AN OVERVIEW OF COMPREHENSIVE APPLICATION OF BEHAVIOR ANALYSIS TO SCHOOLING (CABAS®)

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Overview

• An overview of the CABAS system and its components
• The Learn Unit
• The Decision Protocol
• Characteristic practices of teaching as applied behavior analysis

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What is CABAS®?

• A system of education for _all_ children
• It was originated to develop a science of teaching
• To develop schools based entirely on the use of scientific procedures for classroom management, pedagogy, curriculum design, staff training, and parent education
• Education to be learner driven
• Measurement-based, individualized education for entire classrooms and entire schools driven by what worked for each individual child.

CABAS® Affiliated Schools

- Fred S. Keller School (Preschool)
- Morristown Public School District (General Education Accelerated Learner Independent Model)
- Rockland BOCES (District Based Elementary Classrooms)
- The Faison School for Autism (Early Intervention, Elementary, High School, Adult Day Programs, and Residential)
- Jigsaw England (Elementary and High School)

University Affiliations

- Teachers College at Columbia University, Graduate School of Arts & Science

- The program in Teaching as Applied Behavior Analysis at Teachers College Columbia University is housed in the department of Health and Behavior Studies. The program has a 40-year history of training graduate students (MA, Ed D, and PhD) in the application of behavior analysis and the sciences of learning and teaching to general education and special education.

- http://www.tc.columbia.edu/hbs/SpecialEd

Behavior Analysis and Education

- Behavior analysis and the science of behavior could contribute to school and academic success
- The field of behavior analysis has been successful in isolating causes of learning problems, focusing on mastery learning, and ways to bridge research and practice (Greer, 1983)
- There are many behavioral practices that have been shown to improve learning, which include but not limited to: Direct Instruction, Precision Teaching, Programmed Instruction, Personalized System of Instruction

Pedagogy

- Includes not only the presentation of material, but also the teaching operations provided by a teacher, or a teaching device, that results in new student repertoires (Greer, 1996; Greer, 2002)
- Learning occurs as a function of the instructional operations, as demonstrated by data

Major Characteristics of CABAS®

- Comprehensive individualized instruction
- New conceptions of curriculum and pedagogy based on the epistemology of behavior selection
  - Apply tactics, or particular techniques, that have been subjected to research in the applied or basic science, and tied to the basic principles of behavior.
- A system-wide perspective that is learner driven
- Set educationally and socially significant objectives
- Schools that prime a sense of community
- Total redesign of schools based on the individual and science
- A system that works because there is continuous measurement of the important behaviors of each member of the system, and that measurement drives the system
- Teachers who function as strategic scientists of instruction

CABAS® System Description

- Components include pedagogy, curricula, supervision, administration, and the roles of students, parents, teachers, supervisors, and the university training program
- Student is at the center of instruction
- CABAS incorporates the entire breadth of behavior analytic research, in addition to its own research

Student

Parents | Teachers | Teacher Mentors/ Supervisors

CABAS Board

University Training Program
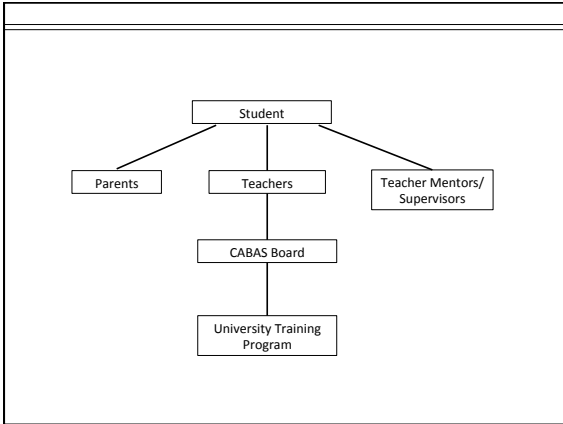
Student

• Categorized based on levels of verbal behavior:
  • Pre-listener
  • Pre-speaker
  • Listener
  • Speaker
  • Speaker-as-own-listener
  • Reader
  • Writer
  • Self-Editor

Student Curricula

• Include the range of behaviors within the context of their target setting events and their target antecedent and consequent controlling variables
• Basic instruction includes the learn unit
• Criterion-referenced objectives specify what degree of correct responding constitutes mastery
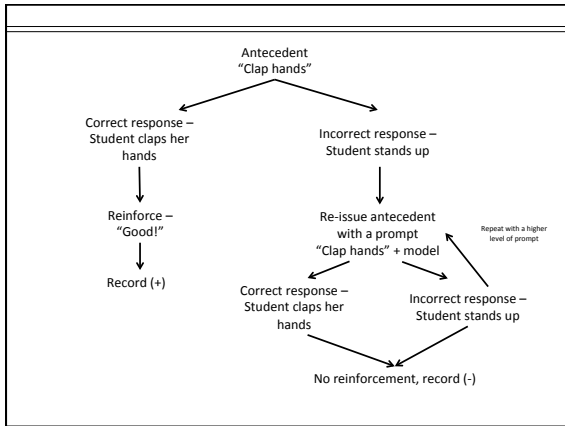
The Learn Unit

- Basic teaching operation
- The LU includes the teacher's presentation of the antecedent stimuli to the student (A), the student's correct or incorrect response (B), and the teacher's response to the student's answer or idea (C) (Greer, 1996; Greer, 2002; Greer, Keohane, Healy, 2002; Greer & Ross, 2008)
- Interlocking three-term contingencies for the teacher and for the student
- Consists of at least 2 three-term contingencies for the teacher and 1 three-term contingency for the student
- Goal – to achieve instructional objectives using the smallest number of learn units possible

The Learn Unit – Correct Response

Event	Operant Components
1. Attending student	Teacher antecedent
2. Teacher says, "Spell cat."	Teacher behavior Student antecedent
3. Student responds, "C-A-T"	Student behavior Teacher consequence Teacher antecedent
4. Teacher responds, "Good job!" and record data as a plus (+)	Teacher behavior Student consequence
5. Completing of the learn unit	Teacher consequence

The Learn Unit – Incorrect Response

Event	Operant Components
1. Attending student	Teacher antecedent
2. Teacher says, "Spell cat."	Teacher behavior Student antecedent
3. Student responds, "K-A-T"	Student behavior Teacher consequence Teacher antecedent
4. Teacher responds, "Spell cat, c-a-t." Student echoes the correction. Teacher does not deliver reinforcement and record a minus (-)	Teacher behavior Student consequence
5. Completing of the learn unit	Teacher consequence

Antecedent
"Clap hands"

Correct response –
Student claps her
hands

Incorrect response –
Student stands up

Reinforce –
"Good!"

Re-issue antecedent
with a prompt
"Clap hands" + model

Repeat with a higher
level of prompt

Record (+)

Correct response –
Student claps her
hands

Incorrect response –
Student stands up

No reinforcement, record (-)

The Learn Unit

- Learn units tell us the moment to moment results of instruction and the criterion-referenced objectives tell us about more long-term outcomes (Greer & McDonough, 1999)
- The learn unit is a measure of student learning and a fundamental measure of instruction, as it is broken down into the smallest components and thus its components can be analyzed separately and together for effective instruction (Greer & McDonough, 1999)
- The learn unit can also be used to calculate cost effectiveness of a program (Greer, 1996)
- The number and size of the learn unit varies by each individual student depending on their level of verbal behavior (Greer, 1996)

Learn Unit Research Base

- The teacher must provide a consequence to the student's response (Abers & Greer, 1991)
- Increasing three-term contingency trials resulted in higher rates of correct responses and incorrect responses remained low (Albers & Greer, 1991; Greer, McCorkle & Williams, 1989)
- The student must observe the antecedent (Hogin, 1996; Hogin & Greer, 1994)
- The student must respond or have the opportunity to respond (Fisher & Berliner, 1986; Greenwood, Hart, Walker & Risley, 1994; Greenwood, Carta, Arreaga-Mayer, & Rager, 1991; Heward, 1994)
- Better student performance results from faster rates of intact learn unit presentations (Carnine & Fink, 1978; Ingram & Greer, 1992)
- Replacing teacher/student interactions that are not learn units with interactions that are learn units increases student correct responses four to seven times (Albers & Greer, 1991; Diamond, 1992; Ingham & Greer, 1992; Selinske et.al., 1991)

Learn Unit Activity 1

A student is learning to read. The current objective is for the student to read every word in a sentence correctly. The sentence the student has to read is:

"The sun did not shine. It was too wet to play. So we sat in the house. All that cold, cold, wet day." (Dr. Seuss, 1957)

Give an example of a learn unit.

Learn Unit Activity 2

The student has met the criterion for reading every word correctly. The current objective is for the student to read every sentence correctly. The paragraph/page the student has to read is:

"The sun did not shine. It was too wet to play. So we sat in the house. All that cold, cold, wet day." (Dr. Seuss, 1957)

Give an example of a learn unit.

Learn Unit Activity 3

The student has met the criterion for reading every sentence correctly. The current objective is for the student to read the whole page correctly and fluently (90 correct words per minute). The page the student has to read is:

"The sun did not shine. It was too wet to play. So we sat in the house. All that cold, cold, wet day." (Dr. Seuss, 1957)

Give an example of a learn unit.

Curriculum (Greer, 1996; Greer, 2002)

- 4 major repertoires: Academic Literacy, Communication, Self-Management, and Expanding Community of Reinforcers
- Academic Literacy not only focuses on the complex operations, but also in mastery and fluency of basic skills
- Communication includes mands, tacts, intraverbal responses, as well as social skills
- Self-Management focuses on students managing their own behavior by teaching them to control and analyze the contingencies of reinforcement and punishment in their own environment
- Students also need to acquire new reinforcers through active conditioning of new reinforcers

The C-PIRK

- C-PIRK: CABAS International Curriculum and Inventory of Repertoires for Children from Preschool through Kindergarten (Greer, 2013)
- Skills-based inventory
- Includes structural and functional goals
- Academic Literacy (172LTOs)
  - Academic Equivalence (131 LTOs)
  - Communication (41 LTOs)
- Community of Reinforcer (16 LTOs)
- Self-Management (57 LTOs)
  - School Sufficiency (30 LTOs): Self-Help Skills, School Routines
  - Social Repertoires (27 LTOs)
- Physical Development (56 LTOs)
  - Small Muscle (21 LTOs): Grapho-motor Skills, Classroom Tools
  - Large Muscle (35 LTOs)

Individualized Curricula

- Long-Term Objectives (LTO)
  - Based on the C-PIRK Assessment
  - The overall learning goal of a particular skill at a pre-determined criterion.
- Short-Term Objectives (STO)
  - A break down of the long-term objectives into smaller steps
  - Mastering one STO will lead to the next more complex STO, and so on…
- Mastery Criterion: usually 18/20 correct responses for 2 consecutive sessions or 20/20 correct responses for 1 session, plus a fluency criterion
- Delivered in 1:1 or small group setting

Academic Literacy		Rhyming Words		
Students Name	**Repertoire**		**Program**	

Long Term Objective – LTO:
1) Given 20 pictures of words, student will identify pictures that rhyme after tacting them, at 90% accuracy for 2 sessions or 100% accuracy for 1 session.
2) Given 20 novel words, student will hears the words and vocally produces a word that rhymes, hears word and points to printed word that rhymes, hears word and points to printed word that does not rhyme, and hears words and writes to construct the word that rhymes, at 90% accuracy for 2 sessions or 100% accuracy for 1 session, for each of the response.

Frequency per session: 1x/session.
Setting: As per specific STO's

Short Term Objectives -	**Onset Date**	**Completion Date**
STO A)		

Target: _____, _____, _____, _____ (4 pairs of rhyming words).

Procedures:
A- Present 3 pictures on the table. Have student tact all of the pictures. Give student a picture that rhymes with one of the pictures on the table. Deliver the antecedent, "What rhymes with _____?"
B- student responds by pointing to the correct picture or matching the picture.
C- (+) Student matches the pictures or point to the correct picture that rhymes. Deliver FR1 vocal praise and VR3 tokens.
(-) Student does not match or point to the correct picture. Deliver correction by telling Student, "CAT rhymes with BAT" and have Student match or point to the picture. Do not deliver reinforcement.

Data: 1 LU per item. Run 5 LUs for each target pair. Graph in 20 LU.

Criterion: 90% for 2 consecutive sessions or 100% for 1 session.

Data Collection

• Data are collected for every student response, based on the student's learn unit
• Teaching is driven by moment-to-moment responses of each individual student
• All data are graphed and a Decision Protocol is used to determine student progress (Greer & Keohane, 2002)

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Behavior Consultant

Student Name: _____

Program: _____

STO									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
TOTAL									
Initials									
Date									

STO/
Antecedent

Number of Learn Units

20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0

Session Date

LTO: _____

Criterion:

Student: _____ Year: _____

Decision Protocol

- Decision opportunities are determined by the trend of data paths (the line drawn between 2 data points)
- Begin the count of data paths per phase of a graph from the point of origin (the first data point in a phase) or the last decision opportunity in a phase
- Once the student has achieved criterion a decision to change the STO is made, this may be the first opportunity within a phase to make a decision
- If criterion does not occur within three data paths (from the point of origin), then a count of three stable data paths may be the next decision opportunity

3 Data Path Rules
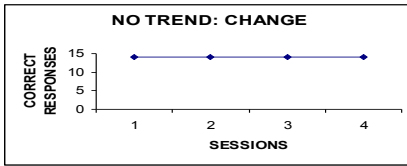
3 consecutive ascending data paths: continue

ASCENDING: CONTINUE

CORRECT RESPONSES

20
15
10
5
0

1   2   3   4

SESSIONS
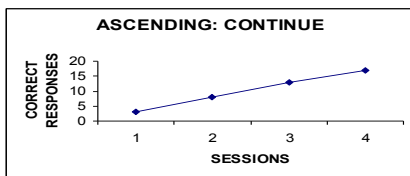
3 Data Path Rules

3 consecutive descending data paths: change

DESCENDING: CHANGE

CORRECT RESPONSES

20
15
10
5
0

1   2   3   4

SESSIONS
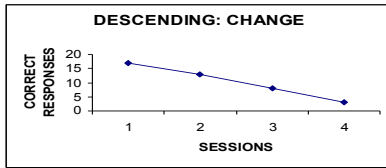
3 Data Path Rules

3 consecutive no-trend data paths: change

NO TREND: CHANGE

CORRECT RESPONSES
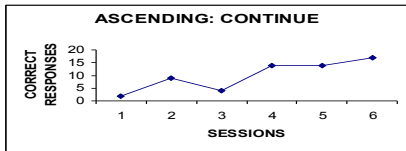
15
10
5
0

1   2   3   4

SESSIONS

Variability

When there is a change in direction...

... count to 5 data paths

5 Data Path Rules
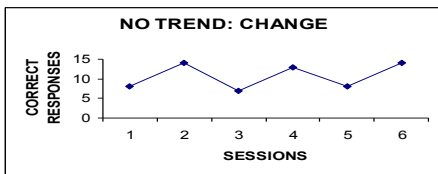
5 consecutive variable, but overall ascending: continue

ASCENDING: CONTINUE

(graph: CORRECT RESPONSES vs SESSIONS, ascending trend)

5 Data Path Rules

5 consecutive variable, but overall descending: change

DESCENDING: CHANGE

(graph: CORRECT RESPONSES vs SESSIONS, descending trend)
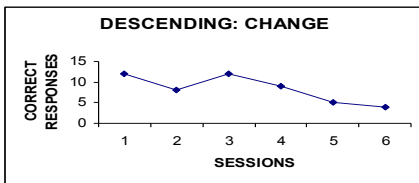
5 Data Path Rules

5 consecutive variable, but overall no trend: change

NO TREND: CHANGE

(graph: CORRECT RESPONSES vs SESSIONS, no trend)

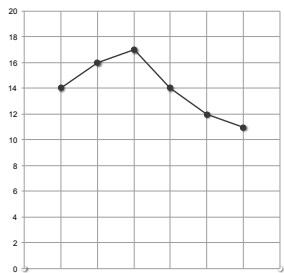## Decision Protocol Activity

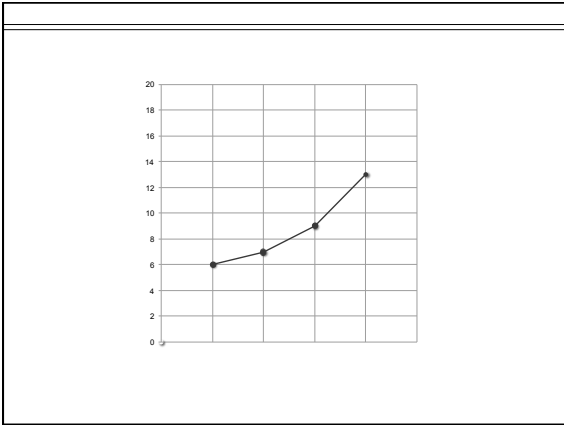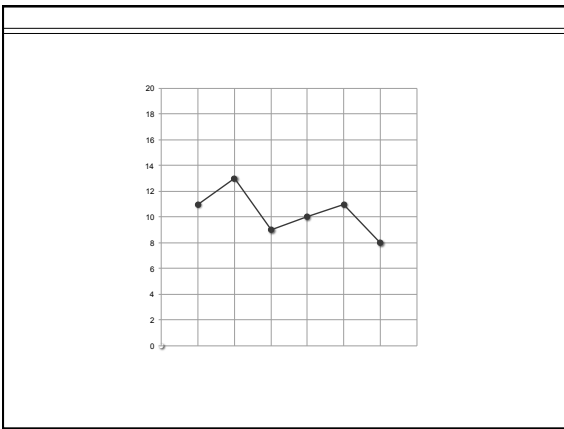For each graph, specify the following:
1) Variable or stable
2) Ascending, descending, or no trend
3) Decision: continue, change, or criterion met

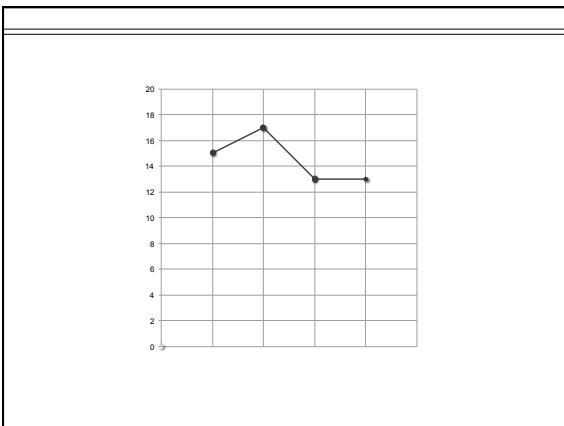Criterion: 18/20 x 2 consecutive sessions

Student

Parents — Teachers — Teacher Mentors/ Supervisors
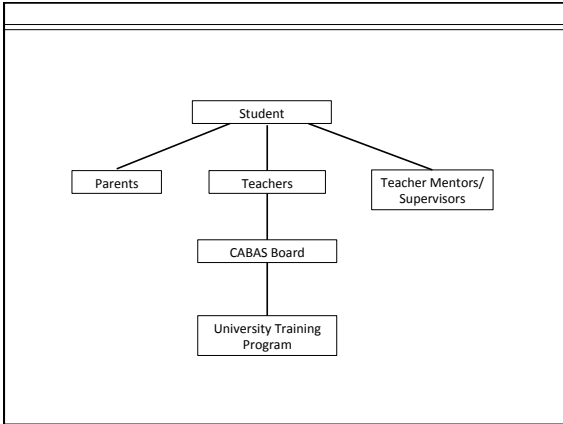
CABAS Board

University Training Program
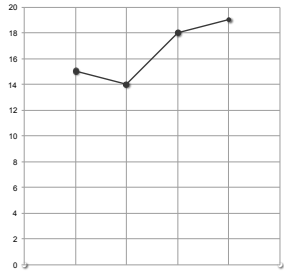
Teachers

- Teachers are strategic scientists of pedagogy and applied behavior analysts
- Teachers demonstrate mastery in the following repertoires:
  1) Contingency-shaped repertoires of in class practice
  2) The vocabulary of the science, or the verbal behavior about the science (the use of vocabulary of the concepts or terms of the science and correspondence between the terms and operations of teaching and learning)
  3) Verbally-mediated repertoires (expertise in analyzing and solving instructional problems)

Characteristics of Learning Problems from the Scientific Perspective (Greer, 2002)

Prescientific Teachers: Provides Categorizations of Instructional Problems	Teaching as Applied Behavior Analysis: Provides Solutions to Instructional Problems
The student is unmotivated	The reinforcement or establishing operations are inadequate for the student, or the student does not have a wide community of reinforcement
The student has a learning disability	Prerequisite repertoires are not mastered or fluent, and must be taught
The child can't learn	The instruction is inadequate in terms of learn unit presentations; the controlling variables for behavior need to be shifted
The problem is in the home	Instruction in the school is the responsibility of the teacher, and we are responsible for fixing the problem and assisting parents

Contingency-Shaped Repertoires

- Teaching practices in the classroom
- Behaviors that are reinforced or punished directly by contingencies in the environment
- Fluent behaviors
- Teachers who do not have fluent contingency-shaped repertoires:
  - Present flawed instructions
  - Neglect to allow the student the opportunity to respond
  - Neglect to reinforce or correct target responses
  - Do not remediate student learning problems immediately
  - Do not present Learn Units
  - Do not teach to mastery

How Teachers Learn Contingency-Shaped Responses

- In-situ teaching
- Present intact learn units and without error
- Reinforce frequently, contingently, and positively
- Supervise teaching assistants in the classroom
- Provide individualized instruction
- Record and display data
- The use of Teacher Performance Rate and Accuracy (TPRA) to measure teacher progress

- Initially, under the complete supervision and support of a qualified supervisor
- Teacher behaviors initially will be rule governed or verbally mediated
- When the practices that are initially dictated by verbal instructions come under the control of their effects on student behavior they will qualify as contingency shaped
- Teacher practices become accurate and automatic (i.e. fluent)

Teacher Performance Rate and Accuracy (TPRA)

- Use to measure the teacher's accuracy and rate at presenting learn units to student
- The learn unit is a measure of both the accuracy of teacher presentations and the productivity of teachers; learn unit data allow for determining cost per learn unit and costs per correct response
- The Decision Protocol is used to monitor the degree to which the practitioner is acting as a strategic scientist, and if the teacher fits the appropriate tactic to the momentary need of the student

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- Teacher performance is also measured by the total and correct number of learn units taught by curricular areas, the objectives achieved by curricular area, the number of inservice modules achieved, and teacher rate and accuracy measures collected several times weekly by teacher supervisors (Greer, 1996)
- The use of TPRAs increased teacher rate and accuracy performance, which in turn increased students' correct rates of responding (Ingham & Greer, 1992)

Verbal Behavior About the Science

- A vocabulary of scientific terminologies, strategies, and tactics
- A correspondence between a use of the terms and implementing the operations (tactics)
- The VB about the science is learned in order to:
  - Engage in the practices of the science
  - To apply the findings of the science
  - To analyze events scientifically to identify problem, if necessary

Verbally-Mediated Repertoires

- Expertise at analyzing and solving instructional problems
- Solve learning problems by:
    1) Identifying the problem within the learn unit context
    2) Identify an appropriate tactic derived from research
    3) Apply the tactic to the problem
    4) Collect data to measure student progress (or lack of progress)

Tactics

- There are over 200 learning tactics available in the literature, to increase and decrease behaviors
- Teachers learn to identify these tactics and apply them to the problem
- These tactics include *behavior management* and *learning* tactics

Teacher Ranks

- The CABAS® Board certification documents a specialization in teaching and supervision as a strategic science for the professionals in our schools
    - Teacher I
    - Teacher II
    - Master Teacher
    - Behavior Analyst Ranks: Assistant, Associate, and Senior
    - Research Scientist Ranks: Assistant, Associate, and Senior

Teacher Ranks

- All staff members must work on their ranks
- Salary increases are based on ranks
- Teacher I Rank requires mastery of the terms and concepts in texts that are scientifically accurate
- The candidate acquires in-situ instructional repertoires to show errorless and rapid presentation of learn units
- The Rank includes accurate decisions that are verbally-governed by selecting from the 200 plus tactics in the literature, and the completion of 10 experiments replicating tested tactics in the literature

Characteristic Practices of Teaching as Applied Behavior Analysis (Greer, 2002, p. 14)

- All *instruction is individualized* whether the instruction is provided in a one-to-one setting or in groups
- *Teacher continuously measure* teaching and student responses
- *Graphs of the measures of student's performance are used for decisions* about which tactics are best for students at any given instructional decision point
- Logically and empirically tested *curricula and curricular sequences are used*
- The *principles of the basic science* of the behavior of the individual and *tactics from the applied research* are used to teach *educationally and socially significant repertoires*

- Teaching is driven by the moment-to-moment responses of each individual student and existing research findings
- The classroom is a positive environment – coercive procedures are avoided (e.g. reprimands are not used)
- Expertise in *the science is used to make moment to moment decisions based on the continuous collection of data and its visual summary in graphs*
- *Teachers are strategic scientists of pedagogy* and applied behavior analysts
- *The progress of students is always available* for view in the form of up to date graphs that summarize all of the students' responses to instruction

In summary…

The student is always right!

Thank you!

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www.cabasschools.org