

**MPS 34: Trouble shooting skills** © copyright Donald R. Woods, 2009

**Applicability:**

Process engineers and engineering students. Chemical engineering and perhaps mechanical engineering.

**Time required:**

1 h of introduction plus three, two hour sessions of triads. For each two session, each plays each of the three roles: trouble shooter, expert system and observer. The role-playing lasts for 20 minutes; then the expert system debriefs, for about 2 minutes, the trouble shooter as to the cause. Then the observer gives the feedback form plus brief feedback to the trouble shooter for about 4 minutes. Then all change roles.

For the first 2-hour session, the cases deal with fluid dynamic-centrifugal pump problems. For the second 2-hour session, the cases deal with pump-heat exchanger systems. For the third 2-hour session, the cases deal with distillation columns involving heat exchangers and pumps.

**Brief description:**

Summarize characteristics of effective trouble shooters (target behaviours). Outline the learning objectives. Introduce the observer feedback form. Introduce the general plan for tackling trouble shooting problems and illustrate the process by using instructor-group dialogue to tackle an example case problem. Debrief by filling out the observer feedback form about how we did. Outline the triad activity.

Hand out expert system packages to everyone. These are number coded on the outside of the envelop. The code will be used to establish the triads. Allow at least 20 minutes for each to become “the expert system”. They do this by privately reading over the case, the solution and the typical ways trouble shooters handle the case. Become comfortable with the case.

Then start the first 2-hour session. At the end of the 2-hour session, collect the expert system cases and hand out the next set of cases.

Repeat this for the second 2-hour session.

At the end of the third 20-hour session, revisit the objectives; ensure that each individual has the evidence needed to write a self-assessment of the progress made and skills acquired from the workshop.

**Comments:**

This is an extremely effective workshop. When done in industry I often ask each individual to create, document and write out an expert system case for their colleagues to try. These are then used for a fourth 2-hour session.

**Prerequisite** Awareness, MPS 1 and strategy, MPS 4 are required to overcome individual’s reluctance to talk aloud about their thought processes. Such discussion is needed if the observer is to be able to provide helpful feedback. Unique you, MPS 11, helps individuals recognize the

P-J dimension and how to cope effectively with this during trouble shooting. Self assessment, MPS 3 and Stress management, MPS 5 are helpful.

**Additional work you need to do:** You need to provide written cases for the expert system. Typically I have worked with groups of about 30 to 40. With about 60 different cases (20 in each of fluids, heat exchange and distillation) and using the same case twice I can provide for 40 participants. However, use the coding to ensure that the same case is not being handled at the same time because triads might overhear what is going on in neighbouring triads. For example, a case with a pump with a worn impeller might be coded #3 and #4. Triad #1,2 3 would then handle this case in the last session for the day while #3 is the expert system; triad #4,5,6 would handle this case first in the session, when #4 is the expert system.