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- [The Neuroscience of Learning and Development: How can Evidence Legitimize Self-Reflection?](#)

MAY 16, 2017 11:30 AM BY [MARILEE BRESCIANI LUDVIK, PH.D.](#)

"We do not learn from experience, we learn from reflecting on experience."

— John

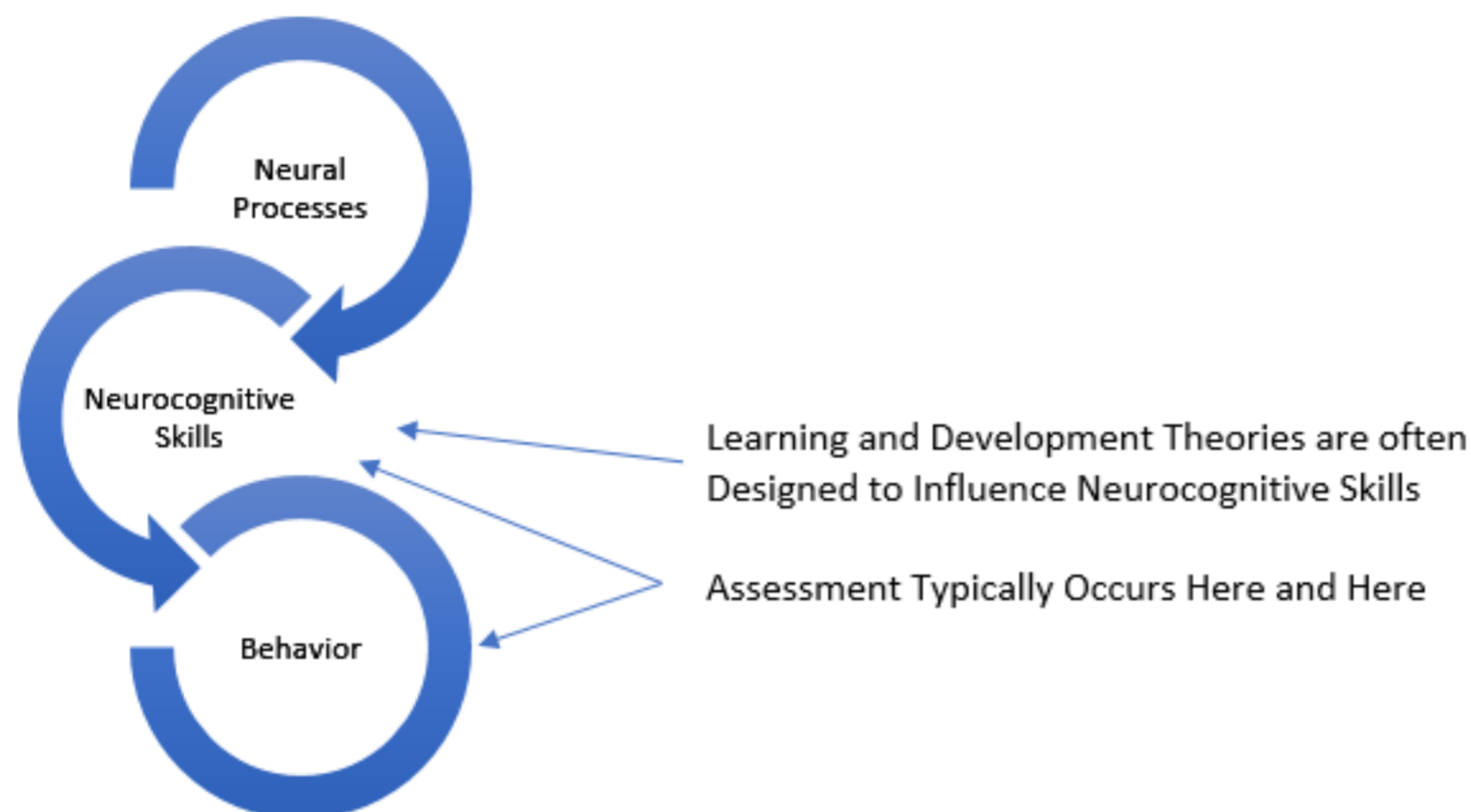
Dewey

When is the last time you took time to reflect...I mean *really* reflect?

It's hard, isn't it? It is not like anyone gets assigned time to simply reflect with no expectation of a "product" that will result from investing time in reflecting. And when we build in reflective pedagogy, it is often constrained by a specific time element; as in "this reflection is due on [insert date]." Furthermore, we often advise the student that we will be evaluating the depth of the reflection with "this rubric," which leaves me wondering whether they are simply just going to "write to fit the rubric" instead of reflecting, writing, and then using the rubric to self-assess before reflecting and writing some more....

Cognitive neuroscientists widely accept that reflection is a malleable cognitive skill (Zelazo, Blair, & Willoughby, 2016). What that means is that we can measure structural changes in certain portions of the brain and the functions related to that portion of change in the brain, as well. This is made evident via 1) measured changes in brain structure and function (per imaging machines), 2) first-person self-report, and 3) observed behavior. The basis for the theoretical characterization of reflection is that it is a neurocognitive skill – one of many that is necessary for executive function. Executive functions consist of many "outcomes" we attempt to influence with our educational systems—such as paying attention, reflection, the ability to regulate emotional reactivity, perspective taking, inhibitory control, working memory, adopting and using certain rules (habits), and cognitive flexibility. Figure 1 illustrates this process and notes where we tend to focus

Figure 1. Theoretical Characterizations of Executive Function



In essence, when students are taught how to reflect (one of the neurocognitive skills) and then do so, it can be observed as a structural change in the brain as well as an observed functional behavior of reflecting (Espinet, Anderson, & Zelazo, 2013). What is also important to note is that without the participant's awareness that they are reflecting, this data is not as easily confirmed. What I mean is that it is very helpful in the process of measuring reflection for the student to attest to "awareness of the act of reflecting" so that what is seen in the imaging can be aligned with the real time function. So, what do researchers do when their participants are not aware they are engaged in the functional activity that is being evaluated? Repeat the experiment until assumptions of observed structural change correlating with observed functional change can be verified by the data.

If you ask a neuroscientist, how much evidence is needed to assert a positive correlation of observed brain structural imaging with corresponding functional behavior, they will tell you that not enough evidence has been acquired to assert anything as a solid correlation particularly because the brain's functional activity is so dynamic; still, there are some consistencies that seem compelling and therefore actionable. Nonetheless, that is why they continue their research in a highly collaborative manner. At this point, are you finding it hilarious that we, as educators, now have to defend the value of a college degree with a handful of performance metrics and years of outcomes-based assessment program review data? I do... and then when I stop laughing at this notion, I realize how I have been feeding right into it.

What I mean is this: I used to be a skeptic of first-person, self-report data. I used to think it had no value. I believed strongly that we needed direct evidence of learning and development—"behavior data" if you will. While I still believe that we need to continue to collect "behavior" data, I have now become a believer that we need to ALSO cultivate students' awareness and reflection capabilities—particularly because of the relevance of awareness and reflection for a student's ability to self-regulate and optimize their executive functions (the educational outcomes we desire). Basically, what is the point of being able to behave as if you can do something if you are unaware that you can do it and have no time to reflect on its meaning and value?

In translating neuroscience research into educational practice and assessment, I realize that not only do we have to educate students on how to reflect and provide them with authentic, messy reflection opportunities, we also have to help them adjust their neural structure of attention and emotion regulation (e.g., the ability to regulate emotional reactivity) in order to cultivate awareness of what they are learning, how they are learning it, and how what they are learning may be meaningful or not. In so doing, we begin to legitimize their reflections as valid first-person, self-report data and likely inform much more meaningful refinement of the learning and development opportunity. This may even lead to providing evidence of the value of a degree.

How fun is that?

In closing, I invite us to consider the following questions:

- Where can we intentionally design and assess how we are inviting students to cultivate their attention, emotion regulation, awareness, and reflection (neurocognitive skills)?
- What kind of resources do we need in order to cultivate these kinds of neurocognitive skills?
- And having done so, where can we invite in authentic reflection to help triangulate learning and development evidence (e.g. reflective student learning portfolios)?
- What do we have to do differently to embrace the messiness of authentic reflection as a data collection form?
- And how do rebuild the trust in first-person, self-report reflective data as a valid form of data collection; perhaps much more so than the current performance indicators being used to fund education and validate the value of a degree?
- What else do we need to consider?

I would welcome hearing from you and learning from your first-person reflective experience. Please share in the comment box below.

References

Espinet, S.D., Anderson, J.E., and Zelazo, P.D. (2013). Reflection Training Improves Executive Function in Preschool Children: Behavioral and Neural Effects. *Developmental Cognitive Neuroscience*, 4: 3-15. doi: 10.1016/j.dcn.2012.11.009

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