Using Think-Aloud Pair Problem Solving as a Formative Assessment during Equipment Troubleshooting Training

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Background


GASOLINE

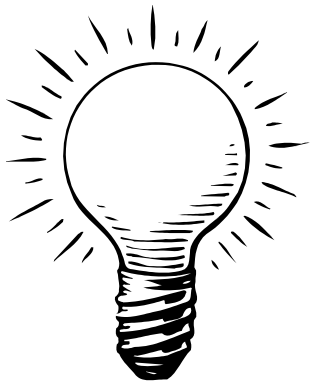
Theoretical Framework

- Cognitive Information Processing Learning Theory (CIPLT) (Andre & Phye, 1986)
- Metacognition
  - Knowledge about cognition
  - Regulation of cognition (Schraw, 1998)
- TAPPS strategy
  - Verbalize thoughts (Lochhead, 2001)

Purpose

- Formatively assess agriculture students' engine technical knowledge during compact power equipment troubleshooting training

- Helps future employer relate to how individuals process information



Examples

Planning

What is the problem?
What information do you have about the problem?

Monitoring

Are you using your strategy?
Do you need a different strategy?

Evaluating

What worked?
What didn't work?

Methodology

- Research Design
  - Post-test only experimental design (Campbell & Stanley, 1966)
- Instruction was provided on troubleshooting.
  - Potential Compression, Ignition and Air/fuel delivery faults were discussed
  - The instructor provided a demonstration on how to use tools for troubleshooting.
- Students received instruction from the researcher on how to use TAPPS
- After the instruction, students practiced using TAPPS on two word problems.

Methodology

- 28 Participants randomly assigned to two groups
- Students were given 45 minutes to identify and repair fault.
- Individually tested away from distractions
- No hints were given except not to remove the crankcase cover or cylinder head.

Treatments

- Group One
  - Undergraduate researcher served as listening partner for experimental group.
  - Used TAPPS during troubleshooting
  - Students were video taped
  - Undergraduate researcher recorded successfulness and time of completion for each student.

Treatments

- Group Two
  - Students were video taped
  - Recording were transcribe and analyzed
  - Students were not asked to talk aloud during troubleshooting
  - Undergraduate researcher recorded successfulness and time of completion for each student.

Conclusions/Recommendations/Implications

- 68.7% of students were successful
- No significant difference in success rate or time completion
- TAPPS helps identify students misunderstandings and unfamiliarity

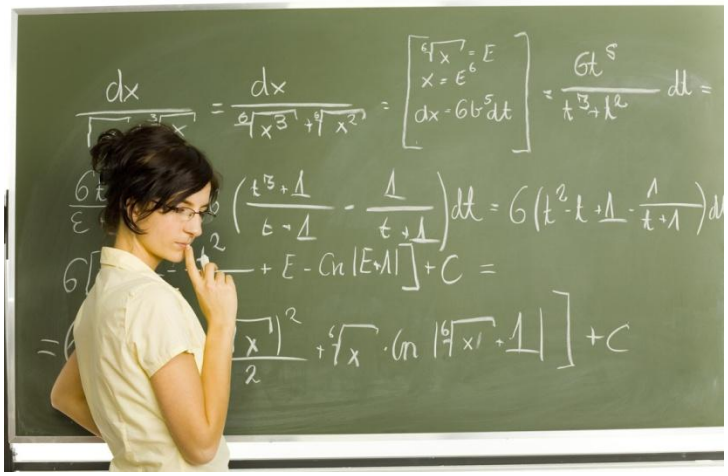
"I'm thinking I might have flooded it out a bit from cranking on it earlier. It sounds like it's sucking a little back in now instead of too much out, but I'm not sure."

-Student

Conclusions/Recommendations/Implications

- Implications for educators in other content areas that rely heavily on problem solving such as science and technology.

- Further research should be conducted:
  - Effectiveness with increasingly complex engine problems
  - Consistent across subject matter and populations



For Questions contact Michael Pate

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