The Effects of Mindfulness Awareness Practice of Conscious Breathing on Time-on-Task Behavior in a Third Grade Classroom

Erik Mattson

Colorado College

HCU

The Effects of Mindfulness Awareness Practice of Conscious Breathing on Time-on-Task Behavior in a Third Grade Classroom

Teaching students in the 21st century classroom requires more than just data-driven academic instruction. Teaching needs to include metacognitive and motivation based strategies as well as disciplinary knowledge and classroom management in a well-rounded modern classroom (Paris & Paris, 2001). Some of these strategies include using metacognitive and reflective practices to enhance self-regulation in individual students. These strategies are most important in a modern student-centered classroom because they help students make the step from merely being motivated to perform assigned academic tasks, to consciously choosing strategies that apply to their individual needs (Wolters, 2003). This study seeks to test the effect of the metacognitive tools of mindfulness awareness practices on students' ability to self-regulate their attention, measured by tracking the time they spend on academic tasks. Mindfulness awareness training is a set of breathing and visualization techniques that help students reflect on their state of mind and intentionally regulate their attention.

The question the researcher tested was: what is the effect of a breathing mindfulness awareness practice (MAP) on the time-on-task behavior of third grade students? The preliminary hypotheses was: if five students were given a MAP treatment immediately before participating in classroom instruction, then the results would show significant improvements in those students' time spent on-task scores during a measured window of instruction because mindfulness training has been shown to decrease task-irrelevant thinking, as well as potentially increase a subject's capacity for self-regulation (Bishop et al., 2004; Pekrun, Goetz, Titz, & Perry, 2002).

In phase two, the question was changed to: what is the effect of a breathing and visualization MAP treatment on the time-on-task behavior and academic task completion of third grade students in a regular classroom? The phase two hypothesis was: if five students were given MAP treatment immediately before participating in classroom instruction, then the results would show significant growth in their time on task scores, as well as the students' academic task completion percentages.

Literature Overview

Mindfulness is a state of awareness that is characterized by engaged attentiveness to what is happening in the present moment (Brown & Ryan, 2003). Mindfulness is achieved by intentionally focusing one's attention on an attention anchor such as a person's breath, or a mental image (Meiklejohn et al., 2012). This focus on a single action keeps a learner's focus on the repetitive practice, thereby training learners to focus their attention on their cognitive processes. This results in enforcing the development of self-regulation, self-awareness and most importantly, avoiding distraction.

Mindfulness awareness practices (MAPs) positively impact self-regulated learning in students (Flook et al., 2010). Self-regulated learning is linked to positive academic emotions and high self-efficacy in individual students, which positively correlates with academic performance and emotional well-being (Pekrun et al., 2002). Because a well-rounded classroom includes opportunities for both social and academic growth for the students, and MAPs shows promising efficacy for providing those opportunities. By deepening self-regulated learning through the acquisition of mindfulness strategies in the classroom, MAP programs have the potential to increase every child's academic well-being and self-regulation.

Researchers have studied how to best affect the development of self-regulated learning (SRL) in children through strategies such as the development of self-awareness and mindfulness (Brown, Ryan, & Creswell, 2007; Pekrun et al., 2002; Wolters, 2003). Many studies in first through third grade classrooms show improvement in such cognitive processes as attention shifting, monitoring, and initiating tasks after subjects received MAP training (Flook et al., 2010; Meiklejohn et al., 2012; Napoli, Krech, & Holley, 2005). In the study by Flook et al., 2010, for example, the group that received MAPs training increased the use of beneficial cognitive processes. In another study, the group that received MAP training saw significant changes in the researcher's attention metrics (Napoli et al., 2005). The researchers reported decreases in the "ADD-H Comprehensive Teacher Rating Scale" ($t=-8.21$, $p<.001$), and significant increases in selective attention scores ($t=+7.94$, $p>.001$) The students under observation demonstrated fewer attention-shifting behaviors, while simultaneously increasing their selective attention abilities in controlled tests. Replicating or modifying these techniques in a classroom setting could produce similar results.

Using MAPs in the elementary classroom is an easy choice. MAPs require minimal instruction and take only a small amount of time from the core curricular instruction (10-15 minute introductions, and 1-2 minute practice sessions). The more advanced techniques such as visualization share similarities with literacy techniques such as visualizing story elements. The simple program outlined in this study employs a rules-based, sequential, and short duration MAP treatment, that aims to help elementary students develop self-regulation strategies.

Methods

Phase one of the study took place over a period of two months during the beginning of Spring semester in a third grade classroom where the researcher was in the role of student teacher. During this phase, the researcher measured time on task (TOT) behaviors of five students in a classroom of 26 students by recording 10 minutes of direct instruction time on a laptop camera and reviewing the footage after instruction hours. The 10 minute observation time was of interest as the students were accustomed to this period of direct instruction before they move into independent and group work in the classroom.

Phase two of the study began at the beginning of the fourth quarter, using the same population of participants and identical data collection instruments. Although phase one showed a positive trend in mean TOT scores, they were not statistically significant. The researcher chose to try a different mindfulness practice known as visualization, while additionally measuring the effect of the treatment on the participants' ability to complete academic tasks (percent task completion, or %TC). Visualization was a MAP strategy that allowed for more individual choice, an important factor in engagement and self regulation of behavior (Wolters, 2003). By asking students to visualize colors or objects, they were able to choose their own attention anchor during the MAP exercise. This was predicted to lead to positive results in students' TOT and %TC scores.

Participants

The participants of this study (n=5) were age eight or nine and were enrolled in a public school third grade classroom in the state of Colorado. The student body was of medium to high socioeconomic status with 14.3% of the student population qualifying for

free and reduced lunch (Department of Education, 2016). The classroom had a population of 26 students, two of whom were unable to be recorded due to opting out of the filming for the study. Two other students had full time educational intervention and could not participate. There was one licensed educator in the classroom and the researcher.

The students were selected by their table grouping, in order to allow for detailed and consistent filming. Four of the five participants were in the tier 2 and 3 RtI classification, which designated them for reading intervention during the regular school day, as well as weekly progress monitoring to record and track their reading fluency and comprehension progress.

Instruments

The researcher chose to measure TOT using a time-sampling interval recording, specifically a partial-interval recording (Hintze, Volpe, & Shapiro, 2002). Time-sampling interval recordings were used as part of a systematic direct observation of student behavior to reduce observation bias, and make behaviors easy to score. Student behavior is only monitored and scored during predetermined intervals (t_{int}=0:30) for a set total duration (t_{total}=10:00) and if the behavior is observed as beginning during t_{intn}, it is scored as a single occurrence.

The intervals were recorded using a MacBook Air laptop camera and the Photo Booth recording program standard to all Apple laptop operating systems. When recording was impractical, the researcher used a spiral-bound notebook and a pencil to record behaviors using the binary scoring system described below. Data was consolidated

and analyzed using Microsoft Excel 2013 and StatPlus:mac LE, a third-party data analysis program.

In order to classify measurable behavior, the researcher established the following physical criteria for off-task behavior during the t_{intn} windows. If students were handling objects other than the tools required for the academic task at hand; turning and visibly conversing with another student; gazing in a place other than on the instructor, projector screen or academic materials greater than half the observed window time; closing their eyes; getting up from their desk and walking to another part of the room; kicking, rocking or waving; or any combination of the previously listed behaviors, they were considered off task.

On-task behavior was marked as a value of 1 and off-task behavior as 0 in the binary scoring system. The researcher created a score sheet that was easily replicated and marked (see figure 1). The researcher could use the sheets even in situations where they were unable to record video, such as during whole group reading time, where there were two non-participant students who could not be filmed.

For Phase two, the researcher included the addition of a task completion metric. This metric was quantified by noting the number of questions completed, lines of notes taken or sentences written out of the assigned quantity. Then a percent task completion score (%TC) was calculated. For example, if a student wrote 5 out of 10 lines of notes that an instructor modeled, their %TC score was 50%.

These methods were chosen in order to maximize data collection efficiency, and allow the researcher to teach as well as measure the data. Also, the partial-interval recording was the most efficient way to gather and score data, and has been utilized in

behavioral monitoring and recording systems in education and psychological studies (Hintze et al., 2002; Ma, Le Mare, & Gurd, 2014).

Procedure

The researcher collected data during math and reading instruction at the beginning of the lessons. The time of recording, the subject (math or reading) the topic (i.e. fractions or non-fiction text), were recorded as well as any noted changes from the normal operation of the classroom (i.e. "participant 3 was disruptive," or "non-participants entered at the end of recording with their aides") (figure 2). The data collection procedure follows:

1. Begin video recording one minute before beginning instruction.
2. Administer treatment to entire class if gathering treatment data (see Appendix A for treatment instructions).
3. Run video for t_{total} = 10 minutes.
4. Turn off recording and continue instruction.
5. After instruction, view video by starting partial-interval at beginning of verbal instruction.
6. Watch students (n=5) for t=0:10 window.
7. Record a 0 for off-task behavior observed, or a 1 for on-task behavior observed in the appropriate data row.
8. Forward video by t=0:30 from start.
9. Repeat steps 5-7 until t_{total} is reached.
10. Calculate total TOT score (out of 21 points).

Phase two data collection was the same as phase one, but it included the following added steps:

11. Record the number of regular classroom assignment questions answered out of the total questions assigned for each participant in the test group.
12. Calculate percent task completion (%TC).
13. Analyze data.

The data was managed in a Microsoft Excel spreadsheet using multiple worksheets to record and track steps in the study. Cumulative score and graphs were completed using spreadsheet calculation tools.

Three values were calculated in order to compare the TOT scores for each of the trials. First, the mean TOT value for each trial was calculated. Then, using the mean TOT value, and the participant count (n=5 for individual trials, n=50 for combined trials) the standard deviation in the mean scores was calculated using the excel command STDEV.S. The standard deviation was then used to calculate two standard errors from the sample mean in order to account for statistical sampling error in the data. The formula $2SE = 1.96 \times {stDev}/{\sqrt{n}}$ was used. Bar graphs were then created using the trial number as the independent variable, and the mean TOT as the dependent variable. Using the 2SE calculation from each trial, error bars were added to the mean TOT score in order to compare trials. The researcher also created similar bar graphs using all the sample data, comparing a grand mean TOT for all the treatment and comparison trials. This produced a set of data that was easy to visually compare in order to determine statistical significance in the comparison and treatment trials. If the error bars from the comparison and the treatment data overlapped, the effect of the MAP treatment was not statistically significant.

The same analysis procedures were conducted for phase two, with the addition of an aggregation of mean percent task completion (%TC) for each of the subject areas.

Results and Discussion

Phase one

Phase one of this study resulted in comparison mean TOT scores ranging from 11.6 (out of 21 total) to 17.8, and treatment mean TOT scores ranging from 12.0 to 14.8. Five trials were completed for both comparison and the treatment, and the data is presented in table 1 and figure 3.

TOT_{treat} scores were consistently lower than the TOT_{comp} scores in every case but trial 2 (see figure 3). Each of the trials' calculated error bars (2SE above and below the mean TOT scores) showed significant overlap, indicating no significant difference between treatment and comparison performance. The mean TOT_{comp} and TOT_{treat} for the combined trials was also found to overlap (mean TOT_{treat} = 13.64, 2SE=1.69; mean TOT_{comp} =11.44, 2SE=1.36) (figure 4).

These initial findings led to the conclusion that the initial hypothesis – that the participants (n=5) would see improved TOT scores when given the treatment – was unconfirmed. The implementation and metrics of phase one were called into question, and led to the redesign of phase two. Because phase one treatment had no significant effect on the time spent on task in the five student subjects, and the general trend was for the TOT scores to decrease after the students were given the treatment, it was important to look to other data to interpret the results.

The subjective data in the research (field notes and follow-up conversations with the classroom teacher) notes that students were observed to be "more calm," "less noisy," and "not distracting each other." These observations indicated either a participant perception bias or a real behavioral change. Although the study group had lower TOT scores, they demonstrated less dramatic physical signs of distraction, and were less prone to outbursts and distracting conversation. The subjects were grouped by their perceived

attention needs by the classroom teacher. It was possible that the calmer, less noisy classroom created an environment where these students were actually less able to focus – either because the MAPs treatment was ineffective or it led to decreased white noise from the classroom. It was therefore important to compare the study group to the class as a whole to see if their TOT scores were representative of the group as a whole. By making this comparison it would eliminate the potential confounding factor of their attention-related differences in determining if they were an appropriate group to study.

Following phase one procedures, the entire class was coded and analyzed during two non-treatment trials over the course of two days, one in mathematics and the other in a reading class. The researcher compared the treatment group's (n=5) mean TOT score during the session with the class as a whole (n=22, n=20) (figure 5). The results were an 18.3 TOT score for the whole group and a 16.2 TOT score for the treatment group in trial 1. In trial 2, the whole group mean TOT score was 15.8, while the treatment group had a 14.5. With the error bars added to the analysis, there was no significant difference between the mean TOT scores of the two groups, although there was a slightly lower mean TOT in both trials with the treatment group. This analysis indicates that the treatment group was well within the normal representation of the class as a whole. It was therefore necessary to adjust the focus of the study to answer a second testable question: what is the effect of a breathing and visualization MAP treatment on the time-on-task behavior and academic task completion of third grade students in a regular classroom? This question guided the design of phase two, the procedure for which is outlined in the previous section.

Phase two

Ten trials were completed for phase two (presented in table 2 and figures 6-9). Phase two resulted in comparison mean TOT scores ranging from 7.8 to 15.2 out of 21 total points with a grand mean of 11.44. The mean TOT scores for the treatment ranged from 13.4 to 19.2 with a grand mean of 16.34 (figure 6). Treatment TOT scores were consistently higher than the comparison TOT scores in every case. Although each of the trials' calculated error bars (2SE above and below the mean TOT scores) showed significant overlap except for trial 10, there was a consistently positive trend between the comparison data and the treatment. For the combined trials, the grand mean TOT scores were significant in that their error bars did not overlap (mean TOT_{treat}=16.34, 2SE= 0.92; and mean TOT_{comp}=11.44, 2SE=1.36) (figure 7).

Mean percent task completion for the comparison trials ranged from 24% to 83%. Mean %TC scores for the treatment trials ranged from 80% to 100% with a mean of 87% (see figure 8). For the combined trials, the error bars on the %TC scores for the combined trials did not overlap (mean % TC_{comp} = 57%, 2SE = 10%; mean $\%TC_{treat}$ = 87%, 2SE = 5%) (figure 9).

These results confirm the phase two hypothesis that the results would show significant growth in the mean TOT and mean %TC scores after the MAP treatment was administered.

Discussion

The success of the MAPs treatment during phase two meant that the topical, breathing and visualization-based MAP strategy was an effective tool for improving third grade students' time spent on-task, and the amount of academic work they completed.

The differences in results from phase one and phase two suggest that a major change in the MAP treatment led to positive change in TOT and %TC scores in the participants. Phase one showed no significant change between the comparison and treatment trials, while phase two showed one significant change on an individual trial, and a significant change in the overall TOT and %TC scores. The treatment differed in phase two by adding an element of visualization to the breathing exercise that was present in phase one. This change was made in order to attempt to anchor the students' attention in a more immediate and personally relevant way. Visualization was a skill that they had been practicing all year as a literature comprehension strategy, and was an easy skill to teach in the context of MAP training. It is possible that the use of visualization was more engaging and more effective than the breathing exercise alone.

The other major difference between phase one and phase two was the duration of students' exposure to the framework and utilization of MAPs in the classroom. Phase two began more than eight weeks after the students' first exposure to MAPs in the classroom, and included a second level of complexity and engagement with the visualization strategy. It is possible that the efficacy of the treatment is greatest over a longer period of use, because students had a chance to assimilate and become better at the application of MAPs, such as other studies have suggested (Flook et al., 2010; Schonert-Reichl & Lawlor, 2010; Weijer-bergsma & Langenberg, 2014). The most significant difference between this study and previous studies that could have made a significant effect was the topical execution of the treatment. MAP treatment was successful when given immediately before the students participated in an academic task, which suggests that MAPs could be used as a pre-treatment for typically anxiety-producing subjects such

as math or perhaps even before testing, where decreased focus and increased anxiety lead to decreased student performance (Ramirez, Gunderson, Levine, & Beilock, 2013).

The difference in trial-based and combined-trial results in phase two suggests that the specific MAPs used in this study were effective on a whole-group level, but were less effective before specific tasks such as whole-group mathematics instruction (see phase two trial five).

The results also suggested that examining the relationship between treatment outcomes (TOT and %TC) on an individual student basis might yield important results. To see if students' TOT affected the amount of work they completed, a multivariate t-test was completed using TOT as the independent variable, and %TC as the dependent variable. By plotting individual students' TOT scores in relationship to their %TC scores, the question of whether the two values were statistically related could be answered. The results from the phase two treatment data set yielded individual t values from 1.5 to 3.8, and p values from .005 to .18 (see table 3). A significant p value of <.05 meant that the students' TOT score could be considered statistically related to that students %TC value. Three of the five student participants showed that their time spent on their academic tasks directly affected the amount of work they completed in the testing window. Two students showed that their TOT and %TC were strongly unrelated. Coincidentally, these two students had strongly variable TOT and %TC scores during both comparison and treatment trials. We can conclude that the MAPs treatment is not consistently effective for every student. However, evidence from this study suggests that it may be effective for whole group cases."

Assumptions and Limitations

Two major assumptions were made in the design of this study. The researcher assumed that the student participants had low prior knowledge of mindfulness practices, and as a result held no pre-formed opinions about receiving mindfulness training as part of an academic environment. The researcher assumed that a single fifteen-minute initial training would suffice for instructing the students in proper mindfulness practice.

There were two major limitations to this study that may have affected the outcome. The first limitation was the short duration of the MAP of breathing and visualization. Unlike previous studies where students were exposed to a multi-week progressive program (see Flook et al., 2010; Schonert-Reichl & Lawlor, 2010). The second major limitation was the variability in lesson difficulty and interest during the different trials. Each lesson was planned according to unit planning guidelines and the needs of the students, but there was no way to control for the difficulty or the students' interest in the academic subject being taught. This may have affected the range of scores in the individual trials.

Conclusion

The mindfulness awareness practice training and treatment administered in this study proved to have a significant effect on the time-on-task scores and the percent completion of academic tasks. Although phase one of the research resulted in an unconfirmed hypothesis, it did lead to further questions and potential avenues for improving a mindfulness awareness practice study in an action research setting. Phase two, with the addition of the visualization exercise on top of the breathing exercise, indicated that MAP interventions can significantly improve TOT and %TC in whole-group third grade participants. Three of the five students improved TOT and %TC

results after receiving mindfulness treatment. The significant results of this study add to the growing body of research that supports the use of MAPs in the elementary school classroom, and hopefully will add to future research on the matter.

Recommendations

Directions for future research

The benefits of undertaking this study lie in taking the procedure and analysis methods and applying it to other mindfulness awareness practice treatments. Perhaps undergoing a more rigorous and time-intensive MAP training would show more consistent or stronger results than were found in this study. A training that includes self-reflection and more than breathing awareness, such as the eight-week program suggested and utilized by Weijer-bergsma & Langenberg, 2014, may be useful.

More research needs to be conducted that measures the effects of MAP treatment on individual students' TOT and %TC scores in order to determine if age, gender, SES or academic performance factors have an effect on the results. A larger sample size, taken over the course of many months could provide useful data for disaggregation and analysis to test for these factors.

Finally, the effect of MAPs treatments on individual students should be studied in order to determine the most effective combination of MAPs strategies for the classroom, in order to benefit the most diverse population of students.

References

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., … Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*, *11*(3), 230–241. http://doi.org/10.1093/clipsy/bph077

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*(4), 822–848. http://doi.org/10.1037/0022-3514.84.4.822

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical Foundations and Evidence for its Salutary Effects. *Psychological Inquiry*, *18*(4), 211–237. http://doi.org/10.1080/10478400701598298

Department of Education, C. (2016). *2015-2016 kindergarten (k) through 12th grade free and reduced lunch eligibility by school*.

Flook, L., Smalley, S. L., Kitil, M. J., Galla, B. M., Kaiser-Greenland, S., Locke, J., … Kasari, C. (2010). Effects of Mindful Awareness Practices on Executive Functions in Elementary School Children. *Journal of Applied School Psychology*, *26*(1), 70–95. http://doi.org/10.1080/15377900903379125

Hintze, J. M., Volpe, R. J., & Shapiro, E. S. (2002). Best Practices in the Systematic Direct Observation of Student Behavior. *Best Practices in School Psychology*, *4*, 993–1006.

Ma, J. K., Le Mare, L., & Gurd, B. J. (2014). Classroom-based high-intensity interval activity improves off-task behaviour in primary school students. *Applied Physiology, Nutrition, and Metabolism = Physiologie Appliquée, Nutrition et Métabolisme*, *39*(12), 1332–7. http://doi.org/10.1139/apnm-2014-0125

Meiklejohn, J., Phillips, C., Freedman, M. L., Griffin, M. L., Biegel, G., Roach, A., … Saltzman, A. (2012). Integrating Mindfulness Training into K-12 Education: Fostering the Resilience of Teachers and Students. *Mindfulness*, *3*(4), 291–307. http://doi.org/10.1007/s12671-012-0094-5

Napoli, M., Krech, P. R., & Holley, L. C. (2005). Mindfulness Training for Elementary School Students: The Attention Academy. *Journal of Applied School Psychology*, *21*(1), 99–125.

Paris, S. G., & Paris, A. H. (2001). Classroom Applications of Research on Self-Regulated Learning. *Educational Psychologist*, *36*(2), 89–101. http://doi.org/10.1207/S15326985EP3602_4

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic Emotions in Students' Self-Regulated Learning and Achievement: A Program of Qualitative and Quantitative Research. *Educational Psychologist*, *37*(2), 91–105. http://doi.org/10.1207/S15326985EP3702_4

Ramirez, G., Gunderson, E. a., Levine, S. C., & Beilock, S. L. (2013). Math Anxiety, Working Memory, and Math Achievement in Early Elementary School. *Journal of Cognition and Development*, *14*(2), 187–202. http://doi.org/10.1080/15248372.2012.664593

Schonert-Reichl, K. a., & Lawlor, M. S. (2010). The Effects of a Mindfulness-Based Education Program on Pre- and Early Adolescents' Well-Being and Social and Emotional Competence. *Mindfulness*, *1*(3), 137–151. http://doi.org/10.1007/s12671-010-0011-8

Weijer-bergsma, E. Van De, & Langenberg, G. (2014). The Effectiveness of a School-

Based Mindfulness Training as a Program to Prevent Stress in Elementary School Children. *Mindfulness*, *5*, 238–248. http://doi.org/10.1007/s12671-012-0171-9

Wolters, C. A. (2003). Conceptualizing the Role and Influence of Student- Teacher Relationships on Children ' s Social and Cognitive Development. *Educational Psychologist*, *38*(4), 207–234. http://doi.org/10.1207/S15326985EP3804

Appendix A

Mindfulness Awareness Practice: Breathing Instruction

In phase one, students were led through an initial fifteen-minute lesson on the benefits of MAPs on their cognitive functioning and emotional regulation. They were then asked to share if they had ever experienced diaphragm breathing before ("belly breathing") and where they had used it. Students responded with examples from extracurricular activities such as singing, playing a wind instrument, and before swimming. They were then instructed to try taking a belly breath in order to focus their attention on a physical anchor. The instructions were as follows:

1. Place your hand on your abdomen.
2. Take a slow deep breath through your nose for a count of 10 where only your hand is moving, not your chest.
3. Exhale slowly through your mouth.
4. Try it again, breathe in for a count of 10.
5. Repeat steps 2-3 for two or more trials with the class.
6. Now we'll add a second physical anchor using your hand:
7. As you breathe in, trace the outline of your index finger with your other hand.
8. When you get to the top of your index finger, take a slow breath down to the web of your hand.
9. Repeat for each finger, making a total of five deep breaths.

In phase two, students were led through an initial fifteen-minute lesson on the addition of the MAP known as visualization. Visualization is a practice where students "make a picture in their mind," and it is used in both MAP trainings as well as English Language Arts curriculum in the elementary classroom (see Colorado Department of Education Reading, Writing and Communication Standard 4.3.1 for an example of visualization use in the classroom). After discussing the skill of visualization, and use in the classroom, the students were given the following instructions:

1. Close your eyes and take five deep breaths.

2. Now I'm going to ask you to visualize an object in your minds' eye that corresponds to the color I'm about to say.
3. As you take another breath, see a picture of the object in your mind, and then breathe out.

The breathing practice was five minutes long, with a reflection at the end, asking students to share one thing they visualized.

Appendix B

List of Figures

1/13/16

Student #	(0:00)	(0:30)	(1:00)	(1:30)	(2:00)	(2:30)	(3:00)	(3:30)	(4:00)	(4:30)	(5:00)	(5:30)	(6:00)	(6:30)	(7:00)	(7:30)	(8:00)	(8:30)	(9:00)	(9:30)	(10:00)	Score
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
6	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	17
16	1	1	1	1	0	1	0	1	1	0	0	1	1	1	1	1	0	0	1	1	0	14
19	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	17
25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	20

Figure 1 - Score Sheet

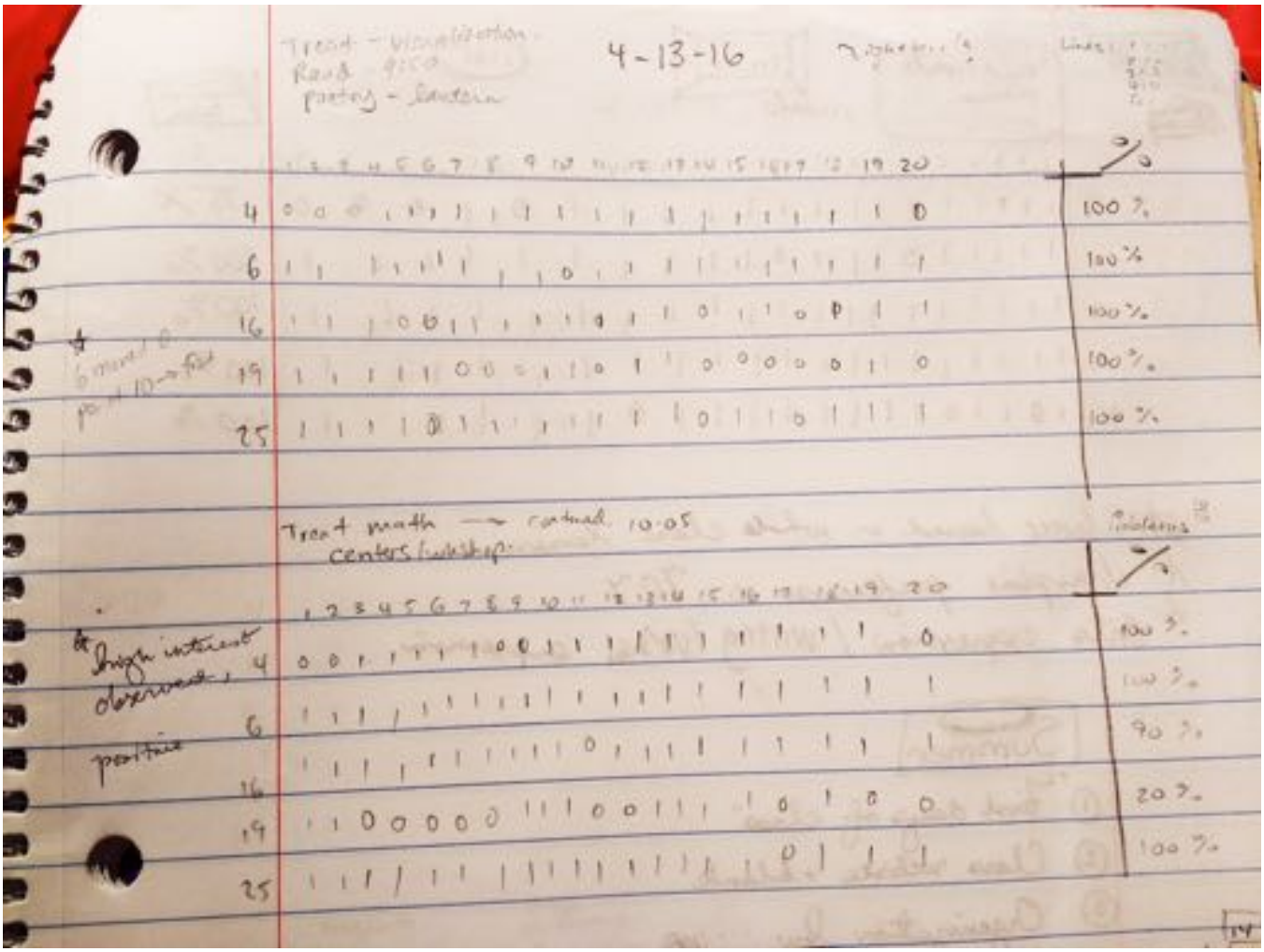

Figure 2 - Notebook Sample

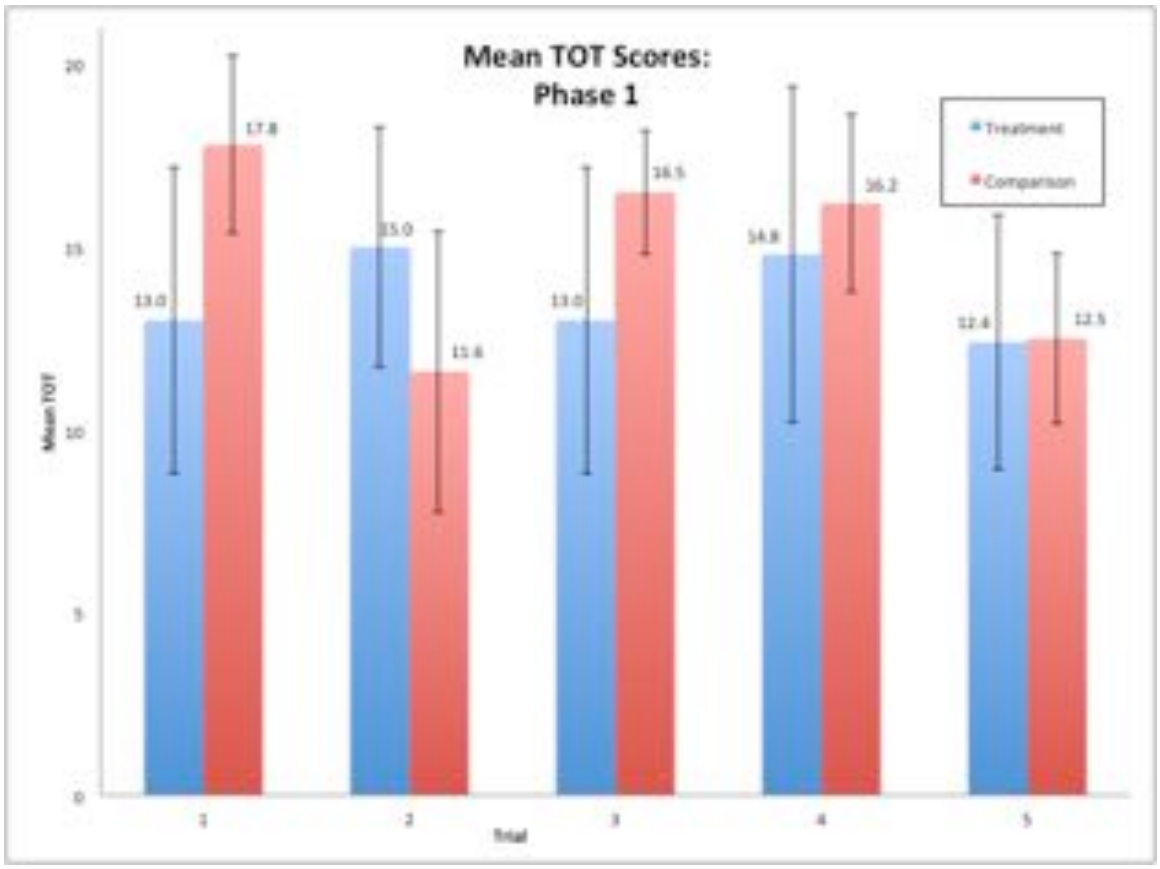

Figure 3 - Meant TOT Scores: Phase 1

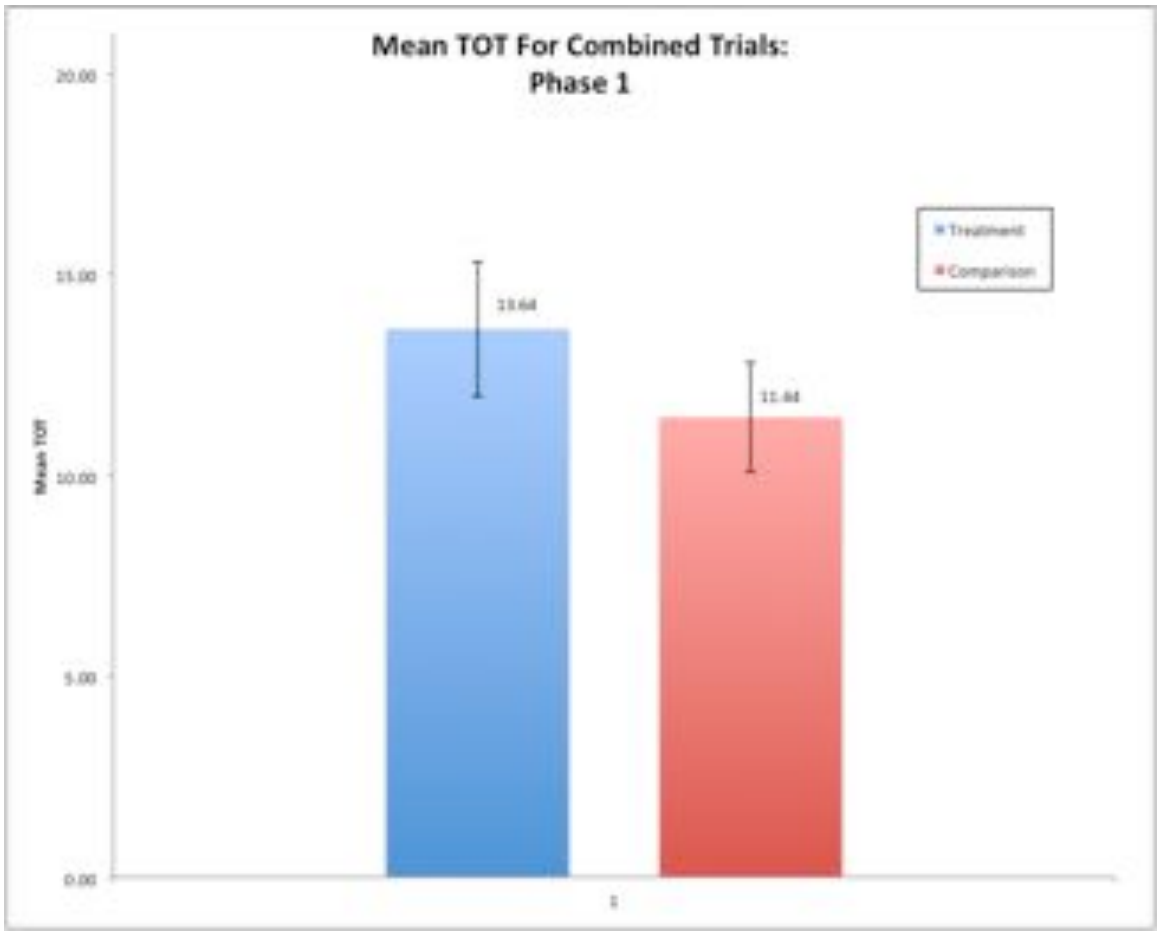

Figure 4 - Mean TOT Scores, Combined Trials: Phase 1

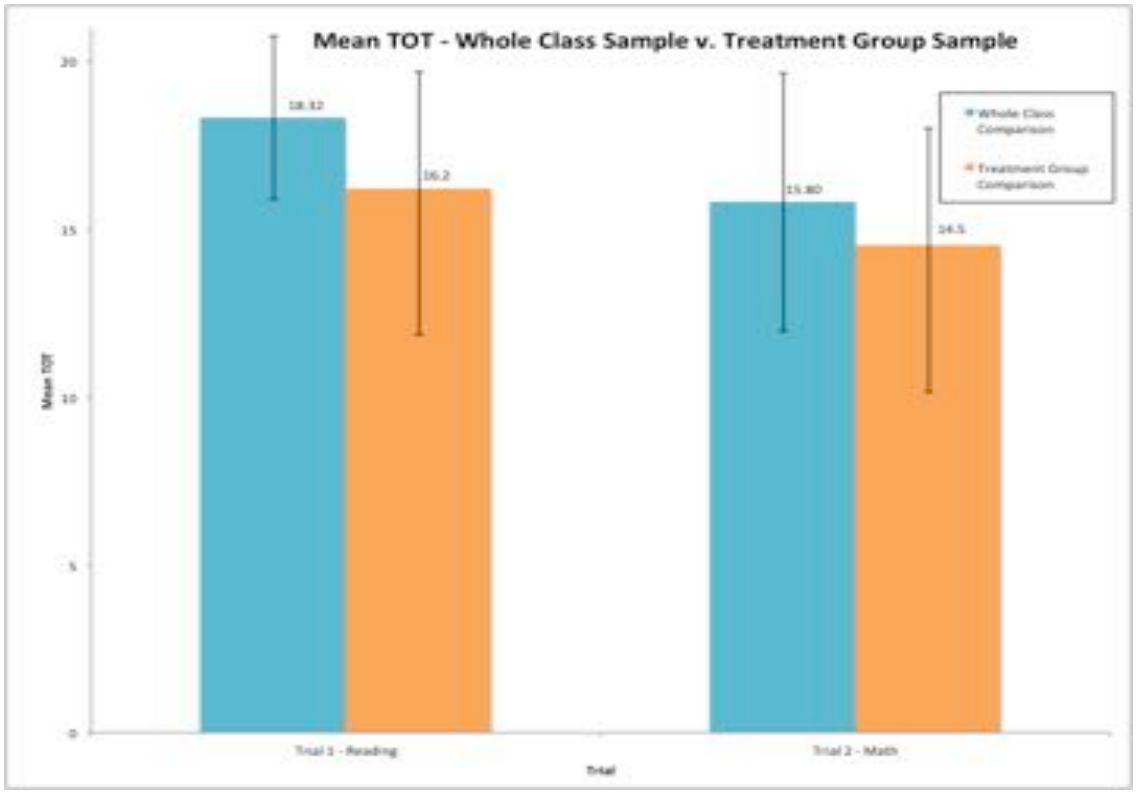

Figure 5 - Mean TOT Whole Class v Treatment Group

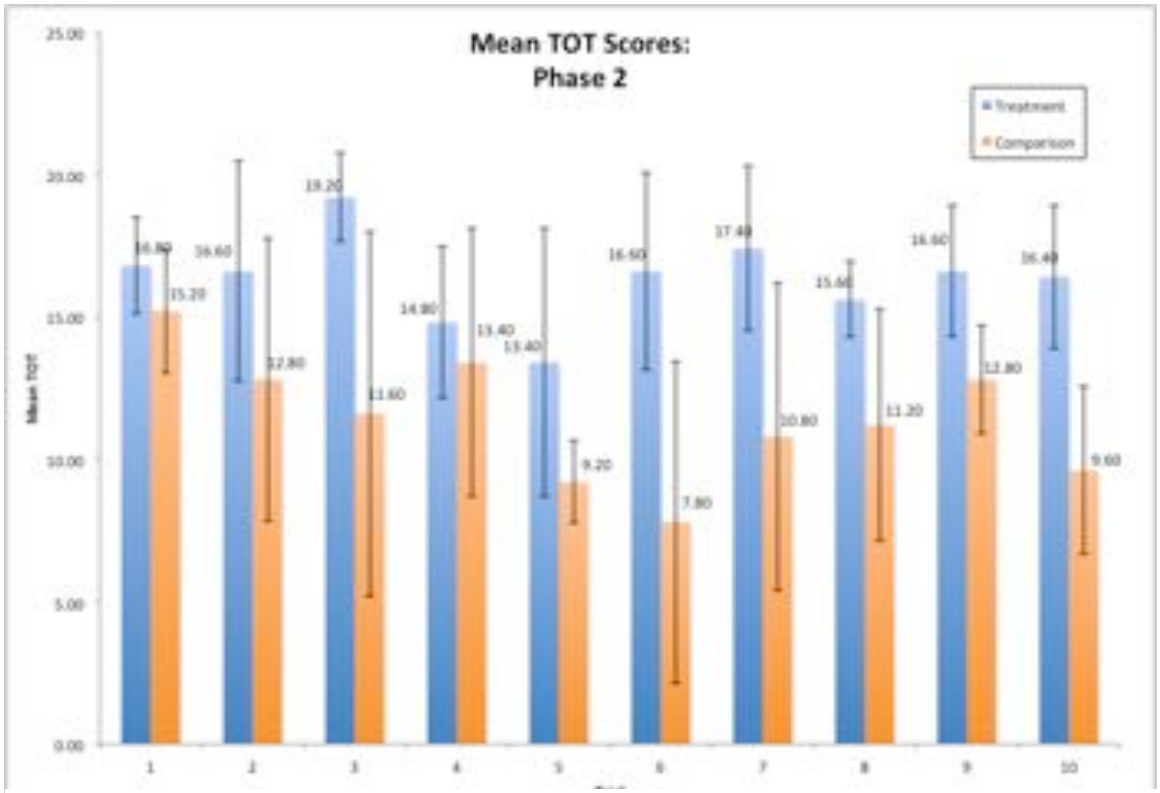

Figure 6 - Mean TOT Score (Trials 1-10): Phase 2

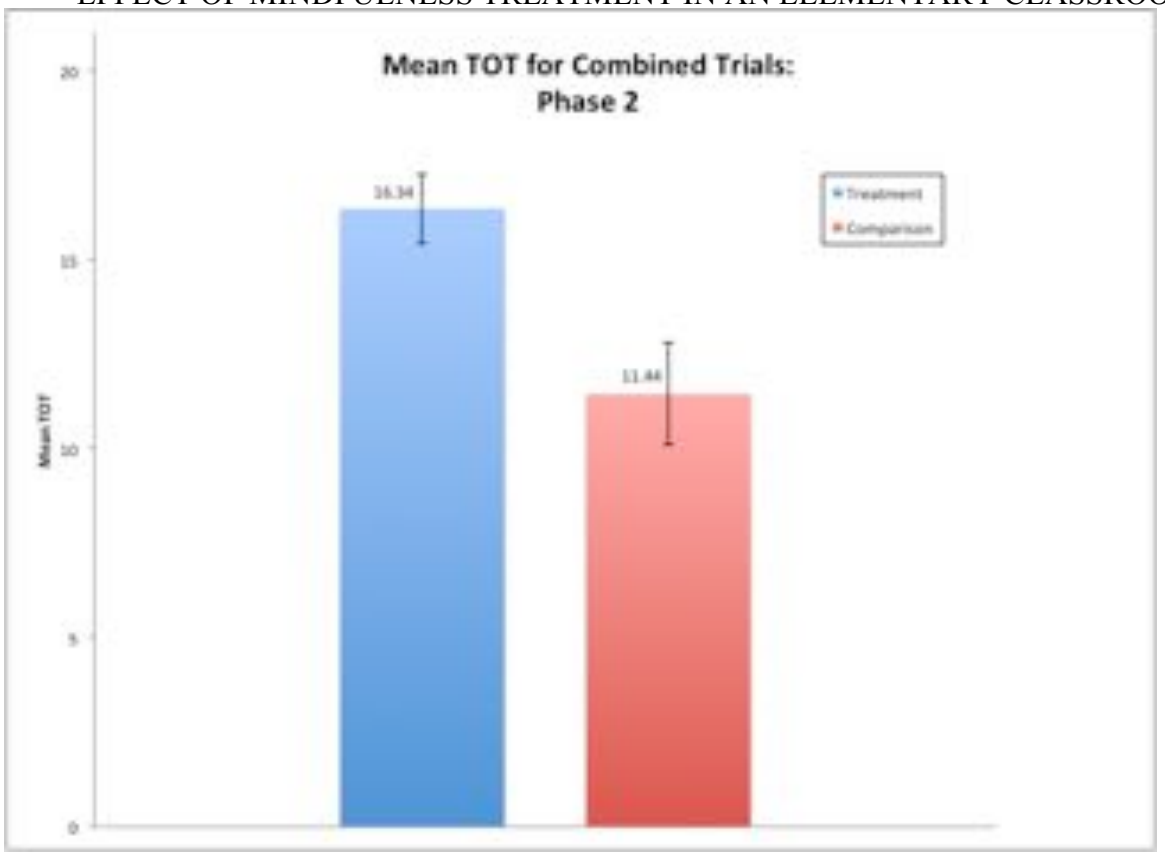

Figure 7 - Mean TOT for Combined Trials: Phase 2

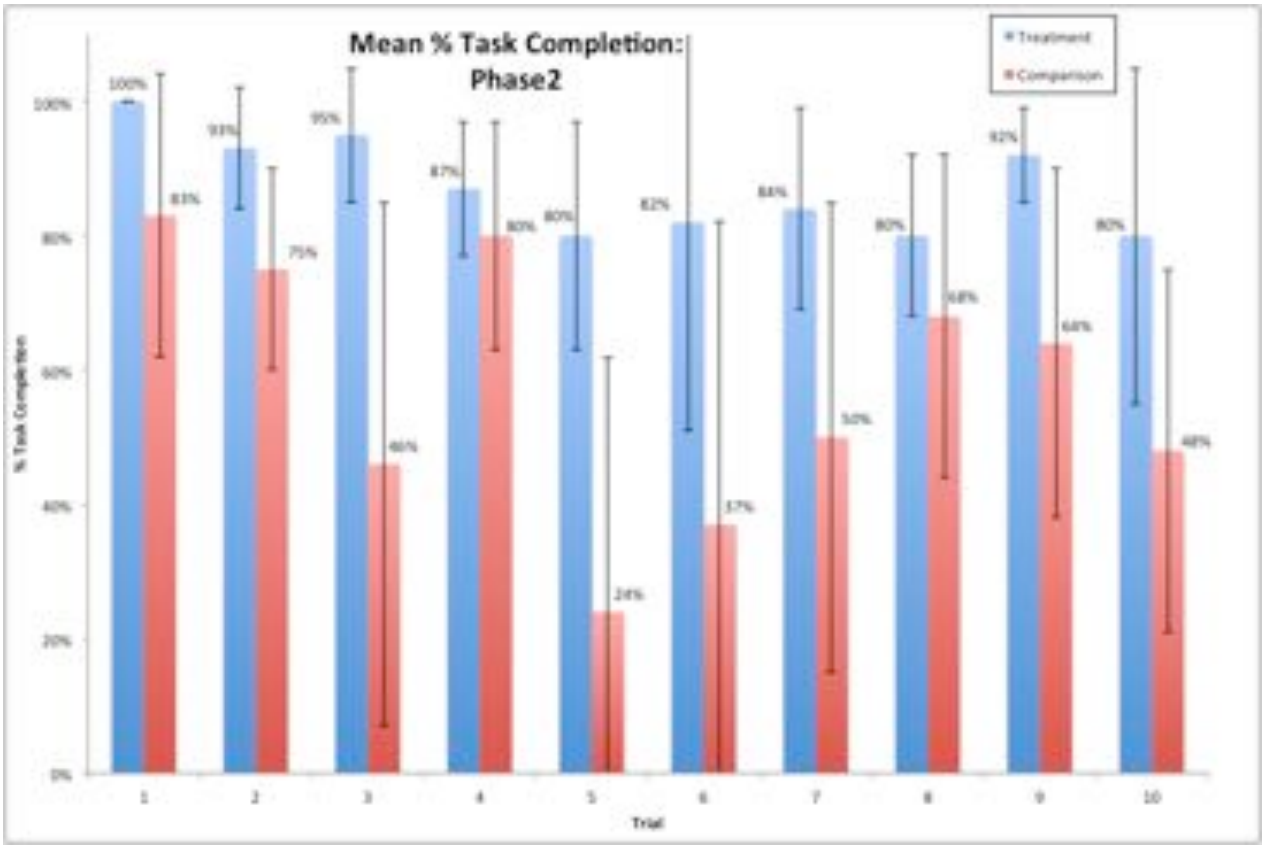

Figure 8 - Mean % Task Completion (Trials 1-10): Phase 2

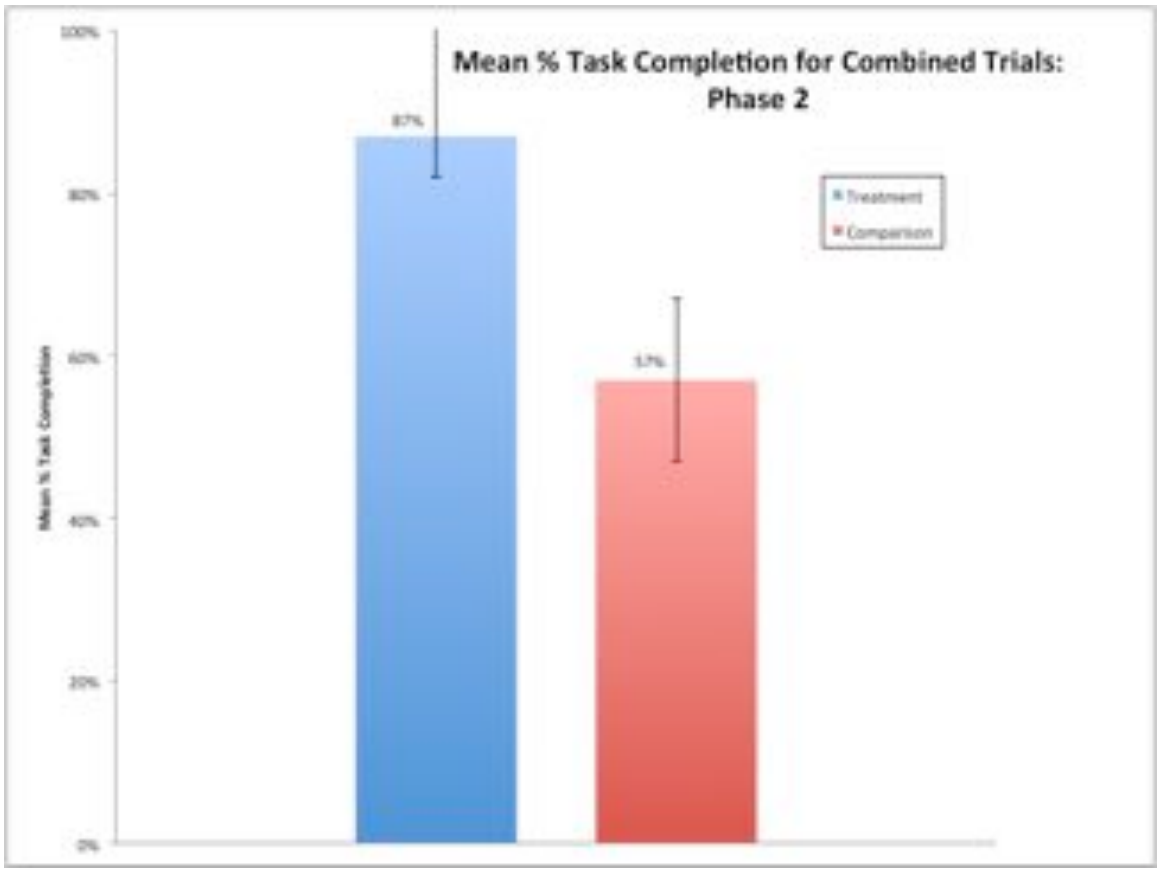

Figure 9 - Mean % Task Completion for Combined Trials: Phase 2

Appendix C

List of Tables

Table 1

Results from Trials 1-5: Phase 1

Trial	Mean Treatment TOT	2SE Treatment	Mean Comparison TOT	2SE Comparison
1	13.0	4.20	17.8	2.43
2	15.0	3.30	11.6	3.85
3	13.0	4.20	16.5	1.70
4	14.8	4.60	16.2	2.43
5	12.4	3.48	12.5	2.33

Table 2

Results from Trials 1-10: Phase 2

	Treatment				*Comparison*			
Trial	Mean TOT	TOT 2SE	Mean % Task Completion	% Task Completion 2SE	Mean TOT	TOT 2SE	Mean % Task Completion	% Task Completion 2SE
1	16.80	1.69	100%	0	15.20	2.18	83%	0.21
2	16.60	3.85	93%	0.09	12.80	4.97	75%	0.15
3	19.20	1.57	95%	0.1	11.60	6.40	46%	0.39
4	14.80	2.66	87%	0.1	13.40	4.70	80%	0.17
5	13.40	4.70	80%	0.17	9.20	1.44	24%	0.38
6	16.60	3.48	82%	0.31	7.80	5.66	37%	0.45
7	17.40	2.88	84%	0.15	10.80	5.42	50%	0.35
8	15.60	1.33	80%	0.12	11.20	4.08	68%	0.24
9	16.60	2.29	92%	0.07	12.80	1.9	64%	0.26
10	16.40	2.53	80%	0.25	9.60	2.95	48%	0.27

**n = 5 for each trial*

Table 3

Effect of TOT on %TC
Individual Students

Student	Slope	t	p
1	2.7%	2.1	0.13
2	2.9%	2.6	0.03
3	2.8%	1.5	0.18
4	4.6%	2.8	0.02
5	4.0%	3.8	0.005