Coaching Middle School Math Interventions with CBM Data

Laura Bantle and Crysti Jones

Vanderbilt University

Abstract

In this study nine special and general education math teacher teams at the eighth grade level will use the progress monitoring system Star Math (SM). Three teams will be assigned to each of three conditions, two treatment and one control. Treatment one will include workshop training on the use of the SM program and weekly monitoring and coaching on data analysis and intervention selection and implementation. Treatment two will involve workshop participation only with teachers independently conducting data analysis and intervention selection. This condition seeks to determine if there are added benefits of coaching, or if SM with training alone can change teacher practices and students' scores. The control condition will represent no intervention and act as a comparison for the control groups. An ABA experimental design will be used to establish treatment control. Teacher records, behavior observation data, student progress on SM objectives, student SM scores, and standardized test scores will be measured throughout the year. Based on previous research, we believe that coaching will increase teacher use of evidence based instruction, improve fidelity of implementation of interventions, and subsequently impact students mastery of math objectives, growth rates on PM benchmarks, and growth on state standardized tests (Foegen, 2008; Fuchs & Fuchs, 1998; Kretlow & Bartholomew, 2010; Stecker, Fuchs, & Fuchs, 2005; Ysseldyke et al., 2003).

Introduction

A large number of schools presently use curriculum based measures (CBM) and other progress monitoring (PM) tools to judge whether or not students are on track to make adequate yearly progress. Even when CBM with skill analysis are available, teachers struggle to use appropriate measures to assess students' academic needs, track progress, and implement

appropriate interventions (Stecker, Fuchs, & Fuchs, 2005; Ysseldyke & Bolt, 2007; Foegen, 2008; Burns & Ysseldyke, 2009). Schumaker et al. (2002) found that one out of nine high schools used evidence based methods to instruct special education students in the inclusion setting, bringing into question the effectiveness of current math instruction for students with special needs in general education classrooms. Proficiency in math is strongly associated with a students' access to higher education and employment, so it is essential that schools take steps to ensure access to high quality instruction (US Department of Education, 1997). We wish to extend present research to CBM usage in middle school math, to discover whether or not coaching in the use of data analysis using CBM tools and intervention selection will increase teacher usage of evidence based practices and selection and implementation of appropriate interventions. Ultimately, we seek to examine whether the use of these practices can improve student growth on CBM measures and standardized testing.

Review of Literature

Coaching

Spencer and Logan (2003) looked specifically at research based strategy instruction of general education teachers of students with special needs. Their study highlights issues with translating research to practice, stating that teachers may not be aware of research based strategies, may not be provided with adequate training for successful implementation, or may be concerned with feasibility of implementation in their particular classrooms or for their particular students. Spencer and Logan (2003) assert that schools must develop plans to connect teachers to research based practices, we posit that coaching may support general education teachers in implementing practices that will help them feel more equipped to implement research based strategies with their students with special needs.

In their review of studies spanning 20 years of research, Kretlow and Bartholomew (2010) reference 12 articles identifying coaching as an effective method to improve fidelity of teaching practices after teachers have received training in that practice. Coaches provide individualized support to a teacher while that teacher gains experience and confidence with a new teaching behavior within the context of his or her own classroom. The coaching process is designed to be nonevaluative and reflective, which encourages teachers to engage in a continuous cycle of implementation and revision to become proficient and comfortable in the use of new methods (Kretlow & Bartholomew, 2010).

Kretlow and Bartholomew (2010) identified three types of coaching that have been examined in the literature; supervisory follow up, side-by-side coaching, and reciprocal peer coaching. As supervisory follow up coaching was found to be most effective in increasing teaching accuracy of research based practices we chose this model for our study. Supervisory follow up coaching utilizes a coach to observe a teacher's implementation of a new instructional practice following initial training. Using observation data, the coach conducts nonevaluative debriefing sessions with the teacher to identify strengths and areas for improvement in teacher practices.

CBM progress monitoring

CBM is a form of progress monitoring that has been developed to help teachers track student growth on curriculum. In order to be effective, CBM probes need to be precise, frequent, and sensitive to change (Foegen, Jiban, & Deno, 2007). Research has been done on the use and effectiveness of CBMs in reading at the primary grade levels to demonstrate an improvement in student performance (Fuchs & Fuchs, 1998); however, little has been done in math (CBM-M) at

the secondary levels.

Stecker, Lembke, and Foegen (2008), described five steps to effective CBM-M measures that we have used to guide our research: (a) one must select appropriate measurement material, (b) CMB-M should be evaluated for reliability, validity, and sensitivity to change, (c) administer and score data, (d) use data for goal setting, and (e) data should be collected biweekly for at least five weeks. Once four data points have been obtained, a decision should be made. If the student's points are above the line, the goal should be raised. If they are on the line, no changes should be made. If they are below the line, the teacher should consider making changes to instructional procedures, instruction time, groupings, materials, and motivational strategies (Stecker, Lembke, & Foegen, 2008).

To date, six monitoring systems have been used in middle school with varying levels of reliability and success (Fuchs, Hamlett, & Fuchs, 1998,1999; Helwig, Anderson, & Tindal, 2002; Foegen, 2000; Foegen & Deno, 2001; Foegen, Jiban, & Deno, 2007). We have chosen SM, a computer based CBM-M, as other studies using computer based CBM-M have found more consistent and significant gains (Ysseldyke, & Bolt, 2007). Stecker, Fuchs, and Fuchs (2005) recommend using up to eight baseline data points prior to intervention, which we will attempt at the start of our study.

Math Interventions

In order to select interventions, teachers and coaches must understand probable causes of deficits. Studies on algebra skills have found that students generally struggle in three areas: cognitive processes, content foundations, and algebra concepts (Impecoven-Lind & Foegen, 2010; Fuchs & Foegen, 2010). Once an area of weakness has been identified, teachers should

decide whether the error is taking place on the procedural level (i.e. knowing the steps to do the problem) or concept level (i.e. being able to conceptualize the problem) and select an intervention to best suit need (Burns, 2011). Common math interventions include cognitive strategy instruction, class-wide peer tutoring, graphic organizers, and explicit instruction which have all been found to have moderate to high effect sizes (Foegen, 2008; Slavin, Lake, and Groff, 2008). Interventions should ensure that (1) instruction matches need, (2) maintains high and realistic expectations, (3) utilizes explicit instruction, (4) have a cognitive and conceptual emphasis, (5) include motivational strategies, (6) order skills hierarchically in order to minimize learning challenges, (7) provide adequate opportunities for practice, (8) conduct frequent measures of progress, and (9) provide immediate and specific feedback (Fuchs et al., 2008; Ysseldyke & Bolt, 2007). With all of the necessary considerations, it is no wonder teachers struggle with implementation. To address this struggle, researchers began creating technology that administers assessments, diagnoses, analyzes, and tracks student progress (Ysseldyke & Bolt, 2007).

Technology-based CBM Math Measures

Studies have found that students in classrooms that employ technology to progress monitor and guide instruction consistently outperform their peers in math classrooms without (Ysseldyke & Bolt, 2007; Ysseldyke et al., 2003; Ysseldyke & Tardrew, 2007). Publishers have produced systems that can provide support for differentiation and instructional changes based on student performance (Ysseldyke & Bold, 2007). Ysseldyke and Bolt (2007) found that teachers who used their accelerated math (AM) program with high fidelity felt better prepared to meet their students' needs, and their students recorded significantly higher gains. In their

meta-analysis, Slavin, Lake, and Groff (2008), found that AM math had an average effect size of .35 which was higher than other math measures.

Rationale

Due to only a small number of studies looking at the use of CBM data to improve student scores in middle school math (Ysseldyke & Tardrew, 2008), Foegen (2010) identified the need for replication with a more diverse population and the need to include measures of teacher usage of instructional practices. While it is unclear whether or not teachers can use data to implement instruction with high fidelity (Foegen, Jiban, & Deno, 2007; Ysseldyke & Bolt, 2007), technology can help teachers manage data and make suggestions for interventions with higher fidelity (Ysseldyke & Tardrew, 2007). Research indicates that greater levels of ongoing support for teachers may lead to higher levels of fidelity with teaching practices and higher levels of student achievement (Klingner, Vaughn, Hughes, & Arguelles, 1999; Kretlow & Bartholomew, 2010). If instructional changes are effective, they have been found to have a moderate to large effect size on student performance (Slavin, Lake, & Groff, 2008).

Based on previous research, we believe coaching will increase teachers' use of fidelity and evidence based practices, as seen in observational data records and teacher lesson plan records. We expect the participants in the coaching condition to select appropriate interventions at a higher frequency, as seen in gains in the number of math objectives met by students on SM measures and observational data of teacher instruction. We also expect student PM scores, SM scores, and Tennessee Comprehensive Achievement Program (TCAP) scores will show greater growth in treatment groups than the control groups.

Methods and Design

Participants

All participants will be selected from Metropolitan Nashville Public Schools (MNPS). Within that setting, the target population includes general education and special education co-teachers who collaborate in inclusion eighth grade math settings. Inclusion is defined by a mixed student population of students with and without individualized education plans (IEP), as well as by the instructional presence of both a general education and special education teacher for the duration of the class period. Potential participants will be eliminated from this pool if they are affiliated with Vanderbilt University, if they are enrolled in any form of continuing education courses through a university or MNPS, or if they are already using CBM in their classroom.

Sampling Procedure

The researchers have gained independent security clearance to work in MNPS, but will seek approval from the superintendent and building principals to conduct this research in all MNPS middle schools. The participating schools will be determined based on principals' consent.

After securing the sample of middle schools, the researchers will contact all teachers within those schools who meet the criteria above. The purpose and general methodology of the study will be described so that those teachers may consent to participate as a co-teaching team. A co-teaching team is defined as a general education teacher and special education teacher who collaborate to co-teach a class consisting of students with and without IEPs. A random sample of 9 teaching teams will be selected from those who have given consent. This method of

selection will reduce bias that would be inherent by asking principals to nominate teaching teams, and also to minimize effects that might occur if participants were recruited only on the basis of volunteering for a study.

The eighteen participants will be randomly assigned to each of the three treatment conditions described below. Each condition will consist of three teaching teams, or six total teachers. Teams assigned to Condition 2 or Condition 3 will have access to follow up coaching and/or CBM training following the conclusion of the study (and based on the most effective treatment condition for student outcomes).

Access to Intervention Program

The researchers contacted the research division of Renaissance Learning to obtain SM materials for use in this intervention. Renaissance Learning granted one classroom license per teaching team in the two treatment conditions, for a total of six classroom licenses. These licenses were granted at no cost, but participants and researchers will complete feedback surveys regarding the software at the end of the study and research results will be shared with Renaissance Learning. Licenses will expire at the end of the academic year.

Variables

Independent variable(s).

Treatment condition 1: CBM training/implementation and coaching.

Participants in this setting will attend a full day workshop introducing how to use the SM system along with data analysis, participate in weekly, one hour coaching sessions to analyze data, select evidence based practices, and plan interventions, and receive a classroom license for the software.

Treatment condition 2: CBM training only.

Participants will attend a half day workshop introducing how to use the SM system and receive a classroom license for the software.

Control condition: No treatment.

Participants will not participate in CBM training or coaching, nor will they receive a software license.

Dependent variables.

Intervention fidelity.

Use of evidence based practices, defined as practices having a moderate to high effect size, will be measured using teacher lesson plans, teacher interviews, and coaches' observational data to calculate the frequency of usage. The fidelity of intervention will be measured through the use of an intervention checklist that will be monitored weekly by coach observation, with interrater agreement found for 20% of the observations. Checklists are taken from the STAR Math program (Appendix A).

Student growth.

Student growth will be measured using SM's student growth function and SM scores that will be collected during the eight week baseline period, after twelve weeks of intervention, and at the end of the school year using the SM screening test. SM has been found to have a reliability score of .90, content validity has been established and scores have been found to correlate highly with standardized test scores (Renaissance Learning, 2010). Student growth and scores on TCAP will be measured across fall, winter, and spring.

Control variables.

A number of potential variables could impact the results of this study, many of which cannot be controlled beyond the use of random selection of participants and random assignment to treatment conditions. We will attempt to control some of these factors by excluding teachers who currently are enrolled in continuing education courses or professional development opportunities during the course of the study to ensure some teachers are not receiving outside training or support.

Teachers will vary according to experience, number of years working together as a team, and education level. Teachers may vary by ethnicity, race, age, native language, or socioeconomic status. Similarly, students may vary along the same demographics as well as by ability level, motivation level, and types of disability (if any). Schools may vary by student body makeup, annual yearly progress (AYP) status, and length of class period. We will attempt to control these variables through random assignment.

Many schools provide teacher development during staff meetings, so exposure to such experiences cannot be controlled. If the school develops intervention plans on a grade-level or content-area basis and students are assigned to those interventions, especially in preparation for state mandated assessments, student performance may be affected by instruction outside of the classroom under study. These experiences could vary by school, so they would not impact all participants or settings equally. However, participants will be asked to report such events on their logs for consideration during data analysis at the conclusion of the study.

Design

Procedures.

Treatment condition 1: CBM training/implementation and coaching.

Training will begin with a whole group workshop attended by all study participants. The researchers will serve as trainers and introduce the CBM method to all participants. This condition will utilize a supervisory follow up coaching cycle in which a coach observes a teacher's implementation of the CBM practice following initial training and then assists with the refinement of the practice through debriefing. Using student achievement data, collected once weekly by the classroom teacher according to the CBM schedule, and fidelity observation data, collected once per week during observation, the coach will conduct nonevaluative debriefing sessions with the teachers assigned to this treatment condition to identify strengths and areas for improvement to help the teacher refine his or her use of the practice. The researchers will serve as the coaches for the purposes of this study. Teaching teams will be assigned a single coach, and coaching sessions will occur once weekly for twelve weeks following the initial training workshop. After the conclusion of the study, maintenance data will be collected through classroom observation and teacher interviews once per week for the rest of the school term.

Treatment condition 2: CBM training only.

Training will begin with a whole group workshop attended by all study participants. The researchers will serve as trainers and introduce the CBM method to all participants. This treatment condition will allow comparison of differences between implementation of CBM with and without the coaching element. Fidelity will be assessed using the same observation checklists as those in the coaching condition. Student achievement data and fidelity data will be collected once weekly according to the CBM schedule for the duration of the study. At the conclusion, maintenance data will be collected through classroom observation and teacher interviews once per week.

Control condition: No treatment.

Teachers in this condition will have consented to participate in the study, and student achievement data and teacher practice logs will be collected from their classrooms according to the study schedule. Participants will not participate in CBM training or coaching. Similar observation and teacher interview data will be collected for comparison.

Measurements.

Intervention fidelity.

Evidence based practices will be monitored using teacher records and interviews completed weekly in all conditions. Frequency of usage will be calculated and change will be compared across conditions.

Intervention fidelity will be recorded by the coach during baseline, intervention, and maintenance phases using the intervention checklist in Appendix A. Interrater agreement will be found for 20% of the observations. In the coaching condition, interventions will be selected and implemented with the assistance of the coach, while in the second condition teachers will do this using only the SM program. Every four weeks, student data will be analyzed and changes to intervention will be made if necessary. Changes to intervention will be recorded in teacher logs. We will use the class average of achieved SM objectives as a measure of fidelity, as research has shown a correlation between higher achievement of objectives and higher fidelity of implementation (Ysseldyke & Bolt, 2007).

Student growth.

SM screening data will be collected for all conditions before baseline, after intervention and following maintenance phases. The screening assessments are similar to cumulative exams

of content, but students complete the exams on a computer. Exact questions vary, content does not vary, and level of difficulty adjusts to the individual student's responses as they take the test in order to find their individual levels of performance (Renaissance Learning, Inc., 2010). TCAP scores will be collected for all conditions after baseline, intervention, and maintenance phases (see Appendix B for schedule).

Weekly PM data will be collected using the SM program for both treatment groups during all phases. This program will calculate a student growth rate automatically. Every four weeks, teachers in the treatment groups will check student growth rates to ensure they are on target, and teachers will make instructional changes if needed. The SM program will calculate student growth rate using PM data. Changes in SM screening assessments will be used to calculate control group student growth rate.

Data analysis.

Intervention fidelity.

Use of evidence based practices will be analyzed by collecting weekly teacher logs and recording the frequency of use of each practice. Type of practice will be calculated as a percent of all practices used. Each teacher's percents for practices with moderate to high effect sizes will be averaged for each phase. Individual scores will be compared across phases to identify changes during intervention. Treatment group scores will be averaged and compared between treatments across phases to identify differences between groups across phases. If the hypothesis is supported, then we should find that teachers in the coaching condition have a higher percentage of use of evidence based practices than other groups. We should also see an increase in percentage between baseline and intervention phases.

Intervention fidelity checklist scores will be calculated as a raw score. Interrater agreement will be calculated to ensure reliability of observation data. Weekly scores will be averaged within each phase for each teacher. Scores will be compared across phases to identify changes during intervention and maintenance for each teacher and compared across treatments to identify differences between groups between phases. If the hypothesis is to be supported, then we should find that teachers in the coaching condition have a higher fidelity score than teachers in other groups. We should also expect to find that scores in the coaching condition will improve from baseline to intervention.

Student attainment of objectives will be collected during each phase across both treatment groups. Scores of all students will be combined to create a class average. Class averages will be compared between phases and across treatments. If the hypothesis is supported, then we should find that teachers in the coaching condition have a higher average than teachers in other groups. We should also expect to find that averages in the coaching condition will improve from baseline to the end of intervention.

Individual student growth rates will be gathered at the end of each phase and be used to create class averages. These averages will be used to compare groups. Individual score changes between phases will also be calculated. These will be used to compare experiment phases. If the hypothesis is supported, we would expect to see higher class averages in the coaching condition. We also hope to find an increase in student growth between baseline and treatment.

Student SM scores will be averaged as a class for each screening. Scores will be compared between phases and across treatments. If the hypothesis is supported, we should expect to see higher scores in treatment one group and during intervention. Students'

value-added scores on TCAP will be used to compare students' true growth over time and across interventions. We expect to see higher scores following intervention in the coaching condition.

During the maintenance phase, data will continue to be collected while coaching is removed. Similar comparisons between phases and groups will be made in order to monitor whether or not treatment effects and fidelity persist. Tests for correlation will be run to identify whether or not relationships between variables exist. Tests for covariance will be run to identify differences between groups.

Implications

By conducting this study we are hoping to fill gaps in current research. The goal of any instructional intervention is to refine teacher practice as a means to improving student outcomes. However, current research indicates that such interventions often are not implemented with the levels of fidelity necessary to achieve the outcomes demonstrated in controlled experimental studies. We are attempting to demonstrate that access to individualized coaching support may be one method through which teachers can implement the research-based programs and practices with fidelity. Individualized coaching support may provide one way to close the research to practice gap so that evidence based practices reach students in more classrooms. As most studies have been done with a predominantly white population, we expect to demonstrate effectiveness with a more diverse population. Conducting the study at the middle school level will help support the research base of the use of CBM at the middle school level. Ultimately though, we hope to demonstrate that coaching is an effective way to increase the use of evidence-based practices, fidelity of intervention implementation, and identify a link to student growth on standardized scores.

References

Burns, M. K. (2011). Matching math interventions to students' skill deficits: A preliminary investigation of a conceptual and procedural heuristic. *Assessment for Effective Intervention, 36*, 210-218. doi: http://dx.doi.org/10.1177/1534508411413255

Burns, M. K., & Ysseldyke, J. E. (2009). Reported prevalence of evidence-based instructional practices in special education. *Journal of Special Education*, *43*, 3-11.

Foegen, A. (2000). Technical adequacy of general outcome measures for middle school mathematics. *Diagnostique, 25,* 175-203.

Foegen, A. (2008). Algebra progress monitoring and interventions for students with learning disabilities. *Learning Disability Quarterly, 31*, 65-78. Retrieved from http://search.proquest.com.proxy.library.vanderbilt.edu

Foegen, A. (2008). Progress monitoring in middle school mathematics: Options and issues. *Remedial and Special Education, 29*, 195-207. Retrieved from http://search.proquest.com.proxy.library.vanderbilt.edu

Foegen, A., & Deno, S.L. (2001). Identifying growth indicators for low-achieving students in middle school mathematics. *Journal of Special Education, 35,* 4-16.

Foegen, A., Jiban, C., & Deno, S. (2007). Progress monitoring measures in mathematics: A review of the literature. *The Journal of Special Education, 41*, 121-139. Retrieved from http://search.proquest.com.proxy.library.vanderbilt.edu/

Fuchs, L. S., & Fuchs, D. (1998). Treatment validity: A unifying concept for reconceptualizing the identification of learning disabilities. *Learning Disabilities Research & Practice, 13*, 204-219. Retrieved from http://search.proquest.com.proxy.library.vanderbilt.edu/

Fuchs, L.S., Fuchs, D., Powell, S.R., Seethaler, P.M., Cirino, P.T., & Fletcher, J.M. (2008). Intensive intervention for students with mathematics disabilities: Seven principles of effective practice. *Learning Disability Quarterly, 31*, 79-92. Retrieved from http://search.proquest.com.proxy.library.vanderbilt.edu/

Fuchs,L.S., & Foegen, A. (2010). Teaching algebra to students with learning disabilities. *Intervention in School and Clinic, 46*, 31. Retrieved from http://search.proquest.com.proxy.library.vanderbilt.edu/

Fuchs, L.S., Hamlett, C.L., & Fuchs, D. (1999). *Monitoring Basic Skills Progress: Basic math concepts and applications.* Austin, TX: Pro-Ed.

Helwig, R., Anderson, L., & Tindal, G. (2002). Using a concept-grounded, curriculum-based measure in mathematics to predict statewide test scores for middle school students with LD. *Journal of Special Education, 36,* 102-112.

Impecoven-Lind, L. S., & Foegen, A. (2010). Teaching algebra to students with learning disabilities. *Intervention in School and Clinic*, *46*, 31-37.

Klingner, J. K., Vaughn, S., Hughes, M. T., & Arguelles, M. E. (1999). Sustaining research based

practices in reading: A 3-year follow-up. *Remedial and Special Education, 20*, 263-274.

Kretlow, A. G., & Bartholomew, C. C. (2010). Using coaching to improve the fidelity of evidence-based practices: A review of studies. *Teacher Education and Special Education, 33*, 279-299. doi:10.1177/0888406410371643

Kretlow, A.G., & Blatz, S.L. (2011). The ABCs of evidence-based practice for teachers. *Teaching Exceptional Children, 43,* 8-19.

Renaissance Learning, Inc. (2010). Getting the most out of STAR Math: Using data to inform instruction and intervention. Retrieved from http://doc.renlearn.com/KMNet/R004454309GKBFA7.pdf

Schumaker, J.B., Deshler, D.D., Lenz, B.K., Bulgren, J.A., Davis, B., Grossen, B., & Marquis, J. (2002). *The educational context and outcomes for high school students with disabilities: Overview of the study and findings* (Research Report #1). Lawrence, KS: University of Kansas, Institute for Academic Success. Retrieved from http://search.proquest.com.proxy.library.vanderbilt.edu/docview/62197260?accountid=14816

Slavin, R.E., Lake, C., & Groff, C. (2008). Effective programs in middle and high school mathematics: A best-evidence synthesis. *Best Evidence Encyclopedia*. Retrieved from http://www.bestevidence.org/word/mhs_math_Oct_21_2008.pdf

Spencer, S. S., & Logan, K. R. (2003). Bridging the gap: A school based staff development model that bridges the gap from research to practice. *Teacher Education and Special Education, 26*, 51-62. doi: 10.1177/088840640302600106

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. doi: http://dx.doi.org/10.1002/pits.20113

Stecker, P.M., Lembke, E.S., & Foegen, A. (2008). Using progress-monitoring data to improve instructional decision making. *Preventing School Failure, 52*, 48-58. Retrieved from http://search.proquest.com.proxy.library.vanderbilt.edu

Tennessee Department of Education. (2012). TCAP Testing Schedule. Retrieved from

http://www.tn.gov/education/assessment/test_schedule.shtml

U.S. Department of Education. (1997). *Mathematics equals opportunity* (White paper prepared for U.S. Secretary of Education Richard W. Riley). Washington, DC: Author.

Ysseldyke, J., & Bolt, D.M. (2007). Effect of technology-enhanced continuous progress monitoring on math achievement. *School Psychology Review, 36*, 453-467. Retrieved from http://search.proquest.com.proxy.library.vanderbilt.edu/

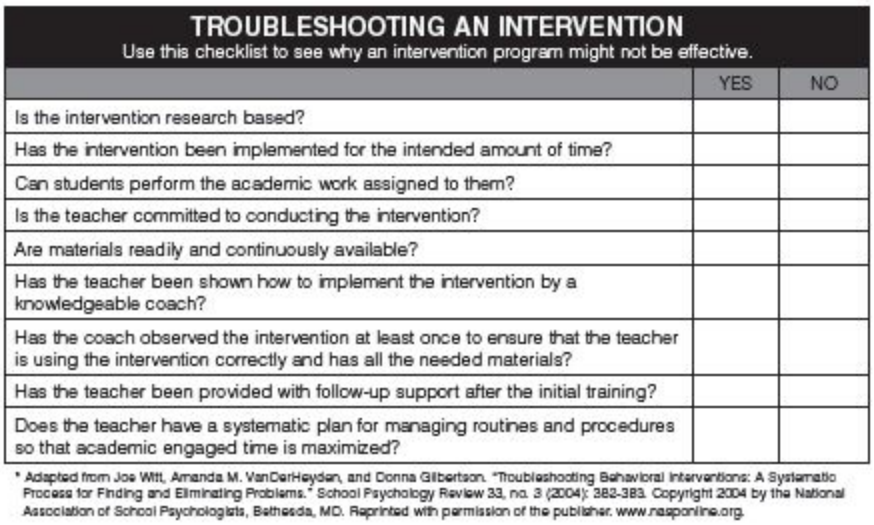
Ysseldyke, J., Spicuzza, R., Kosciolek, S., Teelucksingh, E., Boys, C., & Lemkuil, A. (2003). Using a curriculum-based instructional management system to enhance math achievement in urban schools. *Journal of Education for Students Placed at Risk, 8*, 247-265. doi: http://dx.doi.org/10.1207/S15327671ESPR0802_4

Ysseldyke, J., & Tardrew, S. (2007). Use of a progress monitoring system to enable teachers to differentiate mathematics instruction. *Journal of Applied School Psychology, 24*, 1-28. Retrieved from http://search.proquest.com.proxy.library.vanderbilt.edu

Appendix A

Figure 1

Sample classroom observation checklist from the STAR Math program



TROUBLESHOOTING AN INTERVENTION

Use this checklist to see why an intervention program might not be effective.

	YES	NO
Is the intervention research based?		
Has the intervention been implemented for the intended amount of time?		
Can students perform the academic work assigned to them?		
Is the teacher committed to conducting the intervention?		
Are materials readily and continuously available?		
Has the teacher been shown how to implement the intervention by a knowledgeable coach?		
Has the coach observed the intervention at least once to ensure that the teacher is using the intervention correctly and has all the needed materials?		
Has the teacher been provided with follow-up support after the initial training?		
Does the teacher have a systematic plan for managing routines and procedures so that academic engaged time is maximized?		

* Adapted from Joe Witt, Amanda M. VanDerHeyden, and Donna Gilbertson. "Troubleshooting Behavioral Interventions: A Systematic Process for Finding and Eliminating Problems." School Psychology Review 33, no. 3 (2004): 382-383. Copyright 2004 by the National Association of School Psychologists, Bethesda, MD. Reprinted with permission of the publisher. www.nasponline.org.

Figure 1: Teacher implementation fidelity will be assessed through observations conducted by coaches. Measures will include checklists provided in the STAR Math program. The sample checklist included above is designed to assess an intervention after student data indicate insufficient progress (Renaissance Learning, 2010).

Appendix B

Figure 2
Experiment schedule

Event	Duration
STAR Math screening assessment one	1 class period
Baseline data	8 weeks
Treatment condition two workshop	½ day
Treatment condition one workshop	Full day
TCAP testing fall	1 day
Intervention implementation	12 weeks
STAR Math screening assessment two	1 class period
TCAP testing spring	1 day
Maintenance	6 weeks
STAR Math screening assessment three	1 class period
TCAP testing end of year	1 day