the cause of the problem has already been assumed to exist as likely possibilities. A troubleshooting tree often found in a technical manual is a good example of this method. It is akin to FAQs – situations that have historically arisen or are reasonably expected to occur with some frequency.

In these cases, the technician is not required to engage in higher-level cognition but rather follow established procedures (i.e., if this happens, do this and do that.) If the diagnostic computer tells the technician to replace a presumably defective component, this becomes task-oriented alone. However, if this does not resolve the issue, how well is the technician prepared to begin going down the path of identifying the root cause of the problem that the OEM does not address? This goes beyond even problem-solving – it is a far more cognitively engaging and valuable skill set: problem *finding*.

This is where Technical Knowledge becomes critically important. Here is an example, using a gasoline-powered vehicle in the state of California, where the majority of drivers own and have to comply with the state-mandated biennial smog checks. If a vehicle fails a smog

check – it may have had a history requiring to have it inspected at a STAR or Test and Repair Only facility, requiring more stringent inspection requirements (it may even be designated as a Gross Polluter.) The OEM does not train a new car dealership technician to diagnose smog check failures beyond connecting the OEM diagnostic equipment and replacing what the computer tells the technician to replace. OEMs do not require dealers to have any of the highly specialized equipment required by the State of California Bureau of Auto Repair for Test and Repair stations. Licensed Smog Check technicians also must take additional specialized training and pass ASE or state-approved ASE equivalency tests outside what is required by OEMs. There is considerable specialized training requiring an advanced level of cognition rich in problem-solving and problem-finding skills.

ZEV technicians would greatly benefit not only from OEM-specific training richly augmented with Technical Knowledge, but even more so, earning tangible industry-recognized credentials that are in highest demand by employers.