

Making Prodigious Strides in Education

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CHAPTER IV

FINDINGS AND CONCLUSIONS

Introduction

The purpose of this study was to identify the effects of integrating Quantum Learning's instructional techniques into the classroom to determine its effectiveness on students' success and retention. Quantum Learning is a systematic approach to learning that prepares teachers to augment their own personal style of teaching to enhance classroom experiences (LeTeliar & Parks, 2007). The need for Quantum Learning has been enhanced by the ever increasing challenges educators face on a daily basis as they endeavor to educate students who are consistently over-stimulated outside of the classroom. Rosen (2000) conducted an empirical study on how video and arcade games can impact students' behavior and found that too many hours of video games and television has increased hyperactivity in children. A suggestion came out of the study on what type of environment schools might use to avoid disengaging over-stimulated students, and it suggested instructional techniques that capture and maintain a student's attention. The environment suggested in the study closely parallels Quantum Learning.

Three research questions guided this study:

- 1. What differences in academic achievement were found in Reading and Language Arts for seventh and eighth grade students who were instructed using Quantum Learning compared with those who were not?**
- 2. What differences in academic achievement were found in Reading and Language Arts for seventh and eighth grade students who differed according to race and gender and were instructed using Quantum Learning compared with those who were not?**
- 3. What differences in academic achievement were found in Reading and Language Arts for seventh and eighth grade special education students who were instructed using Quantum Learning compared to their scores from the previous year?**

This chapter provides the findings of the study, a summarization of those findings, implications, recommendations, and limitations.

Findings

Question 1

Achievement/TCAP/Seventh Grade. In order to gauge academic effectiveness, the Tennessee Comprehensive Assessment Program (TCAP) was used as a measure. TCAP was administered to the seventh graders in the spring of the year. An independent samples *t*-test was run to compare the control and treatment group to determine the

effectiveness of the treatment. Achievement served as the within-subjects factor and condition served as the between-subjects factor. The results of the independent samples *t*-test showed a significant difference between the scores for the control group ($M = 736.12$, $SD = 25.44$) and treatment group ($M = 722.93$, $SD = 25.99$) conditions; $t(97) = 2.53$, $p < 0.05$. Table 1 shows the descriptive statistics for these results.

Table 1

Descriptive Statistics for Seventh Grade TCAP Results Based by Condition

Condition	TCAP	
	<i>M</i>	<i>SD</i>
Control	736.12	25.44
Treatment	722.93	25.99

Achievement/TCAP/Eighth Grade. An independent samples *t*-test was run to compare the control and treatment groups to determine the efficacy of the treatment. Achievement served once again as the within-subjects factor and condition served as the between-subjects factor. The results of the independent samples *t*-test showed a significant difference in the scores for the control group ($M = 771.10$, $SD = 24.42$) and treatment group ($M = 741.21$, $SD = 29.64$); $t(75) = 4.89$, $p < .001$.

Table 2 shows the descriptive statistics for these results.

Table 2

Descriptive Statistics for Eighth Grade TCAP Results Based by Condition

Condition	TCAP	
	<i>M</i>	<i>SD</i>
Control	771.10	24.42
Treatment	741.21	29.64

Achievement/ Writing Assessment/Eighth Grade. The students in the eighth grade were administered the TCAP Writing Assessment in February of the school year. It was also used as a measure of academic achievement. An independent samples *t*-test was run to compare the results of the writing assessment on the control and treatment groups. There was a significant difference found between the control ($M = 4.71$, $SD = .72$) and treatment group ($M = 4.37$, $SD = .68$) conditions; $t(77) = 2.16$, $p < .05$ conditions. There was a significant difference found between the two groups, $F(1, 77) = 76.98$, $p < .05$. The seventh grade students in the State of Tennessee are not required to take the TCAP Writing Assessment, and therefore, do not have writing scores to report. Table 3 shows the descriptive statistics for these results.

Table 3

Descriptive Statistics for Eighth Grade TCAP Writing Results based by Condition

Condition	TCAP Writing	
	<i>M</i>	<i>SD</i>
Control	4.71	0.72
Treatment	4.37	0.68

Question 2

Gender/TCAP/Seventh Grade. A factorial ANOVA was run to compare the effect of condition on academic achievement based on gender for the seventh grade TCAP test. There was not a significant interaction found between the control and treatment groups based on gender, $F(1, 95) = 0.04$. Nor was the main effect for gender significant, $F(1, 95) = 0.05$. Only the main effect of condition was significant, $F(1, 95) = 5.23$, $p < .05$, with the treatment group ($M = 736.18$) scoring higher than the control group ($M = 722.93$). Table 4 shows the descriptive statistics for these results.

Table 4

*Descriptive Statistics for Seventh Grade TCAP Results by**Gender*

Condition	TCAP			
	Male		Female	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control	734.54	27.26	736.80	25.06
Treatment	722.88	24.12	723.00	28.84

Race/TCAP/Seventh Grade. Additionally, a factorial ANOVA was run to compare the effect of condition on academic achievement based on race. The main effect of race was not significant, $F(2, 89) = 1.30$. There was no significant interaction in the scores for the control and treatment groups based on race, $F(2, 89) = .45$, nor was the main effect of condition significant, $F(1, 89) = 3.0$. See Table 5 for descriptive statistics.

Table 5

Descriptive Statistics for Seventh Grade TCAP Results

Condition	Race					
	Caucasian		African American		Hispanic	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control	739.78	26.79	737.13	24.82	721.20	19.64

Achievement/Orchard/Seventh Grade/Gender. The Orchard Test, which was given three times during the year, tested the students' Reading and Language Arts skills. It was also used as a measure of academic achievement. A mixed-model ANOVA was run to compare the three Orchard Test scores by condition and gender. Table 6 shows the descriptive statistics for these comparisons and Table 7 reports the inferential statistics. There was a significant interaction between Orchard test and gender which was followed up using a two-way mixed-model ANOVA. The ANOVA for Orchard test by condition showed a significant interaction between the two variables, $F(2, 194) = 3.55, p < .05$. The main effect for Orchard test was not significant, $F(2, 194) = 0.34$, nor was the main effect for condition, $F(1, 97) = 0.82$. Therefore, the significant interaction was followed up with three one-way ANOVAs, one for each Orchard test. The first one-way ANOVA compared the students in the control and treatment group on the first Orchard test. There was no significant difference found, $F(1, 98) = 0.05$. Additionally, the second ANOVA compared the control and treatment group on the second Orchard test and there was no significant difference found, $F(1, 98) = 0.00$. Finally, the third ANOVA compared the students in the control and treatment groups on the third Orchard test and there was no significant difference found, $F(1, 98) = 4.38$, which narrowly missed being significant, $p < .10$.

Table 6

Descriptive Statistics for Orchard Seventh Grade Results Based by Condition

Condition	Orchard					
	August		November		April	
	M	SD	M	SD	M	SD
Control						
Male	52.62	9.71	46.85	18.65	45.90	17.18
Female	48.97	12.34	50.87	14.41	48.40	13.49
Treatment						
Male	48.41	11.43	50.75	17.14	57.30	10.07
Female	51.04	9.01	48.42	7.71	49.47	19.42

Table 7

*Inferential Statistics for Seventh Grade Orchard Results for Gender
Based by Condition*

Result	<i>df</i>	<i>F</i>	<i>p</i>
Orchard Test	2, 190	0.32	.72
Condition	1, 95	0.74	.39
Gender	1, 95	0.11	.74
Orchard by Condition	2, 190	3.36	.04
Orchard by Gender	1, 95	0.71	.49
Condition by Gender	1, 95	0.58	.45
Orchard by Condition by Gender	2, 190	4.33	.01

* $p < .05$.

Achievement/Orchard/Seventh Grade/Race. A mixed-model ANOVA was run to determine the effect of the condition on Orchard based on race. The results of the ANOVA disclosed no significant difference of condition based on race. Table 8 shows the inferential statistics for these comparisons and Table 9 reports the descriptive statistics.

Table 8

Inferential Statistics for Seventh Grade Orchard Results for Race Based by Condition

Result	<i>df</i>	<i>F</i>	<i>p</i>
Orchard Test	2, 178	0.39	.68
Condition	1, 89	0.20	.66
Race	1, 89	0.58	.56
Orchard by Condition	2, 178	1.41	.25
Orchard by Race	1, 89	0.94	.44
Condition by Race	1, 89	1.15	.32
Orchard by Condition by Race	2, 178	0.55	.70

$p < .05$

Table 9

*Descriptive Statistics for Seventh Grade Orchard Results for Condition,
Based by Race*

Condition	Orchard					
	August		November		April	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control						
African American	52.13	8.22	53.13	16.31	53.25	9.60
Caucasian	51.19	12.78	49.52	16.94	46.93	16.72
Hispanic	45.80	9.50	45.00	13.25	44.60	10.24
Treatment						
African American	44.50	10.19	48.39	7.01	52.50	11.43
Caucasian	52.97	9.93	49.60	15.55	55.90	17.84
Hispanic	46.50	9.35	52.90	8.99	49.38	10.89

Gender/TCAP /Eighth Grade. A factorial ANOVA was run to compare the effect of condition on academic achievement based on gender. There was not a significant interaction found between the control and treatment groups based on gender, $F(1, 74) = 0.05$. The main effect for gender was significant, $F(1, 74) = 5.0, p < .05$, as well as the main effect for condition, $F(1, 74) = 22.52, p < .05$. Table 10 provides the descriptive statistics for these results.

Table 10

Descriptive Statistics for Eighth Grade TCAP Results by

Gender

Condition	TCAP			
	Male		Female	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control	776.96	20.89	763.18	27.16
Treatment	746.80	17.43	735.63	37.91

Race/TCAP/Eighth Grade. A factorial ANOVA was run to compare the effect of academic achievement based on race. There was not a significant interaction between the scores for the control and treatment groups based on race, $F(1, 72) = .01$. The main effect for race was not significant, $F(1, 72) = 1.90$. Only the main effect of condition for race was significant, $F(1, 72) = 22.52, p < .001$. Table 11 provides the descriptive statistics for these results.

Table 11

*Descriptive Statistics for Eighth Grade TCAP Results Based
By Race*

Condition	Race					
	Caucasian		African American		Hispanic	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control	768.44	23.86	762.00	48.08	788.83	14.96
Treatment	740.31	31.33	736.14	29.16	753.00	22.19

Achievement/Orchard/ Eighth Grade/Gender. As in the seventh grade, the eighth grade students were administered the Orchard Test which tested the students' Reading and Language Arts skills. As a measure of academic achievement, the Orchard was administered in August, November, and April. There was a significant interaction found between the two groups on the main effect of condition, $F(1, 79) = 20.00, p < .05$. A mixed-model ANOVA was run to compare Orchard scores by condition and gender. Table 12 shows the descriptive statistics for these comparisons and Table 13 reports the inferential statistics. There was a significant interaction on the main effect of condition which was followed up by three one-way ANOVAs, one for each Orchard test. The first

one-way ANOVA compared genders on the first Orchard test. There was a significant difference found, $F(1, 79) = 7.34, p < .05$. Additionally, the second one-way ANOVA compared genders on the second Orchard test, and there was an additional significance found, $F(1, 79) = 20.28, p < .001$. Finally, the third test compared the genders on the third Orchard test and there was additional significance found, $F(1, 79) = 6.60, p < .05$.

Table 12

Descriptive Statistics for Eighth Grade Orchard Results Based by Gender.

Condition	Orchard					
	August		November		April	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control						
Male	67.09	10.76	71.17	10.36	66.13	17.28
Female	55.89	12.55	54.56	13.79	57.83	12.89
Treatment						
Male	52.35	17.99	55.50	12.72	54.05	11.20
Female	46.45	15.01	40.40	21.69	43.40	23.20

Table 13

Inferential Statistics for Eighth Grade Orchard Results for Gender Based by Condition

Result	<i>df</i>	<i>F</i>	<i>P</i>
Orchard Test	2, 154	0.00	.72
Condition	1, 77	20.73	.39
Gender	1, 77	14.68	.74
Orchard by Condition	2, 154	0.42	.04
Orchard by Gender	2, 154	3.30	.49
Condition by Gender	1, 77	0.06	.45
Orchard by Condition by Gender	2, 154	0.76	.01

**p* < .05

Achievement/Orchard/Eighth Grade/Race. A mixed-model ANOVA was run to determine the effect of the condition on the Orchard test based on race. No significant difference was found. Table 14 reports the descriptive statistics for these comparisons and Table 15 reports the inferential statistics.

Table 14

Descriptive Statistics for Eighth Grade Orchard Results Based on Race.

Condition	Orchard					
	August		November		April	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control						
African American	56.50	26.16	54.50	13.44	57.50	17.68
Caucasian	61.70	12.28	62.24	14.40	62.24	17.02
Hispanic	66.67	12.53	76.00	9.12	65.50	8.90
Treatment						
African American	48.88	22.50	45.25	30.12	42.13	27.66
Caucasian	48.56	15.68	47.04	16.07	49.68	16.53
Hispanic	54.80	12.98	57.20	13.39	54.20	13.39

Table 15

Inferential Statistics for Eighth Grade Orchard Results for Race Based on Condition

Result	<i>df</i>	<i>F</i>	<i>P</i>
Orchard Test	2, 150	0.29	.72
Condition	1, 75	6.80	.11
Race	2, 150	1.60	.20
Orchard by Condition	2, 150	0.27	.76
Orchard by Race	4, 150	0.94	.44
Condition by Race	2, 75	0.03	.97
Orchard by Condition by Race	4, 150	0.29	.89

* $p < .05$

Eighth Grade/ Writing/ Gender/ Race. A factorial ANOVA was run to compare the effect of condition on the writing scores of the eighth grade students based on gender and race. **The main effect of gender was not significant** $F(1, 75) = 2.04$. **There was no significant interaction in the scores for the control and the treatment groups based on gender,** $F(1, 75) = .11$. Only the main effect of condition was significant, $F(1, 75) = 4.55, p < .05$. **Concerning race, the main effect of race was not significant,** $F(1, 73) = 2.24$. **There was no significant interaction in the**

scores for the control and treatment groups based on race, $F(1, 73) = 1.01$. Additionally, the main effect of condition was not significant, $F(1, 73) = 1.51$. Table 16 reports the descriptive statistics for race, and Table 17 reports the descriptive statistics for gender.

Table 16

Descriptive Statistics Eighth Grade Writing Results

Based by Race

Condition	TCAP Writing Assessment					
	Caucasian		African American		Hispanic	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control	4.67	0.74	4.00	0.00	5.17	0.41
Treatment	4.44	0.65	4.13	0.35	4.40	1.14

Table 17

Descriptive Statistics Eighth Grade Writing Results

Based on Gender

Condition	TCAP Writing			
	Male		Female	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control	4.78	0.67	4.61	0.79
Treatment	4.50	0.76	4.22	0.55

Question 3

The seventh and eighth grade students who were identified as special education students and received the stated services were also administered the TCAP test in the spring of 2010 and 2011. During the 2010 school year, these students received differentiated instruction throughout the school year, and during the 2011 school year, these students received instruction under Quantum Learning's umbrella. A paired samples *t*-test was administered in spring 2011 to compare the TCAP scores from the 2010 and 2011 school years. With the seventh grade students, the effect of condition was not significant. $F(1, 11) = 1.00$, with no significant difference found between the control group ($M = .000$, $SD = 1.00$) and treatment group ($M = .000$, $SD = 1.00$). Table 18 shows the descriptive statistics of these results. Among the eighth grade special education students, the effect of condition was significant, $F(1, 14)$, $p < .05$, with the control group ($M = 733.93$, $SD = 23.42$) scoring higher than the treatment group, ($M = 755.57$, $SD = 33.21$). Table 19 shows the descriptive statistics of these results.

Table 18

Descriptive Statistics for Seventh Grade Special Education Students Based by Condition

Condition	TCAP Special Education	
	<i>M</i>	<i>SD</i>
TCAP 2010	0.00	1.00
TCAP 2011	0.00	1.00

Table 19

Descriptive Statistics for Eighth Grade Special Education Students Based by Condition

Condition	TCAP Special Education	
	<i>M</i>	<i>SD</i>
TCAP 2010	733.93	23.42
TCAP 2011	755.57	33.21

Qualitative Data

Students and teachers were administered surveys to assess the effects on Quantum Learning from their personal perspective.

Each survey was seven questions long and allowed students and teachers to provide qualitative feedback to the study. Some of the students' questions were geared towards students' perceived confidence levels while completing class work, how well the students believed they

were able to learn the information, retain the information, and whether they enjoyed or “had fun” while learning. The questions on the teacher surveys investigated the teachers’ feelings on their ability to sense the awareness of their students’ learning styles, take more risks in the classroom, make learning more meaningful, accelerate the learning process, and manage the classroom effectively.

Seventh Grade Student Surveys. **Surveys were administered to the students to gain further insight into their perspective on Quantum Learning techniques utilized during the school year.** The students identified to receive special education services were not included in the survey results. Independent samples *t*-test was run to compare effectiveness of Quantum Learning from the students’ perspectives between the control and treatment groups. For survey questions one, four, five, six, and seven there was a significant difference found between the control and treatment groups; and for survey questions two and three, there was no statistical difference found. Table 20 reports the descriptive results of the surveys and table 21 reports the inferential results (see Appendix A).

Table 20

Descriptive Results for the Seventh Grade Student Surveys

Based by Condition

Question	Condition				<i>t</i>
	Control		Treatment		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
1	3.93	0.85	3.32	0.92	3.30
2	3.90	0.83	3.60	0.91	1.60
3	4.00	0.81	3.70	1.03	1.55
4	4.20	0.73	3.92	0.62	2.29
5	3.83	1.20	3.23	0.95	2.71
6	4.46	0.78	3.83	1.05	3.23
7	3.56	1.07	2.94	0.97	2.92

Table 21

Inferential Results for Seventh Grade Student Surveys

Result	<i>df</i>	<i>F</i>	<i>P</i>
Question 1	1, 92	7.46	.00
Question 2	1, 92	1.95	.10
Question 3	1, 92	7.06	.12
Question 4	1, 92	5.81	.02
Question 5	1, 92	1.80	.01
Question 6	1, 92	2.08	.00
Question 7	1, 92	3.45	.00

*p <.05

Eighth Grade Student Surveys. Surveys were administered to the students to gain further insight into their perspective on Quantum Learning techniques utilized during the school year. These surveys did not include students who received special education modifications. Independent samples *t*-test was run to compare the effectiveness of Quantum Learning from the students' perspectives. For survey questions two, three, four, five, and six there was a significant difference found between the control and treatment groups; and for survey questions one and seven, there was no statistical difference found. Table 21 reports the descriptive results of the seventh grade surveys, and Table 22 reports the inferential results (see Appendix A).

Table 22

*Descriptive Statistics for Eighth Grade Student Surveys
Based by Condition*

Question	Condition				<i>t</i>
	Control		Treatment		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
1	3.58	1.05	3.44	0.98	0.56
2	3.85	0.86	3.03	1.06	0.36
3	3.93	1.14	3.09	1.15	3.74
4	3.93	0.94	3.38	1.16	2.22

5	4.00	1.16	2.81	1.26	4.39
6	4.38	0.63	3.25	1.27	4.91
7	3.33	1.30	2.97	1.06	1.26

Table 23

Inferential Statistics for Eighth Grade Student Surveys

Based by Condition

Result	<i>df</i>	<i>F</i>	<i>P</i>
Question 1	1, 70	0.23	.58
Question 2	1, 70	4.70	.00
Question 3	1, 70	8.89	.00
Question 4	1, 70	3.22	.03
Question 5	1, 70	2.72	.00
Question 6	1, 70	21.31	.00

Question 7	1, 70	2.01	.21
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* $p < .05$

Teacher Surveys. To gain further insight into the thoughts of the educators who participated in the study, surveys were completed by the teachers which assessed the instructors' awareness of students' learning styles and needs, the level of risks attained by the educator, the ability to make learning meaningful and interesting, the ability to connect with students, and the acceleration of the learning process. Questions two through six showed a significant difference between the teachers who were in the control and their perceived ability of effectiveness versus the treatment groups. Table 23 reports the descriptive statistics of the surveys, and Table 24 reports the inferential statistics (see Appendix B).

Table 24

Descriptive Statistics for Teacher Surveys based by Condition

Question	Condition				<i>t</i>
	Control		Treatment		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
1	3.75	0.50	4.50	0.58	-1.96
2	3.75	0.50	4.75	0.50	-2.80
3	2.75	0.96	4.25	0.50	-2.78
4	3.00	1.16	4.75	0.50	-2.78
5	2.75	0.96	4.25	0.50	-2.77
6	2.50	0.58	4.50	0.58	-4.90
7	2.50	0.58	4.50	0.58	-4.90

*Inferential Statistics for Teacher Surveys based by
Condition*

Result	<i>df</i>	<i>F</i>	<i>P</i>
Question 1	1, 6	1.00	.09
Question 2	1, 6	0.00	.03
Question 3	1, 6	2.46	.03
Question 4	1, 6	25.00	.03
Question 5	1, 6	2.45	.03
Question 6	1, 6	0.00	.00
Question 7	1, 6	0.00	.00

$p < .05$

After the students completed the Lickert Scale questions, they were given the opportunity to share additional comments on Quantum Learning and its effectiveness. Not all of the students in the study responded, and the following information is from the students who wrote additional information. Among the seventh grade students, five students stated they **learned and understood more information**; seven students felt like **Quantum Learning classes were more fun than their other classes**; three students felt like the **classes where Quantum Learning was utilized were more interesting**; one student stated that they felt the **Quantum classes were easier and the non-Quantum classes were harder**; six students reported **they learned more in their Quantum Learning classes and understood their lessons better**. Two seventh grade students stated **they were more alert and awake in their Quantum classes**. One student reported that they loved the music and the colors used during classroom instruction. Two students reported

their **non-Quantum classes were boring and they would rather talk to their friends than pay attention.** One additional student reported that **Quantum Learning was better because it is better than just sitting and listening to a teacher talk no matter who it is.** One student responded that **Quantum Learning “is a really good thing to use.”**

The eighth grade students also had the opportunity to respond to an additional question at the end of their Lickert Scale survey. Six eighth graders **felt the music integrated during classroom instruction helped them learn better and faster and made them look forward to coming to class.** Three students reported **they enjoyed Quantum Learning because it included “hands-on” instruction that allowed them to move around.** Students reported that **they enjoyed the integration of color into their classroom experience because it helped them learn better.** Four of the graders eighth **believed the teachers who did not use Quantum Learning were boring.** One student reported that **the non-Quantum classes were harder.** Eleven of the eighth grade students said that **Quantum Learning made the lessons easier and more fun.** Seven of the eighth graders stated **they remembered and learned more, and paid more attention.** Three eighth graders reported that **Quantum Learning made them want to attend class and they wanted to stay in the same class all day.** One student wrote that **“Quantum Learning ripped a hole in my brain and put the information in it.”** An additional student felt that **“Quantum**

Learning is so much more amazing and it helps to ‘act out’ the information. (See Appendix C)

Summary of the Findings

Question 1

There were significant findings for the independent samples *t*-test run on the seventh grade TCAP tests for condition (control and treatment). Consentaneously, there were additional significant findings for the independent samples *t*-test run to compare the control and treatment groups on TCAP scores of the eighth grade students. **The students in the treatment group accordantly scored significantly higher than the students in the control group substantiating the impact of the treatment.**

There was a significant interaction found between the Orchard test and condition for the seventh grade students in the group who took the assessment three times during the school year. **The students in the treatment group had higher scores overall on the Orchard test than the students in the control group.** Looking further at the findings of the eighth grade students, a mixed-model ANOVA showed the results of the Orchard tests which was also administered to the eighth graders three times during the school year. The mixed-model ANOVA showed higher scores for control group versus the treatment group on condition also.

In addition to the TCAP assessment given in the spring, the eighth grade students in the study took the TCAP writing assessment in

February of the school year. **The students in the treatment group who received the treatment had higher scores than the students in the control group based on the results of the independent samples *t*-test. Quantum Learning consistently showed a significant difference on the scores of the seventh and eighth grade students on the TCAP test during the duration of the study. These findings help to solidify the findings that *Quantum Learning Network* reported when it found that the Quantum Learning model has a consistent impact on student achievement. The impact included statistically and educationally significant gains in reading, mathematics, writing and more comprehensive measures of core academic achievement (Quantum Learning Network, 2006).**

Question 2

Factorial ANOVAs were run to compare the effect of condition on academic achievement based on gender and race for the seventh grade students on the TCAP test. The main effect for condition was significant based on gender, but **there was not a significant interaction found between the control and treatment groups based on gender, nor was the main effect of gender significant. Concerning race, a factorial ANOVA found no significant interaction in the scores for the control and treatment groups among the seventh graders who took the TCAP test in the spring.**

A factorial ANOVA showed that there was also no significant difference found on the effect of treatment based on gender and race among the eighth grade students on the TCAP test. This implied that Quantum Learning’s effectiveness further impacted the eighth grade students as a whole showing a significant difference in the groups who received Quantum Learning versus those who did not overall, further substantiating the strength of the treatment over race and gender factors.

A mixed-model ANOVA, moreover, found mixed results of the Orchard assessment based on gender and race among the seventh grade students. There was a significant interaction among the seventh grade students on the Orchard test and gender. Although, there was no significant interaction found between the Orchard assessment and race indicating that **Quantum Learning had a positive impact on the results of the seventh grade students overall on gender before race was added as a factor.**

Concerning the eighth grade students and their results on the Orchard test concerning gender and race, there was **no significant difference found among the eighth graders on race.** On the other hand, there were significant differences found in academic achievement based on gender. They were followed up by three one-way ANOVAs and all three of them showed a significant difference on gender. **Quantum Learning’s impact on this study replicates the previous results of**

former research which found that students who are immersed in a Quantum Learning environment have higher test scores and retain more information than their peers who are not (DePorter, 2003). Even the students who are not expected to excel are making tremendous strides in the classroom (Meyer, Kim, Pedigo, Pam, Terrell, & Ellie, 2005).

Question 3

There was a significant difference found on the TCAP scores of the special education students from the seventh grade to the eighth grade year. The students were instructed during the seventh grade year using differentiated instruction only in the seventh grade. In the eighth grade, the special education students received instruction under the Quantum Learning umbrella. This implies that **the strength of Quantum Learning does have an impact on the student achievement of special education students. The findings of this study on Quantum Learning further substantiates the findings that LeTellier (2007) established concerning Quantum Learning and its ability to impact student achievement.**

What differences in academic achievement were found in Reading and Language Arts for seventh and eighth grade students who were instructed using Quantum Learning compared with those who were not? **The results of the study indicated that there is a significant difference between students who received Quantum Learning on**

academic achievement versus those who were not. The students in the seventh and eighth grade in the treatment group had significantly higher scores on the TCAP test and on the Orchard test which was administered three times during the year. The results of the study showed a significant difference in some areas for the control group versus the treatment group based on gender; although, there were no significant findings on the effect of Quantum Learning on academic achievement based on race. Quantum Learning additionally had a strong impact on the students who received the treatment as reported through the student surveys. The students in the treatment group reported to have enjoyed and embraced the learning process significantly, felt the information learned was easier to focus on, easier to understand and remember, more interesting, and increased students confidence levels over than the students in the control group as reported on the surveys.

Implications & Recommendations

There are a few items that need attention for future research. The first item is relevant because it also will appear in the limitation of the study. It is important for the students in the study to be in a classroom that utilized differentiated instruction but none of Quantum Learning's techniques. The middle school teachers involved in the study were trained in Quantum Learning the summer of 2010; therefore, the

teachers in the control group agreed to use differentiated instruction only, but as Quantum Learning trained instructors, some of Quantum's techniques might have been utilized during instruction innately. Any future research should include a school that is Quantum trained and a school that is not Quantum trained.

Another item presented for consideration comes from the student and teacher surveys. Some of the teachers who took the survey were concerned about truly expressing any frustration or dissatisfaction with their ability to engage and instruct their students because they felt the information gleaned would go further than the study; and students, even though they did not put their names on their surveys initially, expressed concerns about being completely honest on their surveys for fear of their teachers. The researcher assured teachers and students of complete anonymity; therefore, future researchers should secure complete anonymity for the study by thoroughly and consistently expressing the safety and security of the participants who were administered the surveys.

Although many of Quantum Learning's concepts are not new, **Quantum Learning has taken the best practices of education and has provided the research and training which allows teachers to augment their personal style of learning to maximize classroom experiences. The Quantum teachers noticed an increase in their confidence levels, the students in the treatment group enjoyed the**

learning process, and positive results can be measured. This study suggested that educational institutions should incorporate Quantum Learning's strategies which include educator moves, the effective use of music, constructive, positive feedback, brain-based learning activities, the use of peripherals, high teacher expectations, and an effective classroom environment which can increase student retention and teacher effectiveness.

The increase of students retention and teacher effectiveness is also substantiated through Quantum Learning's findings which indicated that Quantum Learning's effectiveness is consistent across all race and genders as a whole before the data is disaggregated. The results also suggested that the treatment was the only thing that made the difference in the scores of the students in the control group, not the students' race and gender.

Further implications of the study are related to Quantum Learning's potential impact on educators' confidence levels in their instructional ability, their confidence in adjusting their personal style of instruction to accommodate the needs of their students, and their increased ability to take risks in the classroom. **The teachers who were a part of the treatment group in the study scored themselves higher on the surveys than the teachers who were a part of the control group in the study; stating that they felt more confident in their**

ability to recognize their students' learning styles and their ability to instruct their students on a level where they can retain the information taught.

Limitations

The students were already preselected and enrolled in their designated classes, and the special education students were placed only in the teachers' classrooms who were the designated Quantum Learning instructors. Therefore, the students' scores had to be compared from one year to the next year versus a Quantum Learning instructor and a non-Quantum Learning instructor of the designated year. A second common limitation is related to the administration of the surveys during the study. Some of the teachers in the study expressed a concern about the disclosure of their survey scores. The researcher had to reassure the teachers of the anonymity of their results. Also, the school utilized in the study was unilaterally trained in Quantum Learning techniques. As a result, some of the techniques utilized in the control and treatment groups might have been Quantum Learning techniques. Although, the results of the study indicated Quantum Learning's strengths, future researchers should conduct their research at two separate schools, one that is Quantum Learning trained and one that is not.

One additional limitation of the study stems from the seventh grade special education data and results. The seventh grade special education results were difficult to compare because the students took the

standardized TCAP test when they were in the sixth grade, and they took the TCAP MAAS (Modified form of the TCAP test) during their seventh grade year which required additional tests to be run in order for the scores to be compared. For future recommendations, the researcher should investigate the type of TCAP test the special education students took at the beginning of the study. In particular, the investigator should determine whether the special education students took the MAAS or the regular TCAP test the previous year. Additionally, the researcher should find out which form of the test the special education students will be taking in the spring. It is recommended that the researcher ensures the consistency of the test the special education students took in the spring of the previous year to compare the scores of the special education students for the current year. If the students took the MAAS the previous year, they should also take the MAAS the current year. If the students took the regular TCAP test the previous year, it is recommended that the special education students utilized in the study take the same test in the spring.

