Executive Function: Initiation

Initiation involves a student's ability to begin tasks independently and in a timely manner. It may appear that the student is uninterested, unmotivated or oppositional, when in reality the issue is difficulty knowing how to get started. Once started, most children will be able to continue until the task is completed while others become stuck again as the demands of the task changes. Difficulties with initiation can also be associated with organization issues, memory difficulties or depression

Since the frontal regions of the brain are largely responsible for action and movement, it is not surprising these same areas are responsible for initiation. It is also not surprising that emotions help start actions, so the deeper emotional centers of the brain are implicated in initiation. A specific part of the brain that acts as a neurological communication cable between the frontal area and the emotions area is called the cingulate gyrus. Damage to the frontal areas, the cingulate gyrus, and deeper brain structures may cause initiation and emotional problems.

Initiation Changes that may be Observed

- Can appear lazy, spacey and/or unmotivated.
- Can state what they are supposed to do but does not get started.
- Does not complete homework or seatwork.
- Difficulties with starting school work.
- Turns in poor quality work.
- Difficulties managing long-range projects.
- Requires constant cueing and reminders even on the most routine of tasks.
- Follower.
- Introverted/passive.
- Rarely expresses opinions or desires spontaneously.
- Often gets overlooked because they do not cause problems in the classroom.
- Does not make plans to get together with friends.
- Appears aloof or disinterested to peers.
- Lagging in independent living skills.

Initiation: Strategies for Intervention

- Provide assistance with getting started on school tasks - have the child then identify the first thing they are going to do.
- Provide more frequent check-ins to ensure student is completing work and to provide "jumpstarts" as the task demands change.
- Seat next to a positive peer to help them get started or if they get stuck as the task changes.
- Provide a written routine with an outline of tasks and time frame.
- Break large projects or tasks into smaller steps.
- Help student develop planning skills.
- Teach organization strategies: checklists, graphic organizer or a series of pictures indicating steps needed in task.
- Develop routines at home and school and teach those routines until well learned – continue to use cues if needed to support student in getting started on tasks.
- Teach self advocacy skills: "Can you help me get started?" "Could you help me get started at this time?"
- May need lunch groups or support building relationships if initiation is interfering.

Executive Function: Planning

Planning involves identifying and completing the steps necessary for task or goal completion. Planning also includes determining the time requirement for each step of the process, deciding what is and is not important to focus on, and what resources are needed for successful task completion. Students with planning issues may approach tasks impulsively which leads to difficulties in completing each step of the process or in developing a product that is disorganized and irrelevant to the assignment (Meltzer, 2007).

As students develop, planning demands increase significantly. Planning in young children may involve completing an activity that involves one to two steps, but by the time they are middle school, it involves having to break down long term projects and essays. The planning involved in larger projects can be overwhelming for students and may lead to them giving up because they are unable to break down the steps or figure out the amount of time needed to complete each step.

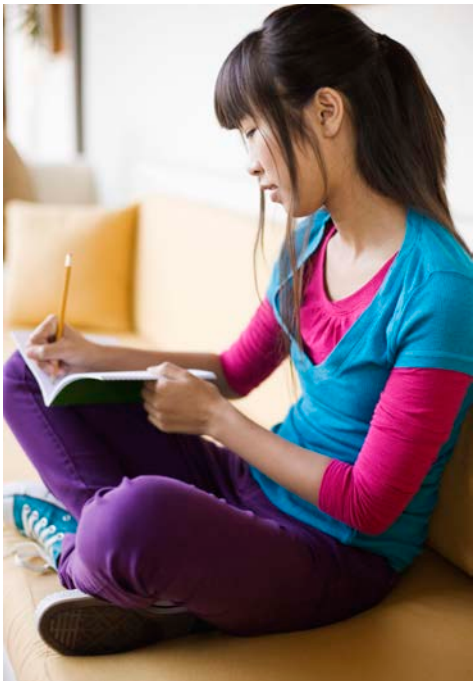
Planning is a future-oriented process requiring forethought, estimation and problem solving. Similar to the same neurological structures involved with regulation, organization, and problem solving, the upper frontal lobe is intimately tied to planning.

Planning Changes that may be Observed

- Difficulties with problem solving and identifying the steps needed to complete a task.
- Rigidity of thinking -- cannot think of more than one way to complete a task.
- Doesn't brainstorm.
- Difficulties organizing thoughts in writing or organizing the steps necessary to complete math problems.
- Struggles with doing more than one activity at once.
- Difficulties organizing thoughts and completing assignments.
- Difficulties completing long term or larger assignments.
- Gives up if their first attempt at something does not work.
- Difficulties getting started on tasks or impulsively jumps in and has a disorganized and/or incomplete end product.
- Often late and unprepared for class.
- Difficulties with time management.
- Difficulties with sequential tasks.
- Difficulties making plans with friends.

Planning: Strategies for Intervention

- Teach the student how to develop a step-by-step guide for problem solving by identifying the problem, considering relevant information, listing and evaluating possible solutions, creating a plan of action, and evaluating the plan of action.
- Provide step-by-step visual directions and instructions.
- Provide student with "Planning Sheets" (see Dawson and Guare, 2010, Executive Skills in Children and Adolescents for a variety of different planning sheets).
- Teach use of graphic organizers and other planning strategies to organize their thoughts.



- Model appropriate planning by verbalizing your own step by step process as you complete a task.
- Teach planning by helping child break down each step necessary to complete task:
  - Have student first visualize and then verbalize each step.
  - If child appears stuck, verbalize "What should you do first?" or "What happens next?"
  - After task is completed, evaluate whether each step was effective and how much time each step actually took. Process what went well, what didn't and what needs to be done differently next time.
  - Break large or long-term projects down into clear steps-teach planning by helping child through this process.
  - Help them identify each step and estimate how long each one will take. Start with when the project is due and work backwards to determine when each step needs to be completed.
  - Help them identify materials and resources needed for each step.
  - Write down steps on planning worksheet or calendar.
  - Check planning worksheet or calendar every day to see that steps are being completed.
- Teach time management and prioritizing.
- Teach how to develop short term and long term goals.
- Support student in connecting new information with what they already know.
- Develop and practice schedules and routines when possible.
- Plan ahead and prepare student for changes in these routines.
- May need written or picture schedule. Prepare the student ahead of time if schedule is changed and make the changes on their written or picture schedule.
- If they are not planning social times with friends, they may need help with planning their social and free time.
- See Organization and Reasoning/Problem Solving strategies.

Executive Function: Mental Flexibility

Mental flexibility is the ability to easily shift from one idea, train of thought, activity or way of looking at things to another (Dise-Lewis, Calvery, Lewis, 2002). Mental flexibility also involves being able to change the approach to problem solving as the task changes or being able to successfully transition from one task to another. As part of the process one needs to be able to consider new information as well as feedback from mistakes and setbacks (Dawson and Guare, 2004). Mental flexibility allows us to adapt to changing conditions and unfamiliar or unexpected situations (Meltzer, 2010).

Controlling the thoughts and actions of the brain falls under the function of the frontal lobe. Although there are different brain areas that also help with initiation, organization, planning and flexibility, these four "executive functions" are primarily regulated by the upper brain areas located behind the forehead. Individuals with damage to the frontal lobe may become more rigid in their thinking and less adaptable to change.

Mental Flexibility Changes that may be Observed

- Rigid and/or concrete thinkers-difficulties with abstract thinking.
- Difficulties with transitions or with deviating from a schedule.
- Perseveration-gets stuck on one train of thought.
- Difficulty taking feedback.
- Resistant to try new things.
- Difficulties coming up with solutions.
- Struggles with switching gears.
- Difficulties following directions and doing what was asked.
- Appears to not learn from mistakes.
- Can appear stubborn and/or argumentative.
- Difficulties making friends and can appear socially awkward.
- Appears to lack empathy and has difficulties seeing others' points of view.

Mental Flexibility: Strategies for Intervention

- Develop and practice schedules and routines when possible.
  - Plan ahead and prepare student for changes in these routines.
  - May need written or picture schedule-prepare student head of time if schedule is changed and make the changes on their written or picture schedule.
  - Rehearse or do a dry run of unfamiliar situations or schedules.
- Prepare and give reminders of upcoming transitions.
- Plan for situations that require mental flexibility.
- Plan ahead and do not introduce too much novelty at once.
- Teach student how to analyze directions, break down problems, self-check and self correct.
- Allow for previewing of class notes or materials.
- Break tasks down into smaller steps. Make sure directions are clear and concrete.
- Teachers should evaluate their assignments, worksheets and tests to see if they are requiring too many shifts in the type of questions the student is required to complete. Either reduce the different types of questions required of the student or help support them as the task demands change.
- Teach coping strategies.
  - Use social stories to help teach solutions or coping strategies to different situations.
  - Structured social skills groups to help identify, practice and learn more flexible coping and problem solving strategies.
  - Teach thought stopping, relaxation or coping strategies (e.g., taking deep breaths, calming self-talk, leaving the situation until calm, etc.).
- Help them understand why strategies used in one setting or for one task may not work for another. Role-play situations ahead of time to help generate more than one outcome and more than one potential solution.

Executive Function: Reasoning

Reasoning is the use of deliberate and controlled mental operations to solve novel and on the spot problems (www.cokidswithbraininjury.com). Reasoning involves the consideration of evidence and drawing of conclusions based on the exploration of all possibilities, consideration of positive and negative outcomes and combining knowledge from past experiences (Savage & Wolcott, 1994). Reasoning is the foundation for problem solving and ultimately overall intelligence (D'Amato, Fletcher-Janzen, Reynolds, 2005).

Many aspects of reasoning are similar to the process of new learning (see the description under new learning). Higher order reasoning involves the effective integration and processes of the entire cerebral (brain) structure. Since the frontal cortex is considered the "manager" of the brain, this region is typically needed in reasoning as it orchestrates how information is processed. Other specific areas that are needed for deep thinking are the middle left temporal lobe and the occipital-temporal-parietal juncture (the junction of the three lobes located in the back of the brain).

The frontal lobes are typically associated with changes in function of these skills. However, it is impossible to isolate problems to this area of the brain when a number of other capacities contribute to it, for example, comprehension and memory. Reasoning, problem solving, and judgment affect the student behaviorally and socially as well as academically. Safety may be a particular concern because when the above factors are not present, the student may place himself or others in potentially dangerous situations.

Reasoning, Problem-Solving and Judgment Changes that may be Observed

- Concrete thinker-difficulties with abstract information and language.
- Difficulties generalizing strategies to new situations because they fail to see relationships between the settings.
- Difficulties learning from experiences because they do not see connection between past experiences and current situation.
- Become frustrated because they cannot think of alternative solutions and uses the same ineffective approach in multiple situation.s
- Appears to comprehend material, but has difficulty answering open-ended questions, making generalizations, or formulating rules.
- Does not get the big picture.
- Does well with true-false and multiple choice but not essay tests.
- Does not understand figures of speech, metaphors or sarcasm.
- Has difficulty identifying essential information or drawing conclusions-for example, solving word problems in math.
- Does not ask for help.
- Argues with adults or peers and can appear oppositional.
- Acts without thinking of the consequences and has difficulties taking the perspective of others.
- Makes poor or unsafe choices of friends or activities-tends to be a follower.
- Behavior or language not suitable to the situation.
- Does not think well on their feet.
- Reacts adversely to changes in routine or unexpected problems.
- When faced with an unexpected situation may respond by becoming upset.

Reasoning, Problem-Solving and Judgment: Strategies for Intervention

- Teach the student how to develop a step-by-step guide for problem solving by identifying the problem, considering relevant information, listing and evaluating possible solutions, creating a plan of action, and evaluating the plan of action.
- When considering solutions, review at least two different alternatives then let the student select one of the solutions. The goal is to eventually move them to developing their own possible alternative solutions.
- Teach use of self-monitoring questions- "What else could I do?"
- Present information in concrete and concise manner- avoid language using puns, sarcasm, and double meanings.
- Check for understanding and the need for assistance.
- Give consistent, neutral feedback.
- Break tasks into smaller and shorter segments.
- Use graphic organizers to show relationships.
- Provide copy of guided notes or outlines with most important points highlighted.
- Use multiple choice tests instead of essay format.
- Connect information to past knowledge/experiences and find other ways to make content meaningful for the student.
- Teach generalization and application across concepts.
- Discuss, plan and prepare student for changes in routine.
- Teach the child what to expect and appropriate behaviors in each setting. If they are struggling with appropriate behavior in a setting, prepare them before entering the setting and keep providing verbal reminders of the expected behavior while in the setting.
- Prepare the student with a set of activities that they can do during unstructured times to reduce the chance that they will engage in impulsive, aggressive, or unsafe behaviors.
- Remember that the student is likely to be more defiant, irritable, and resistant when confused. At such times, provide more structure and fewer choices.
- Be clear on expectations and consequences of risk taking behaviors (sex, drugs, alcohol, etc.).
- Expect the student to participate in group discussion about real-life situations: explore pros and cons and alternatives.
- Help the student identify cues (responses or actions of others) from the environment to use as a guide for behavior.
- Foster friendships with positive role models.

Executive Function: Organizational Skills

Difficulty organizing behavior or thoughts is one of the most common results of a traumatic brain injury. The student's ability to organize his or her behavior and thinking is rarely assessed in a school-based evaluation. Intelligence tests and other tests present the information to the student in an already-organized fashion, directing the student's attention to the materials in front of him and describing the response requested of the student. Real-life situations are rarely so organized and structured. Organizational skills can also be impacted by difficulties in memory, attention and language.

Students who have difficulty paying attention to the most important features of their environment, logically organizing and planning their behavior, and following through often have grave difficulty behaving reasonably in situations which do not provide intense external support and structure. When a very young child (under the age of 3) experiences a brain injury, the result typically is a severe disruption in the ability to organize incoming information and to behave in a way which is planned and "sensible." Older children and adolescents who suffer a traumatic brain injury also demonstrate deficits in organizational abilities; these difficulties show up in more subtle aspects of their behavior and in their academic achievement.

The upper frontal region of the brain, behind the forehead, controls planning and organization of thoughts and activities. The ability to sequence thoughts in a logical fashion and translate those thoughts into action to organize a person's environment involves communication between the frontal cortex and left hemisphere of the brain. Damage to the front and/or the left hemisphere of the brain may cause disorganized thinking and ordering of materials.

Organization Skill Changes that may be Observed

In Young Children Birth to 4 Years

- Difficulty with transitions.
- Outbursts or tantrums over a change in activity or during unstructured times.
- Difficulty changing activities or dealing with unexpected changes in the routine.
- Impulsive and/or aggressive behavior, particularly in new, complex or unpredictable settings.
- Inability to change thinking based on new information.

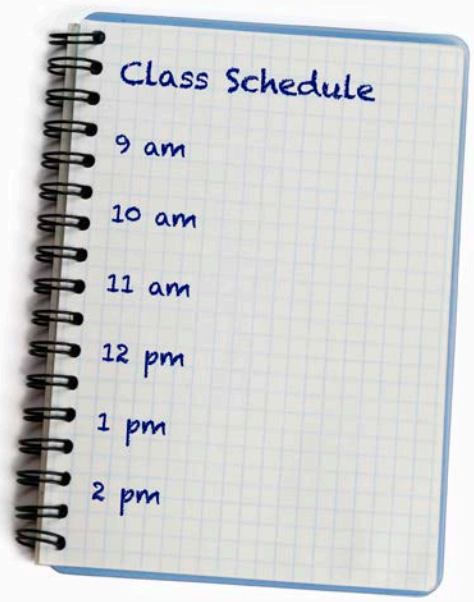
In Older Children and Adolescents

- Inability to do two things at once or pay attention to several things at once.
- Difficulties with multistep activities.
- Completes tasks out of order.
- Does not do well with independent learning activities and has difficulties getting started on tasks.
- Struggles with taking notes in class; notes may be illegible, undecipherable or simply not very helpful.
- Written work appears sloppy, dashed-out and poorly organized on the page.
- Difficulty following through with long-range assignments.
- Difficulty entering assignments into planner.
- Homework is incomplete or is not turned in.
- Difficulties listening to and learning from lectures in class.
- Difficulties following or participating in classroom discussions.
- Struggles with seeing the big picture.
- Appears to have memory difficulties and loses things easily.
- Spaces out or daydreams in class.
- Difficulty learning new information and understanding abstract information.
- Difficulties with transitions or changes in routine.
- Does not apply information learned to new situations.
- Poor social judgment. Copies the behaviors of others-requires more adult supervision.
- Easily frustrated.

Organizational Skills: Strategies for Intervention

To help a student who does not have normal ability to organize information independently, parents and teachers must provide more structure for the student than is ordinarily necessary for a student their age. Increasing structure can include any of the following:

- Establish a daily routine as much as possible. Particularly for young students, the ability to predict what is going to be happening will help them to organize their behavior better.
- Teach the student how to develop a step-by-step guide for problem solving by identifying the problem, considering relevant information, listing and evaluating possible solutions, creating a plan of action, and evaluating the plan of action.
- Use picture schedules, planners, checklists, or electronic organizers to help them organize their day and prepare themselves for transitions.
- Use a "check-in/check-out" system to ensure that student has assignments and materials.
- Help the student break down long-term and larger projects. Start with the due date and then work backwards to determine when the smaller steps need to be completed. Mark those dates in their planner or on a calendar.



- Identify a counselor, teacher, or paraprofessional at school who is aware of the schedule of required assignments and long-range projects and who can work with the student on a regular basis so that assignments can completed and turned in on time.
- Help the student develop and learn organizational strategies that work for them and can be supported between home and school. Examples: homework folder, color coded class system, morning and afternoon classroom binders, written or visual checklists of everything need for each class or need to take home, etc.
- Use organizational checklists (see Dawson and Guare, 2010, Executive Skills in Children and Adolescents for a variety of examples).
- Require the use of spiral or composition notebooks to avoid the loss of information on loose leaf paper.
- Establish a communication notebook or email routine for school-home communication.
- Provide student/parents with upcoming topics, notes and materials so they can preview and reinforce concepts at home. Provide parents with a list of required projects and assignments as well as the due dates.
- At school, teach routines and provide times for organizing desk and locker.
- Teach time management skills to help the child determine how much time an activity, assignment, or part of an assignment will take to complete.
- Provide step by step instruction and present information in small, concise, concrete steps.
- Provide a copy of guided classroom notes or outlines.
- Use graphic organizers and teach students to prepare written work by using a series of drafts-beginning with a listing of main ideas and then elaborating on each in outline form.
- Teach the student to highlight text and to make an outline of the important information from textbook material.
- Teach the child to answer "wh" questions while reading a paragraph: Who, What, When, Where, Why, How does this event impact me or the world?
- Cue child as to what information is really important and when needs their full attention.
- Preferential seating near the area of instruction and next to a positive peer who can help with understanding of instructions and content.
- Follow the SPELL IT OUT rule to increase structure and organization for the child.
  - Simplify the task
  - Parts-break it down
  - Enlarge it
  - Layout-does the page allow room for working the problem?
  - Link skills that are already mastered
  - Identify the relevant concepts
  - Teach a strategy
  - One skill at a time

  - Underline and highlight
  - Tell the student what to look for
- Provide an extra set of textbooks for use at home.
- At home, teach child how to check and organize backpack every night. Prepare everything child needs for next day the night before and put it by the front door. Use a checklist for organizing morning routine and materials.
- Teach the child what to expect and appropriate behaviors in each setting. If they are struggling with appropriate behavior in a setting, prepare them before entering the setting and keep providing verbal reminders of the expected behavior while in the setting.
- Prepare student for changes in routine-let them know what to expect and how to behave.
- Prepare the student with a set of activities that they can do during these unstructured times to reduce the chance that they will engage in impulsive, aggressive, or unsafe behaviors.
- Remember that the student is likely to be more defiant, irritable, and resistant when confused. At such times, provide more structure and fewer choices.

Uneveness

The single hallmark of a brain injury on a child's performance is unevenness in abilities across different settings, over time, and across different content areas. Most people are consistent across settings, time, and skill domains, so this extreme variability can be highly confusing to family, teachers, and friends. It is not unusual for a student with a brain injury to have performance on cognitive measures ranging from below the 1st percentile to the 95th percentile. This large variability means that certain types of performance will come easily and automatically for the student, while other areas of performance are labored or highly unsuccessful.

The pattern of strengths and deficits may not be sensible or logical, given what we know about the normal development of academic skills. Thus, a student may be above grade level in some areas (i.e., knowledge of facts) and behave like a child several years younger in other areas (contributing to a class discussion). This unevenness can also be observed in a student being able perform a task one day but is unable to do the same task on another day. Wide variability among skill domains is particularly true of students injured as adolescents, and therefore these students often are misread as being unmotivated, disinterested, or not working hard enough.

Unevenness in the cognitive and learning profile is often revealed on testing performed by school personnel. Examiners need to consider if there is wide scatter either within subtests or across subtests. Keep in mind that unevenness in performance may also be related to fatigue, medical issues or as a side effect and/or change in medications.

Uneveness: Changes that may be Observed

- Failure in certain school subjects with success in others.
- Good performance on tests, but poor performance on homework or class work or vice versa.
- Inconsistent classroom participation or performance across days.
- Student seems involved and motivated in one class but not another.
- Lack of common sense or failure to generalize.
- Teachers cannot reach a consensus about the best ways to assist the student in school.
- Student is not succeeding at a level expected based on their intellectual ability.
- Student is frustrated by and/or avoidant of certain situations or classes.

Uneveness: Strategies for Intervention

- Multidisciplinary assessment of the child's cognitive abilities from a team of individuals with expertise in pediatric acquired brain injury. If needed, ask your school psychologist, contact the brain injury team in your district or consult with individuals in the private community who have this expertise.
- Parents and school staff need to work together to better understand the student's profile to discover ways to build upon strengths and work around areas of challenge.
- Educate student about their own areas of personal strength and weakness. Students often are very distressed and frustrated by their inability to perform.
- Develop schedule to have a good mixture of non-academic subjects and a focus on the student's cognitive strengths.
- Use real materials and hands-on activities to supplement written or lecture material.
- Create learning opportunities that bring the information into the child's brain in different modalities.
- Encourage the child to read aloud when studying text. This gets the information processed by different centers of the brain without taking more time.

Fatigue/Endurance

Fatigue and endurance issues following brain injury is another hallmark of brain injury and it occurs in several ways. The primary source of fatigue is cognitive fatigue and is the direct result of disrupted pathways in the brain described in previous chapters. Once axons in the brain are broken or stretched, immense effort is required to complete even simple functions. Sensory and motor changes, for which the student is constantly compensating, are common. Thinking, movement, and speech may take longer and be less accurate. The brain tires much more quickly and is less able to process the stimulation of what is heard, seen and felt.

There are other components of fatigue as well. Headaches, often persistent and severe, are also common with brain injury. Endurance in physical activity may be seriously reduced and there frequently is pain associated with injury to other areas of the body. Sleep patterns are often disrupted by changes in brain chemistry related to the brain injury. There may be side effects to current medications or newly introduced medications of which school staff may not be aware. All of these can contribute to greatly increased levels of fatigue that may improve, but can persist indefinitely.

Fatigue can impact the ability to attend or even to perform the most familiar of tasks. Adequate rest, regular breaks, and modifying the workload are especially important in addressing fatigue. The student may have difficulty self-monitoring their level of fatigue before it has become severe. Ignoring or inadequately treating fatigue may lead to a downward spiral for the student.

Fatigue/endurance Changes that may be Observed

- May appear to be spacey or daydreaming.
- Complains of feeling like they are in a fog.
- Student is just not themselves.
- Displays slower performance of tasks.
- Reports having headaches or other pains.
- Poorer memory than usual.
- Displays symptoms of fatigue (yawns, dozes, etc.) or illness (pale, listless, etc.).
- Participates in disruptive behaviors or is unusually emotional.

Fatigue/endurance: Strategies For Intervention

- Reduce cognitive overload in the first place by providing the academic accommodations and supports presented in the above cognitive processing areas.
- Keep track of observed symptoms of fatigue such as poor posture, excessive fidgeting, glassy stares, etc. Discuss these with the student and parents.
- Send to health clinic if complaints of headaches and other pain. Communicate this information with parents.
- Incorporate brief breaks throughout the day to rest or quiet the brain. Depending on needs of the student, this may be able to occur in classroom or they may need to go to a quiet, darkened environment like the health clinic.
- Break and rest time does not mean silent reading. This activity is still cognitively taxing to the brain. Break time also does not mean recess, physical education, or other exploratory classes. Break time involves resting the brain and the body.
- Be aware of the student and when they appear to need a break. The student might not always realize they are fatigued or they might try to push themselves too far.
- Consider whether the length of the school day needs to be shortened. Schedule their day when they have the most energy and ability to focus.
- If the student is at school for a full day, schedule academic and more cognitively challenging classes at times when student has the most energy. Schedule exploratories, study hall or free times when student has less energy.
- Reduce or modify workload expectations-reduce the assignment requirements or focus on the most important learning opportunities and excuse the student from other assignments.
- Break down directions, assignments and projects into one to two steps.
- Allow additional time to complete assignments and tests-consider if tests need to be eliminated and the number of assignments reduced.
- Offer headphones, earmuffs, or earplugs.
- Reduce stimulation in the environment as much as possible (sound, movement, bright light, clutter or number of objects around their desk).
- Build quiet activity and slowed pace times into the curriculum.
- Assess sleep patterns, evening and weekend activities and responsibilities with the student and their parents.
- Assure that the student is eating protein-rich meals and snacks (it has been found that protein with each meal is valuable in preventing swings in energy levels). Bananas and almonds (if no allergies) have been identified as good brain foods (nasponline.com, 2010).