Kool Tools 4 Students

**http://kooltools4students.weebly.com/at-and-executive-functioning.html**

**Assistive Technology to Support Executive Function**

**What are Executive Function Skills?**

There is a great deal of literature about executive functioning and executive function disorder; and many definitions of what is considered an executive function skill. The Universal Design for Learning (UDL) guidelines state that executive function skills are associated with the prefrontal cortext in the brain and allow humans to overcome “impulsive, short-term reactions to their environment and instead set long-term goals, plan effective strategies for reaching those goals, monitor their progress, and modify strategies as needed” (citation version 1.0).   In their book, “Executive Skills in Children and Adolescents,” Peg Dawson, EdD and Richard Guare, PhD state “These [executive function] skills help us create a picture or goal, a path to that goal, and the resources we need along the way”(p 2).  They also identify 10 types of executive function skills that work together; namely: Sustaining attention, shifting attention, inhibiting impulses, initiating activity, planning and organization, organization of materials, time management, working memory and emotional control (ibid, pp 24-28).

For the purposes of this discussion, I will use the following definition of executive function:  *Cognitive abilities associated with the prefrontal cortex that are required to initiate or stop one’s actions, monitor and moderate behavior, create a plan for future actions, and pay attention to and remember details.*

To illustrate how a student uses Executive Function skills let’s consider Tom, a fifth grade student.  Tom has a research paper that is due in three weeks.  He must analyze the assignment and clarify the parameters or desired outcome (i.e., topic from which he can choose, number of pages, deadline, and other guidelines set by the instructor). Based on this analysis, Tom must create a plan to accomplish the task and use his organization skills to consider the steps necessary to conduct research and write the paper. Tom then identifies required resources and develops a timeline to meet the three-week deadline. With more information available, Tom adjusts or moderates the steps identified earlier to make sure he has enough research data and enough time to write, edit and submit a stellar paper. Finally, Tom effectively works toward his goal by organizing his research data, managing his time, performing tasks in a sequential order, monitoring his progress, and making adjustments as needed.

Tom is fortunate to have strong executive functions skills.  Students with weak executive skills have difficulty meeting the cognitive demands of analyzing, planning, organizing, scheduling, and completing tasks in a timely manner. They have trouble forming and bringing together their thoughts, providing details in an organized, sequential manner and difficulty retaining information while doing something else (poor working memory).  Dawson and Guere state that these students most often struggle with “sustained attention, performance monitoring, inhibition on impulses, and goal directed persistence” (p14).

**Screening and Assessments**

Typically, behavior rating scales and observations at school and home are the best indicators of executive functioning. Self-assessment rubrics like Organization Inventory by Onion Mountain also provide information about executive functioning deficits and areas that require supports.

**Interventions**

Executive function interventions fall into two broad categories; (1) Teaching and modeling desired skills and (2) Altering the external environment to reduce the need for executive skills. From a UDL framework, the goal is to balance the two types of interventions by embedding scaffolds for learning and gradually fading the supports.

Interventions – Teaching and modeling skills

“We draw a map for children and prompt them to refer to the map so they don’t get lost. With practice, they no longer need either the map or the external cues because they have internalized them and can follow the procedure on their own.” (Dawson and Guare, page 107).

Executive functioning is not something we often think about when we are using the skills.  In some ways they are “invisible talents” that we often take for granted.  However, students with learning disabilities need explicit strategy instruction, scaffolding and modeling of executive skills until they are able to internalize them.

The model for teaching executive function skills is as follows:

1.      Start external – present and model the skills first;

2.      Gradually fade the instruction, supervision and cues;

3.      Eventually, (over a long period of time), they will internalize the skills (Dawson and Guare, p. 49).

It is important to model the use the executive skills to make students aware of them and to help them internalize needed skills and processes. Teaching routines include:

1.      Cuing students before, during and after a task or problem to help them learn and practice specific procedures.  Cues can be pictures, words or audio resources.

2.      Teachers can “live out loud” or narrate as they solve a problem, make a plan or determine how to organize a project.

3.      Providing to students templates that walk them through a process.

4.      Distributing and reviewing scoring rubrics which spell out every step and expectations for good performance.

5.      Teachers can help students get started or plan required steps and let students complete the steps on their own.

6.      Adults can remind students to check his or her schedule and make students aware of the resources available to him before and during a work session.

7.      Teachers and parents can debrief a project or work session by talking about what did not work and making a plan to do it differently next time.

Interventions – Modifying external environments

Providing external supports, controls, and schedules – anything that reduces the necessity for the student to use executive skills is an example of modifying the external environment.  There are a number of ways that teachers can alter their methods to provide external supports:

1.      Teachers can shorten tasks by reducing the number of steps involved.

2.      They can shorten teaching routines to reduce the load on working memory.

3.      Teachers can change open-ended tasks to close ended by using fill-in-the-blanks, true/false tests and providing words for fill-in-the-blank questions.

4.      They can provide prompts or choices to students instead of asking them to come up with their own ideas, and post goals, objectives and schedules in obvious places.

**Assistive Technology (AT)**

I have organized the materials into three big buckets that support Executive Functioning. They are *Can you Hold This Please?* (working memory supports), *Where Am I & Where Should I Be?* (self-management and time-management tools), and *How am I Doing?*  (self-reflection and higher order thinking tools).  Many AT tools can be used in more than one category even though they may be listed only once.

**Can You Hold This Please? (working memory supports)**

“One of the limits of executive function is that imposed by the limitations of so-called working memory. This “scratch pad” for maintaining chunks of information in immediate memory where they can be accessed as part of comprehension and problem-solving is very limited for any student and even more severely limited for many students with learning and cognitive disabilities. As a result, many such students seem disorganized, forgetful, unprepared. So, wherever short-term memory capacity is not construct-relevant in a lesson, it is important to provide a variety of internal scaffolds and external organizational aids to keep information organized and “in mind.” (Source: UDL Guidelines 1.0)

Examples of Assistive Technology supports include:

·         Graphic organizers and templates for data collection and organizing information

·         Embedded prompts for categorizing and systematizing

·         Checklists and guides for note-taking

[MyHomework](http://www.inov8-ed.com/app/myhomework) (Free IPad, IPhone, and IPod Touch app)

[MyHomework](http://www.inov8-ed.com/app/myhomework)allows you to enter your homework by subject or due date. A good organizational tool for upper elementary or high school students. [Macworld’s AppGuide](http://www.macworld.com/appguide/index.html) also has a[great review](http://www.macworld.com/appguide/app.html?id=66728) of this application.

Screenshots:

[Corkulous](http://www.inov8-ed.com/app/corkulous) ($4.99 IPad, IPhone, and IPod Touch app)

[Corkulous](http://www.inov8-ed.com/app/corkulous) – Can be used to create to do lists, share information, etc. It is a “corkboard” where a student can map out ideas, brainstorm, and tore notes, etc.  There is a YouTube video giving an overview of the application.

[Soundnote](http://www.inov8-ed.com/app/soundnote)($4.99 IPad, IPhone, and IPod Touch app):

[Soundnote](http://www.inov8-ed.com/app/soundnote) syncs audio and notetaking at the same time. It is great for typing notes with the occasional drawing. So if a student is having a hard time keeping up with the notes or has difficulty writing, he/she can write one word, hit audio and listen to the playback of the lecture when he/she taps on that one word later. Most appropriate for high school and university students. There is a [good review of Soundnote](http://notebooks.com/2010/09/03/soundnote-ipad-app-of-the-week/) from [Notebooks.com](http://notebooks.com/) which awarded it iPad App of the Week.

Screenshots:

[Note Taker HD](http://www.inov8-ed.com/app/notetakerhd)($4.99 IPad, IPhone, and IPod Touch app):

The big key benefit to [Note Taker HD](http://www.inov8-ed.com/app/notetakerhd) is that it was designed from the beginning to be a written notetaking application. You can write with your finger (or a stylus like the [Pogo Sketch](http://tenonedesign.com/sketch.php)) in the larger area at the bottom of the screen. You can write in large (and messy) letters, but then see your full page of smaller notes at the top. A student does not have to write neatly or precisely when notetaking but still benefits from a full page of notes. You can also store and organize all your notes in sections to retrieve them later. Some more detailed reviews on [Appadvice.com](http://appadvice.com/appnn/2010/06/dan-bricklins-note-taker-hd/) and[iPad.net](http://www.ipad.net/ipad-app-reviews-note-taker-hd-leads-the-way.html).

Screenshots:

[Soshiku](http://soshiku.com/) is a free personal planner designed for high school and college students. [Soshiku](http://soshiku.com/) lets students organize their assignments by course, add assignments, and receive text message and or email reminders before each assignment is due. Students can add assignments to their calendars directly on the Soshiku website or via text message. Registering and getting started with [Soshiku](http://soshiku.com/) is quick and the user interface is very intuitive and easy to learn.

**Where Am I &Where Should I Be? (organizing supports)**

To help students become more plan-full and strategic, we need to put in place  cognitive “speed bumps” that prompt them to “stop and think” (Source:  UDL Guidelines 1.0).  Students need graduated AT scaffolds that will help them implement strategies and make moment-by-moment decisions in line with their goals.

Examples of Assistive Technology supports include:

·         Embedded prompts to “stop and think” before acting;

·         Checklists and project planning templates for setting up prioritization, sequences and schedules of steps;

·         Embedded coaches or mentors that model think-alouds of a process; and

·         Guides for breaking long-term goals into reachable short-term objectives

Digital calendars like *Outlook, Google Calendar, Watchminder* (a watch that can be programmed to give text or verbal messages to the wearer) are helpful to students with executive function deficits.

[Time Timer](http://www.inov8-ed.com/app/timetimer)($4.99 IPad, IPhone, and IPod Touch app)

[Time Timer](http://www.inov8-ed.com/app/timetimer) is an app based on the visual timer that is commonly used with students in school who need a visual timing system for behavioural intervention or for organization. Students can actually see time passing on the timer and solves the problem for those who ask, “how much time is left?” Useful for elementary students.

Screenshots:

[Picture Scheduler](http://www.inov8-ed.com/app/picturescheduler) ($2.99IPad, IPhone, and IPod Touch app)

[Picture Scheduler](http://www.inov8-ed.com/app/picturescheduler) – Allows the student to create picture task and to do lists. Also allows you to set alerts for when to do this task. We like this app because it’s multi-use; it can be used to show step-by-step pictures of a task (ex. how to cook macaroni) or it can be used as a visual “to do” list. You can add audio to the picture as well, very helpful for many students with LD. All levels.

Screenshots:

[43 Things](http://www.43things.com/) is an interesting way to track goals and achievements. [43 Things](http://www.43things.com/) is not a personal organizer, it's a goal tracker. The service is simple, users enter a list of things that they want to accomplish and other users can "cheer" them on until the goal is reached.

[Squareleaf](http://squareleaf.net/) is a simple system for creating and managing online sticky notes. To use[Squareleaf](http://squareleaf.net/) just register for an account and begin creating notes. Your notes are displayed on an online "whiteboard." On your [Squareleaf](http://squareleaf.net/) whiteboard you can arrange your sticky notes in any pattern that you like. The size and color of the sticky notes can also be adjusted.

**How Am I Doing? (metacognition)**

Metacognition requires the use of a broad set of skills and there is no one way to teach these skills.  To develop important self-evaluation and self-monitoring skills, students require tools and teaching routines that help them self-monitor and opportunities to evaluate and do something with information *while*they learn.

Examples of Assistive Technology supports include:

·         Guided questions for self-monitoring;

·         Representations of progress (e.g. before and after photos, graphs and charts showing progress over time);

·         Templates that guide self-reflection on quality and completeness; and

·         Differentiated models of self-assessment strategies.

Assistive technology that lessens the cognitive burden of performing mechanical tasks, along with guided mentorship and informative feedback are needed.  For example, text-to-speech programs that support students struggling with decoding free the mind to consider and engage with the meaning of text.  Study guides, reading outlines ([www.donjonhston.com](http://www.donjonhston.com/) ), and rubrics ([www.rubistar.4teachers.org](http://www.rubistar.4teachers.org/)) are important.  Digital photos and images, video software ([www.animoto.com](http://www.animoto.com/)) can be used by students to represent progress, evaluation and analysis.

Finally, while not discussed fully in this paper, another part of metacognition is critical thinking.  The TregoEd is a nonprofit created by The Kepner Tregoe Organization, a training organization that provides critical thinking skills to execcuties.  TregoEd created SCAN, a web-based, critical thinking tool for students<http://www.tregoed.org/teachers/about-scan.html>.  Middle and high school students examine real life health, character education and teen-related issues from different points of view using authentic scenario and role-playing.  There are built-in steps and prompts to focus thinking and discussion while building student understanding.  They have over 100 authentic, ready-to-use scenarios and teachers can use the guidelines to create their own lessons also.