WORKSHOP SESSION SUMMARY

POST-CONFERENCE PROCEEDINGS

2018 National Trainers' Exchange

1. **Session Title and Presenter's Contact Information:**

Workshop title: #35 Using Brain Science to Present Better Training
Presenter (s) Name: Tim Manning and Barbara McCabe
Presenter Organization: IUOE National Training Fund
Presenter Email: Timothy_A_Manning@rl.gov, bmccabe@iuoehazmat.org

2. **Workshop Summary:**

Regardless of the method used – classroom lecture, webinar, e-learning, blended learning, and so on – and no matter what the topic, the goal of training is to communicate a message that engages the students, make it stick in their minds, and persuade them to take action (hopefully the correct one). To help trainers create presentations that can accomplish this, it is helpful to understand how their students' brains work. If you want to be more persuasive, memorable, and engaging as a presenter/instructor, you need to take advantage of understanding how the brain learns and how it applies to workplace learning. This session will discuss the most important aspects of the science of *how the brain works* in relation to adult learning and how you can apply this understanding when developing your classroom presentations, hands-on activities, and some e-learning methodologies.

3. **Methods:**

Participants took the VARK (Visual, Auditory, Read/Write, Kinesthetic) and the VAK (Visual, Auditory, Kinesthetic) questionnaires to determine what types of learners they are. After determining the results of the questionnaires, discussion was held on how students actually have a preference for how they learn but not an actual "learning style". Learning Styles refer to the students' self-reported media preferences. Endless potential frameworks for categorizing learning styles exist, but the most popular one divides students into three types: visual, auditory, and kinesthetic learners. According to this theory, a self-reported visual learner learns best through visual content, while an auditory learner finds visual content less helpful than auditory material. There is an overwhelming consensus among scholars that no scientific evidence backs this "matching" hypothesis of learning styles (Kirschner 2017, Pashler 2008, Simmonds 2014). Studies deny that students learn *better* through a self-reported learning style. Instead, scholars increasingly call for educators to replace 'neuromyths' with resources and strategies rooted in evidence from cognitive and adult learning theory.

What does your learning preference from the VARK questionnaire say about your media preferences for learning?

1. Visual: you learn best from the depiction of information in maps, spider diagrams, charts, graphs, flow charts, and other devices that people use to represent what could have been presented in words. This does not include still pictures or photographs of reality, movies, videos or PowerPoint.

2. Auditory: you learn best from lectures, group discussion, radio, email, using mobile phones, speaking, web-chat and talking things through. Email is included because it is often written in chat style.
3. Read/Write: you learn best from information displayed as words. This emphasizes text-based input and output.
4. Kinesthetic: you learn best from demonstrations, simulations, videos, and movies of "real" things, case studies, and practice and application.

What does your learning preference from the VAK questionnaire say about your media preferences for learning?

1. Visual: you learn best from visual displays such as diagrams, illustrated textbooks, flipcharts, interactive whiteboards, and hand-outs.
2. Auditory: you learn best through verbal lessons, discussions, talking things through, and listening to what others have to say.
3. Kinesthetic: you learn best through a hands-on approach and actively exploring the physical world around you.

What does this tell us as educators? As educators, we need to present information in the most appropriate manner for the content and use strategies rooted in evidence from cognitive and adult learning theory.

Brain science can help with training by looking at basic concepts, such as:

- People learn more easily when they are trained intermittently over a long time rather than cramming the same total duration of training into a continuous period.
- Research reveals that people forget approximately 70 percent of what they learn within 24 hours and 90 percent within a week.

Models of information processing have input (stimuli), storage (working or short-term memory), long-term memory, and finally output (response). When our senses are triggered by a stimuli or input, our brains briefly store the information. Visual storage lasts for approximately 1 second and auditory storage lasts for approximately 4 seconds. To retain information for a longer period, it must be encoded and transferred to working or short-term memory.

The maximum number of items that can be held in working or short-term memory is 7≠2 and the time to search a list of items for a specific item increases linearly as the number of items in the memorized list increases. Chunks help the working or short-term memory in a number of ways;

1. To increase the capacity of the working memory, you can *chunk* information into familiar units, regardless of size, and these can be recalled as an entity. *C.A.T.D.O.G.R.A.T.* can be chunked as three familiar entities: *CAT DOG RAT*.
2. Chunks can also make items easier to remember. The numbers *458 321 691* are easier to remember than *458321691*.
3. The more meaningful the chunk the easier it is to remember, such as *IB MJF KTV* is more difficult to recall than *IBM JFK TV*.

The practical implications of all of this is (1) avoid presenting more than five to nine chunks of information for people to remember, (2) present information in meaningful chunks, and (3) provide training on how to recall information by chunking.

The information in working or short-term memory is transferred to long-term memory by coding it, by supplying meaning to the information and relating it to information already stored in long-term memory. To recall more information it must be analyzed, compared and related to past knowledge. Long-term memory can diminish over time if we do not refresh our knowledge.

The Forgetting Curve, created in the late 19th century by the German psychologist Hermann Ebbinghaus, introduced ways to combat the forgetting curve:

- Reinforce training regularly.
- Improve clarity.
- Make it relevant.
- Make it interactive.

One final myth dispelled is that of multitasking. According to MIT neuroscientist Earl Miller, one of the world's experts on divided attention, there is no such thing as "multitasking." People cannot actually do two things at one time. By switching cognitively between each of those tasks we hope to accomplish at a very rapid rate makes us worse at everything we are trying to do. It is similar to having too many tabs open on your computer – it takes up RAM and makes the computer less productive.

4. **Main Points/ Key Points Raised from Participants:**
   We all use adult education training techniques. We all discuss different theory and models of learning and curriculum development. We seldom if ever talk about how the brain works to remember/use all the information that we give the adults/people in our classroom/training sessions.

   Attendees at the session completed VARK and VAK learning styles Questionnaires to determine if the type of learner they have always believed they were matched what the questionnaires said, and then whether the two questionnaires matched. Once those were completed it was discussed how there really is not a "style of learning."

   Questions from attendees focused on short- and long-term memory and how people recall what they learned.

5. **References:**
   Human Factors in Engineering and Design, Sanders Mark S. and McCormick Ernest J. Seventh Edition.

6. **Workshop Handouts/ Resources:**
   VARK Questionnaire, VAK Questionnaire, and PowerPoint.