Using CogAT® Scores to Inform Instruction

Different students benefit from different instructional strategies. Children enter your classroom with different levels and patterns of cognitive development. They have differences in many areas including their working memory capacity, tendency to develop and use strategies, and need for structure in their environment. **By knowing the level of cognitive development students are at, you can tailor your instruction to students to support them in ways that help them to thrive.**

Cognitive profile scores for your students are posted on the DWH reports folder. They are provided in two forms: Group Profile and Profile Score. Broadly, students are divided into four groups. Students within each group share similar learning needs. **All the information you need to get started in tailoring your instruction to your students by group is included in this packet[1].** Simply looking at the Profile Groups that your students fall in and the fourth page of this booklet gives you enough information to get started. When you are ready for more information, look at the other attachments and visit the website listed below for more detailed information.

Included in this packet are the following documents:

1. Sample Profile Score Data Report
2. Broad Overview of Characteristics by Group Profile Level (figure)
3. Broad Overview of Instructional Recommendations by Group Profile Level (figure)
4. Brief Characteristics and Instructional Recommendations by Group Profile Level (table)
5. Detailed Characteristics and Instructional Recommendations by Group Profile Level
6. Common Recommendations to Support Cognitive Development
7. Using Profile Scores
8. Example of Differentiated Instruction
9. Universal Ways to Support Growth in All Students

For detailed information about student characteristics and instructional recommendations by profile score, go to Riverside Publishing's CogAT® Interactive Ability Profile Interpretation System which is located at **www.cogat.com.** Simply type in the student's profile score to get a rich source of information about him or her.

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[1] Information regarding characteristics and instructional recommendations is adapted from Riverside Publishing's Cognitive Abilities Test Interpretive guide for Teachers and Counselors and from the online Cognitive Abilities Test Interactive Ability Profile Interpretation System located at www.cogat.com. Riverside Publishing is the creator of the CogAT®.

1. SAMPLE PROFILE SCORE DATA REPORT

Where should I start?

Start by looking up your students' **GroupProfile** scores on the **Profile Score Data Report**. Then, look on the next pages of this packet for information that will help you to match your instructional practices to the needs of your students. Even if you only have a few minutes, page 4 will give you some information to begin working with. As you have time, look through the rest of this packet.

SchoolNumber	School	SchoolYear	Grade	StudentNumber	LastName	FirstName	GroupProfile	ProfileScore
0XXX	SCHOOL	2016	03	0XXXXXXXXX	AXXXXXXXX	EXXXXX		
0XXX	SCHOOL	2016	03	0XXXXXXXXX	AXXXXXXXX	CXXXXX	1.00	3A
0XXX	SCHOOL	2016	03	0XXXXXXXXX	BXXXXXX	DXXXXX	1.00	3B (Q+)
0XXX	SCHOOL	2016	03	0XXXXXXXXX	CXXXXXXXXX	GXXXXXXX		
0XXX	SCHOOL	2016	03	0XXXXXXXXX	EXXXXXXXXXXXXXX	JXXXXXX		
0XXX	SCHOOL	2016	03	0XXXXXXXXX	SXXXXXXXXXX	GXXXXXXX	3.00	7A
0XXX	SCHOOL	2016	03	0XXXXXXXXX	CXXXXXXXXXXX	JXXXXXX		
0XXX	SCHOOL	2016	03	0XXXXXXXXX	MXXXX	WXXXX	3.00	7B (N+)
0XXX	SCHOOL	2016	03	0XXXXXXXXX	NXXXXXX	CXXXXXXX	1.00	2A
0XXX	SCHOOL	2016	03	0XXXXXXXXX	YXXXXXXXXXX	LXXX	2.00	4E (N+)
0XXX	SCHOOL	2016	03	0XXXXXXXXX	TXXXXXX	CXXXX		
0XXX	SCHOOL	2016	03	0XXXXXXXXX	MXXXXXXX	TXXXX	1.00	3B (N-)
0XXX	SCHOOL	2016	03	0XXXXXXXXX	CXXXXX	MXXXXXXXX	2.00	5A
0XXX	SCHOOL	2016	03	0XXXXXXXXX	VXXX	AXXXX	2.00	6C (Q-N+)
0XXX	SCHOOL	2016	03	0XXXXXXXXX	NXXXXXXXX	JXXXXXX	2.00	6C (Q-N+)
0XXX	SCHOOL	2016	03	0XXXXXXXXX	WXXXXX	JXXXXXXXXXX	1.00	2C (V-N+)
0XXX	SCHOOL	2016	03	0XXXXXXXXX	DXXXXXX	IXXXXXX	1.00	2A
0XXX	SCHOOL	2016	03	0XXXXXXXXX	XXXXXXX	JXXXXXXXXXX	2.00	5A
0XXX	SCHOOL	2016	03	0XXXXXXXXX	DXXXXXX	AXXXX		
0XXX	SCHOOL	2016	03	0XXXXXXXXX	EXXXXXXXXXXXXX	MXXXXXXXX	3.00	7B (Q-)
0XXX	SCHOOL	2016	03	0XXXXXXXXX	FXXXXXXXXXX	TXXXX	2.00	5E (N+)
0XXX	SCHOOL	2016	03	0XXXXXXXXX	FXXXXXXXXXX	DXXXXX	1.00	3A
0XXX	SCHOOL	2016	03	0XXXXXXXXX	FXXXXXXXXXX	LXXX		
0XXX	SCHOOL	2016	03	0XXXXXXXXX	GXXXXXXX	TXXXX	2.00	4C (V-N+)

Ready for more information?

You can input the **ProfileScore** into Riverside Publishing's interactive web tool which is located at **www.cogat.com**
See more information about profile scores on page 11 of this document.

Why are scores missing for some students?

Students do not have a GroupProfile or ProfileScore if:

- They were absent on any of the days the CogAT® was administered and did not take a makeup.
- Their parents signed a letter to have them opt out of the CogAT®.
- They made mistakes in filling out the answer form and their test could not be properly scored.
- They could not complete enough questions in the allotted time
- They are new to the District

2. BROAD OVERVIEW OF CHARACTERISTICS BY GROUP PROFILE LEVEL

Group 1
- Process information slowly
- Trial and error instead of strategy
- Lower working memory capacity
- Difficulty transferring information

Group 2
- Adequate knowledge but difficulty with recall
- Do not analyze tasks to find relationships with previous
- Learn strategies but difficulty implementing

Group 3
- Good memory
- Effective learning strategies
- See connections between new concepts and previously learned

Group 4
- Organize and store knowledge differently
- Superior problem-solving
- Effective strategies
- Good at making meaning of new information
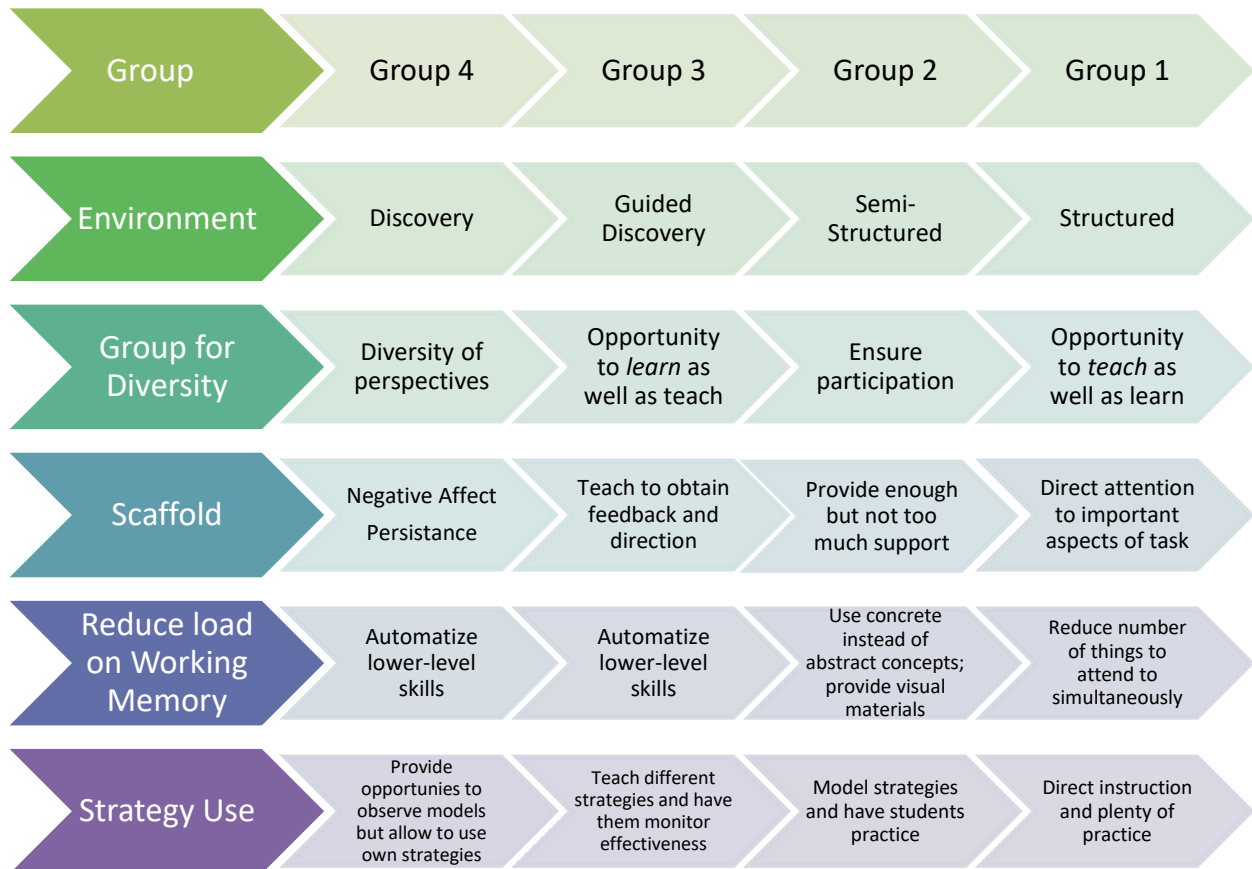- Negative affect; lack of persistance

Distribution of 2016 Broward County Public Schools CogAT® Scores

Group 1	Group 2	Group 3	Group 4
26.8%	59.7%	11.8%	1.6%

Note: Information regarding characteristics and instructional recommendations is adapted from Riverside Publishing's Cognitive Abilities Test Interpretive guide for Teachers and Counselors and from the online Cognitive Abilities Test Interactive Ability Profile Interpretation System located at www.cogat.com. Riverside Publishing is the creator of the CogAT®.

3. BROAD OVERVIEW OF INSTRUCTIONAL RECOMMENDATIONS BY GROUP PROFILE LEVEL

Group	Group 4	Group 3	Group 2	Group 1
Environment	Discovery	Guided Discovery	Semi-Structured	Structured
Group for Diversity	Diversity of perspectives	Opportunity to *learn* as well as teach	Ensure participation	Opportunity to *teach* as well as learn
Scaffold	Negative Affect Persistance	Teach to obtain feedback and direction	Provide enough but not too much support	Direct attention to important aspects of task
Reduce load on Working Memory	Automatize lower-level skills	Automatize lower-level skills	Use concrete instead of abstract concepts; provide visual materials	Reduce number of things to attend to simultaneously
Strategy Use	Provide opportunies to observe models but allow to use own strategies	Teach different strategies and have them monitor effectiveness	Model strategies and have students practice	Direct instruction and plenty of practice

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4. BRIEF CHARACTERISTICS AND INSTRUCTIONAL RECOMMENDATIONS BY GROUP PROFILE LEVEL

Group	Characteristics	Recommendations
1	Process information slowly	Structured learning environment that provides direct guidance and support
	Have trouble making meaning out of information and determining what is relevant to learn and remember	Instruction more interactive than verbal alone (i.e., peer modeling, hands-on activities, multi-media)
	More likely to use trial and error than strategies	Reduce load on working memory by off-loading lower-level tasks
	Lower working memory capacity	
	Forget abstract concepts quickly	Teach to structure and organize material
		Give lots of opportunities to practice strategies
	Difficulty transferring information learned in one context to another	Group with other ability levels, ensure they have opportunity to *teach* as well as learn
2	Adequate knowledge but difficulty recalling and using that knowledge	Somewhat but not highly structured learning environment
	Do not analyze new tasks to find relationships with previously learned tasks	Reduce load on working memory by providing visual materials, overlearning low-level tasks
	Learn strategies but have difficulty selecting and implementing them	Teach higher level reasoning skills such as inferring, deducing, elaborating and making connections
		Teach strategies and allow time for practice
		Group to be teacher and learner; ensure participation
3	Good memory	Guided discovery environment
	Effective learning strategies	Group with older students or adults; opportunities to *learn* as well as teach
	See connections between new concepts and previously learned knowledge	Challenge to think critically
		Teach different problem-solving strategies and have them keep track of how they work for them
4	Organize and store knowledge differently than other students	Discovery learning best, highly structured worst
	Superior skill in solving problems and thinking differently	Need to be appropriately challenged; which may mean instruction several years above peers
	Possess effective strategies and use them efficiently	Expose to strategies, but allow them to choose which ones work best for them
	Good at making meaning of new material	Support in managing negative emotions and learning persistence
	Often experience negative affect and lack of persistence	Group for diversity of *perspectives* to challenge critical thinking

5. DETAILED CHARACTERISTICS AND INSTRUCTIONAL RECOMMENDATIONS BY GROUP PROFILE LEVEL

Group 1 (profile scores of 1, 2, and 3)

Characteristics: These students have weak listening and comprehension skills, process information slowly, and have trouble making meaning of information. They do not know how to break tasks into smaller parts and have difficulty determining what information is relevant to learn and remember. They have a lower working memory capacity and tend to forget abstract concepts quickly. They are able to learn concepts, strategies, facts, and skills that they are directly taught, but have difficulty applying them to new situations. They are more likely to approach tasks with trial-and-error than to plan and strategize. Of the second graders who took all three batteries of the CogAT® in BCPS in 2016, 27% received scores falling within the range of Group 1.

Recommendations: Students in Group 1 typically learn better in structured environments that provide more direct guidance, coaching, and support. They do better with instructional strategies that include peer modeling, demonstrations, hands-on activities, and the use of multi-media rather than with verbal instruction. They also need abstract concepts to be represented in concrete ways. These students are often asked to do more things simultaneously than they are capable and benefit from reducing the load on their working memory. The best way to do this is by scaffolding lower-order tasks so that they can focus on higher-order tasks. For example, if a student is having difficulty writing an essay, allowing them to type or dictate the essay and forget about spelling and grammar enables them to focus on the meaningful aspect of the assignment. Group 1 students need help in learning to structure and organize material. They benefit from learning strategies and from being given many opportunities to practice those strategies in new situations. Teaching should also focus on transferring information learned to real-world contexts.

Group 2 (Profile scores of 4, 5, and 6)

Characteristics: These students have an adequate level of knowledge, but it is not as well organized as higher scoring students. They frequently have trouble recalling and using their knowledge. They do not analyze new tasks to find relationships with tasks previously learned and have difficulty transferring skills learned to new situations. By middle school they have acquired a number of learning and problem-solving strategies, but often don't select the most effective strategy for the task, and make errors in implementation. Of the BCPS second graders who took all three batteries of the CogAT® in 2016, 60% received scores falling within the range of Group 2.

Recommendations: Group 2 students learn best in somewhat but not highly structured environments. Highly structured environments will inhibit the development of high-level skills in these students. As with Group 1, these students benefit from limiting the burden on working memory. Providing visual representations of materials (e.g.; diagrams, pictures) and having students overlearn low level skills can help to reduce the load on working memory. Providing strategies, memory prompts, and task structure can free attentional resources for these students to focus on learning different forms of thinking; inferring, deducing, elaborating, and making connections. Group 2 students also benefit from direct teaching of strategies through modeling and practice (rather than simply providing a verbal explanation), being taught how to break complex tasks into simpler parts, and learning to become aware of their own strengths and weaknesses.

Group 3 (profile scores of 7 and 8)

Characteristics: These students learn relatively quickly, have good memories, and use effective learning strategies. They tend to see connections between new concepts and previously learned knowledge. They have strong enough reasoning abilities to do well in all tasks at school, but not so strong that they find school work unchallenging. Because of this, Group 3 students are more likely to develop strategies for perseverance and coping with difficulty than Group 4 students. Differences between Group 3 and Group 4 students are not usually observed except in tasks that require transfer of previous experience across different domains of knowledge, or instruction that emphasizes original problem-solving and critical thinking. Of the BCPS second graders who took all three batteries of the CogAT® in 2016, 12% received scores falling within the range of Group 3.

Recommendations: Group 3 students thrive in guided discovery learning environments. They also benefit from working with older students or adults. They need to be challenged with materials, projects and problems that are somewhat more difficult than those used for typical students. Since they already have a high level of general reasoning ability, they should be challenged to develop critical thinking skills. They should also be taught to use different learning and problem-solving strategies and to keep track of how they work for them.

Group 4 (profile score of 9)

Characteristics: These students have superior cognitive resources, enabling them to solve problems in novel ways, think critically, and fluently produce ideas. They differ from other students in the way that they organize and store knowledge in long-term memory. They are good at making meaning of new material and relating it to old material, possess efficient strategies, and use those strategies effectively. When faced with a new problem, they are able to adapt and combine strategies to solve the problem. However, some students in this group experience

negative affect, such as anxiety or negative self-talk. These students also have trouble learning to persist in the face of difficulty. Often unchallenged, they do not have experience in dealing with difficulty and have trouble learning to be persistent. Of the BCPS second graders who took all three batteries of the CogAT® in 2016, 2% received scores falling within the range of Group 4.

Recommendations: Group 4 students benefit most from discovery learning and least from highly structured environments. The single greatest need for these students is to be appropriately challenged. This often means providing instruction at a level that is several years above their peers. These students readily learn the value of self-monitoring, and are generally receptive to discovering how to best deploy their own cognitive resources. To help them in this area, teachers can point out that there are different ways to acquire skills and different strategies to accomplish tasks, and can encourage them to try different methods and see which ones work best for them. This approach is better than teaching them to use a specific learning strategy. In fact, when they are required to use someone else's strategy after they have already developed their own, their performance generally decreases. Because of their tendency towards negative affect and lack of persistence, they need help in coping with negative emotions and learning to persist as tasks get more difficult.

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6. COMMON RECOMMENDATIONS TO SUPPORT COGNITIVE DEVELOPMENT

Common Recommendations

Regardless of the group, there are some things common to all students. They all benefit from participating in peer groups, from lessoning the load on working memory when working on higher level tasks, from being taught for transfer, and from learning meta-cognitive strategies and regulation. The key to effective implementation of these things to the different groups is sensitivity to the level of exposure and support they need.

Peer Group Work. Grouping different ability students together allows students to both teach and learn from their peers. In the case of Group 1 students, teaching peers can take the form of guided reading wherein each student takes a turn being the teacher (e.g., Fountas & Pinnell, 1996). In the case of Group 4 students, giving them the opportunity to learn from others is important but not likely to happen with their peers in typical classrooms. Diversity for this group may consist of older students, or students of a similar competence level but with a diversity of perspectives. Being exposed to different points of view gives students the opportunity to exercise their critical reasoning skills as they evaluate the merits of new ideas (Lohman & Hagen, 2003).

Although students in higher groups progressively benefit more from discovery learning, this does not mean they need to learn alone. All students benefit from working with other students who can model new ways to understand a problem. Successful grouping ensures that all students have the opportunity to learn, the opportunity to teach, and the opportunity to participate. This means supporting students who don't readily participate by giving them the skills to do so, or structuring groups such that all members have a clearly defined role (Lohman & Hagen, 2003).

Working Memory. Across all groups working memory is likely to create a bottleneck in the amount of information a student can learn. Regardless of the group a student is in, they benefit from assistance with lower-order tasks and from being afforded the opportunity to work on learning the higher order tasks. Students in the lowest ability level need to be exposed to complex tasks even if they haven't mastered the lower order tasks yet. The consequence of focusing on lower order tasks until they are mastered before being challenged with higher level tasks is to increase the gap that already exists between these and higher scoring students (Lohman & Hagen, 2003). There are a number of methods that can reduce the load on working memory. Students can be excused from components of a task (such as spelling and grammar), can be given tools to assist (such as calculators or diagrams), or they can overlearn lower level tasks that are necessary to complete more complex tasks. Overlearning is when students continue to practice

a skill that has already been mastered. Research has shown that skills continue to develop after a student has already demonstrated competence (Schneider, 1985).

Transfer. Transfer is the ability to take information that is learned about solving one problem and applying it to another problem. Students who take the information they learn in the classroom and apply it to real-world situations are demonstrating transfer (Bohlin, Durwin, Reese-Weber, 2012). Students do not typically demonstrate transfer unless teaching is specifically geared towards it (Marini & Genereux, 1995). Research indicates that students do not readily transfer what they have learned in school because they have not learned the information in a meaningful way (Bereiter, 1995). Examples of this type of learning are rote memorization and convergent thinking wherein there is only one correct answer to a problem (Adams et al., 1988; Bransford et al., 2000). Students are more likely to transfer when they are taught conceptual principals rather than simply procedures (Perry, 1991). Teaching for transfer also involves being shown how one concept or procedure can apply in different contexts, and making the concept of transfer explicit to students. Cueing can also help students to transfer by having them ask themselves, "What have I already learned that can apply to this problem?" (Salomon and Perkins, 1989). Another method is teaching one strategy in different domains, for example teaching reading comprehension strategies in different subjects or using the scientific method in a variety of contexts (Bohlin et al, 2012). Instruction that teaches for transfer is important for all groups; the difference is the degree to which time needs to be dedicated to illustrating the variety of settings in which a particular type of knowledge can apply.

Meta-cognition. Meta-cognition is thinking about one's own thinking processes such as study skills, memory capabilities, and the ability to monitor one's own learning (Hertzog & Robinson, 2005; Metcalfe, 2000). Students can be taught strategies to help them with tasks (meta-cognitive knowledge) and can also be taught to try different strategies to determine which is the most effective for them (meta-cognitive regulation). For example, students can be taught a variety of strategies for memorizing information, including rehearsal strategies such as maintenance rehearsal, elaborative rehearsal, and chunking as well as mnemonic devices such as acronyms, chain mnemonic, the keyword method, and the method of loci, and can be asked to use them all and see which ones work best for them.

7. USING PROFILE SCORES

CogAT® profile scores are reported in stanines (normed scores ranging between 1 and 9), and indicate if the student has a relative strength or weakness in any of the three batteries. Scores can end in an A, indicating even performance across the three batteries, B, indicating a relative strength or weakness on one battery, C indicating a relative strength on one battery and a relative weakness on another, or E indicating an extreme relative difference between at least two batteries.

Riverside Publishing has specific recommendations for each profile score that teachers can view on their website which is located at: www.cogat.com. The site is interactive, allowing a teacher to type in the exact profile in order to receive specific recommendations.

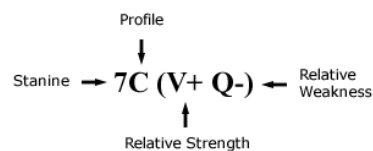## Cognitive Abilities Test™ (CogAT®) Form 6 and Form 7

Interactive Ability Profile Interpretation System

This site was built to enable teachers, counselors, and parents to interpret the Cognitive Abilities Test™ (CogAT) Ability Score Profiles for their students.

▶ **Note to Parents**

Directions

Enter a student's ability profile in the appropriate drop down boxes (see sample for clarification). Once complete, click search, and an interpretation of the score will be provided.

$$\text{Stanine} \rightarrow \underset{\text{Relative Strength}}{\overset{\text{Profile}}{7C\ (V+\ Q-)}} \leftarrow \text{Relative Weakness}$$

| Stanine : | Select ▼ | Profile : | Select ▼ | Relative Strength : | Select ▼ | Relative Weakness : | Select ▼ |

VIEW PROFILE   **RESET**

8. EXAMPLE OF INSTRUCTION DIFFERENTIATION

One strategy for differentiating instruction is having centers available that are targeted towards each of the groups. This helps to ensure there are meaningful learning opportunities for all students, and helps free the teacher to work with the students that are in need of in-depth instruction. Teachers at the BCPS CogAT® workshop who utilize centers report a higher level of student engagement and lower level of behavioral problems. They also say that this type of instruction does require an initial investment but that the pay-off is well worth the investment. Plus, once planned and tested with students (some centers end up being unpopular and teachers change them), the lesson can be used again in subsequent years.

Pose Question to Class

Give students time to work on solution

Teacher moves around room and observes students.

Students Who Got It
Usually Group 4 and some 3

→ Enrichment Center

→ Optional: Fluency Center

Students Who are Close
Usually Group 3 and some 2

→ Teacher provides enough support to help them understand

→ Learning Center

→ Choice: Fluency or Enrichment Center

Students Who Need Instruction
Usually Group 2

→ Teacher begins with conceptual information, provides multiple ways to understand and learn.

→ Learning Center

→ Fluency Center

→ Optional: Enrichment Center

Students Who Need In-Depth Instruction
Usually Group 1

→ Teacher begins with conceptual information, provides multiple ways to understand and learn. Works with children until they understand, and has them practice under supervision.

Provide plenty of prompts (i.e., maps, manipulatives) to help with working memory, teach strategies and give opportunities to practice.

→ Learning Center

→ Optional: Fluency Center

9. UNIVERSAL WAYS TO SUPPORT GROWTH IN ALL STUDENTS

All students can be helped. CogAT® profile scores provide instructional recommendations geared towards the specific needs of the individual student. General reasoning ability at a certain point in time is the culmination of the interaction between nature and nurture, or genes and the home and prior school environment, up until that point in time. **Students can improve their skills and abilities by being challenged and supported in appropriate ways.**

It is critical that teachers hold high expectations for all of their students. Studies have shown that teacher expectation impacts student outcome. A study was conducted in 1965 wherein teachers were told that certain students were expected to show 'surprising gains in intellectual development' in the coming year. These students, who were randomly selected, did in fact experience more gains over that year compared to other students (Rosenthal & Jacobson, 1968). Since then, over 400 studies on various forms of expectancy impacting performance have been conducted with positive results, confirming this phenomenon (Rosenthal, 1994).

Cooper (1979) proposed a causal theory of why teacher expectation impacted student performance. Observations show that teachers create a warmer environment for brighter students, nodding their head and smiling more (Chaikin, Sigler, and Derlega, 1974). Teachers also focused more on "effort" when interacting with high-achieving students and control with low-achieving students. Praising effort rather than intelligence helps to increase student academic achievement.

Carol Dweck found that when students believe that they can do better academically through effort they take on challenges and persist at them. She found that students who have what she calls a "fixed mind-set", meaning believe they are either smart or not smart, and that their intelligence does not change with effort, will reject opportunities to learn if they feel they might make a mistake. These students don't accept challenge in an effort to hide the fact that they are not smart (Hong, Chiu, Dweck, Lin, & Wan, 1999; Mueller & Dweck, 1998). Students with a "growth mind-set" are not afraid to accept a challenge because they view it as an opportunity to learn and further develop their intelligence (Dweck, 2013).

Dweck also found that teachers can do something very simple to encourage a growth mind-set, and that is to praise effort rather than intelligence. In a study illustrating this phenomenon, students were given puzzles and after completing them either told, "You must be smart at these problems" or "You must have worked hard at these problems." They were then offered a choice

of a challenging or easy task, given a challenging task (regardless of what they chose), given an easy task, and then told to report on how they did. Students praised for being smart were more likely to ask for the easy task, struggle and lose their enjoyment working on the problem, then struggle with the easy problem, and then lie about how they did. Students praised for effort were more likely to ask for the challenging problem, persist at it and remain positive. They improved their performance on the easy task and reported how they did more honestly (10% lied vs. 40% in the other group). This experiment shows what a powerful negative impact a well-intentioned statement can have on a child. It also illustrates the power of a teacher's beliefs. Students who put effort into their work can improve (Dweck, 2007).

Teachers who have the tools to effectively support the cognitive development of their students along with the expectation that they will succeed can create a tremendous positive impact in their students' lives. After administering an intervention given to students transitioning to 7th grade that taught growth-mindset and some basic information about how working hard to learn increases connections in the brain, Dweck observed, "Students were riveted with this information. The idea that their intellectual growth was largely in their hands fascinated them. In fact, even the most disruptive students suddenly sat still and took notice, with the most unruly boy of the lot looking up at us and saying, "You mean I don't have to be dumb?"' (Dweck, 2007, page 191).

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