The Best Evidence of Competence

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Safety professionals from all industry sectors recognise that training is a critical element of an effective safety and health management program. A vital component of any training regime is the assessment process, that is used to demonstrate the trainee has been able to transfer their learning from the training room into the workplace.

The question to consider is: *Where does assessment sit within the training agenda of the resources sector?*

- Is it a quick "have to do" at the end of the training day?
- Is it an evaluation of the trainee's retention of the knowledge imparted during the training day?
- Is it a tool to evaluate the effectiveness of the training? or
- Is it an effectual analysis of the trainee's ability to apply the new knowledge successfully in their workplace?

Assessment must be measurable, valid, reliable, flexible, and fair (Canter, 2000). The individual needs to know what is expected of them and it must not contain more than has been included in the training.

When discussing training for worker safety a logical starting point is asking: *What is the goal of the learning?*

- Is it to merely satisfy regulatory requirements? or
- Is the goal to facilitate true learning about working safely?

If the industry is genuine about improving worker safety it must be the latter. This means the assessment tools used must allow the trainee to demonstrate they have the skills and knowledge to work safely.

1. Assessment and Higher-Order Thinking

Customarily, assessment practices employed within the resource sector have utilised the traditional curriculum model of testing the recall of information that has been taught during the training. The critical issue to consider about this practice is: *After passing a test of knowledge does this mean the trainee will automatically transfer this understanding into their workplace behaviours?*

It is important to remember that adults can be compelled to undertake the training, but, they cannot be made to learn while they are there. More significantly, adults

cannot be obligated to internalize and accept what is instructed as part of their own belief system or way of working (Camm & Cullen, 2002). Assessment must provide the trainee with the opportunity to demonstrate they have internalised the new knowledge plus how they can incorporate these skills and subsequent behaviours into the workplace environment.

1.1 How do you assess for internalisation or acceptance of new knowledge?
Internalisation occurs as a result of higher-order thinking. To assess trainees in their higher-order thinking, assessment tasks must require them to apply their skills and knowledge by doing such things as:

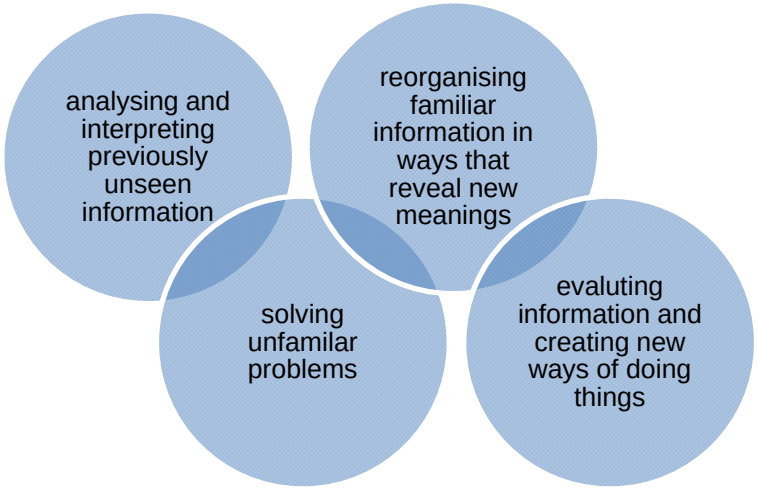

Diagram 1: Assessment inclusions to assess for higher-order thinking

Higher-order thinking occurs when trainees can apply the new underlying principles in creating solutions to new problems or responding to novel events. This higher order thinking can be assessed at a variety of certificate levels (Canter, 2000).

Anderson and Krathwohl (as cited in Killen, 2005) state to prove in-depth understanding the assessment task must be challenging where the trainee has to bring together all the cognitive processes outlined in Table 1.

Cognitive process	What the learners have to do	Example of actions required	Example
Remember	Retrieve relevant memory	Recall and describe facts	Remember the hierarchy of controls
Understand	Construct meaning of information and concepts	Interpret or compare information presented Explain their understanding of what is happening in their own words	Complete a risk assessment
Apply	Carry out procedure in a given situation	Prediction – recognising Demonstrate use in new situation	Follow a JSA
Analyse	Understand how the information is a totality of parts	Compare, contrast, differentiate Break knowledge into	Understand how energy sources can contribute to an incident

	Understand how the parts relate to the overall purpose	parts	
Evaluate	Make judgements based on criteria	Judge interpret, defend course of action	Implement corrective action or report risky behaviour or unacceptable risk to supervisor Choose most effective control and explain why
Create	Create a new whole by pulling elements together	Design, rearrange, reconstruct, prepare a whole from parts	Contribute to the implementation and communication of a new process e.g. new standard operating procedure

Table 1: Cognitive Processes

1.2 Can a pen-and-paper multiple choice test demonstrate this high-order thinking?

Assessment tasks that require trainees to remember and reproduce information do not engage trainees in higher-order thinking. Additionally it is not valid to assess an employee's knowledge of key procedures, or even their ability to employ them in standard situations. Assessment must introduce tasks that require a higher order of thinking to occur.

What assessment strategies does the resources sector need to consider so it can be assured the assessment is verifying valid competence not just knowledge recall?

2. Assessment and Behaviour Change

As previously stated, the outcome of safety training should be the demonstration of behaviour change. Behaviour change occurs when the trainee has moved from an unconscious-incompetence state of mind, to one that reflects conscious-incompetence. That is; when, because of the presentation of new knowledge, the trainee alters their thinking from *"I do not need to change"* to presenting signals of an attitude that reflects *"show me how to change".*

Within the premise of changing behaviour, assessors must be able to recognise when the trainee is presenting an altered state of mind. MacDonald, Burke & Steward (2006) have released considerable work on the premise that dissonance is the lever for behaviour change. That is, challenging the trainee's expectation or prediction about a situation or event to the point where they recognise that they need to change their behaviour.

If the trainee is assessed before they accept their behaviour needs to change then the assessment will be redundant. For the trainer/assessor it is very easy to see when the trainee is moving from unconscious-incompetence to conscious-incompetence, as trainees follow the individual change process as demonstrated in Figure 1.

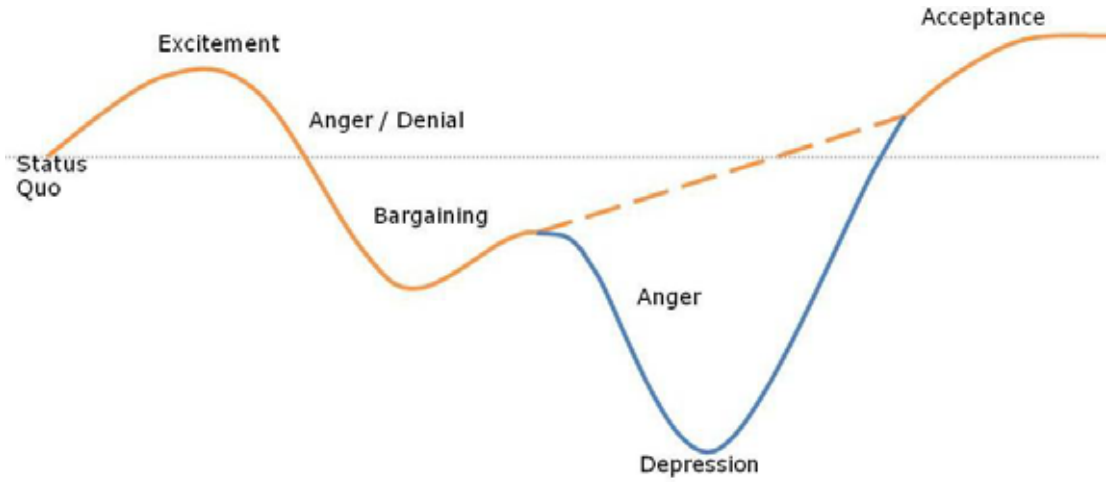

Figure 1: Individual change process (Adams et al. (1976) (as cited in Windeknecht, 2004))

Initially the trainee will be excited about the new knowledge, until they recognise they will have to alter their behaviours to be able to demonstrate competence and successfully produce the required work outcomes. Anger and bargaining are typical responses to this recognition. Acceptance of reality (i.e. letting go) is when the trainee is aware and acknowledges the impending behaviour change and the subsequent release of past behaviours. If the assessment occurs before the acceptance of change or release of past behaviours then internalisation of learning cannot be proven. How can assessors document the changes observed?

3. Assessment and Adult Learning

Improving assessment quality and knowledge transfer through the use of adult learning principles is another essential consideration. Table 2 highlights some principles of adult learning that need to be considered when developing assessment strategies.

drawing out of their life experiences	experienced based	problem centred	solution driven
skill seeking	task centred	real-life centred	requiring the use of all senses

Table 2: Principles of adult learning to be considered when creating assessment

Adults respond to interactive learning that is active and experience-based. An interactive learning experience that is problem-centred means most adult learners are quick to focus on the problem and are then solution driven (Peters, 2002).

Considering this what does this mean for the assessment process? To bring all these theories into perspective let's take a minute to consider the apprenticeship training model.

4. Activity Based Assessment

How does an assessor or workplace know when an apprentice has reached competence? The hypothesis I would like you to consider is: *Can you assess and verify an apprentice's competence by observing simulated or workplace activity?*

Within the current apprenticeship training regime, theory tests are part of the assessment strategy. However, the emphasis of the assessment relies heavily on the apprentice's ability to demonstrate their skill competency in simulated and real workplace conditions. Let's consider this for a moment:

- How does an electrical supervisor know if an apprentice understands the principles of wiring a switchboard?
- How does the workshop supervisor have confidence is assigning welding projects to the apprentice?
- How does the same supervisor know that his apprentice will not take short cuts when it comes to adhering to the workplace health and safety procedures?
- How does a trainer know the apprentice is using the equipment competently?

Ninety-nine precent of the time it is through the setting of detailed workplace activities that require the assessor to:

- Observe behaviour; and
- Clarifying the apprentice's thought process through the use of open-ended questions.

So what does this mean for assessment? Designing authentic assessment tools to assess if real learning has taken place results in the proof of applicable learning. This happens when the learner is actively involved in doing something and is simultaneously reflecting about what they are doing.

This lends itself to an assessment model that is constructed from a real work/life problem. These need to be inclusive of *behavioural assessment tasks*, as outlined in Diagram 2.

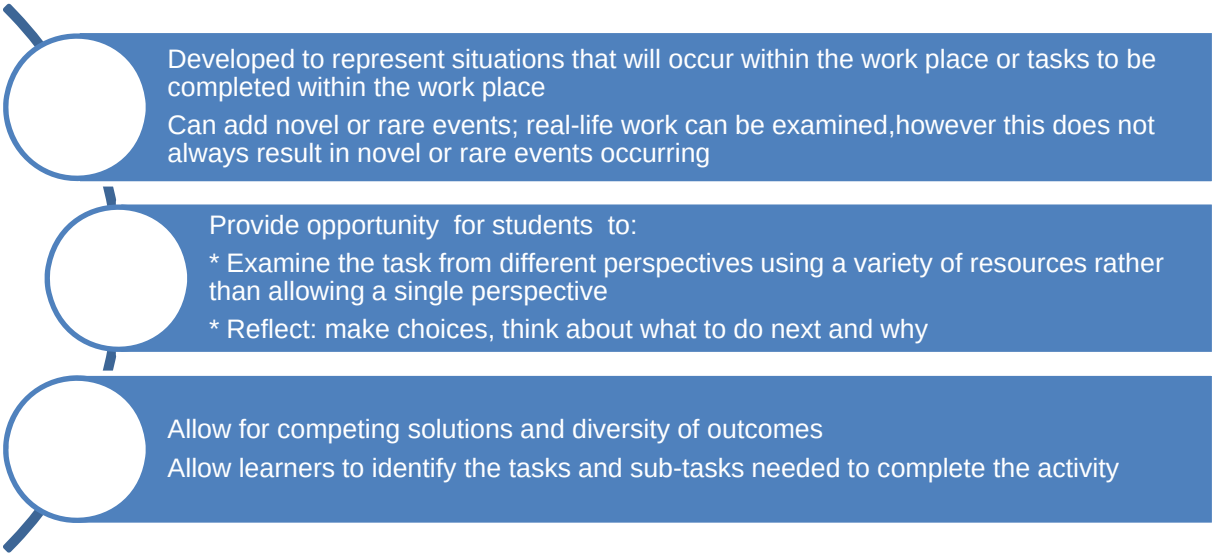

Diagram 2: Inclusions in behaviour task assessment

Diagram 3 describes the components a behavioural assessment task must include. It brings together all previous discussion in a visual representation. The diagram demonstrates:

- The opportunities the behavioural assessment task must provide the trainee; and
- Attributes the trainee needs to demonstrate.

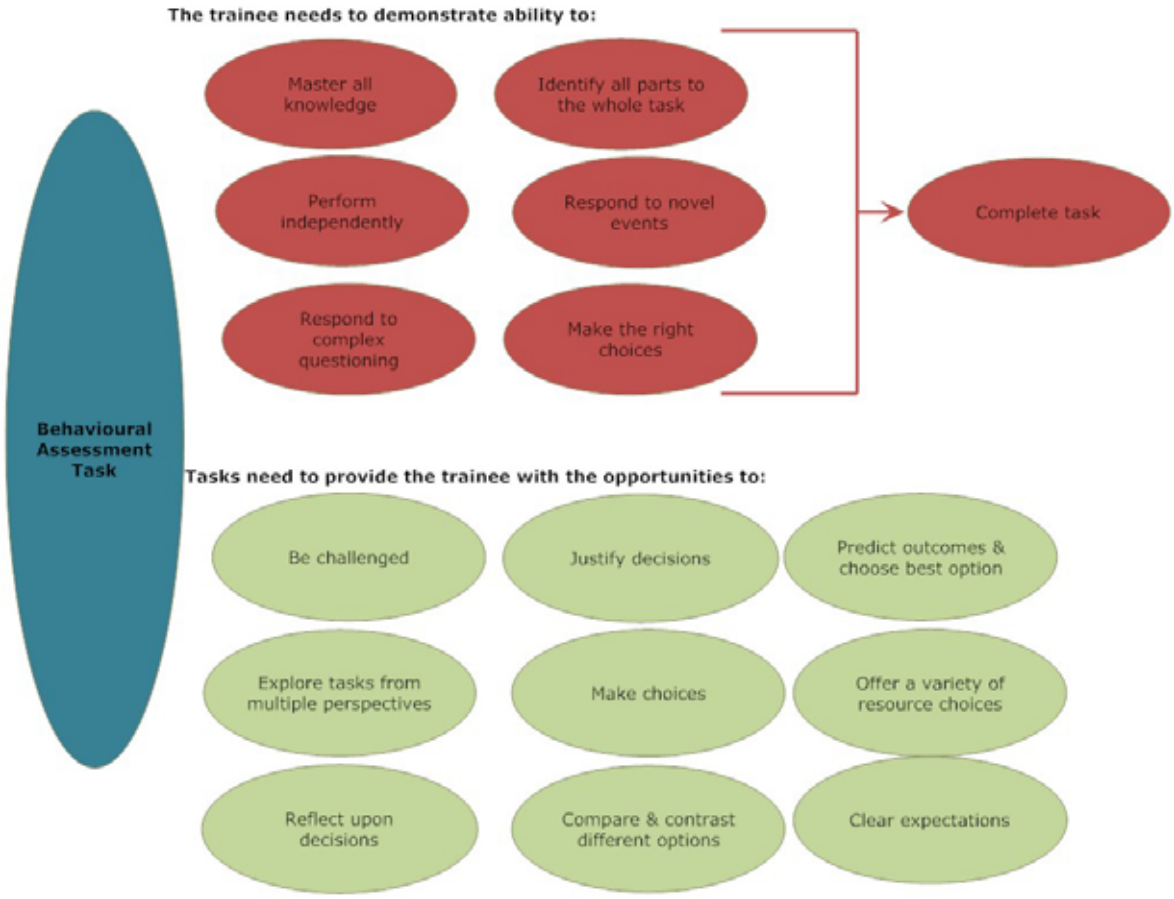

Diagram 3: Behavioural task components

5. Assessor Skills

What skills will the assessor need to be able undertake this mode of assessment? Consider the previous comments regarding apprenticeship assessment.

5.1. Observing Behaviour

This is a complex and thought-consuming process for the assessor. Checklists are an ideal tool; however, what the resources sector does not want to see is the use of inadequate checklists that do not drill down to the exact behaviour the assessor wants to observe. Assessors I have worked with in the past have created effective checklists by observing the competent professional completing the selected tasks; documenting a detailed description of the stages of the task from those observations; and reading the Training Package to maintain standards.

Diagram 4 outlines the kaleidoscope of considerations an assessor needs to examine when observing a trainee completing a behavioural assessment task.

Diagram 4: Kaleidoscope of assessor considerations

5.2. Questioning

Open-ended questions address the essential concepts, processes, and skills that go beyond the specifics of instruction to define a subject area. In general, they require complex thinking and yield multiple solutions. Open-ended questions require teachers or evaluators to interpret and use multiple criteria in evaluating responses.

Such questions also require more from students than simply memorizing facts. Open-ended questioning is an excellent way to assess if a trainee is able to transfer

the new knowledge to the workplace operations. This questioning technique will assess the trainee's ability to:

- Explain their understanding of what is happening in their own words;
- Demonstrate use of knowledge in a new situation;
- Predict;
- Compare, contrast, and differentiate;
- Break knowledge into parts;
- Make judgements;
- Defend course of action; and
- Design, rearrange, reconstruct.

An open-ended question is an unstructured question in which possible answers are not suggested. Such questions begin with:

Open-ended questions focus on students' understanding, their ability to reason, and their ability to apply knowledge in less traditional contexts. Such questions can communicate levels of student achievement more clearly than multiple-choice items and give better guidance for instruction.

5.3 How can open-ended questions incorporate self-reflection within the assessment process?

Self-reflection is one of the most powerful learning or assessment tools a trainer can use. Having a trainee justify the *why* of their actions provides the assessor with an opportunity to see the trainee use the underpinning knowledge in a context that requires them to use higher-order thinking. That is, they will have to make judgements, reconstruct knowledge, and compare and contrast concepts. This assesses their higher level of thinking when in the workplace.

This paper has introduced a number of theories that question why assessment of knowledge recall does not prove competence in the workplace. It has demonstrated that a trainee must internalise or own the new knowledge, in addition to applying the new underlying principles, when creating solutions to new problems or responding to novel events. That is, the trainee must utilise higher-order thinking. Adopting an assessment methodology that includes behavioural observation and the use of open-ended questions will ensure that the assessor has gathered the best evidence of competence.

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