Addressing Executive Function at the Secondary Level

In the Classroom and as an RtI Intervention

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What is Executive Function?

"Executive Function" is a term used to describe a set of mental processes that help us connect past experience with present action. (NCLD Editorial Staff. March, 2009.) Features of executive function give us the ability to set goals; plan how to complete a project; prioritize tasks; organize time, materials and information; shift approaches flexibly; hold and manipulate information in working memory, and to monitor our own progress. (Meltzer, L. 2010.) *Promoting Executive Function in the Classroom*. 3). In light of these definitions, the connection between effective executive function and success in school becomes readily apparent. The following list describes critical skills for academic success that are often taken for granted, especially at the secondary level: grades 6-12.

- Make plans
- Keep track of time
- Keep track of more than one thing at a time
- Meaningfully include past knowledge in discussions
- Engage in group dynamics
- Evaluate ideas
- Reflect on one's work
- Change one's mind and make mid-course corrections while thinking, reading and writing
- Finish work on time
- Ask for help
- Wait to speak until called on
- Seek more information when needed

- Executive Function Fact Sheet
NCLD Editorial Staff. March, 2009

For many students, the lack of one or several of these executive function skills can adversely affect their ability to succeed in school. This white paper will investigate the nature and importance of executive function processes, and review explicit strategies for improving them. From years of experience, educators know that it is "… ineffective to teach study skills independent from the learner who uses them." (Petersen, Lavelle, Guarino, 2006). Similarly, teaching strategies for executive function will be most effective if they are incorporated into the classroom or as an RtI intervention once the needs of the learner have been determined. By focusing on *how* students learn, we can then address *what* students learn, at the same time providing students with transferable skills for college and career.

Need for Executive Function

Along the educational spectrum, more is being required of students at an earlier age. Several factors play a role in this acceleration of content and skills, namely: increased emphasis on standardized testing from No Child Left Behind legislation; the impact of access to technology on learning, and changing parental expectations. Recess minutes have been disappearing from elementary schools and the nature of assignments such as long-term projects requiring research, individual responsibility for homework, and multi-step math word problems occur in ever younger grades. These types of cognitive processes are difficult to complete without sophisticated executive functioning processes. However, having executive function expectations without explicit training in the related processes leaves students unprepared and can create a sense of anxiety, academic failure, or the desire to withdraw from school.

Due to increased focus on *what* students learn, the systems for *how* students learn have been neglected. In the elementary grades, the number of students assigned to a teacher and the breadth of the curriculum may allow the teacher to model and teach executive function processes. However, at the secondary level, the number of students (120+), along with the focus on departmentalized content, and the assumption of prior instruction of executive function skills, can interrupt the gradual mastery of these skills just when they are most needed for students to meet accelerated expectations. As a result, previously successful or slightly marginal students begin feeling overwhelmed and incompetent. Although the student's academic ability has not changed, inability to complete homework, take notes or hand in assignments on time, and organize time and materials to meet competing demands of multiple teachers, work, and extracurricular involvements, can begin affecting his/her academic progress. "For students with executive function weaknesses, their conceptual reasoning abilities may be stronger than their output and productivity. … As these students enter middle and high school, their difficulties become more evident, due to the mismatch between their skills and the curriculum demands." (Meltzer, 2010. 7)

Another factor that affects student success at the secondary level is emotional self-regulation. While family or peer dynamics can impact a student's academic performance at any age, adolescent developmental changes combined with new awareness of the family/school environment can trigger emotional responses which in turn affect the ability to learn. In such cases, strategies that enhance executive function may be more effective than additional tutoring. As with so many cases involving struggling students, the key is having a trusting relationship in which the circumstances influencing performance can be revealed.

Assessing for Executive Function

Assessing for executive function begins with building awareness among teachers of the nature and importance of executive function skills along with their impact on learning. This should lead to informal, observation-based classroom assessment of students' ability to focus, plan, organize, and manage time, materials and ideas. As struggling students are identified, additional assessments can be administered to determine if executive function is a factor in the student's performance. The Behavior Rating Inventory of Executive Function (BRIEF; Gioia, Isquith, Guy, & Kenworthy, 2000; Gioia, Isquith, Kenworthy, & Barton, 2002) consists of multiple rating forms, a parent questionnaire, teacher questionnaire and a self-rating form for students age 12 to adult. The Metacognitive Awareness System (MetaCOG; Meltzer et al., 2004b; Meltzer & Krishnan, 2007.) is comprised of five rating scales that allow teachers to compare their own judgments with their students' self-ratings of effort, strategy use and academic performance (Meltzer, 2010, 14.). The Executive Skills Questionnaire (ESQ) (Dawson and Guare, 2010, 183-85.) provides forms that parents, teachers, and older students can complete to provide information regarding a student's executive skills strengths and weaknesses.

Other more discriminating assessments are available for determining the strength or weakness of specific executive functioning skills. These assessments are typically administered by educational psychologists or neuroscientists.

Executive Function: Goal Setting

It starts with the first book report, diorama, or science project – feeling helpless, not knowing where to start, or perhaps a general paralysis induced by being overwhelmed by the task. As a child, your teacher may have modeled a step-by-step approach to completing the assignment. Today, your executive functions assist you in determining the series of tasks you must complete in order to achieve the desired result. This is goal setting. As soon as the pace of instruction requires students to learn independently and/or produce a long-term product, goal setting becomes foundational to success. By learning how to set reasonable, achievable goals, students' motivation to continue increases along with their sense of empowerment to accomplish a difficult task. Without concrete goal setting skills, a student may remain anxious and overwhelmed at the prospect of a complex, long range assignment.

Strategies for goal setting include:

- Help students understand their own learning profiles so they can use modalities and techniques that work best for them.
- Understand and envision the endpoint of a task. Having a well-defined target helps to focus students' efforts.
- When students value the task and expect to be successful, they will be motivated to engage in the assignment. Therefore, the assignment should be relevant and defensible as an important learning experience.

- Set **proximal** goals, e.g., goals that can be accomplished in the near future.
- Set **specific** goals, e.g., goals that describe the actual outcome, as opposed to a reminder to "Do your best."
- Set **appropriately challenging** goals, e.g., goals that are based on the student's tolerance for stress and engagement.
- Provide rubrics and samples of completed work to help students visualize the end product.
- Use calendars to help students schedule and pace the tasks that lead to completion of the project. (www.scholastic.com/kids/homework/calendar.)
- Use graphic organizers to synthesize and summarize key concepts.

(Meltzer, 2010, 60-69.)

Executive Function: Planning and Prioritizing

Planning and prioritizing is a more descriptive term for what is commonly called 'time management.' With the advent of social networking sites and hand-held computers, perceptions of time and how it is used have become increasingly complex for adolescents. Consider how difficult it is to avoid the distractions and interruptions that come with being connected 24/7 through blogs, Twitter, texts, email and Facebook. One change in Facebook 'status' generates hundreds of immediate reactions that in turn demand hundreds of comments. Add to this the fact that students have very little control over how their time is allocated. Between school, homework, extracurricular activities, and part-time jobs, every waking minute is scheduled. And yet, "Effective planning and prioritization lead to efficient time management, which in turn has been found to increase productivity, alleviate stress, and have a positive effect on students' learning and achievement" (Misra & McKean, 2000). Clearly, there is a need for explicit training for planning and prioritization, especially to prepare students to manage the blocks of unscheduled time they may encounter in college or career.

Strategies for planning and prioritization include:

- Develop a 'sense of time' by noting when time 'flies' and when it drags. Monitor how much time typical activities take. Keep a log of frequency and length of time used for social networking, etc.
- Practice estimating how long a task might take to complete. Compare the actual length of the activity and the estimation.
- Prioritize tasks by categorizing them as: **Obligations** ("have to"), **Aspirations** ("want to") and **Negotiations** ("choose to"). Then allocate time according to the category.
- Rearrange schedules to accommodate unexpected occurrences. This is a difficult aspect of time management due to lack of students' experience with time allocation. It is a critical executive function for college and career.

- Identify 'overcommitments' and reduce frustration through delegation and deletion – if the activity is not an obligation.
- Reflect on current time management strategies and their success or need for improvement. Use of an Activity Reflection Worksheet and Reflection Rubric can help students identify areas for improvement.

(Meltzer, 2010, 71-85.)

Executive Function: Organizing

It is not surprising that whole industries and even TV programming have emerged with the goal of organizing space, material, and time. The adverse consequences of lack of organization make this process one of the most critical of the executive functions. The dictionary defines *organize* as: to form as or into a whole consisting of interdependent or coordinating parts, especially for harmonious or united action. In the school setting, these interdependent parts include time, space, materials and ideas, each of which may require different strategies in order to improve performance.

Along with changes in the educational environment that have increased expectations of students to analyze, synthesize and create independent products, the number of resources available to students to meet these expectations has expanded geometrically. In the recent past, research meant hoping that some of the books available in the library on your topic were available to be checked out. Today, students must be taught how to discriminate among thousands of resources available to then on-line. Similarly, the change from one or two academic teachers in elementary grades to five or six in secondary increases the need to organize and maintain many more materials, assignments and expectations.

Strategies for organizing materials include:

- Break down tasks into component parts and provide a checklist for each component, e.g., what materials are needed to complete each part?
- Develop templates for repetitive procedures, e.g., homework in a designated folder, daily update of assignment calendar, etc.
- Mentally walk through the planning process, e.g., what materials are needed for each class at school and/or at home?
- Use technology to assist organizational skills, e.g., email completed assignment to teacher; download finished product onto flash drive and print in school; use alarm app to remind student of due dates or for time management.

Strategies for organizing space include:

- Provide examples of well-organized spaces. Analyze why and how the space works and have students replicate aspects of the examples.
- Use labeled color-coded folders or accordion files to organize backpacks and lockers.
- Schedule regular opportunities to sort and delete materials from learning spaces.

(Cooper-Kahn, J. & Dietzel, L., 2008. *Late, Lost, and Unprepared*. 169-182)

Strategies for organizing ideas include:

- Sort and categorize ideas using graphic organizers appropriate for the task. www.learningreviews.com/Graphic_Organizers.html www.teachervision.fen.co/graphic-organizers www.teacherplace.net/Pages/Software.html
- Use semantic maps to identify similarities and differences among concepts. Seeing relationships between concepts assists vocabulary acquisition, reading comprehension and analysis.
- Practice identifying the main idea of paragraphs, chapters, works of literature. Determine if the main idea 'fits' the details provided.
- **"PLEASE"** writing strategy: **P**ick a topic, **L**ist your ideas, **E**valuate your list, **A**ctivate the paragraph with a topic sentence, **S**upply supporting sentences, **E**valuate your list. (Welch, M. (1992). in *Learning Disability Quarterly* 15, 119-128.
- **"TREE"** writing strategy for persuasive essays: **T**opic sentence, **R**easons, **E**xamine each reason**, E**nding. (Graham & Harris, 1989)
- **"STOP"** writing strategy for persuasive essays: **S**uspend judgment, **T**ake a side, **O**rganize ideas, **P**lan more as you write. (De La Paz & Graham. (1997). in *Journal of Educational Psychology*, 89, 203-222.)
- **"DARE"** writing strategy for persuasive essays: **D**evelop a topic sentence, **A**dd supporting details, **R**eject arguments for the other side, **E**nd with a conclusion. (De La Paz & Graham, (1997). *Ibid.*
- **"PROVE"** strategy and template for writing a thesis and counterarguments: **P**resent your knowledge, **R**eveal information, **O**ffer examples/explanations, **V**erify your knowledge, **E**xpress your knowledge in a summary statement. (Scanlan, D. (2002). in *Teaching Exceptional Children*, 34(4), 50-54.)
- "Pieces of a Thesis" Strategy for organizing analytical writing: The template helps students map their ideas using a graphic organizer starting with the topic that leads to three or more strands, each of which tracks the evidence for each strand and culminates in a conclusion. (Meltzer, 2006)

Executive Function: Remembering

All learning depends on students' ability to hold and manipulate information in working memory. "Working memory is proposed to be the central cognitive control process that focuses the mind, directs mental efforts, accomplishes tasks, and ignores distractions." (de Fockert, Rees, Frith , & Lavie. (2001). *Science*, 291 (5509), 1803-1806). Both in and out of school, many variables affect how information is committed to memory, how long it will be retained, and how easily it can be retrieved. These include: the nature of the information, its connection to an existing mental schema, the emotional 'environment' of the information and the student's level of attention. Another significant variable has been added since the advent of the computer age, namely: the enormous volume of information accessible to students and the rapid proliferation of new information. The implications for students and learning are compelling.

Strategies for improving memory include:

- Heighten attention by using bright colors, bold letters, and startling or unexpected images.
- Provide repetition, rehearsal, and review to move information from working to long-term memory.
- Attach meaning to new information by connecting it with prior knowledge. Use mnemonics and 'Crazy Phrases' - www.braincogs.com
- Chunk information into related topics to make information more accessible and reduce stress.
- Organize information with a five "W's" chart in which the concept is described by answering who, what, when, where, why questions and space to indicate 'how' it will be remembered.
- "Essay Express" software from (ResearchILD & FableVision, 2003) assists students with the writing process.
- A list of sentence starters such as "The primary reason…," or "Another factor to consider…." can jump start the writing process for a student .
- Rhymes, songs, stories, and acronyms help students remember content such as math algorithms or studying for tests, e.g., ANN E. BOA stands for the 'trick' words on tests: Always, Never, Not, Except, But, Only and All

(Meltzer, 2010. 116-127)

Executive Function: Shifting and Flexible Problem Solving

The term 'cognitive flexibility' refers to the ability to adapt to unfamiliar or unexpected situations, to combine concepts creatively, and to integrate different representations (Cartwright, K.B. (Ed.) 2008a, 2008b, 2008c; Deák, 2008 in *Literacy Processes: Cognitive flexibility in learning and teaching*). As reading comprehension and writing tasks become more sophisticated at the secondary level, cognitive flexibility allows students to consider issues from multiple perspectives, draw inferences and conclusions, interpret subtle language, and seek other

strategies for comprehending and expressing ideas when the one they're using fails. Math requires students to shift word problems into mathematical representations, turn algorithms into graphic representations, and to interpret data sets in a variety of models. As with the other executive functions, explicit instruction in flexible shifting can increase the likelihood of academic success.

Strategies for improving flexible shifting include:

- Integrate curricular topics to encourage making connections between content areas and experiencing different points of view.
- Use 'five minute warm-ups' to generate multiple solutions to a problem or multiple interpretations of a sentence, cartoon, or scenario.
- Have students identify ambiguous words or words with multiple meanings, or write a different ending to a book.
- Provide models and graphic organizers that help students identify the main idea from the supporting details.
- Use the 'Triple Note Tote' strategy for note taking and studying. The three column headings are: Term, Definition, Example/Strategy.
- Practice shifting from the language of a math word problem to the computational details and back again.

(Meltzer, 2010. 145-149)

Executive Function: Self-Monitoring

Self-monitoring as an executive function refers to students' ability to recognize how, when and why to use a certain strategy; to evaluate the effectiveness of the strategy; to revise their use of the strategy, and to continue to adjust based on the demands of the task (Meltzer, 2010. 160). Effective self-monitoring skills will lead to greater independence after high school, when less if any support will be available to students.

Strategies to encourage self-monitoring include:

- Help students develop checklists for homework completion and turning in assignments.
- Have students use prompts on their lockers so that they bring the correct materials to each class and for homework assignments.
- Remind students that success is attributable to hard work and use of strategies, and failure to their lack of strategy use – not lack of ability.
- Teach students how to shift mindsets and approaches to identify and correct errors.
- Make self-monitoring and correcting count by requiring self-monitoring and correcting and giving points for fixing errors.
- Give students additional time on tests to check and correct their work.
- Have students analyze their test performance by quantifying and categorizing their errors to reveal patterns.

Executive Function: Emotional Self-Regulation

Frustration, anxiety, feeling overwhelmed due to academic, personal and social challenges – this may describe more than the 17% of young people in the U.S. who suffer from learning, emotional, or behavior disorders. Temperamental differences among children, varying levels of language competence, cultural expectations, social context, and parenting styles all affect a student's ability for emotional self-regulation. The presence of strong emotions can override the effectiveness of all of the previously described executive function strategies, as well as impair learning by inhibiting concentration, memory and retrieval.

Strategies for encouraging emotional self-regulation include:

- Identify circumstances that trigger strong emotional responses and have an intervention plan ready.
- Teach ways to manage anger and impulse control by recognizing the emotion, taking deep breaths, thinking calming thoughts, and finding ways to solve the problem.
- The majority of events occur during transition times in the school day. Help students develop a menu of activities that will decrease anxiety or frustration at these times, e.g., read, plan the rest of the day/week, play a game, write a note, poem or song.
- Give students choices in how they can demonstrate what they've learned.
- Guide students through self-talk that reminds them of other instances when they successfully regulated their emotions.

(Meltzer, 2010. 191-196)

Discussion

The spirit of Response to Intervention (RtI) has allowed teachers and administrators to provide assistance to many more students whose needs may be temporary or not severe enough to warrant a full Individualized Educational Program (IEP). Designing and implementing appropriate interventions is well developed and, in general, deemed successful at the elementary level. Implementing RtI at the secondary level has been more challenging due to the complexity of the content, the dearth of progress monitoring tools, and the inflexibility of the school schedule.

Many schools have high hopes for well-intentioned courses in study skills combined with tutoring and mentoring (the *what* of learning), but have not seen the anticipated increase in students' academic performance. By promoting executive function processes (the *how* of learning), secondary schools can address the core issues that have resisted intervention until now. Providing strategies that counteract the lack of homework, daily preparation and materials; inability to complete long-term assignments; lack of motivation and 'checking out,' and other symptoms of poor executive function is an appropriate and necessary intervention at the secondary level. Attending to how students learn can increase what students learn and lead to improved performance now - and in college and career.

Resources

The search of the literature regarding executive function reveals that most research and books addressing this topic are relatively recent, e.g., since the 1990's. Many books for the non-expert are directed at parents and students. For the purposes of this white paper, we have focused on those that provide concrete strategies and interventions for educators. The works of Lynn Meltzer, PhD. and the team of Peg Dawson and Richard Guare are recommended for their comprehensive approach, practicality, and sound basis in research. The following titles would serve as strong foundational works from which to develop programs and interventions addressing executive function needs.

Dawson, P. & Guare, R. (2010). *Executive Skills in Children and Adolescents.* New York: Guilford Press.

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