TECHNICAL REPORT #30:

Teachers' Understanding of Curriculum-Based Measurement Progress Monitoring Data

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Teachers' Understanding of Curriculum-Based Measurement Progress Monitoring Data

A large body of research supports the validity and reliability of curriculum-based measures (CBM) and the positive effects on instruction and achievement when the measures are implemented for progress monitoring (Marston, 1989; Wayman, Wallace, Wiley, Ticha & Espin, 2007; Stecker, Fuchs, & Fuchs, 2005). A central purpose of progress monitoring is teacher use of the data to evaluate student progress and determine the success of instructional programs. However, research has demonstrated that teachers have difficulty using progress-monitoring data to inform instruction (Stecker et al., 2005). Although methods have been designed to improve use of CBM data, one area of study that has been neglected is teachers' understanding and interpretation of progress monitoring data. In this study we examine the understanding and interpretation of progress-monitoring data for more- and less experienced teachers. The following primary research question and secondary research questions were examined:

1. How do teachers interpret and understand CBM progress monitoring data?
    a. Do ratings of teachers' interpretation and understanding correspond to teacher characteristics (e.g., years experience using CBM)?
    b. Does teacher interpretation and understanding vary with different components of CBM progress monitoring?
    c. On what components of CBM progress monitoring do teachers rated higher and lower differ in understanding and interpretation?
    d. How can the think alouds of teachers rated higher and lower on interpretation and understanding be characterized?

Results of this study, combined with results of a prior focus-group study, were used to develop methods for enhancing teachers' implementation of CBM data.

Method

Participants

District liaisons identified 52 special education teachers from an urban district with more and less CBM experience. Of the 52 special education teachers identified, 14 teachers agreed to participate in the study. Participants were 14 special education teachers (13 female and 1 male) who were more-experienced CBM (n = 10) users and less-experienced CBM users (n = 4). All Teachers with 2 years or less experience using CBM and some knowledge of the CBM process were *less-experienced* users. Teachers who had 5 or more years of experience with CBM and who had generated 30-50 individual student graphs were labeled as *more-experienced* users. Teacher characteristics are presented in Table 1.

Table 1. Individual Teacher Characteristics

Teaching License(s)	Degree	Yrs. Tch. Exp.	Yrs. Tch. Exp. In Dist.	Yrs. Exp. CBM	Number of CBM Graphs	CBM Training
LD/EBD/Social Studies	Master's	32	31	20	250	District
LD/EBD	Master's	30	11	11	150	District
LD/EBD/MMI/Elementary	Master's	30	30	25	300	District
LD/EBD/Elementary	Master's	27	27	20	200	District
MMI/Elementary	ABD	27	17	14	280	District
LD/EBD/MMI/Elementary	Master's	24	20	18	180	University/District
LD/EBD/MMI	Master's	21	17	14	240	District
LD/Elementary	Master's	14	14	14	280	District
EBD/MMI	Master's	14	1	10		University
LD/EBD/Elementary	Master's	9	9	9	100	District
LD/EBD	Bachelor's	8	6	5	56	District
LD/EBD/Elementary	Master's	7	1	1	18	District
LD	Master's	2	2	3	13	University
DCD	Master's	1	1	1	10	University/District

Procedure

Teachers' understanding of CBM data was assessed using a think-aloud approach. Each teacher was presented with 3 CBM graphs (see Appendix A). For the first two graphs, an open-ended think-aloud structure was used: Teachers were asked to look at the graph and tell what

they were seeing and thinking (see administration directions in Appendix B). The order of the first two graphs was counterbalanced across teachers (Form A: Graph A, B and Form B: Graph B, A). For the third graph, which was always presented last (with the exception of one teacher who mistakenly received Graph A), a directed think-aloud structure was used. Teachers were asked a series of questions about different aspects of the progress-monitoring graph (e.g., baseline data, intervention phases, goal setting, growth rates, etc.). The list of think aloud prompts are provided in Appendix C. Each think aloud was tape recorded and transcribed.

Analysis

Data analyses were conducted in three phases. In the first phase, the extent to which more- and less-experienced teachers differed in their interpretation and understanding of CBM data was examined by having four experts (identified on the basis of their work and research in CBM) read the think aloud transcripts and evaluate teachers' responses. Each think aloud transcript was evaluated by at least two raters and two of the think aloud transcripts were evaluated by all four raters. The expert raters used the Teacher Interpretation Rating Scale (see Appendix D) to evaluate the think aloud transcripts. Each item on the Teacher Interpretation Rating Scale was rated on a 4-point scale (1- Not at All, 2 - Somewhat, 3 - Well, 4 - Very Well) and the expert raters were encouraged to provide comments for each item in addition to the rating scale. Teachers were then divided into low, middle, and high groups based on the global rating given by the expert raters to examine similarities and differences in their interpretation and understanding of CBM data.

In the second phase, themes were extracted from the think aloud protocols using the expert raters' comments to describe differences in understanding and interpretation for teachers in the low, middle, and high groups.

In the third phase, each think aloud was parsed into clauses and coded to identify the areas discussed by lower- and higher-rated teachers (sample in Appendix E). The coding and analysis were guided by prior research on development of expertise in general, prior research on development of teacher expertise, raters' comments from first part of study, and a task analysis of CBM use and procedures (Appendix F). The think aloud transcripts were parsed and coded by two researchers with CBM experience. Differences in parsing and coding were resolved through discussion. The overall total score given by the expert raters was used to identify the four highest rated teachers and the four lowest rated teachers. The similarities and differences in areas discussed were examined for lower- and higher-rated teachers. A path analysis was created for the four highest rated teachers and the four lowest rated teachers based on the think aloud analysis.

Results

Expert Ratings

Interrater agreement between two raters was 46% for exact matches (includes matches within .5) and 74% for close matches. For close matches, ratings of 1 or 2 were counted as agreements, and ratings of 3 or 4 were counted as agreements. The interrater agreement among all 4 raters was 35% for exact matches (includes matches within .5) and 81% for close matches.

Understanding and interpretation across teachers. On average, teachers received the highest ratings for their understanding and interpretation of goal attainment, function of the goal line, and setup of the graph. Teachers received the lowest ratings for their understanding and interpretation of the slope, baseline data, and the meaning of the words read correctly measure (see Table 2).

Table 2. Average Ratings Across Teachers

Item	Rating
Goal attainment	3.43
Goal line, function	3.23
Setup of graph	3.14
Understand/use level	2.96
Baseline, purpose	2.93
Goal line, construction	2.93
Interventions, effectiveness	2.93
Understand/use, variability	2.82
Interventions, need to change	2.79
Meaning of WRC measure	2.71
Baseline data, interpretation	2.59
Understand/use, slope	2.36

Understanding and interpretation by group. Initially, teachers were identified as more- and less-experienced users by district liaisons; however, the groupings did not coincide with the expert ratings. Teacher characteristics also did not coincide with expert ratings (correlations between Total Ratings Across Items and Global Rating [r = .91], Teaching Experience [r = -.10], District Teaching Experience [r = .12], Years Experience CBM [r = -.07], Number of CBM Graphs [r = -.36]). Instead of using nomination by district liaisons or teacher characteristics to form groups, teachers were divided into low (n = 5), middle (n = 3), and high (n = 6) groups based on their global rating given by the expert raters.

The item ratings for each teacher are shown in Table 3. Teachers in the low group were generally rated lower in their understanding of the purpose of the baseline data, construction of the goal line, setup of the graph, interpretation of the baseline data, function of the goal line, effectiveness of the interventions, and interpretation of variability in the data when compared to the middle and high group. Teachers in the low and middle group were generally rated lower in their understanding and interpretation of the meaning of the words read correctly measure and

the need to change interventions when compared to the high group. The two teachers with a global rating of four showed a greater understanding of the slope when compared to teachers with a global rating of less than four. Few differences were found across groups in understanding and interpretation of goal attainment and use and interpretation of level.

Table 3. Item Ratings for Individual Teachers (Rank Ordered by Global Rating)

Group	Global Rating	Purpose of Baseline Data	Meaning of WRC	Construct Goal Line	Setup of Graph	Baseline Data Int.	Function of Goal Line	Change Interv.	Slope	Effect. Interv.	Variability	Goal Attain.	Level
High	4.00	4.00	3.50	4.00	4.00	3.50	4.00	4.00	4.00	4.00	4.00	4.00	4.00
	4.00	3.50	4.00	4.00	4.00	3.25	3.75	3.50	4.00	3.50	3.00	4.00	3.50
	3.50	3.50	3.50	3.50	4.00	2.25	4.00	3.00	2.00	2.50	3.00	3.50	3.00
	3.25	4.00	4.00	3.00	4.00	3.50	4.00	3.50	2.50	3.00	3.00	4.00	3.50
	3.25	3.50	4.00	3.50	3.50	3.50	4.00	3.50	2.00	3.75	3.50	4.00	3.00
	3.25	3.50	3.50	4.00	3.50	3.50	3.50	3.50	2.50	3.50	3.00	3.50	3.50
Middle	3.00	4.00	1.50	4.00	3.50	3.50	4.00	2.50	2.50	3.50	4.00	4.00	3.00
	3.00	3.00	2.50	3.50	3.00	3.00	3.50	2.50	2.50	3.00	3.00	3.00	2.50
	3.00	3.00	2.00	2.25	4.00	2.50	2.50	2.25	3.00	3.25	2.00	4.00	3.50
Low	2.25	1.50	2.00	1.00	2.00	1.00	2.00	2.25	1.00	2.50	2.50	3.50	3.00
	2.00	2.00	2.00	3.50	2.00	1.50	4.00	3.00	2.00	3.00	3.50	3.00	3.50
	2.00	2.00	2.00	1.50	2.50	2.00	2.00	2.00	2.00	2.00	2.00	2.50	2.00
	2.00	1.50	2.00	1.25	2.00	1.75	1.50	2.00	1.50	1.50	1.00	3.00	1.50
	1.75	2.00	1.50	2.00	2.00	1.50	2.50	1.50	1.50	2.00	2.00	2.00	2.00

The average ratings by group are presented in Table 4. On average, the largest differences in ratings for the high and low groups were on the understanding of the purpose of baseline data, the meaning of the word read correctly measure, and the construction of the goal line. The smallest differences were on use and interpretation of level and goal attainment.

Table 4. Average Ratings by Group (Rank Ordered by High/Low Difference)

Item	Low Group (n=5)	Middle Group (n=3)	High Group (n=6)	Difference High and Low Groups
Baseline Data: Purpose	1.80	3.33	3.67	1.87
Meaning of WRC measure	1.90	2.00	3.75	1.85
Goal Line: Construction of	1.85	3.25	3.67	1.82
Setup of Graph	2.10	3.50	3.83	1.73
Baseline Data: Interpretation	1.55	3.00	3.25	1.70

Goal Line: Function	2.40	3.33	3.88	1.48
Interventions: Need to Change	2.15	2.42	3.50	1.35
Use and interpretation: Slope	1.60	2.67	2.83	1.23
Interventions: Effectiveness	2.20	3.25	3.38	1.18
Use and interpretation: Variability	2.20	3.00	3.25	1.05
Goal Attainment	2.80	3.67	3.83	1.03
Use and interpretation: Level	2.40	3.00	3.42	1.02
(Global Rating)	(2.00)	(3.00)	(3.54)	(1.54)

Themes

In addition to rating each think aloud transcript, the expert raters were encouraged to comment on the teachers' understanding and interpretation of CBM data. The expert raters' comments for teachers in the low, middle, and high groups are presented in Table 5. The expert raters' comments were used to extract themes for each group. Themes for the low group were a.) confused, disorganized, and unclear think alouds; b.) confusion on many aspects of CBM progress monitoring; and c.) focusing on WRC as a fluency measure. Themes for the middle group were a.) gaps in knowledge base and b.) weaknesses in the area of the meaning of the words read correctly measure and the use of data for decision making. Themes for the high group were a.) clear and coherent discussion of CBM graphs and b.) knowledgeable across many components of CBM.

Table 5. Expert Raters' Comments by Group

Low Group	Middle Group	High Group
Confused about purpose of CBM and instructional utility	Talks a lot about ups and downs in data and does not attend to "trends" in data; seemed comfortable talking about baseline, goal-setting, words gained per week.	Thoughtful about most aspects of CBM

Gaps in knowledge base for CBM	Focuses on CBM as just measuring fluency	Think aloud clear and coherent . . . person talks sensibly about the graphs
Really focuses on fluency measurement	Seems to understand procedures well, but I question whether the data would drive decisions for this person	Knowledgeable about many aspects
Focuses on CBM as a measure of fluency and not overall reading proficiency	Probably experienced but not very skilled in CBM instructional utility	Paid attention to determining level of measurement and how initial performance is related to finding level of measurement and sensitivity to growth
Calls the goal a trend line	Probably experienced -- surprised at end by reference to fact it was "just reading fluency"	Response is organized and clear and follows the process used in implementing CBM (from baseline to goal to data collection to evaluation of interventions)
Confused on several issues		Talks knowledgeable and clearly about data
Discussion of graph and effects of interventions seems very superficial		Knows how to compute goal, realizes goal line is a guide for judging performance
A primary concern is whether goal was set too high		Demonstrated insight and knowledge on CBM procedures
Talk is not very organized and the focus of talk is inconsistent		

Think Aloud Analysis and Path Analysis

Higher-rated teachers discussed 19 out of the 21 areas identified by the task analysis. The highest percentage of comments made by higher-rated teachers were on the general effects of the interventions on student progress (21.25%) and describing the effects of the interventions in reference to the goal line (14.25%). Lower-rated teachers discussed 15 out of the 21 areas identified by the task analysis. The highest percentage of comments made by lower-rated teachers were on the general effects of the interventions on student progress (21.25%) and 36.50% of the comments made were inaccurate or uninterpretable clauses. The major differences in the percentage of comments made by lower- and higher-rated teachers were on inaccurate or

uninterpretable clauses (0.75% for higher vs. 36.50% for lower), describing effects of intervention by referring to level or the goal line (14.25% for higher vs. 7.25% for lower), and determining goal attainment (5.75% for higher vs. 2.25% for lower).

The path analysis revealed slightly different patterns for lower- and higher-rated teachers (see Tables 6 and 7). Higher-rated teachers tended to discuss the areas of CBM sequentially and discussed more areas of CBM in general. Lower-rated teachers tended to discuss fewer areas of CBM and in a less sequential manner.

Table 6. Path Analysis for Higher-Rated Teachers

Higher-Rated Teachers
Teacher #2 (47 total pts.) 3 → 6 → 6 → 6 → 6 → 6 → 6 → 7 (Graph B) 6 → 5 → 1 → 6 → 8 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 (Graph A)
Teacher #3 (44 total pts.) 4 → 5 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 (Graph A) 1 → 1 → 3 → 4 → 4→ 5 → 6 → 6 → 7 (Graph B)
Teacher #7 (42 total pts.) 3 → 3 → 4 → 5 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 7 (Graph B) 3 → 4 → 5 → 6 → 6 → 6 → 6 → 6 → 7 → 6 → 6 → 6 → 6 → 6 (Graph A)
Teacher #14 (41.75 total pts.) 1 → 3 → 4 → 4 → 6→ 6 → 6 → 6 → 6 → 6 → 5 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 7 → 6 → 8 → 6 → 1 → 1 → 1 → 1 → 1 (Graph B) 1 → 3 → 4 → 4 → 4→ 8 → 6 → 6 → 6 → 6 → 5 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 6 → 7 → 7 → 1 → 1 → 1 → 7 → 7 → 6 → 1 → 1 → 6 → 6 → 6 (Graph A)

Note: Red numbers indicate inaccurate/uninterpretable clauses

Table 7. Path Analysis for Lower-Rated Teachers

Lower-Rated Teachers
Teacher #10 (24.50 total pts.) 6 → 6 → 6 → 6 → 1 → 6 → 6 → 6 → 6 (Graph A) 6 → 6 → 6 → 1 → 9 → 6 → 6 → 9 → 6 → 6 → 1 → 6 → 7 → 6 → 6 (Graph B)
Teacher #11 (24.25 total pts.) 5 → 6 → 6 → 6 → 6 → 7 → 6 (Graph B) 8 → 6 → 8 → 6 → 6 → 8 → 6 → 1 → 7 → 6 (Graph A)
Teacher #5 (22.50 total pts.) 6 → 6 → 6 → 6 → 6 → 6 (Graph A) 6 → 6 → 6 → 6 → 9 → 9 → 9 → 9 → 9 → 9 (Graph B)
Teacher #1 (20.50 total pts.) 3 → 5 → 6 → 6 → 4 → 4 → 4 → 6 → 8 → 6 → 6 → 6 → 6 → 1 → 6 → 6 → 8 → 9 (Graph B) 2 → 2 → 1 → 3 → 6 → 4 → 4 → 6 → 6 → 9 → 3 → 6 → 6 → 6 → 6 → 8 → 6 → 6 → 9 → 6 → 9 (Graph A)

Note: Red numbers indicate inaccurate/uninterpretable clauses

Discussion

Interestingly, there is little correspondence between teacher characteristics (e.g., years experience using CBM) and the rated quality of teachers' understanding and interpretation of CBM data. This finding is particularly important for the field of CBM because it indicates that teachers may need additional training or guided practice on interpreting CBM graphs on an ongoing basis.

There are definitely areas of more and less understanding and interpretation across teachers with more understanding of goal attainment, goal line function, and graph setup; and less understanding of the words read correctly measure, baseline data interpretation, and use of slope. Teachers rated higher and lower differ more on their understanding and interpretation of the purpose of baseline data, the meaning of words read correctly measure, and the goal line

construction; and less on goal attainment and the use and interpretation of variability and level. Higher-rated teachers' discussions about the CBM graphs are more accurate, clear, and coherent while lower-rated teachers' discussions about the CBM graphs are more inaccurate, disorganized, and unclear. Higher-rated teachers discuss more components of CBM and in a more sequential manner while lower-rated teachers discuss fewer areas and less sequential manner.

Overall, lower-rated teachers have a general state of confusion about CBM data collection and interpretation while higher-rated teachers exhibit a generally coherent and organized body of knowledge. Our study indicates that it's not easy to interpret CBM graphs and more instruction is needed in order to ensure proper interpretation and use. The meaning of the words read correctly measure, changing interventions, and using and interpreting slope are areas that are particularly difficult for most teachers. Although preliminary, our results imply that the understanding of CBM progress monitoring data is more complex than it may first appear, and is something that may need to be developed through careful training and experience, especially if CBM is to be used within an RTI approach to identification.

One limitation to this study is the type of CBM graphs used for the think-alouds. Two of the CBM graphs presented were taken from the Experimental Teaching Project where changes to the instructional programs were made although the data did not indicate that a change was necessary. The unnecessary instructional changes may have caused some confusion for teachers during their think aloud sessions.

References

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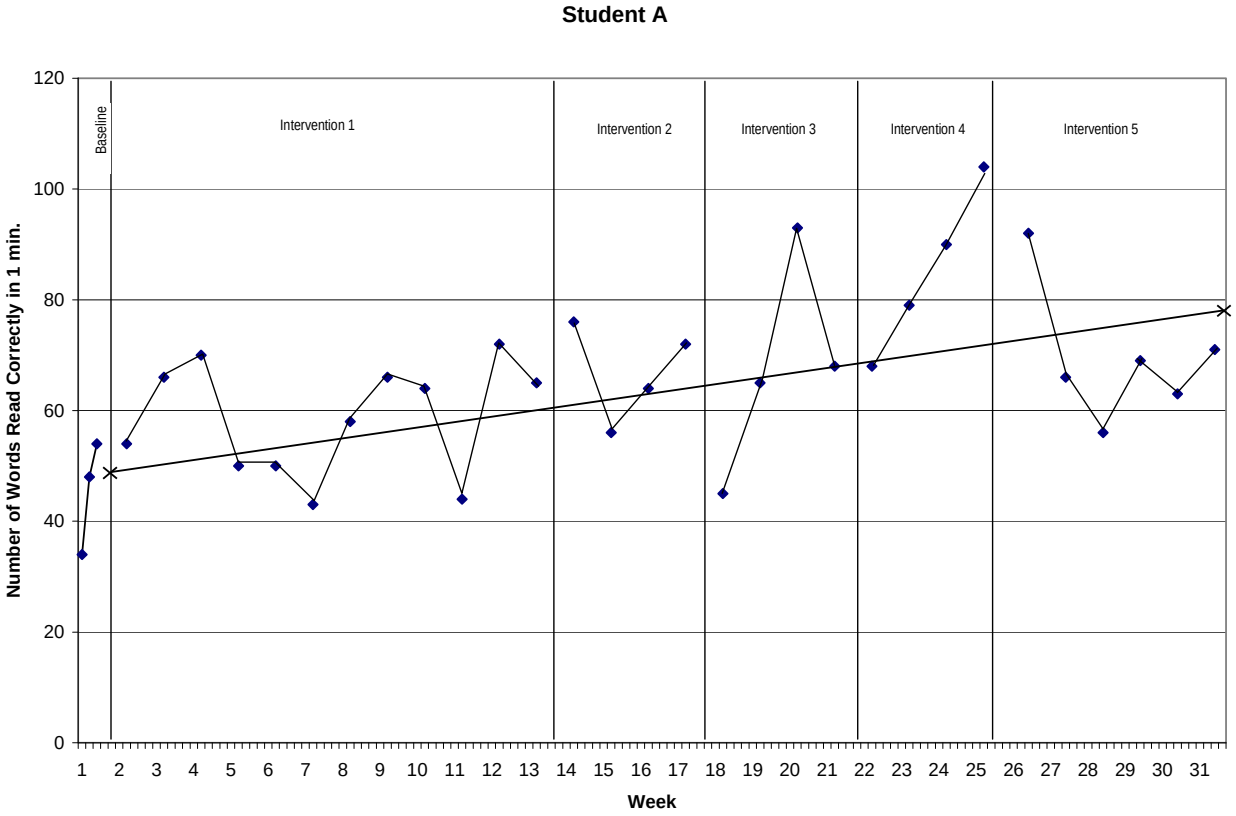
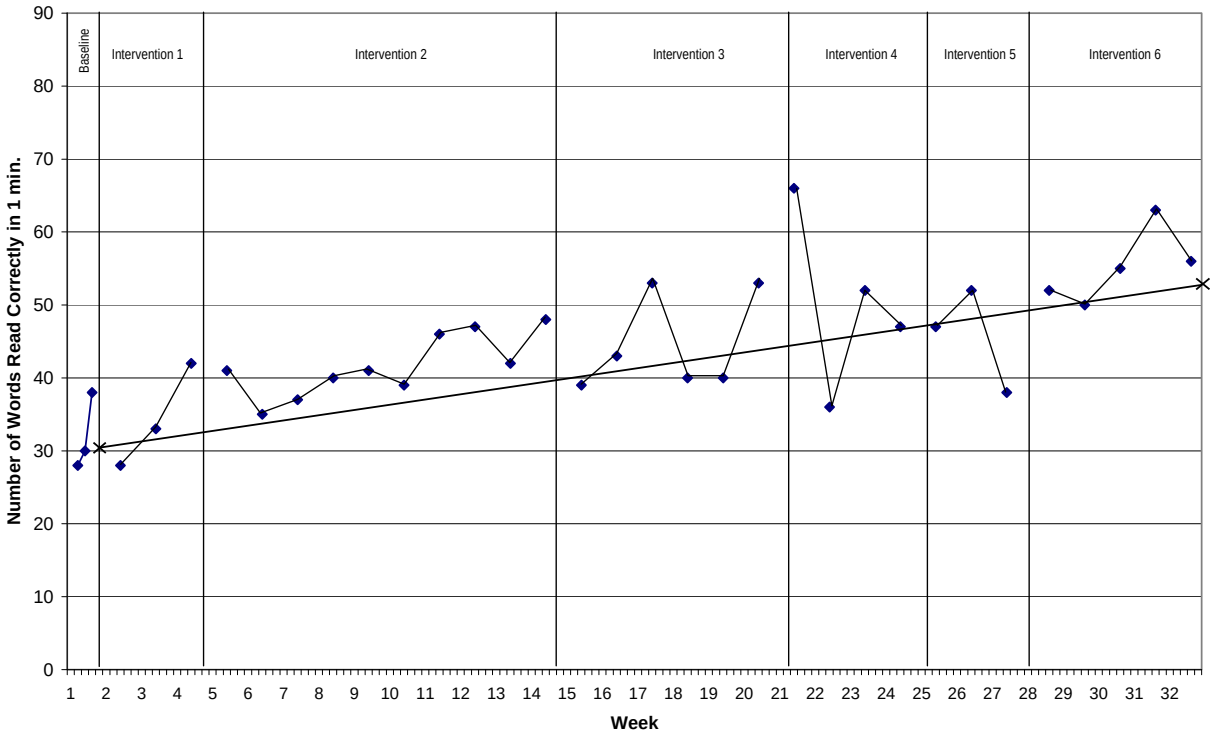
Appendices

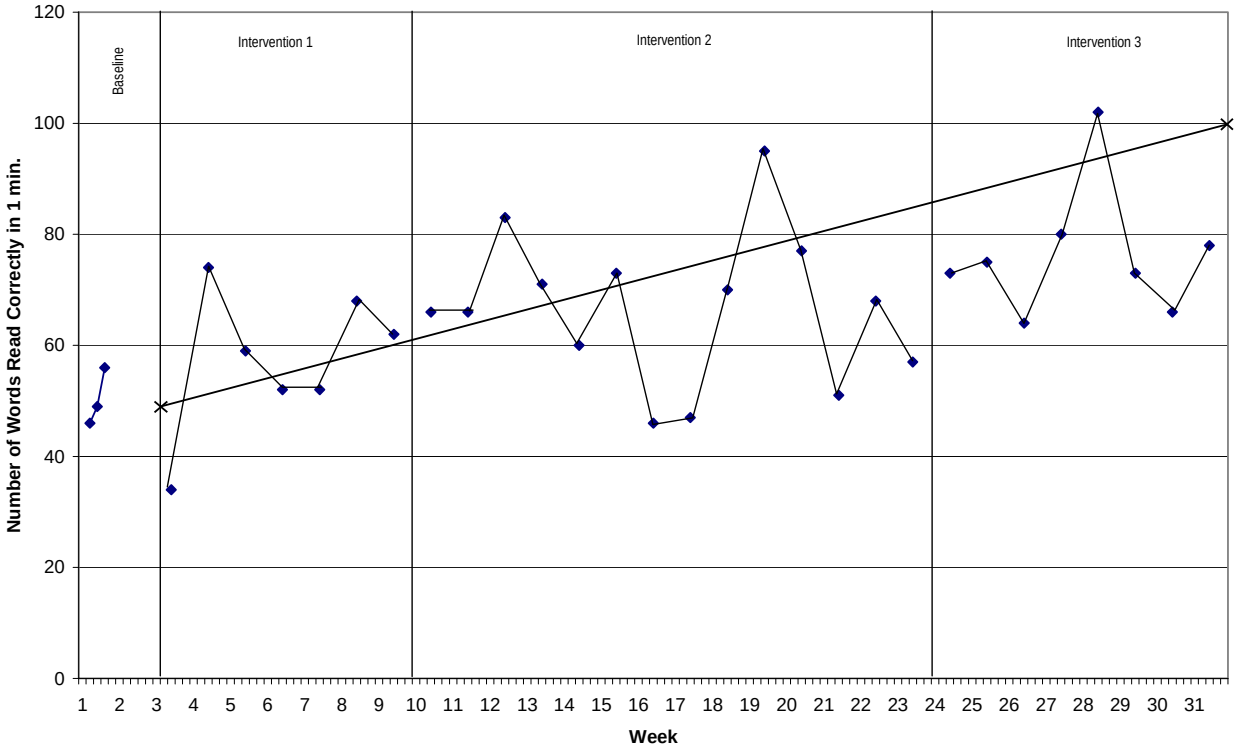
Appendix A
CBM Graphs



Student B


Baseline
Intervention 1
Intervention 2
Intervention 3
Intervention 4
Intervention 5
Intervention 6
Number of Words Read Correctly in 1 min.
Week
0
10
20
30
40
50
60
70
80
90
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

Student C


Baseline
Intervention 1
Intervention 2
Intervention 3
Number of Words Read Correctly in 1 min.
Week
0
20
40
60
80
100
120
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Appendix B
Think Aloud Administration Directions

Thank you for your assistance in this research project. Please follow the format below when conducting think alouds.

1. Write teacher's name on label and put it on the tape. Place the think aloud packet (Form A or B) and 2 pencils in front of the teacher.

2. Introduce yourself

3. Turn on the tape recorder

4. Graph #1 – Provide the general prompt: *"We want you to look at this graph of a special education student's progress in reading. Think out loud as you look at the graph and tell me what you are seeing and thinking. Tell me what you are looking at and why you are looking at it."*

5. After the teacher is done thinking aloud, remove graph #1 and place graph #2 in front of him/her.

6. Graph #2 – Provide the general prompt: *"We want you to look at this graph of a special education student's progress in reading. Think out loud as you look at the graph and tell me what you are seeing and thinking. Tell me what you are looking at and why you are looking at it."*

7. After the teacher is done thinking aloud, remove graph #2 and place graph #3 in front of him/her.

8. Graph #3 - Do not provide a general prompt. Instead, use the prompts provided (see attachment).

9. When the teacher is done with all three graphs, take the tape out of the recorder.

10. Return tape to the University.

Appendix C
Think Aloud Prompts (Graph C)

Say to the teacher: *"We will now ask you a series of questions about this graph. We will ask you all the questions in a predetermined order. If you feel you have already answered a question, please elaborate of what you previously said."*

Note: If the teacher said they already answered a question, say to the teacher: *"Could you elaborate on…? Do you have anything else to say about…?"*

Set up of Graph

- What is this graph telling you about?

Baseline Data

- How would you describe where the student starts/begins??
- How would you describe the student's initial progress?
- How would you describe the procedures used to establish the student's initial level of performance? Why?
- Do you think the data are adequate for making decisions about the student's initial level of performance? Why or why not?

Goal Line

- Can you talk about the goal set for the student?
- How do you think about the expected rate of progress set for the student? Why?
- How would you describe the procedures used to set the goal for the student?

Interventions

- How would you describe the process you use for making a judgment about the effectiveness of the interventions?
- What impact if any did the interventions have on the student's level of performance? Why?
- What impact if any did the interventions have on the student's rate of progress? Why?
- What are your thoughts about the length of the interventions?
- Do you think the data are adequate for making decisions about the effectiveness of the interventions? Why or why not?

Goal Attainment

- What are your thoughts about the student's progress compared to his/her goal? Why?
- Does it appear that the student will make the goal set by the teacher? Why or why not?
- Do you think the data are adequate for making decisions about the student's progress? Why or why not?

Data Analysis

- Do you think the data are adequate for making decisions about the student's overall instructional program? Why or why not?

Appendix D

Teacher Interpretation Rating Scale

Thank you very much for agreeing to help us out in this study as an "expert rater." The instructions for completing the rating scale are below. Please note that the teachers talked about three graphs. For the first two, they completed a free think aloud with no prompts or questions. For the last one, we asked specific questions. We think it may be helpful to look at the graphs as you are reading the think aloud. Please note that the graphs were presented to each teacher in a different order. The order in which the teacher saw the graphs is on the cover page of the think aloud. The graphs represent actual student data. Two of the graphs used were taken from the Experimental Teaching Project, which accounts for the many changes made in the instructional programs.

Step 1: *Read through all of the think aloud transcripts at one time*. This will provide you with an overview of the content of the various think alouds.

Step 2: Rate the teachers' overall understanding and interpretation of the CBM graphs (#1 on the rating scale.) Add any comments you wish to elaborate upon your overall rating.

Step 3: Read through each think aloud separately. Feel free to write notes or comments on the transcripts, or underline or highlight. We will ask you to send your copies of the transcripts back to us after you have finished rating them.

Step 4: Rate the teachers' understanding of each part of the CBM graph, as represented by the each of the items on the rating scale. Please add any comments you have regarding the teachers' understanding of each item. Additional comments will help us to better understand your impressions and differentiate among the teachers with similar ratings.

Teacher Interpretation Rating Scale

Rater: _____ Teacher ID#: _____

Date: _____ Order of Graphs (circle one) ABC BAC

Instructions

Circle the number that accurately reflects your rating for each question. Only one number may be circled per question. Please use the space below each question to add any comments you have regarding the person's understanding of each item. Additional comments are desired.

How well did the teacher:	Not At All	Somewhat	Well	Very Well	Didn't Mention
1. Understand and interpret the CBM graphs overall?	1	2	3	4	N/A
Comment:					
12. Understand the meaning of the number of words read correctly in one minute?	1	2	3	4	N/A
Comment:					
3. Understand the setup of the CBM graphs?	1	2	3	4	N/A
Comment:					
4. Understand the reason for collecting baseline data?	1	2	3	4	N/A
Comment:					

5. Interpret baseline data?	1	2	3	4	N/A
Comment:					
How well did the teacher:	Not At All	Somewhat	Well	Very Well	Didn't Mention
6. Understand the function of the goal line?	1	2	3	4	N/A
Comment:					
7. Understand the procedures for constructing a goal line?	1	2	3	4	N/A
Comment:					
8. Accurately interpret the data to evaluate the effectiveness of interventions?	1	2	3	4	N/A
Comment:					
9. Accurately interpret the data to evaluate the appropriateness of changing the interventions?	1	2	3	4	N/A
Comment:					

10. Determine whether or not students attained their goals?	1	2	3	4	N/A

Comment:

How well did the teacher:

11. Understand and use the following in analyzing the data?	Not At All	Somewhat	Well	Very Well	Didn't Mention
Level of Performance	1	2	3	4	N/A
Slope/Rate of Improvement	1	2	3	4	N/A
Variability in Performance	1	2	3	4	N/A

Comment:

12. Would you consider this person to be a new or experienced CBM user? Why?

Appendix E
Sample Parsed Protocol

TEACHER THINK ALOUD ANALYSES

TEACHER #2:

(Rank Order 1; Overall rating = 47; Rating on item 1 =4)

GRAPH B

1. Well it looks like I'm looking at a reading graph,	
2. number of words read correctly in a minute.	1A
3. So measuring reading fluency	1B
4. and I'm seeing the three data points here in the baseline area and then…	3A
5. Is this how detailed you want me to be or…?	
6. Okay. Then I can see that the goal is set at the end of the graph	4A
7. and a line was drawn from the baseline median point to the goal line.	4B
8. And then you see the data points that were all plotted along the goal line or aim line.	5
9. And you see the intervention lines that were drawn	6A
10. as the teacher had tried different things with the student and made different interventions throughout.	6A
11. It looks like the student was making fairly steady progress along their goal line.	6D1
12. And had, in fact, achieved the goal by the end of the graph, by the end of the school year.	7

GRAPH A

1. Well, I mean the set up of the graph is the same as in the previous graph so I won't go through that again	
2. but the data on this graph is interesting.	
3. It's much more scattered. It's all up and down.	6D3
4. I'm wondering if perhaps this teacher wasn't using the moving median and was just plotting, you know,	5
5. and wasn't doing three passages	1C

Appendix F
Think Aloud Task Analysis

1. Unit of measurement
    A. What the measure is/how it's scored
    B. Meaning of score
    C. Material used

2. Set up of graph (what is graphed on x-axis, y-axis)

3. Establish baseline

    A. Indicate where it is on graph or state what baseline level is
    B. Describe process
    C. Meaning of baseline (present level of performance)
4. Setting the goal
    A. Indicate where goal is on graph or state what goal is
    B. Describe process
    C. Meaning of goal

5. Collect/graph data (how data are graphed/procedures; note frequency of data collection)

6. Evaluate data
    A. Indicate that an instructional change is on graph or state that a change was made
    B. Refer to data decision rule
        1) General reason for change (e.g. "I wonder why they changed instruction?")
        2) Specific reason for change (refers to a specific data decision rule, e.g. 3 consecutive data points below goal line)
    C. Describe effects of intervention (general – refers to progress but does not state how that progress is represented)
    D. Describe effects of intervention (specific) – refers to progress by referring to characteristics of the data
        1) Level / goal line
        2) Trend
        3) Bounce

7. Determine whether student achieves long-range goal

8. Normative comparison – makes a statement to compare graph or progress to some type of normative standard (e.g., "Twenty words over a year is not a lot.)

9. Inaccurate/uninterpretable statement – makes a statement (can be also coded as one of the statements above) that is inaccurate. Uninterpretable statement within the given context.

Appendix G
Survey of Teaching Experience

1. Teaching Licenses/Certification Held (check all that apply)

_____Elementary Education	_____Secondary-Music	_____Emotional/Behavioral
_____ Secondary-Art	_____Secondary-Science	Disorders
_____ Secondary-English	_____Secondary-Social Studies	_____Mild Mental
_____ Secondary-Foreign	_____Remedial Reading	Impairment
Language	_____ Physical Education	_____ Media Specialist
_____ Secondary-Math	_____ Learning Disabilities	_____ Other (please specify)

2. Your highest degree earned: _____ Bachelor's _____ Master's _____ Doctorate

3. Total number of years of teaching experience (include current year) _____

4. Number of years of teaching experience in current district _____

5. Number of years of experience using CBM (include current year) _____

6. For how many students have you created frequent progress monitoring graphs (data collection at least once a week) for instructional purposes? _____

7. Where did you receive your CBM training? _____

8. During the spring of this school year, we will be developing different strategies to help improve teachers' use progress monitoring data. We are looking for a small number of teachers (e.g. 3-4 teachers per district) to work closely with us to help develop strategies and design the study for the following year. Please let us know your level of interest in participating below. Indicating interest in participating will not obligate you to participate in the spring.

   _____ Interested
   _____ Not Interested

Thank you for your time.