

## **Annotated Bibliography of Selected Curriculum-Based Measurement and Student Progress Monitoring Articles Published in 2004-2006**

As curriculum-based measurement (CBM) and student progress monitoring (SPM) are increasingly implemented in schools, research continues in an effort to improve and expand the practice. Current research seeks to answer questions such as:

- What is the best way to implement CBM and SPM?
- What kind of support do teachers need to use CBM and SPM effectively?
- How should we use CBM and SPM data?
- Can CBM be used beyond reading and mathematics or elementary school?

This bibliography contains studies published between 2004 and 2006 that answer some of these questions. It is organized by subtopic to help users find articles that answer their own questions.

## **GENERAL CBM AND SPM ARTICLES**

The following articles present general information about SPM and CBM derived from reviews of extant literature. There are now decades of research on CBM, so scholars are beginning to draw conclusions and advocate for next steps in the field.

**Fuchs, L. S. (2004). The past, present, and future of curriculum-based measurement research. *School Psychology Review*, 33, 188-192.**

This brief article introduces other papers in an issue devoted to CBM. The article describes the emergence of CBM from mastery measurement and the nature of CBM research in the last three decades. It is recommended that researchers shift from studying “technical features of the static score” to studying associations between CBM-related growth (i.e., slope) and academic achievement, as well as the instructional utility of CBM. The author further recommends exploring the potential of technology for improving the accessibility and utility of CBM. Finally, the author warns that movement from multidimensional CBM tasks toward single-skill measurement (e.g., letter naming fluency) is not supported by the CBM research literature and may be detrimental to students if it contributes to teachers narrowing instructional objectives.

**Madelaine, A. & Wheldall, K. (2004). Curriculum-based measurement of reading: Recent advances. *International Journal of Disability, Development and Education*, 51, 57-82.**

This article reviews the previous decade’s research on R-CBM, particularly oral reading fluency. Included in the review are studies on technical characteristics of R-CBM; development of R-CBM norms; and the use of R-CBM for screening or classification, instructional decision-making, and progress monitoring. The authors discuss the face validity of R-CBM measures, along with other issues that make acceptance by teachers problematic. Research on students’ perceptions of R-CBM is reviewed, particularly as it relates to goal-setting and motivation. Finally, R-CBM implementation procedures, including passage selection issues, is discussed.

**Safer, N. & Fleischman, S. (2005). How student progress monitoring improves instruction. *Educational Leadership*, 62, 81-83.**

This is a brief article that describes the role of student progress monitoring in ensuring that all students meet academic standards. The SPM procedure is described from both technical and practical perspectives. Additionally, research on SPM’s effectiveness for students and teachers is discussed. Finally, the authors conclude by informing educators that SPM may have begun as a special education practice, but there is ample evidence that SPM is beneficial for all students.

## **IMPLEMENTATION OF CBM**

Much research is devoted to developing CBM tasks and procedures that most accurately reflect students' progress over time. These studies often answer very specific research questions that address a relatively narrow aspect of CBM. The articles in this section were summarized to reflect that narrow focus and clarify the research questions, methods, and findings.

**Brown-Chidsey, R., Johnson, P., Fernstrom, R. (2005). Comparison of grade-level controlled and literature-based maze CBM reading passages. *School Psychology Review, 34, 387-394.***

Purpose: Determine the implications of selecting maze passages from grade-level vs. literature-based passages.

Method:

- Sample: 21 students from a suburban Northeast elementary school, randomly selected from the school's eight 5<sup>th</sup> grade classes.
- Instruments: Three grade-level controlled passages were adapted from AIMSWeb's fifth grade oral reading fluency stimuli. Three literature passages were selected from fifth grade-level children's literature recommended by the American Library Association. Passages were checked for fifth grade readability using the Dale-Chall readability formula. Mazes were created by replacing every seventh word with a blank and three word choices. The two distracter words in each item came from a list of all the words in the passage.
- Procedures: Students completed all six mazes three times during the school year: September, January, and May. They had two minutes to complete each passage. Scores were derived from the number of items completed up to and including the last three incorrect items minus the number of circled words that were incorrect.

Research Questions and Findings:

- How are maze scores obtained from grade-level vs. literature-based passages similar? How are they different?
  - Scores from the two types of passages were highly positively correlated with each other. Scores on the grade-level controlled passages were significantly higher than scores on the literature-based passages at each time point.
- Do maze scores from the two passage types indicate skill growth over a school year?
  - Yes, scores using both types of passages went up as the school year progressed.

Implications: Scores on mazes using grade-level controlled and literature-based passages should not be compared to each other because of the discrepancy in the scores they yield. Both types of passages can be used to monitor reading skill growth, but mazes should be derived from the same type of text (grade-level controlled or literature-based) at each testing occasion.

**Christ, T. J. (2006). Short-term estimates of growth using curriculum-based measurement of oral reading fluency: Estimating standard error of the slope to construct confidence intervals. *School Psychology Review*, 35, 128-133.**

Purpose: Determine the influence of a variety of progress monitoring durations and measurement conditions on measurement error in order to select optimal durations and conditions for minimizing error.

Method:

- Sample: Three studies in the PsychINFO database that reported the Standard Error of the Estimate (SEE) of oral reading fluency growth.
- Procedure: Examine changes in the SEE as a result of duration of progress monitoring (number of weeks) and measurement conditions (optimal, moderate, or poor, based on Christ's subjective evaluation). Optimal measurement conditions include features like a quiet test setting, consistent administrators, consistent probe difficulty, and use of standardized administration instructions.

Research Questions and Findings:

- To what extent does duration, or number of weeks, of progress monitoring affect measurement error in R-CBM?
  - Longer durations reduce error substantially.
- To what extent do testing conditions affect error in R-CBM?
  - Optimizing testing conditions similarly reduces error.

Implications: When R-CBM is being used to inform major educational decisions, practitioners should pay careful attention to testing conditions and test two times per week for eight or more weeks in order to minimize error in the results.

**Christ, T. J., Johnson-Gros, K. N., & Hintze, J. M. (2005). An examination of alternate assessment durations when assessing multiple-skill computational fluency: The generalizability and dependability of curriculum-based outcomes within the context of educational decisions. *Psychology in the Schools, 42*, 615-622.**

Purpose: Evaluate the implications of varying the assessment duration (i.e., number of minutes) of standardized M-CBM administrations for multiple-skill computational assessments in the context of educational decision-making, considering the impact of measurement error on the confidence in testing outcomes.

Method:

- Sample: One-hundred-four general education students in fourth and fifth grades at a high-poverty southeast elementary school.
- Instruments: Two sets of grade-level M-CBM probes (one for fourth grade, one for fifth) containing grade appropriate items assessing skills identified by the district's curriculum and classroom teacher input.
- Procedure: Students were given two different colored pencils. The test administrator instructed students to switch pencils at the end of each minute during the 6-minute testing administrations. Scores were calculated by counting the number of digits correct divided by number of minutes.

Research Question and Findings:

- What is the ideal testing duration (number of minutes) of a multiple-skill M-CBM test for determining student performance *relative* to that of others in a class?
  - One minute for low-stakes decision-making, such as screening and instructional grouping.
  - Four minutes for high-stakes decision-making, such as diagnosis.
- What is the ideal testing duration (number of minutes) of a multiple-skill M-CBM test for determining intra-individual student performance change, such as in a response to intervention (RTI) model?
  - Three minute for low-stakes purposes, such as profiling strengths and weaknesses.
  - Thirteen minutes for high-stakes decisions, such as instructional placement following progress monitoring or RTI.

Implications: Practitioners should carefully plan M-CBM multiple skill testing according to the purpose and types of decisions that need to be made about the student's instruction. For both inter- and intra-individual interpretations of scores, longer testing durations are more reliable indicators for high-stakes decision-making.

**Fuchs, L. S., Fuchs, D., Compton, D. L., Bryant, J. D., Hamlett, C. L., & Seethaler, P. M. (2007). Mathematics screening and progress monitoring at first grade: Implications for responsiveness to intervention. *Exceptional Children, 73*, 311-330.**

Purpose: Determine which math CBM instruments are best for screening and progress monitoring in first grade, and understand the implications of those instruments' properties for determining response to intervention (RTI).

Method:

- Sample: 225 students followed from first to second grade. The races/ethnicities of students were primarily African American (46%), non-Hispanic White (46%), and Hispanic (7%). Students were from a mix of Title 1 and non-Title 1 schools in the southeast. There were 10 schools and 41 first-grade classrooms involved.
- Instruments and Procedures: Four measures were used for screening in the fall of first grade. Addition and Subtraction Fact Fluency is a pair of measures, one of which assesses addition fact knowledge and one of which assesses subtraction fact knowledge. Both tests were administered. Students had one minute to complete the 25 problems on each test. CBM Computation measured the entire first-grade math computation curriculum, including single- and multi-digit addition and subtraction. Number identification/Counting required students to complete blanks in a series of digits, e.g., 4, 5, 6, \_\_\_\_, \_\_\_\_. CBM Concepts/Applications measured the entire first-grade concepts and applications curriculum, including items assessing measurement, graph, and word problem skills.  
Additionally, two progress monitoring instruments were used during the first grade year: CBM Computation and Number Identification/Counting (described above). Finally, the WRAT 3-Arithmetic, which measures calculation ability, and Jordan's Story Problems were used to assess math ability and identify disability in the spring of second grade.

Research Questions and Findings:

- Which screening measure or combination of measures was most accurate at identifying math disability?
  - The two math CBM instruments—Computation and Concepts/Applications—were particularly effective predictors. Concepts/Applications was the best of the four screening instruments at predicting both calculation and word problems math disabilities. No measure or combination of measures had perfect accuracy, however: The screening procedures led to more false positives than false negatives.
- Which progress monitoring measure yielded the strongest relationship between first-grade slope and second-grade outcomes?
  - CBM Computation

Implications: CBM Computation and Concepts/Applications are good screening instruments to use to identify first-graders in need of math intervention in an RTI model, and CBM Computation is a good choice for progress monitoring throughout the first-grade year.

**Hintze, J. M. & Christ, T. J. (2004). An examination of variability as a function of passage variance in CBM progress monitoring. *School Psychology Review*, 33, 204-217.**

Purpose: To compare the amount of measurement error present when grade level-controlled text is used as opposed to randomly selected passages from graded readers (uncontrolled).

Method:

- Sample: Ninety-nine students in eight 2<sup>nd</sup> through 5<sup>th</sup> grade classrooms. The students attended a Northeast elementary school where 26% of student received free or reduced-price lunch. Students were largely (92%) white.
- Instruments: Uncontrolled reading passages were randomly selected from the basal reader series in which students were currently being instructed (e.g., 2<sup>nd</sup> graders used probes from the 2<sup>nd</sup> grade reader). Controlled reading passages were selected from literature- and skills-based reading series, but not the series used in the school. Passages for each grade level were selected from the corresponding grade level of each series, and were then scored using readability formulas. Passages with readability at the middle of each grade level were selected (e.g., 2.3-2.7, 3.3-3.7).
- Procedure: Students were scored on each type of passage in number of words read correctly per minute (WRC). Students were tested twice weekly for 11 weeks. The slope, standard error, and standard error of the slope were calculated for each student's data.

Research Question and Findings:

- Which type of reading passage is associated with the least measurement error: uncontrolled or grade level-controlled?
  - Grade level-controlled passages yielded less measurement error than uncontrolled passages. Therefore, scores for WRC using grade level-controlled passage are more accurate, and the slopes of progress monitoring trend lines are more reliable.

Implications: Carefully controlling the readability of R-CBM text may increase the accuracy of progress monitoring data and allow practitioners to make reliable predictions of students' growth.

## **SUPPORTING TEACHERS IN THE USE OF CBM**

Some recent studies have looked closely at the extent to which CBM data influence teachers' instructional decision-making. More specifically, researchers are trying to understand how to make CBM most effective for students through support of teachers in the use of CBM data. The studies included here compared groups of teachers who received different levels of CBM information and support.

**Capizzi, A. M. & Fuchs, L. S. (2005). Effects of curriculum-based measurement with and without diagnostic feedback on teacher planning. *Remedial and Special Education, 26*, 159-174.**

The purpose of this article was to determine whether offering teachers training in CBM and/or CBM plus diagnostic student-level feedback affected general and special education teachers' instructional planning. Twenty special education resource teachers, twenty general education second grade teachers, and their students were involved in the study. Teachers completed classwide planning sheets, as well as individual planning sheets for the highest achieving student, the lowest achieving student, and an average achieving student in their classes. Teachers were randomly assigned to three groups. The control group completed the planning sheets with no CBM information. The CBM only group teachers were provide with CBM class reports and instructions for interpreting them. The CBM+Diagnostic feedback group teachers received CBM class reports and individualized instructional recommendations for comprehension, fluency, or phonics instruction based on each student's needs. Students were administered computer-based, second grade-level CBM reading assessments (words read correctly per minute). Teachers who received CBM+Diagnostic feedback planned a smaller number of weekly objectives than did teachers in the control group who received no CBM report. General education teachers in the CBM+Diagnostic feedback group wrote more appropriately individualized goals for average-achieving students than did general education teachers in the CBM only group. There were no differences, however, in individualization of goals for the low- or high-achieving students. Special education teachers in the CBM+Diagnostic feedback group targeted needed skills for low- and average-achieving students more than did special education teachers in the CBM only or control groups. The authors conclude that CBM reports combined with diagnostic feedback may help teachers focus instruction on fewer key skills in their classwide planning. Further, offering CBM reports combined with individualized diagnostic feedback for students may help special education teachers tailor instructional objectives for low- and average-achieving students.

**Graney, S. B. & Shinn, M. R. (2005). Effects of reading curriculum-based measurement (R-CBM) teacher feedback in general education classrooms. *School Psychology Review, 34*, 184-201.**

The purpose of this article was to determine whether different levels of feedback to teachers about their lowest instructional reading group students' progress monitoring data led to increased achievement for individuals or the group. The study involved 44 2<sup>nd</sup> grade general education teachers and the 184 students in their lowest reading groups. Teachers were divided into three

conditions. In the group feedback condition, teachers were shown graphs of the mean slope of their group and a slope for each individual student. In the individual feedback condition, teachers were shown graphs of the data for one randomly selected student from their group. In the no feedback condition, or the control group, student progress was monitored, but data were not shared with teachers. Student progress was monitored using the Test of Oral Reading Fluency (TORF). Probes were administered once per week, and the number of words read correctly in 1 minute (WRC) was recorded. The study's results revealed that neither group-level nor individual-level feedback improved students' reading achievement. The authors conclude that general education teachers need more feedback than a graph and numerical summary of slopes accompanied by general recommendations for instructional changes to use student progress data to improve reading achievement. Feedback should be more descriptive and more prescriptive with regard to instruction. Additionally, this study revealed that providing teachers with individual feedback can actually reduce the achievement of that student, possibly because positive feedback causes teachers to "relax" their attention to the student's instruction and negative feedback causes teachers to give up when they perceive that nothing works for that student.

**Stecker, P. M., Fuchs, L. S., & Fuchs, D. (2005). Using curriculum-based measurement to improve student achievement: Review of research. *Psychology in the Schools*,42, 795-819.**

This article is a review of research on using CBM to improve student achievement by training teachers to use CBM data to inform reading and math instruction. The article describes CBM practices in reading and math. The studies reviewed in the article met the criteria of using a pretest-posttest design, twice-weekly CBM data collection, having teachers use CBM for instructional decision-making, and having a minimum 7-week treatment period. Students in the reviewed studies had mild to moderate disabilities. The general conclusion of the review was that teachers' use of CBM for student progress monitoring does yield gains in student achievement under specific conditions. First, teachers must use CBM data to tailor instruction to individual students' needs. Second, teachers must use a data-decision framework that clearly indicates when changes should be made. Goals should be raised for students who consistently make expected progress, and instruction should be modified for students who do not make adequate progress toward the goal. Third, teachers need CBM computer software to make efficient use of data. Fourth, using CBM data for detailed analyses of student skills, preferably with consultation, helps teachers further individually tailor instruction according to students' strengths and weaknesses. Fifth, teachers need ongoing support to devise and implement instructional changes so that they can make meaningful changes that can impact achievement for students.

## **SPM AND IEP PLANNING**

Student progress monitoring using CBM complements Individualized Education Programs (IEPs) by providing information about students' current capabilities and rates of progress, and by informing ambitious goal-setting. The following articles address the implications of CBM and student progress monitoring for IEP planning and goal-setting. As SPM and CBM become more widely used, it is clear that attention needs to be paid to sufficient training of practitioners and appropriate use of data.

**Codding, R. S., Skowron, J., & Pace, G. M. (2005). Back to basics: training teachers to interpret curriculum-based measurement data and create observable and measurable objectives. *Behavioral Interventions, 20*, 165-176.**

This article addresses the link between assessment data, IEP objectives, and instruction using an approach to train teachers to interpret CBM data and create objective and measurable IEP objectives from them. The authors developed training and practice system using simulated student data. Teachers were trained to interpret the simulated CBM data and to create instructional objectives. Then, a researcher modeled the steps of translating CBM data into measurable goals, offered teachers a chance to practice, and gave the teachers feedback on their practice. Finally, one week later, teachers were asked to create IEP goals using actual CBM data. Three teachers were involved in the study. All three teachers showed increased skill following the modeling, practice, and feedback phase. This skill increase was stable when the teachers worked independently with actual CBM data.

**Etscheidt, S. K. (2006). Progress monitoring: Legal issues and recommendations for IEP teams. *Teaching Exceptional Children, 38*, 56-60.**

Examples of several key mistakes, omissions, or oversights regarding progress monitoring planning and implementation in IEPs are described:

- “The IEP team fails to develop or implement progress monitoring plans;
- Responsibilities for progress monitoring are improperly delegated;
- The IEP team does not plan or implement progress monitoring for behavior intervention plans (BIPs);
- The team uses inappropriate measures to determine student progress toward graduation; or
- Progress monitoring is not frequent enough to meet the requirements of IDEA or to provide meaningful data to IEP teams” (p. 57).

Three suggestions for meeting the requirements of IDEA and improving progress monitoring for students with disabilities are presented. First, progress monitoring plans should include multiple measures; each goal should have an appropriate measure associated with it. Second, explicit plans for progress monitoring, including who will do it and where and when it will take place, should be specified. Third, IEP teams should not overlook the importance of monitoring progress toward behavioral and post-secondary as well as academic goals.

## **CBM AS SCREENING AND IN AN RTI MODEL**

CBM and SPM can be used to screen students in an effort to identify those who may benefit from instructional intervention. Screening may take place as part of an RTI model in which practitioners both identify students who need extra support and monitor their response to intervention to inform further instructional changes or special education referral. The following articles address the utility of CBM for identifying students who are likely to have long-term problems in an academic area.

**Ardoin, S. P., Witt, J. C., Suldo, J. C., Connell, J. E., Koenig, J. L., Resetar, J. L., Slider, N. J., Williams, K. L. (2004). Examining the incremental benefits of administering a maze and three versus one curriculum-based measurement reading probes when conducting universal screening. *School Psychology Review, 33*, 218-233.**

The purpose of this study was to evaluate whether one of three types of CBM testing (single R-CBM probe, median of three R-CBM probes, R-CBM plus maze) could be as effective a screening tool as a standardized test (Iowa Test of Basic Skills). The study involved seventy-seven students drawn from four 3<sup>rd</sup> grade regular education classrooms at a high-poverty, high proportion ethnic minority southeastern school. Students were administered several 3<sup>rd</sup> grade-level passages for R-CBM oral reading fluency probes. Students read aloud for 1 minute while words read correctly were counted. Additionally, the authors created maze instruments using 3<sup>rd</sup> grade-level text in which every seventh word was replaced with a choice of three words. Students were given 3 minutes to complete the maze task. Scores on these R-CBM tests were compared to those on the following standardized tests: Woodcock-Johnson-III (WJIII) Letter-Word Id, Reading Fluency, Passage Comprehension subtests; Iowa Test of Basic Skills (ITBS) Reading Comprehension and Vocabulary subtests. Findings revealed that R-CBM scores predict WJIII scores just as well as do scores on the ITBS. Moreover, a single probe's score was just as effective as the median of three probes at predicting standardized test scores. Maze scores do not add significant predictive power to R-CBM scores when predicting scores on the WJIII. As a screening tool, R-CBM has an advantage over standardized tests like the ITBS because it is faster and less expensive to administer than standardized tests.

**Compton, D. L., Fuchs, D., Fuchs, L. S., & Bryant, J. D. (2006). Selecting at-risk readers in first grade for early intervention: A two-year longitudinal study of decision rules and procedures. *Journal of Educational Psychology, 98*, 394-409.**

The article's introduction reviews literature on the use of multivariate assessment, focus on first-grade screening, and short-term progress monitoring for early identification of students at risk for RD. A major research question in this study is: Does adding a word identification fluency (WIF) measure or five weeks of WIF SPM to a 1<sup>st</sup> grade screening battery that already includes phonemic awareness, rapid naming skill, and oral vocabulary measures help predict RD at the end of 2<sup>nd</sup> grade? The purpose of answering this question is to reduce the false-positive and false-negative rates of children identified for Tier 2 intervention based on 1<sup>st</sup> grade screening. Results indicate that a single measure of WIF does not improve risk classification accuracy, but that data from five weeks of WIF SPM do improve accuracy when added to a screening battery

including the typically-used measures listed above. The authors also found that an analytic approach called a classification tree, in which different combinations of risk factors can be used to predict individuals' RD outcomes, is a uniquely successful and promising approach for developing RTI classification (i.e., Tier 2 placement) decision rules.

**Hosp, M. K. & Fuchs, L. S. (2005). Using CBM as an indicator of decoding, word reading, and comprehension: Do the relations change with grade? *School Psychology Review*, 34, 9-26.**

This article investigated whether R-CBM scores differ in their association with traditional reading assessment scores (e.g., Woodcock Reading Mastery Test-Revised) as a function of grade level. Additionally, the authors explored whether they could identify R-CBM cutscores that could serve as benchmarks of mastery on the WRMT-R subtests. The study focused on first through fourth grade, and a total of 310 students in four schools were involved. Results revealed that there relations between R-CBM and WRMT-R scores were strong at each grade level. While benchmarks could not be identified for specific reading subskills, benchmarks were identified that indicated overall reading mastery at each grade level.

## **CBM IN WRITING**

Because CBM has proved to be an effective means of promoting student achievement in reading and mathematics in the elementary grades, a next phase of research involves expanding the scope of CBM. One area in which researchers are exploring the use of CBM beyond reading, mathematics, and elementary school is writing. The following articles address the development and validation of CBM-Writing measures for elementary through high schoolers.

**Espin, C. A., De La Paz, S., Scierka, B. J., & Roelofs, L. (2005). The relationships between curriculum-based measures in written expression and quality and completeness of expository writing for middle school students. *The Journal of Special Education, 38*, 208-217.**

This study focused on CBM in written expression, correct word sequences (CWS) and correct minus incorrect word sequences (CIWS), for middle school students. The authors investigated the relations between CWS/CIWS and the number of functional elements in essays, ratings of the essays' quality, and essay length. Additionally, the authors investigated whether CWS and CIWS were sensitive to changes in performance over time. The study involved 22 seventh- and eighth-grade students. Six of the students were diagnosed with LD, six were low-achieving, six were average-achieving, and four were high-achieving. The results of the study served to validate CWS and CIWS by revealing strong relations between the CBM measures and ratings of essay quality and the number of functional elements in essays. Moreover, longer writing samples yielded more reliable CBM scores. Both CWS and CIWS were found to be sensitive to change in student performance over time.

**Espin, C. A., Weissenburger, J. W., & Benson, B. J. (2004). Assessing the writing performance of students in special education. *Exceptionality, 12*, 55-66.**

This article summarizes extant literature on CBM in writing for elementary, middle, and high school special education students. Traditional non-CBM scoring procedures—holistic, primary trait, and analytic scoring—are compared and contrasted. It is concluded that, “none of the three is designed to provide reliable and valid progress information useful for systematic evaluation of instruction” (p. 59). As a result, researchers have developed and tested CBM indicators at the elementary, middle, and high school levels. At the elementary level, the most successful approach is to gather 3- to 5-minute writing samples produced in response to a story starter, topic sentence, or picture stimulus and score them for total words written (TWW), words spelled correctly (WSC), correct word sequences (CWS), or correct letter sequences (CLS). As students get older, production-dependent measures that depend upon the length of the writing sample become less valid indicators than the production-independent measures of percentages of WSC and CWS. “At the middle school level, a 5-min sample written in response to a narrative story starter or descriptive essay prompt and scored for CWS or CIWS [correct minus incorrect word sequences] was found to be a valid indicator of writing performance” (p. 63). Findings are similar at the high school level, but these measures have not reached acceptable levels of validity and reliability for high schoolers and research continues. Other future research should address the relatively low sensitivity of writing CBM measures to change over time, particularly in

circumstances where students receive intervention, and the effects of student progress monitoring using writing CBM on student achievement and teachers' instructional choices.

**Gansle, K. A., Noell, G. H., Vanderheyden, A. M., Slider, N. J., Hoffpauir, L. D., & Whitmarsh, E. L. (2004). An examination of the criterion validity and sensitivity to brief intervention of alternate curriculum-based measures of writing skill. *Psychology in the Schools, 41*, 291-300.**

This study addressed relations between the Woodcock Johnson-Revised (WJ-R) Writing Samples subtest and CBM of written expression, as well as the sensitivity of CBM of writing to a brief group writing intervention. Subjects were 45 third- and fourth-grade students. The students were read a story starter and asked to extend it with a story. Writing CBM measures were total words written, total punctuation marks, correct punctuation marks, word in complete sentences, and simple sentences. In the brief writing intervention, groups of students practiced brainstorming ideas and writing sentences in response to story starters. Results showed that students wrote significantly more words (total words written) after the intervention than before. The writing CBM scores for total punctuation marks and words in complete sentences showed the most promise in terms of their associations with WJ-R Writing Samples scores.

## **CBM IN THE CONTENT AREAS**

The success of CBM in reading, writing, and math has prompted researchers to find CBM procedures that are appropriate for content areas like science and social studies. A small body of research has yielded the vocabulary matching procedure for this purpose.

**Espin, C. A., Shin, J., & Busch, T. W. (2005). Curriculum-based measurement in the content areas: Vocabulary matching as an indicator of progress in social studies learning. *Journal of Learning Disabilities, 38, 353-363.***

Vocabulary matching involves the student reading a content-area passage, then getting a set period of time (e.g., 10 minutes) to complete a vocabulary matching task using terms selected from the passage. While previous research has indicated that vocabulary matching can indicate a student's level of performance in a content area, this study seeks to determine whether vocabulary matching is a valid and reliable way to measure progress in performance over time. In addition to the validity of the task, the authors investigated differences between having the student read the passage vs. having the administrator read the passage. Subjects were 58 students in two seventh-grade social studies classes. Results revealed that only the student-read administration version yielded valid and reliable indicators of growth in social studies knowledge that were sensitive to inter-individual differences in growth rates.