

What is the Role of Executive Function in Expert Learning?

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Abstract

Following directions, beginning an assignment, knowing how to respond to open-ended questions or prompts, managing time and materials, making a plan, and prioritizing what is most important rely on the brain's most complex systems. When such demands outweigh a learner's capacities, educators may observe disengagement, anxiety/irritability, or other task-avoidant behaviors (e.g., impulsivity, procrastination). What do these behaviors signal and how do we best support all learners proactively in order to promote and build the most efficient expert learning skills and strategies? Across contexts, educators can foster executive function (EF) skill development. Doing so starts with an accurate assessment of a learner's EF functioning, as well as their ability to enact or perform tasks that require EF skills. Next, educators can proactively design and plan curricula to support EF skill acquisition and performance in learning environments, which can have a positive effect on learners. The principles of Universal Design for Learning (UDL) can assist to integrate resources, provide explicit exposure to, and establish supports in the environment to shape experiences and behaviors to improve expert learning.

INTRODUCTION

Across an ever-changing educational landscape, educators aim to fine-tune and enhance their educational practice to provide learners with the most enriching, engaging, and empowering learning environments possible. Universal Design for Learning (UDL) provides a framework to accomplish this pursuit in proactive, intentional ways (Meyer, Rose, & Gordon, 2014). The UDL guidelines are a roadmap to educators for best understanding how learning can be supported. In order to capitalize on the power of UDL, it is imperative to design learning environments that promote and support expert learning skills, including executive function skills. The UDL guideline for providing multiple means of expression targets the goal of activating executive function to help students engage in strategic, goal-directed actions. However, there is still confusion in the field around what executive function is and is not, as well as how to best support the development of executive function skills in learning environments.

EXPERT LEARNING

Conceptualizing what expert learning looks like can help individual learners successfully navigate complex, novel situations. Understanding how each individual learns best across contexts can aid in breaking down barriers that may have previously gotten in their way. By developing skills and strategies to purposefully engage in learning experi-

ences, individuals can take on more goal-directed tasks and action (Meyer, Rose, & Gordon, 2014). The role of executive function, and the potential to develop these capacities, can bolster the process and lead to a greater capacity for expert learning.

LEARNER VARIABILITY

The fields of cognitive neuroscience, developmental psychology, and education are elucidating nuances in how learner variability can differ across individuals and contexts (Meyer, Rose, & Gordon 2014). Apparent and subtle differences can manifest uniquely from learner to learner and may reside in either a skill or performance strength or deficit. This is especially evident in the identification of executive function (EF) and dysfunction. Whether there is an established neuro-cognitive deficiency, mental health challenge, or lack of exposure to learning and practicing specific EF skills, executive dysfunction can impact a learner's performance. Despite this seemingly grim reality, research shows that such skills are trainable and can be improved with practice and time (Bertin, 2015; Best & Miller, 2010; Dawson & Guare, 2004, 2009; Diamond, Prevor, Callender, & Druin 1997; Meltzer, 2007, 2010; Miyake & Friedman, 2012; Steinberg, 2017).

WHAT IS EXECUTIVE FUNCTION?

Executive function may be considered differently among experts in the field (Nigg, 2017; Miyake, Friedman, Emerson, Witzki, Howerter, & Wager, 2000; Miyake & Friedman, 2012). However, there are three core EF constructs that are considered both interrelated and distinct: inhibitory control, working memory, and cognitive flexibility (Best & Miller, 2010; Nigg, 2017; Miyake et al, 2000; Miyake & Friedman, 2012) that contribute differently as learners better manage their thoughts, emotions, and behaviors to carry out complex tasks. EF will be discussed here through those three core skills with the appreciation that executive function is also frequently considered an umbrella term for many interconnected skills. As the frontal lobe of the brain develops and connections are established, skills relative to planning, organization, time management, attention and focus, task initiation, and other goal-directed approaches are more readily accessed and engaged (Best & Miller, 2010; Steinberg, 2017).

EF may commonly be referred to as air traffic controller, conductor of an orchestra, or even CEO of the brain (Dawson & Guare, 2004 & 2009; Bertin, 2015). These core functions allow for higher level tasks and challenges to be taken on in a more strategic and goal directed way. However, executive dysfunction may occur at varying

stages of development. EF skills may not be consistently activated or utilized in the same ways, across contexts. This could be a result of trauma, mental health or learning challenges, lack of exposure to the modeling and practice of these skills, or simply a slower development of the frontal lobes (Diamond 1997; Miyake et al, 2000; Steinberg, 2017). However, these skills can be trained and environment can help to shape learning experiences (Best & Miller, 2010; Gallagher, Abikoff, & Spira, 2014; Meltzer, 2007). Learning experiences can be shaped through positive, supportive, and dynamic interactions between context, environment and individual (Bronfenbrenner & Morris, 1998; Lerner, 2008). Ultimately, the intention is to engage and activate executive function skills to be more strategic and goal directed (Meyer, Rose, & Gordon, 2014). To do so, educators can refer to the UDL guidelines and principles to provide options to support EF development by providing enriching environments that set learners up for success. This may include skills and strategies ranging from modeling and explicitly teaching time management, organization, and self-regulatory skills to building in opportunities for progress monitoring through the use of rubrics, checklists, and guides for success, specific and supportive feedback that emphasizes the process of learning, rather than just the outcome. The addition of opportunities for mindfulness, reflection, access to different tools and strategies in a safe and nurturing space where all constituents learn from attempting challenges and making mistakes are foundations for encouraging expert learning through EF skill development.

Educators can inspire, or re-ignite, a sense of confidence and understanding about what expert learning means, especially for disengaged or struggling learners, made possible by teaching, supporting, and scaffolding executive function skills in learning environments.

Consider Your Executive Functioning Skills

As adults we often take for granted all that goes into starting, executing, monitoring progress, and completing a task. Take a moment to reflect on how you currently navigate through your day? Consider how your EF skills support the navigation of a typical day.

Check all that apply:

- I use a digital or paper-based planner to record and keep track of appointments.
- I use a checklist or digital tool to keep track of tasks or assignments I am responsible for.
- My watch or clock help to guide me to be on time.
- A phone notification system alerts me when I need to prepare for a transition, event, or task.
- I have a routine every morning and evening.
- Exercise and healthy eating helps me to regulate my emotions and feel good each day.

- I make a plan to celebrate when I accomplish a challenging or novel task or goal.

Consider how integrating EF supports into learning environments can assist learners to determine what strategies or tools work best for them to bolster executive function and expert learning skills.

NEXT STEPS

Educators can influence expert learning skills by increasing a mindfulness around the demands and expectations in learning environments. These increased demands may impede a learner's performance, as their perceived resources or skills may not match what they are asked to do. In such instances, a learner may not have a requisite set of EF skills, or they may not be able to effectively utilize needed skills.

Across development, learners may utilize strategies to adapt to different situations and environments to be successful across contexts. As UDL enthusiasts, we know that variability is the norm, rather than the exception (Meyer, Rose, & Gordon, 2014). Changes in context at an individual level may be impacted by how the learner is feeling on a particular day, or how much information is presented at a given time. Despite being successful in the past, differences in the activation of an EF skill, or how they can show what they know may impact how each learner feels about learning. The UDL guidelines and principles provide a framework to allow for mindful acceptance of how the learning environment can impact executive function skill development. When considering and embedding supports for executive function into learning environments through a UDL approach, across development, greater opportunities to strengthen expert learning skills are possible.

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