

1-1-2013

Effects on Student Achievement of Changing Cognitive Strategies During Targeted Tier II Interventions

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Mellace, Angela M., "Effects on Student Achievement of Changing Cognitive Strategies During Targeted Tier II Interventions" (2013). *Theses, Dissertations and Capstones*. Paper 479.

EFFECTS ON STUDENT ACHIEVEMENT OF CHANGING COGNITIVE STRATEGIES
DURING TARGETED TIER II INTERVENTIONS

A thesis submitted to
The Graduate College of
Marshall University

In partial fulfillment of
The requirements for the degree of
Education Specialist

in

School Psychology

by

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May 2013

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ABSTRACT

The purpose of this study was to determine whether changing cognitive based strategies is more effective than not changing strategies when a student fails to respond to an intervention. Ninety students who performed in the bottom third on a state reading test from a rural school district in Virginia were randomly placed into three groups: 1) students who received traditional evidence-based reading interventions 2) students whose teachers were trained in Cattell-Horn-Carroll theory and whose teacher chose an intervention that she considered being the most suited to the student's cognitive profile 3) students who were assessed using the Woodcock Johnson III Tests of Cognitive Abilities (WJ III COG) and were given interventions based on their test results. The scores on the year end SOL test were compared. Results indicated that there was a significant difference between students whose intervention strategy was changed after failing to respond to intervention and those whose intervention strategy was not changed.

Chapter I

Chapter I: Review of Literature

The intent of RTI is to identify children who are not making progress in the regular education curriculum and supply them with more intensive, individualized instruction that targets regular curriculum goals (Koutsoftas, Harmon, & Gray, 2009). RTI includes three tiers to help improve children's academic success in the classroom (Rinaldi, Averill & Stuart, 2010). Most RTI models have common characteristics, which include screenings of every child, different tiers for interventions, a problem-solving model, data collection, and an assessment system at every tier (Rinaldi, et al., 2010). The Institute of Educational Sciences in 2009, stated that there were many other vital elements of an RTI model: progress monitoring of students who are not meeting the benchmark requirement, differentiating instruction in the classroom, providing Tier II interventions, and providing Tier III interventions (Jones, Yssel, & Grant, 2012).

Tier I consists of research-based, universal instruction given to all students and is extremely likely to bring all students to proficiency level. Tier II is extra instruction given to student(s) and is completed in small groups (Rinaldi, et al., 2010). Students receiving Tier II services are not progressing in Tier I. The key for successful interventions in Tiers II and III is progress monitoring of the students to change interventions. (Hughes & Rollins, 2009). Tier III is extra services provided to students who are not responding to Tier I or Tier II interventions. Tier III is more intensive and more individualized (Rinaldi, et al., 2010).

Whether an intervention should be drastically modified, changed, intensified, or continued is determined based on how the student(s) are responding to the evidence-based intervention being implemented with integrity and fidelity. RTI assumes that if a student is

showing insufficient responses to the best interventions offered, the student may require a different and more intensive intervention (Shapiro, 2008).

In Tier II of the RTI model, the student is to get an extra 30 minutes of the academic area that they are struggling with for approximately nine to twelve weeks. Progress monitoring is done approximately every one to two weeks during Tier II intervention to screen progress. The student(s) who respond to Tier II interventions close the achievement gap they once had and progress on grade level with their peers. If this does not occur, students will move to Tier III, where the student will receive an additional 30 minutes of academic instruction, in addition to the universal instruction, and the additional 30 minutes from Tier II. During Tier III interventions, progress monitoring is more frequent and takes place once or twice per week to monitor the progress the student is making (Feifer & Toffalo, 2007).

Progress Monitoring

Progress monitoring is an important component for improving academic outcomes of students. Progress monitoring helps gauge whether a student is on track to meet his/her academic goals. Progress Monitoring helps give data to teachers, parents, and educators about the intervention that is implemented (Shapiro, 2008). When provided with quality instruction and remedial services, a student without disabilities will make satisfactory progress (Responsiveness to Intervention and Learning Disabilities, 2005). Results from a meta-analysis of RTI studies indicated that approximately 15% of young children getting Tier II instruction will make enough progress to return to Tier I instruction (Koutsoftas, et al., 2009).

Changing Strategies

Progress monitoring informs the teacher if the student is making gains academically. If a child is not progressing at the desired rate, there needs to be a change in the instructional

strategy. This change may involve a new strategy, the addition of another strategy or a change in the intensity of the strategy. A more intense intervention may include more frequent sessions and/or reducing the size of the group (Daly III, Martens, Barnett, Witt & Olson, 2007). During Tier II interventions, a few of the strategies that are utilized include: providing the student with additional instruction and practice, increased structure, changing the physical environment to position the students in an environment where they may be more inclined to respond to the intervention, and smaller group instruction (McIntosh, Bohanon & Goodman, 2010). Additional changes that may need to be considered if a student is not responding to an intervention are: the time allotted for the intervention should be increased, the student should be moved to a different group, and/or the targeted skill should be changed (Krieg, 2010).

Students who are in Tier II interventions should be placed in same-ability small groups. Teachers should provide these students with daily, targeted instruction that is explicit, systematic, and provides adequate practice opportunities with immediate feedback. Teachers should provide numerous opportunities for struggling students to apply what they are learning (Vaughn & Roberts, 2007). When students are falling behind, educators should turn their attention to discover better ways to meet the students' specific learning need (Buffum, et al. 2010). Future academic progress of students depends on adjusting classroom and instructional elements (Hoover, 2011).

In RTI, an important concept is the strength of the treatment (Roach & Elliott, 2008). Administering more of a given treatment does not necessarily make the treatment stronger (Roach & Elliott, 2008). For example, administering more of what did not work in Tier 1 is seldom the right intervention for a student who is not progressing on grade level (Buffum, et al., 2010).

Knowledgeable Staff

Knowledge of different strategies that provide effectiveness for students in Tier I and Tier II interventions would help teachers offer improved services to students with academic difficulties. Then, teachers, reading specialists, etc. would be better able to differentiate/individualize instruction for all students.

Previous/Current Research

Previous research was conducted using a school wide progress monitoring system. During this research, the MAZE and R-CBM was used to determine whether progress was being made for the bottom 20% of the students. During the study, the students' progress was monitored three times in the year. However, the students who were not making adequate progress began immediate interventions and their progress was monitored every other week and changes were made based on their progress. However, during the duration of the research no one kept track of how frequently instructional changes were made. This study did provide evidence that progress monitoring and making adequate instructional changes can lead to student improvement (Deno, Reschly, Lembke, Magnusson, Callender, Windram, & Stachel, 2009).

Another study conducted using a school wide RTI model showed fewer students needing to receive Tier III services when progress monitored during Tier II interventions. During this research, different schools used different techniques to determine whether students would qualify to need additional progress monitoring. Some schools used DIBELS, some used published materials, such as Harcourt, and others used classroom data to determine the need. Most of the 41 schools targeted the lowest 25% of their students. However, some schools used 20%, 16%, or 15%. Immediately following the district-wide school screenings, a Literacy Team held a "Literacy Day." The Literacy Team made decisions during this time about changing student

interventions and identifying students who may need more intensive interventions (Mellard, McKnight, & Woods, 2009).

Another study worked with Kindergarten and first grade students who were at high risk for developing reading problems. The students in this study were monitored once a week to see if they would make progress. If the students were not making progress, then the instructional strategy was changed based on the students' needs. This study indicates that if a student is not making progress and the strategies being used are changed, then the student is likely to make sufficient progress. For example, in the study, Jennifer was not making progress that would lead her to the goal she needed to reach by June, but when the teacher decided to change her intervention by providing her more time and reducing the size of her group she was back on track to meet her goal. In this study, at the beginning of the year approximately 25% of students were at risk, but by the end of the year only 15% of the students were still at risk (Coyne, & Harn, 2006).

Like previous studies, progress monitoring was conducted based on a specific score on a specific test. If students were failing to make progress, then the strategy was changed. However in the current study, strategies (interventions) were selected based on the WJ III COG cognitive factors. A literature review shows that, there were no known studies that have previously selected strategies based on the WJ III COG factor. The purpose of this study was to determine whether changing interventions after a student has failed to respond to the intervention is correlated with increasing student achievement.

Hypotheses

This study is organized around five primary hypotheses.

1. There will be a difference in posttest reading scores between two groups of students: 1) students who were in the group where teachers were trained in CHC theory and the students were changed based on not responding to the teachers' chosen intervention, and 2) students who were tested using the Woodcock Johnson III Tests of Cognitive Abilities and the students were changed based on not responding to the intervention that was selected based on the WJ-III scores.
2. There will be a difference in posttest reading scores between two groups of students: 1) students who were in the group where teachers were trained in CHC theory and the students were not changed due to responding to the intervention, and 2) students who were tested using the Woodcock Johnson III Tests of Cognitive Abilities and the students were not changed due to responding to the intervention.
3. There will be a difference in posttest reading scores between two groups of students: 1) students who were in the group where teachers were trained in CHC theory and the students were not changed due to responding to the intervention, and 2) students who were in the group where teachers were trained in CHC theory and the students were changed due to not responding to the intervention.
4. There will be a difference in posttest reading scores between two groups of students: 1) students who were tested using the Woodcock Johnson III Tests of Cognitive Abilities and the students were changed based on not responding to the intervention that was selected based on the WJ-III scores, and 2) students who were tested using the Woodcock

Johnson III Tests of Cognitive Abilities and the students were not changed due to responding to the intervention.

Chapter II

Method

Participants

In a rural public school system in Virginia ninety third graders from fifteen different classrooms in six elementary schools participated in the study. The third graders consisted of fifty nine males and thirty one females.

Procedure

In Virginia, all students participate in the Standards of Learning (SOL) test at the end of each year. At the start of the 2011-2012 all third graders in the district took the 2010-2011 third grade SOL test as a pretest benchmark for the current study. The students in the district who scored in the bottom third in reading on the SOL test and were not presently getting Tier III intervention special education pull-out instruction were chosen to partake in the study (N=90). Students were assigned to one of three groups based on their school, and each group consisted of five classrooms. The teacher decision group consisted of thirty students (teachers were educated in CHC theory and chose the cognitive interventions that they considered being best for each child). The tested group consisted of thirty students (students were tested with the WJ-III COG and assigned a cognitive intervention based on their cognitive deficit obtained on the WJ-III COG). The control group consisted of thirty students (received the same intervention as they were receiving from the previous school year). The schools were selected randomly without replacement.

Twelve hours of training were given to the teachers in both treatment groups on the CHC theory. During the training, the teachers were taught detailed information about psychology assessments, the neuropsychology of learning, learning disabilities, cognitive neuropsychological

perspectives, and interventions based on the CHC theory. The third graders that were chosen to be part of the tested group were administered the Woodcock Johnson III Tests of Cognitive Abilities (WJ-III COG) subtests 1-9 and 11-17 by Marshall University graduate students who were trained on how to administer the assessment. Based on the CHC clusters, seven strategies were formed (Visual-Spatial Thinking, Processing Speed, Auditory Processing, Comprehension-Knowledge, Long-Term Retrieval, Fluid Reasoning, and Short-Term Memory). Each strategy consisted of two evidence-based interventions. In the tested group (the students who were administered the WJ-III COG), the strategy was chosen based on the students' lowest cluster score on the Woodcock Johnson III COG. In the teacher decision group (where the teachers obtained training and selected the research-based intervention for each student), the teachers selected the CHC area where they believed the student was encountering the most problems. The first intervention in that strategy area was then given to the student. In the two treatment groups, intervention specialists and the teachers kept data each day on the duration of the intervention in order to monitor fidelity during the study. All students participating in the study were progress monitored using Virginia's state SOL test on two separate occasions in the 2011-2012 school year. During the monitoring, the mean score of progress was given for the two treatment groups. If a third grader had a score on the SOL progress monitoring test that was one standard deviation beneath the mean progress score, the student was changed to the second intervention within the strategy that was selected for him/her. Students who were making progress received the same intervention as they were given prior to progress monitoring. During this process, an intervention specialist monitored the implementation of the interventions, the engagement level, the observation dates, and protocols that were used.

Chapter III

Results

A two factor mixed model analysis of variance was used to determine whether there were differences between the students whose interventions were changed based on not responding to intervention and the students whose interventions were not changed based on responding to the intervention, the teacher decision changed group and the tested children changed group on the posttest; the teacher decision changed group and the tested children non changed group, and the teacher decision non changed group and the tested children changed group. It was anticipated that there would be a significant difference between the posttest scores. As such, a one-way between-groups analysis of variance was then used to determine whether there were differences between any of the groups on the posttest scores.

With random assignment of schools, it was anticipated there would be a significant difference between the posttest scores in each group: ANOVA tests confirmed there was a significant difference in posttest scores in students who changed strategies.

Table 2: Descriptive Statistics

Dependent Variable: SOL

switch	Tested	Mean	Std. Deviation	N
	Tested	25.91	5.147	11
Switched	Teacher Trained	28.00	2.954	12
	Total	27.00	4.189	23
	Tested	25.00	5.011	19
Not Switched	Teacher Trained	20.89	6.351	18
	Total	23.00	5.995	37
	Tested	25.33	4.992	30
Total	Teacher Trained	23.73	6.286	30
	Total	24.53	5.685	60

The interaction between the students whose teachers were trained in the CHC theory and changed strategies and students who were in the group that were tested using the WJ COG III and changed strategies was compared. There was not a statistically significant difference between students in either group as determined by a one-way ANOVA ($F(1,21) = 1.549, p = .227$).

A one-way between groups analysis of variance was conducted to explore the impact of changing strategies. The results of this analysis are depicted in Table 2.a. There was a statistically significant difference between students who changed strategies and students who did not change strategies as determined by a one-way ANOVA ($F(1,58) = 7.963, p = .001$). Students who did not change strategies had lower scores ($m = 23, sd = 5.995$) than those who did change strategies ($m = 27.04, sd = 4.237$).

Table 2a

ANOVA: Changing Strategies vs. Not Changing Strategies

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	372.672	1	372.672	13.231	.001
Within Groups	788.694	28	28.168		
Total	1161.367	29			

Next, the interaction between the students whose teachers were trained in the CHC theory and changed strategies and students who were in the group that were tested using the WJ COG III and changed strategies was compared. There was not a statistically significant difference between students in either group as determined by a one-way ANOVA ($F(1,21) = 1.549, p = .227$).

In order to address the third hypothesis a between subjects one-way ANOVA was calculated comparing posttest SOL reading scores for students who were in the teacher trained group and did not change strategies, and students who were in the tested group and did not

change strategies. The results of this analysis are depicted in Table 2.b. There was a statistically significant difference between the two groups ($F(1,35) = 4.806, p = .035$). Students who were in the teacher selected group who did not change strategies had lower scores ($m = 20.89, sd = 6.351$) than those who were in the tested group and did not change strategies ($m = 25, sd = 5.011$).

Table 2b

ANOVA: Teacher Trained Not Changed vs. Tested Not Changed

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	156.222	1	156.222	4.806	.035
Within Groups	1137.778	35	32.508		
Total	1294.000	36			

Next, the interaction between the students who were in the teacher trained group and did not change strategies and students who were in the teacher trained group and changed strategies were compared. The results of this analysis are depicted in Table 2.c. There was a statistically significant difference between the two groups ($F(1,28) = 13.231, p = .001$). Students who did not change strategies in the teacher trained group had lower scores ($m = 20.89, sd = 6.351$) than those who did change strategies in the teacher trained groups ($m = 28.08, sd = 3.059$).

Table 2c

ANOVA Summary: Teacher Trained Changed vs. Teacher Trained Not Changed

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	372.672	1	372.672	13.231	.001
Within Groups	788.694	28	28.168		
Total	1161.367	29			

Finally, the interaction between the students who were tested using the WJ COG III and changed strategies and students who were tested using the WJ COG III and did not change

strategies was compared. There was not a statistically significant difference between the two groups ($F(1,21) = 1.460, p = .240$). Students who changed strategies had lower scores ($m = 25.91, sd = 5.147$) than those who did not change strategies ($m = 28.00, sd = 2.954$).

Chapter IV

Discussion

The findings of this study suggest students who changed strategies showed the most improvement. However, when all of the students who changed strategies within the study were compared there was not a significant difference between the students who changed strategies in the teacher selected group and the students who changed strategies in the tested group. This result indicates that it does not matter whether the students are tested using the WJ COG III or whether the teachers are trained on all the CHC theories. If you change strategies the students will show improvements if they are failing to respond to the current strategy. This is not a surprising result considering the amount of research that clearly shows changing strategies when a student is failing to respond to the current strategy is beneficial. According to (Deno, et al., 2009; Coyne, & Harn, 2006; and Mellard, et. al., 2009), changing strategies/interventions when a student is not progressing onto grade level is effective.

The idea is that the current instruction should be changed in some way so that the possibility of the student responding to the instruction is increased (Baker, Fien, & Baker, 2010). When used effectively, Tier I and II instruction meets the need of approximately 95% of learners (Hoover, 2011).

The findings of this study suggest that the greatest difference was between the students who were in the teacher trained group who changed strategies and students who were in the teacher selected group who did not change strategies. This result indicates again that changing strategies is beneficial for students when they are struggling. Teachers owe it to the students to change the strategy being implemented at the first indication of unresponsiveness to the classroom implementations of evidence based interventions. Teachers should be adjusting

interventions based on regular reviews of academic performance (Algozzine, Wang, White, Cooke, Marr, Algozzine, K. & Duran, 2012).

It was predicted that there would be a significant difference between the students who were in the teacher selected group who changed strategies and students who were in the tested group and changed strategies; however, the current findings fail to support this hypothesis. When struggling students have low achievement data scores, the scores have more room for improvement and the need for instructional adjustments are greater than if the student is performing slightly below average compared to his/her peers (Hoover, 2011). It appears that the process of changing is more important than the strategy used to guide the change.

Some limitations must be taken into consideration when reviewing the results of this study. One limitation is that we failed to look at the students who remained in the same strategy the entire year and determine if they made progress. Second, this study may not be generalizable to other populations. If this study is done in a more urban area, perhaps we may see different results. Thirdly, this study only changed the strategy within the cognitive domain in which the student was currently receiving an intervention. Another limitation of the current research study was the small sample size.

A suggestion for future research is to consider doing this study with students in grades K-3. It is believed that by the end of third grade students who cannot read are not going to be able to learn to read as easily as younger students, so by starting this study with younger students who are struggling and following those students through the end of third grade would be beneficial to see if the students continue improving. Teachers can prevent long term reading failure in these younger students by identifying students early on and putting an intervention in place immediately (Lembke, McMaster, & Stecker, 2010). Secondly, giving feedback to teachers

concerning fidelity issues could improve student outcomes. Longitudinal research may also be required to determine if the effects of the Tier II interventions continue to impact a student's future reading abilities. Also, more research needs to be done on the effect of changing strategies on the students who responded to the initial strategy. Research is also needed to determine the effect of not changing strategies on children who did not respond to the initial strategy. Research is also needed to determine if we would receive the same results with a different population.

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October 17, 2012

Fred Krieg, Ph.D.
Psychology Department

RE: IRBNet ID# 274494-2

At: Marshall University Institutional Review Board #2 (Social/Behavioral)

Dear Dr. Krieg:

Protocol Title:	[274494-2] Targeted Based Cognitive TIER II Interventions to Increase Student Achievement
Expiration Date:	October 19, 2013
Site Location:	MU
Submission Type:	Continuing Review/Progress Report APPROVED
Review Type:	Exempt Review

The above study was approved for an additional 12 months by the Marshall University Institutional Review Board #2 (Social/Behavioral) Designee. The approval will expire October 19, 2013. Since this approval is within 30 days of the expiration date, the fixed anniversary date of 10/19 was maintained. Continuing review materials should be submitted no later than 30 days prior to the expiration date.

If you have any questions, please contact the Marshall University Institutional Review Board #2 (Social/Behavioral) Coordinator Michelle Woomer, B.A., M.S at (304) 696-4308 or woomer3@marshall.edu. Please include your study title and reference number in all correspondence with this office.