

EFFECTS OF ADAPTIVE CURRICULUM ON STUDENT ACHIEVEMENT IN MIDDLE SCHOOL MATHEMATICS

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Abstract

The issue of lower than expected mathematics achievement is a concern to education leaders and policymakers at all levels of the U.S. pre K – 12 education system. This report prepared by Technology Based Learning and Research at Arizona State University reveals the result of the first year of a three year longitudinal study and the purpose of this quantitative, quasi-experimental study was to determine if there was a measurable difference in mathematics achievement for 6th, 7th and 8th grade students from a southwestern urban school district in Phoenix, Arizona. The students received computer-assisted instruction (CAI) through an online learning environment called Adaptive Curriculum in relation to their peers who did not receive the CAI. Descriptive, correlational, and comparative analyses were conducted among the schools that adopted the CAI curricular support (treatment group) versus the schools that did not (the control group). Student achievement was assessed using the state wide high stakes exam called AIMS as well as a third party exam called Galileo. The exams were conducted during the 2010-2011 school year. The results show that Adaptive Curriculum improved students' performance in mathematics at grades 6 and 8.

1. INTRODUCTION

The No Child Left Behind Act (NCLB, 2011) supports standards-based education reform, based on the idea that setting high standards and establishing quantifiable goals are likely to improve individual student outcomes in education. NCLB requires states to develop basic skills assessments to be administered to all students in certain grades every year, if those states are to receive federal funding for schools. These yearly standardized tests are a major part of the research used to determine whether or not schools are living up to the standards that they are required to meet (Braden, 2002; Linn, 2000). If these standards are not met, the schools face decreased funding, salary cuts, job losses, and/or the state taking over a school district's administration, along with other punishments that contribute to the increased liability brought by the NCLB.

Conforming to the NCLB, the state of Arizona uses a standardized testing system entitled Arizona's Instrument to Measure Standards (AIMS) to track how well students are performing compared to state standards. Students in grades 3 through 8 and 10 take the AIMS in mathematics, reading and writing. The AIMS test is based on the Arizona state standards, which define what students should be learning each year. AIMS results show the level of proficiency a student demonstrates in each of the subject areas tested. For each student taking the AIMS test on a particular content area, the raw score, the scaled score, the placement rating and a pass/fail index is reported.

In order to keep track of the students' progress, many schools employ third party testing instruments developed in accordance with the state's educational standards and known to be highly correlated with the AIMS test. In this study, the pre- and post-test scores were obtained from the third party Galileo testing system throughout the 2010 – 2011 school year. The results from the 2010 and 2011 AIMS mathematics tests as well as Galileo were used to compare the student performance among the control and treatment groups in an urban school district in Phoenix, Arizona at grades 6, 7 and 8. The treatment group received math curricular support through an online learning environment whereas the control group received traditional instruction.

2. TECHNOLOGY AS A MEANS OF CURRICULAR SUPPORT

Technology is everywhere, affecting almost every part of our lives, our communities and our homes. However, when it comes to integrating technology into the classroom experience, most schools lag far behind. Many schools are just beginning to discover the true potential that technology offers for teaching and learning. If properly used, technology will help students obtain the skills they need to survive in a composite and highly technological knowledge based economy.

Effective integration of technology is accomplished when technology is used in a routine and transparent way supporting curricular objectives. Many student believe that technology enabled project based learning is the ultimate level for classroom instruction. Learning through projects that are equipped with the proper technological tools allows students to be intellectually challenged while providing them with a realistic photograph of what they will have to confront in a contemporary office environment. Through projects, students improve their analysis and problem solving skills as they work individually and in teams to find, process, and synthesize information.

New technological tools for visualizing and modeling, especially in mathematics and sciences, present students ways to experiment and examine the facts and to view results in explicit ways that help them in understanding the concept. And, as an added advantage, with proper technologies and a project based learning approach, students are more likely to stay engaged on the task with considerably reduced behavioral problems in the classroom.

The U.S. Department of Education recommends the integration of technology into the classroom experience. The Final Report of The National Mathematics Advisory Panel advised that “high-quality computer assisted instruction (CAI) drill and practice, implemented with fidelity, be considered as a useful tool in developing students' automaticity (i.e., fast, accurate, and effortless performance on computation), freeing working memory so that attention can be directed to more complicated aspects of complex tasks”.

National Council of Teachers of Mathematics (NCTM) also verifies the fact that integration of technology in instruction is absolutely essential. The position statement of NCTM is: “Technology is an essential tool for learning mathematics in the 21st century, and all schools must ensure that all their students have access to technology. Effective teachers maximize the potential of technology to develop students' understanding, stimulate their interest, and increase their proficiency in mathematics. When technology is used strategically, it can provide access to mathematics for all students”.

Adaptive Curriculum is one of the many examples of online teaching and learning environments containing a rich library of learning activities that employ technological tools and a project based learning approach. Adaptive Curriculum has been developed in collaboration with Arizona State University (ASU)'s Technology Based Learning and Research (TBLR), an independent research development entity and an expert team of faculty at ASU. The online supplementary math and science programs for middle grade level instruction have already been completed.

The so called “Activity Objects” in Adaptive Curriculum have been providing the audience with:

- greater depth of content in math and science;
- lessons aligned to the state, NCTM, NSES and the Common Core State math standards;
- engaging, real-world simulations using three dimensional graphics;
- cross-curricular lesson content;
- school and home accessibility.

3. KEY CHARACTERISTICS OF ADAPTIVE CURRICULUM

Adaptive Curriculum has been designed with the classroom teacher in mind. Adaptive Curriculum provides a rich library of math and science classroom activities that are easy to use. Without true ease-of-use for both the teacher and the student, the most effective educational content in the world will be wasted. Therefore, usage has been made simple with the Activity Objects in Adaptive Curriculum; the Activity Objects are special learning objects with realistic visualizations, a high level of interactivity, and clear, engaging content.

Adaptive Curriculum delivers differentiated instruction. With the Activity Objects in Adaptive Curriculum, teachers can provide whole group, small group or individual instruction to math and science students. Each Activity Object delivers a full lesson on the assigned topic, including:

- real-world scenarios within a thematic focus;
- high quality audio support;
- simulations and practice in content-specific activities, based on math and science standards;
- end-of-activity assessments track student progress and report results to teachers.

The Activity Objects are accessible anytime-anywhere. Users can access Activity Object lessons from any standard Web browser, eliminating the need to learn yet another proprietary interface. A one-stop location has been created so as to make it practical to search for specific content and build assignments. Whether using Adaptive Curriculum for instructor-led teaching or to assign lessons to a single student, teachers use a private, customizable resource called MyAdaptiveSpace to organize Activity Objects and their own resources into lessons, and to make student assignments.

The Activity Objects provide an engaging and entertaining learning environment. Engaging today's technology-native students is critical to maintaining their attention long enough for learning to occur. This reality has led the design of the discovery-based activities and 3D-rich visuals featured in every Activity Object, and that have students raving. High quality animations, visuals and audio commentary similar to those used in high-quality computer and video games provide middle grade level students with the temptation to come back for more. The learning activities online can readily be used via interactive whiteboards, in a single computer or a multi computer class setting.

Studies conducted by Arizona State University show that student engagement and understanding of materials based on state standards in math and science improve when students are exposed to and regularly use Adaptive Curriculum.

To summarize the discussion, Adaptive Curriculum

- supports state and national standards as well as Common Core State Math Standards;
- provides the learners with engagement, individual practice, content mastery, skill development, lab experiences, challenges for advanced students, review, evaluation, and homework;
- is accessible anywhere/any time learning at school or home;
- can operate on Windows, Mac OS and Linux with a web browser without the need for installing any other software;

- is applicable in class, group or individual presentations, with facilitated activities or individual assignments;
- uses standards or curriculum to determine what is needed in the schools.

4. MODULES WITHIN ADAPTIVE CURRICULUM

The modules associated with the Adaptive Curriculum online learning environment have been designed for easy and effective usage. The list of the modules and their brief descriptions are given in Table 1.

Table 1: Description of the Modules within Adaptive Curriculum

MODULE	FUNCTION
Search	To search any keyword and see lists of the related Activity Objects.
Activity Objects	This is an annotated list that provides a brief content description and buttons to add to a lesson plan or play the Activity Object.
Activity Object Details	The Details window provides the usage scenario, the corresponding standards and performance objectives, the estimated learning time, the prerequisites, and teaching suggestions.
My Lesson Plans	To create and assign lesson plans to students.
My Students	To manage students in groups. Student progress assessment data can be tracked anytime and anywhere.
Assignment Report	To see students' progress anytime.
Catalog	To index Adaptive Curriculum Activities by standard and grade level. This enables locating an activity specifically for a particular curriculum.
Other Resources	To bookmark the web resources and use them in the lesson plans along with the Activity Objects.
Corresponding Standards	By selecting NCTM, NSES, or a particular state, it is possible to view the related performance objectives of an Activity Object.
Lesson Planning	To plan lessons by organizing the selected Activity Objects and other resources.
Assignments	To assign each lesson plan to a class, group of students or an individual student.
Report	To monitor students' success in Activity Objects; see their right and wrong answers in detail.

Table 2 gives a brief overview of mathematics Activity Objects types and their goals along with examples of the Activity Objects.

Table 2: Key characteristics of the Mathematics Activity Objects in Adaptive Curriculum

Type	Goal	Examples
Concept Development	to teach the difficult-to-understand concepts with clear and engaging content	<ul style="list-style-type: none"> • Compare and Order Fractions • Experimental and Theoretical • Probabilities Line Plot • Analyzing Bar Graphs and Line Graphs
Problem Solving	to improve student's problem solving skills. This type is based on the Polya's Problem-Solving Cycle: <ol style="list-style-type: none"> 1. Consider a real-life problem 2. Understand the problem 3. Make a plan to solve it 4. Carry out the plan and check the results 5. Draw a conclusion 	<ul style="list-style-type: none"> • Problem Solving Involving Volumes of Prisms • Problem Solving Involving Ratio and Proportion
Visual Proof	to develop the concept of formulae, theorems, special relationships, and other mathematical constants with visual explanations	<ul style="list-style-type: none"> • The Sum of The Exterior Angles of Polygons • Formula for the Volume of a Sphere • Multiplication of Fractions
Dynamic Modeling	to practice the mathematical concept by changing the variables and observing the results in real time	<ul style="list-style-type: none"> • Classification of Quadrilaterals • Types of Triangles • Mean, Mode and Median • Observing Changes in Surface Area of Prisms • Observing Changes in Volume of Square Prisms
Interactive Exercise	to practice the mathematical concepts through a series of leading questions	<ul style="list-style-type: none"> • Evaluating an Algebraic Expression • Finding the Area of Polygons • Interpreting Bar Graphs • Completing the Missing 2D Views of a 3D Object • Application of Translation • Find the Given Probability

5. SCHOOL DISTRICT PROFILE

The district at which the study took place encompasses 6.8 square miles in Phoenix Arizona with 13 schools. The student population is approximately 7362 students. Table 3 gives the schools and their populations; table 4 gives the ethnic composition of the student body in the district.

Table 3: The schools and their populations in the school district.

Type of School	School	Population
Middle Schools	School 1	678
	School 2	444
	School 3	796
	School 4	630
	School 5	677
Elementary Schools	School 6	333
	School 7	858
	School 8	391
	School 9	216
	School 10	555
	School 11	751
	School 12	740
	School 13	509

Table 4: Ethnic composition of in the school district.

Ethnicity	Percentage
Native American	0.01%
White	2.6%
Hispanic	94%
African American	2%
Asian	0.5%

6. A DETAILED OVERVIEW OF THE AIMS MATHEMATICS TEST

AIMS 3-8 tests contain both AIMS items and Stanford 10 items. AIMS items are based on the grade specific Arizona Academic Content Standards. Stanford 10 items are nationally normed items. All questions are multiple choice with 4 answer choices (AIMS 2010). The Placement ratings are as follows:

1. Falls Far Below the Standard
2. Approaches the Standard
3. Meets the Standard
4. Exceeds the Standard

The placement ratings of 1 and 2 are considered failing whereas 3 and 4 are considered passing.

Grades 3-8 Mathematics (Dual Purpose Assessment)

The AIMS Mathematics tests for Grades 3-8 consisted of both a criterion-referenced and norm-referenced component to allow for both criterion-referenced and norm-referenced scores. Some items contributed to criterion-referenced test (CRT) scores only, some items contributed to norm-referenced test (NRT) scores only, and some items contributed to both CRT and NRT scores. No NRT items were used as anchor items for AIMS (AIMS 2010).

The AIMS CRT mathematics tests for Grades 4 and 6 through 8 consisted of 53 items developed by Arizona teachers and 15 Stanford 10 items that map to the Arizona content standards, for a total of 68 items. Ten field test (FT) items written to the Arizona standards were embedded with the operational items. Detailed test structure information can be found in Table 5.a. The raw score and scale score ranges are presented in Table 5.b. New performance standards were set for the tests in 2010 (AIMS 2010).

The left hand side of Table 5.a presents the breakdown of the number of items that contributed to the AIMS mathematics CRT and the AIMS mathematics NRT component for each grade. The number of Stanford 10 mathematics ASU - Technology Based Learning and Research August 8th, 2011 Page 5 of 29

items that contributed to both components is also reported. The total number of test items on the test is the composite of the number of field test items, the number of CRT items, and the number of NRT items. The right hand side of Table 5.a presents the number of anchor items used in the annual equating for each grade. Table 5.b presents the raw score and scale score ranges of AIMS CRT assessments (AIMS 2010).

The AIMS NRT mathematics tests for Grades 3-8 consisted of 25 Stanford 10 mathematics items from Stanford 10 Form B. The AIMS NRT mathematics tests closely approximated the test blueprint and statistical criteria of Stanford 10. Scale scores are reported on the Stanford 10 mathematics NRT scale. Norms are reported using the 2007 Stanford 10 spring norms (AIMS 2010).

Items on the AIMS 3-8 reading and mathematics tests that reported to a criterion-referenced score were either developed by Arizona teachers or were Stanford 10 items that matched the Arizona content standards. No norm-referenced only reading items or mathematics items reported to the AIMS 3-8 criterion referenced scores. No Stanford 10 language items reported to the AIMS 3-8 criterion referenced scores for writing (AIMS 2010).

Table 5.a AIMS Mathematics Test Structure

Grade	MA FT	MA CRT only	MA NRT /CRT	MA NRT only	MA CRT TOTAL (CRT + NRT/CRT)	MA NRT TOTAL	TOTAL ITEMS ON TEST	Anchor (Common CRT: Spring 2009 - 2010)
6	10	53	15	10	68	25	88	17
7	10	53	15	10	68	25	88	16
8	10	53	15	10	68	25	88	17

Table 5.b Raw Score and Scale Score ranges of AIMS CRT Assessments

Grade	Raw Score Range	Scale Score range
6	0-68	160-600
7	0-68	180-620
8	0-68	200-640

Scaling of AIMS CRT Mathematics Scores

Item response theory makes available two types of scoring: number-correct and item-pattern. With number-correct scoring, the value of theta corresponding to each number-correct score (or raw score) is converted to a scale score. Item-pattern scoring produces a scale score, taking into account not only how many items were answered correctly but also which items and the characteristics of those items. For groups of 25 or more students, the two methods produce tau-equivalent results. Tau-equivalent means that examinees are expected to receive the same score on average between the two methods. Number-correct scoring was used to derive scales scores for both the AIMS CRT tests and the AIMS NRT tests (AIMS 2010).

Typically, a test score is obtained from a single observation of behavior and represents an estimate of the trait being measured. As an estimate, an observed test score contains some measurement error and does not perfectly reflect an individual's true score. The degree of measurement error in a test score can be estimated using a statistic called the standard error of measurement (SEM) (AIMS 2010).

A student's exact true score cannot be known. The true score is defined as the average test score that would result if the test could be administered repeatedly without the effects of practice or fatigue. The standard error of measurement is an estimate of the standard deviation of an individual's observed scores from these repeated administrations. For practical purposes, this statistic can be used to obtain a range within which a student's true score is

likely to fail. Using item response theory, the standard error of measurement can be calculated for every possible scale score (AIMS 2010).

Table 5.c AIMS Raw Score to Scale Score Table Mathematics CRT Grade 6

Raw Score	Scale Score	SEM	Raw Score	Scale Score	SEM
0	160	65	35	375	12
1	177	46	36	377	12
2	207	33	37	380	12
3	226	28	38	383	12
4	240	24	39	386	12
5	250	22	40	389	12
6	260	20	41	392	12
7	267	19	42	395	12
8	274	18	43	398	12
9	281	17	44	401	12
10	286	16	45	405	12
11	292	16	46	408	13
12	297	15	47	411	13
13	301	15	48	415	13
14	306	15	49	418	13
15	310	14	50	422	13
16	314	14	51	425	14
17	318	14	52	429	14
18	322	13	53	433	14
19	325	13	54	437	14
20	329	13	55	442	15
21	332	13	56	446	15
22	335	13	57	451	16
23	339	13	58	456	16
24	342	12	59	462	17
25	345	12	60	468	18
26	348	12	61	475	19
27	351	12	62	483	20
28	354	12	63	492	22
29	357	12	64	502	24
30	360	12	65	516	27
31	363	12	66	534	33
32	366	12	67	565	46
33	369	12	68	600	65
34	372	12			

Note. Cut scores for Approach the Standard, Meets the Standard, and Exceeds the Standard are 366, 398, 446.

Table 5.d AIMS Raw Score to Scale Score Table Mathematics CRT Grade 7

Raw Score	Scale Score	SEM	Raw Score	Scale Score	SEM
0	180	61	35	384	11
1	191	44	36	387	11
2	221	31	37	390	11
3	240	26	38	393	11
4	253	23	39	396	11
5	263	20	40	399	11
6	272	19	41	402	11
7	280	18	42	405	12
8	287	17	43	408	12
9	293	16	44	411	12
10	298	15	45	414	12
11	303	15	46	417	12
12	308	14	47	421	12
13	313	14	48	424	12
14	317	14	49	427	12
15	321	13	50	431	13
16	325	13	51	434	13
17	329	13	52	438	13
18	332	13	53	442	13
19	336	12	54	446	14
20	339	12	55	451	14
21	343	12	56	455	14
22	346	12	57	460	15
23	349	12	58	465	15
24	352	12	59	471	16
25	355	12	60	477	17
26	358	12	61	484	18
27	361	11	62	491	19
28	364	11	63	500	21
29	367	11	64	511	23
30	370	11	65	524	26
31	373	11	66	542	31
32	376	11	67	573	44
33	379	11	68	620	62
34	382	11			

Note. Cut scores for Approach the Standard, Meets the Standard, and Exceeds the Standard are 382, 411, 460.

Table 5.e AIMS Raw Score to Scale Score Table Mathematics CRT Grade 8

Raw Score	Scale Score	SEM	Raw Score	Scale Score	SEM
0	200	69	35	409	12
1	216	49	36	411	13
2	246	35	37	414	13
3	264	29	38	417	13
4	278	25	39	420	13
5	288	23	40	423	13
6	297	21	41	426	13
7	305	20	42	429	13
8	311	19	43	432	13
9	317	18	44	435	13
10	323	17	45	438	13
11	328	16	46	441	13
12	333	16	47	445	13
13	337	15	48	448	14
14	342	15	49	451	14
15	346	15	50	455	14
16	350	14	51	459	14
17	353	14	52	462	15
18	357	14	53	466	15
19	360	14	54	471	15
20	364	14	55	475	16
21	367	13	56	480	16
22	370	13	57	484	17
23	373	13	58	490	17
24	377	13	59	495	18
25	380	13	60	501	19
26	383	13	61	508	20
27	386	13	62	516	21
28	388	13	63	525	23
29	391	13	64	536	25
30	394	13	65	549	29
31	397	13	66	567	35
32	400	12	67	598	49
33	403	12	68	640	69
34	406	12			

Note. Cut scores for Approach the Standard, Meets the Standard, and Exceeds the Standard are 409, 426, 475.

7. METHODS

In this quantitative, quasi-experimental study, the treatment group received a year of online curricular support based on the Adaptive Curriculum parallel to their traditional mathematics curriculum that took place in their usual school setting whereas the control group received the traditional instruction. The participants are shown in table 6.

Table 6: Participants in the Study

School	Grade 6	Grade 7	Grade 8
School 1	60	66	56
School 2	113	105	97
School 3	259	236	277
School 4	211	232	190
School 5	98	92	71

All students attended the same school district where 94% of the student population was Hispanic and 99% of the students received free lunch which is an indicator of their low SES. All schools were classified as Title I. The curricular support consisted of online Adaptive Curriculum mathematics learning activities selected in accordance with the district's mathematics curricula. Descriptive, correlational, and comparative analyses were conducted among the schools that adopted the CAI (treatment group) versus the schools that did not (the control group). Student achievement was assessed using the state wide high stakes exam called AIMS administered in April 2011 and correlated to the respective 2010 AIMS test. A third party exam called Galileo was correlated to the district Math Objectives. The Galileo math pretest was administered during the first week of school (August, 2010) administered to all students. The Galileo math posttest was administered to all students during May 2011. Professional development for Adaptive Curriculum was provided by Technology Based Learning & Research (TBLR) and Adaptive Curriculum staff. Teachers volunteered to use the program. A workshop was presented to the volunteer teachers by the Adaptive Curriculum staff. Technology Based Learning & Research (TBLR) staff met with individual teachers throughout the school year as requested. At the beginning

of each quarter teachers were provided with a list of Adaptive Curriculum activity objects correlated to their math objective's for the quarter. Technology Based Learning & Research (TBLR) staff communicated with administration and teachers throughout the year to provide on-site Professional Development. Included were lesson plan development, technology support as well as whole class and individual student instruction approaches. Teachers had the option of whole class application or individual computer supported instruction or both.

8. STATISTICAL ANALYSES

This section depict the results of descriptive, correlational and comparative analyses pertaining to the curricular support carried out using Adaptive Curriculum in parts A through D and the results will be summarized at part E of this section.

The school district examines the students at grades 6 through 8 using a third party testing system called the Galileo tests. In this study, along with the AIMS scores of students, we also examined the Pre and Post-tests of Galileo which are known to be highly correlated with the AIMS tests for each grade level as it can be confirmed through the strong positive correlations (R values) indicated in Table 7. Please note that all correlations are assumed significant at the $\alpha = 0.01$ level.

Table 7: Correlation between AIMS and Galileo Pre and Post-Tests

Grade	Attribute	MathPost	MathPre
6	R	0.84	0.72
	N	703	583
7	R	0.78	0.64
	N	655	600
8	R	0.82	0.71
	N	654	594

In this study our instruments of analyses are:

- the AIMS 2011 Scaled math Score (AIMS2011MathScale);
- the AIMS 2010 Scaled Math Score (AIMS2010MathScale);
- the gain in the AIMS score from the year 2010 to year 2011
- (i.e. $AIMSGain = AIMS2011MathScale - AIMS2010MathScale$);
- the percent gain in the AIMS score from the year 2010 to year 2011
- (i.e. $AIMSGain\% = (AIMS2011MathScale - AIMS2010MathScale)/AIMS2010MathScale \times 100$);
- the Pretest conducted by Galileo in the beginning of the 2010-2011 school year (MathPre);
- the Posttest conducted by Galileo at the end of the 2010-2011 school year (MathPost);
- the gain between pre and post Galileo tests (i.e. $PrePostgain = MathPost - MathPre$);
- the percent gain between pre and post Galileo tests (i.e. $PrePostgainPercent = (MathPost - MathPre)/MathPre \times 100$);
- the total time spent by students and teachers while using Adaptive Curriculum in minutes (ACTime); and finally
- the total number of times Adaptive Curriculum was used by students and teachers (ACFreq).
- We will refer to the first eight attributes in the above list as success indicators.

Part A: AIMS Pass/Fail and Placement Ratings

For each student taking the AIMS test on a particular content area, the raw score, the scaled score, a placement rating and a pass/fail rating is reported. Students receive one of the following four placement ratings in the AIMS test for each subject tested: 1 - falls far below standard, 2 - approaches the standard, 3 - meets the standard, or 4 - exceeds the

standard; the placement ratings of 1 and 2 are considered as failing. As the pass/fail rating, if the student passed the AIMS, s/he receives the P rating; if s/he failed the AIMS, s/he receives an F rating.

A.1. Overall

Table 8 shows that the treatment group had more students scoring 3 and 4 student and passing the AIMS and fewer student scoring 1 and 2 and failing the AIMS.

Table 8

	AIMS2011MathPL								AIMS2011MathPF			
	1		2		3		4		F		P	
	N	N %	N	N %	N	N %	N	N %	N	N %	N	N %
Control	332	39.00%	155	18.20%	243	28.60%	118	13.90%	487	57.20%	361	42.40%
Treatment	380	29.00%	324	24.70%	409	31.20%	198	15.10%	704	53.70%	607	46.30%

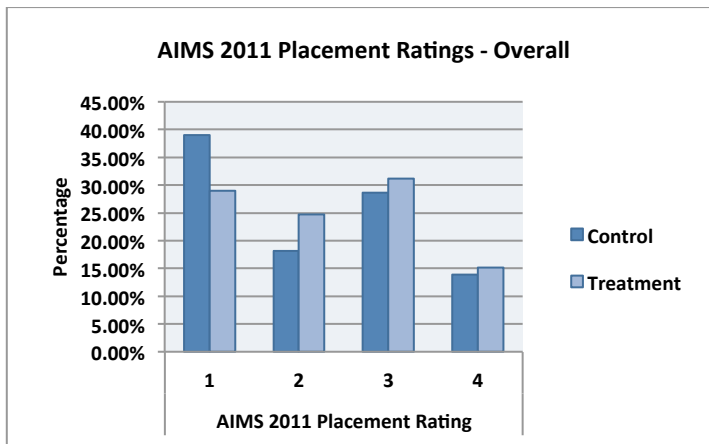


Figure 1

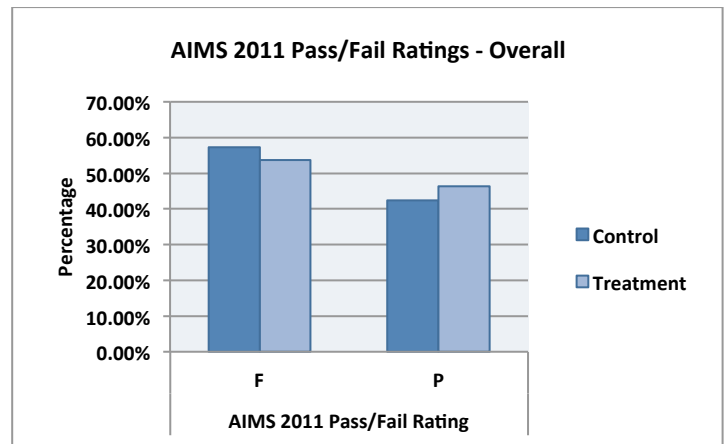


Figure 2

A.2. By Grade Level

Table 9 shows that:

- At grades 6 and 8, the treatment group had more students scoring 3 and 4 and passing the AIMS and less students scoring 1 and 2 and failing the AIMS.
- At grade 7, the control group had more students scoring 3 and 4 student and passing the AIMS and less student scoring 1 and 2 and failing the AIMS.

Table 9

		AIMS2011MathPL								AIMS2011MathPF			
		1		2		3		4		F		P	
		N	N %	N	N %	N	N %	N	N %	N	N %	N	N %
6	Control	89	37.10%	55	22.90%	67	27.90%	28	11.70%	144	60.00%	95	39.60%
	Treatment	111	22.20%	131	26.10%	163	32.50%	95	19.00%	242	48.30%	258	51.50%
7	Control	94	33.60%	62	22.10%	86	30.70%	37	13.20%	156	55.70%	123	43.90%
	Treatment	141	31.30%	125	27.70%	144	31.90%	41	9.10%	266	59.00%	185	41.00%
8	Control	149	45.00%	38	11.50%	90	27.20%	53	16.00%	187	56.50%	143	43.20%
	Treatment	128	35.60%	68	18.90%	102	28.30%	62	17.20%	196	54.40%	164	45.60%

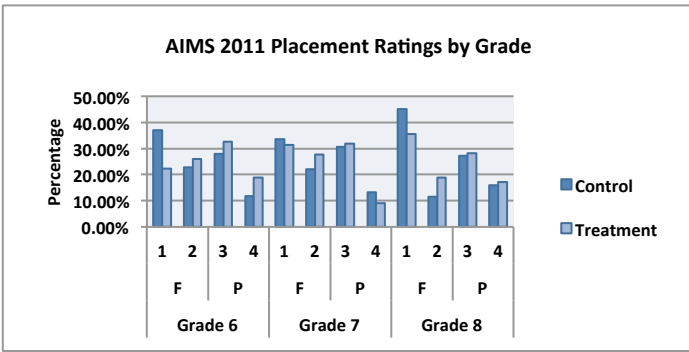


Figure 3

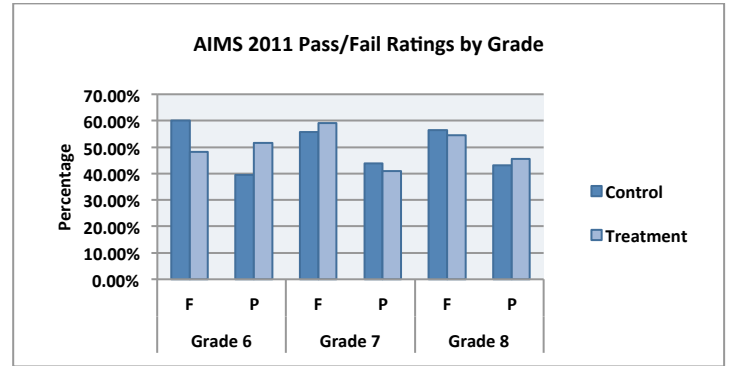


Figure 4

A.3. By Grade Level and School

Table 9 shows that:

- At grade 6, the treatment group in School 3, School 4 and School 2 had more students scoring 3 and 4 student and passing the AIMS and less students scoring 1 and 2 and failing the AIMS.
- At grade 7, the treatment group in School 4 and School 2 had more students scoring 3 and 4 student and passing the AIMS and less students scoring 1 and 2 and failing the AIMS.
- At grade 8, the treatment group in School 1, School 3 and School 4 had more students scoring 3 and 4 student and passing the AIMS and less students scoring 1 and 2 and failing the AIMS.

Table 9

			AIMS2011MathPL								AIMS2011MathPF			
			1		2		3		4		F		P	
			N	N %	N	N %	N	N %	N	N %	N	N %	N	N %
6	Control	School 1	22	36.70%	21	35.00%	13	21.70%	4	6.70%	43	71.70%	17	28.30%
		School 3	43	36.10%	22	18.50%	36	30.30%	18	15.10%	65	54.60%	54	45.40%
		School 4	17	32.10%	11	20.80%	18	34.00%	6	11.30%	28	52.80%	24	45.30%
	Treatment	School 2	7	87.50%	1	12.50%	0	0.00%	0	0.00%	8	100.00%	0	0.00%
		School 3	27	19.30%	38	27.10%	42	30.00%	33	23.60%	65	46.40%	75	53.60%
		School 4	43	27.20%	42	26.60%	51	32.30%	22	13.90%	85	53.80%	73	46.20%
		School 2	12	11.40%	31	29.50%	39	37.10%	22	21.00%	43	41.00%	61	58.10%
7	Control	School 5	29	29.60%	20	20.40%	31	31.60%	18	18.40%	49	50.00%	49	50.00%
		School 1	19	28.80%	18	27.30%	16	24.20%	12	18.20%	37	56.10%	28	42.40%
		School 3	28	35.00%	12	15.00%	31	38.80%	9	11.30%	40	50.00%	40	50.00%
		School 4	31	64.60%	9	18.80%	7	14.60%	1	2.10%	40	83.30%	8	16.70%
	Treatment	School 2	16	18.60%	23	26.70%	32	37.20%	15	17.40%	39	45.30%	47	54.70%
		School 3	42	26.90%	45	28.80%	52	33.30%	17	10.90%	87	55.80%	69	44.20%
		School 4	64	34.80%	52	28.30%	54	29.30%	14	7.60%	116	63.00%	68	37.00%
8	Control	School 2	0	0.00%	4	21.10%	11	57.90%	4	21.10%	4	21.10%	15	78.90%
		School 5	35	38.00%	24	26.10%	27	29.30%	6	6.50%	59	64.10%	33	35.90%
		School 1	17	58.60%	1	3.40%	7	24.10%	4	13.80%	18	62.10%	11	37.90%
		School 3	34	29.30%	17	14.70%	39	33.60%	26	22.40%	51	44.00%	65	56.00%
	Treatment	School 4	68	63.00%	8	7.40%	23	21.30%	8	7.40%	76	70.40%	31	28.70%
		School 2	30	38.50%	12	15.40%	21	26.90%	15	19.20%	42	53.80%	36	46.20%
		School 1	10	37.00%	6	22.20%	11	40.70%	0	0.00%	16	59.30%	11	40.70%
Treatment	School 3	43	26.70%	18	11.20%	48	29.80%	52	32.30%	61	37.90%	100	62.10%	
	School 4	31	37.80%	27	32.90%	21	25.60%	3	3.70%	58	70.70%	24	29.30%	
	School 2	5	26.30%	2	10.50%	6	31.60%	6	31.60%	7	36.80%	12	63.20%	
	School 5	39	54.90%	15	21.10%	16	22.50%	1	1.40%	54	76.10%	17	23.90%	

A.4. By Grade Level, School and Teacher

Table 10 shows that 4 of the 10 (40%) control group of teachers at grade 6 had 35% or more students passing the AIMS test whereas 15 of the 21 (71%) treatment group of teachers had 35% or more students passing the AIMS test.

Table 10

Grade 6		AIMS2011MathPL								AIMS2011MathPF					
		1		2		3		4		F		P			
		N	N %	N	N %	N	N %	N	N %	N	N %	N	N %		
School 1	Control	Teacher 1	9	29.00%	12	38.70%	8	25.80%	2	6.50%	21	67.70%	10	32.30%	
		Teacher 2	13	44.80%	9	31.00%	5	17.20%	2	6.90%	22	75.90%	7	24.10%	
School 3	Control	Teacher 3	2	11.80%	3	17.60%	7	41.20%	5	29.40%	5	29.40%	12	70.60%	
		Teacher 4	9	32.10%	10	35.70%	7	25.00%	2	7.10%	19	67.90%	9	32.10%	
		Teacher 5	16	100.00%	0	0.00%	0	0.00%	0	0.00%	16	100.00%	0	0.00%	
		Teacher 6	9	31.00%	3	10.30%	11	37.90%	6	20.70%	12	41.40%	17	58.60%	
		Teacher 7	7	24.10%	6	20.70%	11	37.90%	5	17.20%	13	44.80%	16	55.20%	
	Treatment	Teacher 8	5	17.20%	11	37.90%	7	24.10%	6	20.70%	16	55.20%	13	44.80%	
		Teacher 9	8	29.60%	3	11.10%	6	22.20%	10	37.00%	11	40.70%	16	59.30%	
		Teacher 10	4	14.30%	9	32.10%	7	25.00%	8	28.60%	13	46.40%	15	53.60%	
		Teacher 11	6	22.20%	9	33.30%	9	33.30%	3	11.10%	15	55.60%	12	44.40%	
		Teacher 12	4	13.80%	6	20.70%	13	44.80%	6	20.70%	10	34.50%	19	65.50%	
	School 4	Control	Teacher 13	4	16.00%	6	24.00%	11	44.00%	4	16.00%	10	40.00%	15	60.00%
			Teacher 14	13	48.10%	5	18.50%	7	25.90%	2	7.40%	18	66.70%	9	33.30%
Treatment		Teacher 15	11	31.40%	11	31.40%	9	25.70%	4	11.40%	22	62.90%	13	37.10%	
		Teacher 16	4	16.70%	6	25.00%	8	33.30%	6	25.00%	10	41.70%	14	58.30%	
		Teacher 17	7	25.00%	6	21.40%	10	35.70%	5	17.90%	13	46.40%	15	53.60%	
		Teacher 18	1	100.00%	0	0.00%	0	0.00%	0	0.00%	1	100.00%	0	0.00%	
		Teacher 19	1	4.50%	4	18.20%	10	45.50%	7	31.80%	5	22.70%	17	77.30%	
		Teacher 20	13	61.90%	5	23.80%	3	14.30%	0	0.00%	18	85.70%	3	14.30%	
		Teacher 21	6	22.20%	10	37.00%	11	40.70%	0	0.00%	16	59.30%	11	40.70%	
School 2	Control	Teacher 22	7	87.50%	1	12.50%	0	0.00%	0	0.00%	8	100.00%	0	0.00%	
	Treatment	Teacher 23	0	0.00%	3	13.00%	14	60.90%	6	26.10%	3	13.00%	20	87.00%	
		Teacher 24	2	9.10%	6	27.30%	11	50.00%	3	13.60%	8	36.40%	14	63.60%	
		Teacher 25	0	0.00%	12	50.00%	5	20.80%	7	29.20%	12	50.00%	12	50.00%	
		Teacher 26	8	47.10%	5	29.40%	4	23.50%	0	0.00%	13	76.50%	4	23.50%	
		Teacher 27	2	11.10%	5	27.80%	5	27.80%	6	33.30%	7	38.90%	11	61.10%	
School 5	Treatment	Teacher 28	10	32.30%	8	25.80%	11	35.50%	2	6.50%	18	58.10%	13	41.90%	
		Teacher 63	5	100.00%	0	0.00%	0	0.00%	0	0.00%	5	100.00%	0	0.00%	
		Teacher 30	10	34.50%	8	27.60%	9	31.00%	2	6.90%	18	62.10%	11	37.90%	
		Teacher 31	3	9.40%	4	12.50%	11	34.40%	14	43.80%	7	21.90%	25	78.10%	

Table 11 shows that 10 of the 16 (63%) control group of teachers at grade 7 had 35% or more students passing the AIMS test and 10 of the 17 (59%) treatment group of teachers had 35% or more students passing the AIMS test.

Table 11

Grade 7			AIMS2011MathPL								AIMS2011MathPF			
			1		2		3		4		F		P	
			N	N %	N	N %	N	N %	N	N %	N	N %	N	N %
School 1	Control	Teacher 32	12	37.50%	6	18.80%	10	31.30%	4	12.50%	18	56.30%	14	43.80%
		Teacher 33	7	21.20%	12	36.40%	6	18.20%	8	24.20%	19	57.60%	14	42.40%
School 3	Control	Teacher 34	5	83.30%	0	0.00%	1	16.70%	0	0.00%	5	83.30%	1	16.70%
		Teacher 35	9	39.10%	2	8.70%	11	47.80%	1	4.30%	11	47.80%	12	52.20%
		Teacher 36	6	27.30%	4	18.20%	7	31.80%	5	22.70%	10	45.50%	12	54.50%
		Teacher 37	3	100.00%	0	0.00%	0	0.00%	0	0.00%	3	100.00%	0	0.00%
		Teacher 38	5	19.20%	6	23.10%	12	46.20%	3	11.50%	11	42.30%	15	57.70%
	Treatment	Teacher 39	7	31.80%	6	27.30%	6	27.30%	3	13.60%	13	59.10%	9	40.90%
		Teacher 40	5	21.70%	8	34.80%	9	39.10%	1	4.30%	13	56.50%	10	43.50%
		Teacher 41	5	22.70%	7	31.80%	8	36.40%	2	9.10%	12	54.50%	10	45.50%
		Teacher 42	8	36.40%	5	22.70%	7	31.80%	2	9.10%	13	59.10%	9	40.90%
		Teacher 43	8	34.80%	3	13.00%	9	39.10%	3	13.00%	11	47.80%	12	52.20%
School 4	Control	Teacher 44	5	23.80%	4	19.00%	7	33.30%	5	23.80%	9	42.90%	12	57.10%
		Teacher 45	4	17.40%	12	52.20%	6	26.10%	1	4.30%	16	69.60%	7	30.40%
		Teacher 46	16	55.20%	6	20.70%	6	20.70%	1	3.40%	22	75.90%	7	24.10%
		Teacher 47	2	100.00%	0	0.00%	0	0.00%	0	0.00%	2	100.00%	0	0.00%
	Treatment	Teacher 48	0	0.00%	0	0.00%	1	100.00%	0	0.00%	0	0.00%	1	100.00%
		Teacher 49	13	81.30%	3	18.80%	0	0.00%	0	0.00%	16	100.00%	0	0.00%
		Teacher 50	5	13.50%	7	18.90%	16	43.20%	9	24.30%	12	32.40%	25	67.60%
		Teacher 51	8	25.80%	12	38.70%	10	32.30%	1	3.20%	20	64.50%	11	35.50%
		Teacher 52	9	27.30%	13	39.40%	9	27.30%	2	6.10%	22	66.70%	11	33.30%
		Teacher 53	18	42.90%	11	26.20%	11	26.20%	2	4.80%	29	69.00%	13	31.00%
School 2	Control	Teacher 54	24	58.50%	9	22.00%	8	19.50%	0	0.00%	33	80.50%	8	19.50%
		Teacher 55	3	15.80%	7	36.80%	5	26.30%	4	21.10%	10	52.60%	9	47.40%
		Teacher 56	1	5.30%	4	21.10%	10	52.60%	4	21.10%	5	26.30%	14	73.70%
		Teacher 57	2	10.00%	8	40.00%	6	30.00%	4	20.00%	10	50.00%	10	50.00%
		Teacher 58	9	90.00%	1	10.00%	0	0.00%	0	0.00%	10	100.00%	0	0.00%
	Teacher 59	1	5.60%	3	16.70%	11	61.10%	3	16.70%	4	22.20%	14	77.80%	
Treatment	Teacher 60	0	0.00%	4	21.10%	11	57.90%	4	21.10%	4	21.10%	15	78.90%	
School 5	Treatment	Teacher 61	3	10.00%	9	30.00%	13	43.30%	5	16.70%	12	40.00%	18	60.00%
		Teacher 62	15	53.60%	7	25.00%	6	21.40%	0	0.00%	22	78.60%	6	21.40%
		Teacher 63	4	100.00%	0	0.00%	0	0.00%	0	0.00%	4	100.00%	0	0.00%
		Teacher 64	13	43.30%	8	26.70%	8	26.70%	1	3.30%	21	70.00%	9	30.00%

Table 12 shows that 10 of the 17 (59%) control group of teachers at grade 8 had 35% or more students passing the AIMS test and 9 of the 14 (64%) treatment group of teachers had 35% or more students passing the AIMS test.

Table 12

Grade 8			AIMS2011MathPL								AIMS2011MathPF			
			1		2		3		4		F		P	
			N	N %	N	N %	N	N %	N	N %	N	N %	N	N %
School 1	Control	Teacher 65	17	58.60%	1	3.40%	7	24.10%	4	13.80%	18	62.10%	11	37.90%
	Treatment	Teacher 66	10	37.00%	6	22.20%	11	40.70%	0	0.00%	16	59.30%	11	40.70%
School 3	Control	Teacher 67	5	18.50%	3	11.10%	10	37.00%	9	33.30%	8	29.60%	19	70.40%
		Teacher 68	8	29.60%	5	18.50%	9	33.30%	5	18.50%	13	48.10%	14	51.90%
		Teacher 34	5	83.30%	1	16.70%	0	0.00%	0	0.00%	6	100.00%	0	0.00%
		Teacher 37	4	100.00%	0	0.00%	0	0.00%	0	0.00%	4	100.00%	0	0.00%
		Teacher 69	6	24.00%	3	12.00%	10	40.00%	6	24.00%	9	36.00%	16	64.00%
		Teacher 70	6	22.20%	5	18.50%	10	37.00%	6	22.20%	11	40.70%	16	59.30%
	Treatment	Teacher 71	6	24.00%	2	8.00%	9	36.00%	8	32.00%	8	32.00%	17	68.00%
		Teacher 72	8	28.60%	4	14.30%	4	14.30%	12	42.90%	12	42.90%	16	57.10%
		Teacher 73	11	40.70%	3	11.10%	10	37.00%	3	11.10%	14	51.90%	13	48.10%
		Teacher 74	6	22.20%	3	11.10%	9	33.30%	9	33.30%	9	33.30%	18	66.70%
		Teacher 75	8	29.60%	1	3.70%	8	29.60%	10	37.00%	9	33.30%	18	66.70%
		Teacher 76	4	14.80%	5	18.50%	8	29.60%	10	37.00%	9	33.30%	18	66.70%
School 4	Control	Teacher 77	17	89.50%	2	10.50%	0	0.00%	0	0.00%	19	100.00%	0	0.00%
		Teacher 78	24	92.30%	1	3.80%	1	3.80%	0	0.00%	25	96.20%	1	3.80%
		Teacher 79	0	0.00%	1	3.70%	18	66.70%	8	29.60%	1	3.70%	26	96.30%
		Teacher 80	13	61.90%	4	19.00%	4	19.00%	0	0.00%	17	81.00%	4	19.00%
		Teacher 81	14	100.00%	0	0.00%	0	0.00%	0	0.00%	14	100.00%	0	0.00%
	Treatment	Teacher 82	12	44.40%	7	25.90%	7	25.90%	1	3.70%	19	70.40%	8	29.60%
		Teacher 83	8	25.00%	12	37.50%	10	31.25%	2	6.25%	20	62.50%	12	37.50%
		Teacher 84	11	47.80%	7	30.40%	5	21.70%	0	0.00%	18	78.30%	5	21.70%
School 2	Control	Teacher 85	5	26.30%	4	21.10%	6	31.60%	4	21.10%	9	47.40%	10	52.60%
		Teacher 86	4	23.50%	3	17.60%	5	29.40%	5	29.40%	7	41.20%	10	58.80%
		Teacher 87	5	35.70%	0	0.00%	6	42.90%	3	21.40%	5	35.70%	9	64.30%
		Teacher 88	7	36.80%	5	26.30%	4	21.10%	3	15.80%	12	63.20%	7	36.80%
	Treatment	Teacher 22	9	100.00%	0	0.00%	0	0.00%	0	0.00%	9	100.00%	0	0.00%
School 5	Treatment	Teacher 89	5	26.30%	2	10.50%	6	31.60%	6	31.60%	7	36.80%	12	63.20%
		Teacher 90	17	51.50%	7	21.20%	8	24.20%	1	3.00%	24	72.70%	9	27.30%
		Teacher 63	5	83.30%	1	16.70%	0	0.00%	0	0.00%	6	100.00%	0	0.00%
		Teacher 91	17	53.10%	7	21.90%	8	25.00%	0	0.00%	24	75.00%	8	25.00%

Part B: Scores

B.1. Overall

Tables 13 and 14 show that the treatment group outperformed the control group in terms of AIMS2011MathScale, AIMS2011MathGain, Percent AIMS2011MathGain, MathPost, PrePostGain and Percent PrePostGain. Figure 5 also shows that the treatment group outperformed the control group in terms of Percent AIMS2011MathGain, and Percent PrePostGain.

Table 13

	AIMS2011MathScale	AIMSGain	MathPost	PrePostGain
	Mean	Mean	Mean	Mean
Control	406.17	21.43	1286.21	98.38
Treatment	410.26	21.50	1272.87	105.54

Table 14

	AIMS2011MathScale Mean	AIMS2010MathScale Mean	Percent AIMS2011MathGain	MathPost Mean	MathPre Mean	Percent PrePostGain
Control	406.17	388.05	4.67	1286.21	1190.89	8.00
Treatment	410.26	391.61	4.76	1272.87	1176.34	8.21

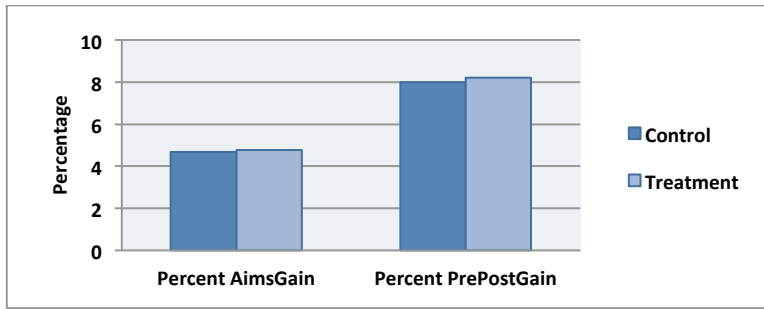


Figure 5

B.2. By Grade Level

Tables 15 and 16 show that the treatment group outperformed the control group at grades 6 and 8 in terms of AIMS2011MathScale, AIMGain, Percent AIMGain, MathPost, PrePostGain and Percent PrePostGain. Figure 6 also shows that the treatment group outperformed the control group at grades 6 and 8 in terms of Percent AIMGain, and Percent PrePostGain.

Table 15

		AIMS2011MathScale	AIMSGain	MathPost	PrePostGain
		Mean	Mean	Mean	Mean
6	Control	386.72	16.76	1184.75	112.16
	Treatment	403.88	23.41	1217.47	139.39
7	Control	403.83	20.36	1287.92	112.42
	Treatment	402.97	12.77	1257.40	81.27
8	Control	422.22	25.54	1359.02	76.20
	Treatment	428.25	28.87	1366.57	92.55

Table 16

		AIMS2011MathScale Mean	AIMS2010MathScale Mean	Percent AIMGain	MathPost Mean	MathPre Mean	Percent PrePostGain
6	Control	386.72	372.60	3.79	1184.75	1071.13	10.61
	Treatment	403.88	382.64	5.55	1217.47	1083.98	12.31
7	Control	403.83	387.29	4.27	1287.92	1184.03	8.77
	Treatment	402.97	392.58	2.65	1257.40	1181.36	6.44
8	Control	422.22	399.50	5.69	1359.02	1286.04	5.67
	Treatment	428.25	402.05	6.52	1366.57	1279.67	6.79

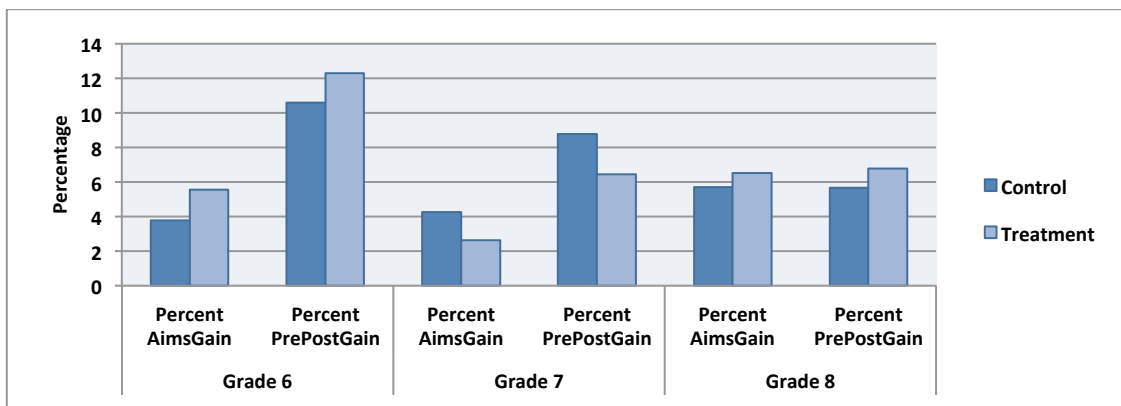


Figure 6

B.3. By Grade Level and School

Table 17 shows that:

- At grade 6 level, the treatment group in School 3 outperformed the control group in the same school in terms of AIMS2011MathScale, MathPost, PrePostGain and PrePostGain%.
- At grade 6 level, the treatment group in School 2 outperformed the control group in the same school in terms of all success indicators.

- At grade 6 level, the treatment group in School 4 outperformed the control group in the same school in terms of AIMS2011MathScale, AIMSGain and AIMSGain%.
- At grade 7 level, the treatment group in School 3 outperformed the control group in the same school in terms of AIMS2011MathScale and MathPost
- At grade 7 level, the treatment group in School 4 outperformed the control group in the same school in terms of AIMS2011MathScale, MathPost, PrePostGain and PrePostGain%.
- At grade 7 level, the treatment group in School 2 outperformed the control group in the same school in terms of AIMS2011MathScale, AIMSGain and AIMSGain%.
- At grade 8 level, the treatment group in School 1 and School 3 outperformed the control group in the same school in terms of AIMS2011MathScale, AIMSGain, AIMSGain%, MathPost, PrePostGain and PrePostGain%.
- At grade 8 level, the treatment group in School 4 outperformed the control group in the same school in terms of AIMS2011MathScale, MathPost and PrePostGain.
- At grade 8 level, the treatment group in School 2 outperformed the control group in the same school in terms of AIMS2011MathScale, PrePostGain and PrePostGain%.

Table 17

			AIMS2011MathScale	AIMSGain	AIMSGain%	MathPost	PrePostGain	PrePostGain%
			Mean	Mean	Mean	Mean	Mean	Mean
6	Control	School 1	381.88	18.12	5.35	1191.85	123.93	11.67
		School 3	391.75	18.91	5.33	1175.65	101.99	9.53
		School 4	389.48	9.28	2.64	1199.98	124.28	11.53
		School 2	330.25	17.75	5.73	1050.5	45.00	4.61
	Treatment	School 3	407.15	18.41	4.89	1218.02	133.63	12.35
		School 4	395.32	16.76	4.71	1197.71	112.24	10.34
		School 2	414.18	39.80	10.88	1255.74	179.29	16.85
		School 5	402.07	22.49	6.12	1207.05	136.45	12.61
7	Control	School 1	406.66	14.83	4.01	1348.79	159.16	13.33
		School 3	406.21	24.71	6.53	1280.66	115.16	9.88
		School 4	372.79	18.88	5.83	1170.96	29.28	2.62
		School 2	416.79	20.75	5.64	1312.9	110.12	9.19
	Treatment	School 3	409.64	15.77	4.32	1281.17	98.93	8.43
		School 4	397.97	17.54	4.80	1243.58	75.33	6.42
		School 2	435.32	23.40	5.69	1308.18	81.64	6.76
		School 5	394.99	-5.03	-0.83	1239.91	62.34	5.31
8	Control	School 1	413.28	15.20	3.84	1332.71	67.52	5.26
		School 3	437.53	33.82	8.76	1394.25	108.87	8.41
		School 4	400.50	18.99	5.26	1304.03	37.67	2.97
		School 2	432.59	25.15	6.53	1395.88	89.31	6.80
	Treatment	School 1	413.56	16.08	4.41	1349.26	84.88	6.76
		School 3	445.27	38.28	9.64	1418.18	139.16	10.88
		School 4	413.87	25.06	6.47	1303.54	45.16	3.67
		School 2	453.05	36.63	9.13	1395.17	104.06	8.07
		School 5	405.23	13.74	3.99	1322.19	36.48	2.94

B.4. By Grade Level, School and Teacher

Table 18 shows that 6 of the 10 (60%) control group of teachers at grade 6 had students with 5% or more gain in the AIMS test score and 13 of the 20 (65%) treatment group of teachers at grade 6 had students with 5% or more gain in the AIMS test score. Table 18 also shows that 8 of the 10 (80%) control group of teachers at grade 6 had students with 5% or more gain from pretest to posttest and 19 of the 20 (95%) treatment group of teachers at grade 6 had students with 5% or more gain from pretest to posttest

Table 18

Grade 6			AIMS2011MathScale	AIMSGain	AIMSGain Percent	MathPost	PrePostGain	PrePostGain Percent
			Mean	Mean	Mean	Mean	Mean	Mean
School 1	Control	Teacher 1	390.16	19.30	5.61	1219.06	148.28	14.03
		Teacher 2	373.03	16.74	5.04	1162.76	96.77	9.03
School 3	Control	Teacher 3	420.41	11.18	2.95	1245.81	140.19	12.80
		Teacher 4	381.64	6.23	1.89	1169.88	89.75	8.36
		Teacher 5	337.25	15.85	5.07	1046.67	30.20	2.98
		Teacher 6	403.07	31.38	8.79	1185.62	112.17	10.66
		Teacher 7	403.45	24.64	6.65	1204.71	123.18	11.44
		Teacher 8	401.24	3.90	0.96	1235.67		
	Treatment	Teacher 9	411.85	28.16	7.35	1205.75	129.09	11.91
		Teacher 10	412.68	10.80	3.00	1245.33	142.95	12.87
		Teacher 11	395.74	9.73	2.83	1196.04	128.79	12.05
		Teacher 12	413.97	36.92	9.63	1205.96	134.8	12.62
		Teacher 13	405.68	4.48	1.23	1246.31	134.55	12.29
		Teacher 14	374.48	16.19	4.65	1155.37	111.00	10.55
School 4	Control	Teacher 15	382.34	5.26	1.51	1176.79	86.41	8.00
		Teacher 16	413.83	26.06	6.69	1275.86	159.7	14.50
	Treatment	Teacher 17	402.25	18.38	5.23	1197.44	119.9	10.89
		Teacher 19	431.14	24.44	6.58	1262.64	134.84	12.13
		Teacher 20	356.14	25.33	7.77	1103.81	94.22	9.41
		Teacher 21	392.78	13.50	3.92	1186.22	102.81	9.63
		Teacher 22	330.25	17.75	5.73	1050.50	45.00	4.61
School 2	Treatment	Teacher 23	433.65	44.25	11.72	1283.57	183.16	17.22
		Teacher 24	411.59	32.05	8.60	1267.59	190.62	17.86
		Teacher 25	423.00	43.67	11.73	1269.91	179.24	16.56
		Teacher 26	371.29	38.75	11.72	1160.18	139.93	13.80
		Teacher 27	421.22	40.21	10.75	1277.83	197.93	18.43
School 5	Treatment	Teacher 28	385.87	22.36	6.83	1174.48	121.52	11.49
		Teacher 63	343.20	6.33	2.46	1063.60	85.00	8.90
		Teacher 30	383.59	19.22	5.75	1172.07	125.84	11.96
		Teacher 31	445.91	27.94	6.65	1294.35	161.72	14.36

Table 19.a and 19.b shows that 6 of the 16 (38%) control group of teachers at grade 7 had students with 5% or more gain in the AIMS test score and 8 of the 17 (47%) treatment group of teachers at grade 7 had students with 5% or more gain in the AIMS test score. Table 19 also shows that 10 of the 16 (63%) control group of teachers at grade 7 had students with 5% or more gain from pretest to posttest and 14 of the 17 (82%) treatment group of teachers at grade 7 had students with 5% or more gain from pretest to posttest

Table 19.a

Grade 7			AIMS2011MathScale	AIMSGain	AIMSGain Percent	MathPost	PrePostGain	PrePostGain Percent
			Mean	Mean	Mean	Mean	Mean	Mean
School 1	Control	Teacher 32	398.06	15.52	4.21	1320.00	135.48	11.25
		Teacher 33	415.00	14.19	3.83	1376.69	177.66	14.95
School 3	Control	Teacher 34	363.83	10.60	3.16	1215.00		
		Teacher 35	404.17	16.91	4.50	1257.47	73.05	6.22
		Teacher 36	423.05	32.64	8.36	1324.47	146.43	12.33
		Teacher 37	330.67	4.00	1.20	1125.50		
		Teacher 38	412.27	30.54	8.11	1294.04	130.25	11.35
	Treatment	Teacher 39	403.95	8.94	2.48	1258.06	92.35	7.97
		Teacher 40	405.26	4.44	1.36	1276.35	77.71	6.70
		Teacher 41	414.36	30.00	8.03	1296.47	136.11	11.89
		Teacher 42	409.36	14.31	4.14	1244.00	74.59	6.23
		Teacher 43	405.13	20.29	5.53	1285.09	100.50	8.56
School 4	Control	Teacher 44	426.76	27.06	7.06	1348.61	140.31	11.64
		Teacher 45	404.09	5.83	1.76	1253.25	62.00	5.22
		Teacher 46	379.72	13.54	4.10	1186.59	39.33	3.46
		Teacher 47	341.50			1151.50	52.00	4.83
	Treatment	Teacher 48	445.00	-11.00	-2.41			
		Teacher 49	359.62	28.80	8.90	1147.00	13.62	1.29
		Teacher 50	429.03	22.16	5.48	1303.39	110.47	9.18
		Teacher 51	403.71	18.62	5.19	1255.90	75.62	6.49
		Teacher 52	396.42	19.93	5.60	1244.03	73.64	6.46
		Teacher 53	389.14	17.47	4.91	1218.24	59.39	5.09
		Teacher 54	375.88	9.45	2.90	1206.13	56.60	4.86

Table 19.b

Grade 7			AIMS2011MathScale	AIMSGain	AIMSGain Percent	MathPost	PrePostGain	PrePostGain Percent
			Mean	Mean	Mean	Mean	Mean	Mean
School 1	Control	Teacher 32	398.06	15.52	4.21	1320.00	135.48	11.25
		Teacher 33	415.00	14.19	3.83	1376.69	177.66	14.95
School 2	Control	Teacher 55	418.00	23.23	5.85	1300.31	111.00	9.16
		Teacher 56	429.84	15.94	3.93	1364.12	128.64	10.56
		Teacher 57	424.90	23.75	6.39	1308.89	94.00	7.92
		Teacher 58	361.40	34.56	11.01	1177.25	59.50	5.35
		Teacher 59	423.50	13.24	3.55	1341.82	136.62	11.37
	Treatment	Teacher 60	435.32	23.40	5.69	1308.18	81.64	6.76
School 5	Treatment	Teacher 61	418.23	-9.10	-1.78	1289.50	85.76	7.19
		Teacher 62	379.39	-9.14	-1.92	1213.26	56.24	4.81
		Teacher 63	356.25	28.00	8.36	1132.75	77.00	6.82
		Teacher 64	391.47	0.92	0.61	1238.37	47.20	4.11

Table 20 shows that 14 of the 17 (82%) control group of teachers at grade 8 had students with 5% or more gain in the AIMS test score and 12 of the 14 (86%) treatment group of teachers at grade 8 had students with 5% or more gain in the AIMS test score. Table 20 also shows that 9 of the 17 (53%) control group of teachers at grade 8 had students with 5% or more gain from pretest to posttest and 8 of the 14 (57%) treatment group of teachers at grade 8 had students with 5% or more gain from pretest to posttest

Table 20

Grade 8			AIMS2011MathScale	AIMSGain	AIMSGain Percent	MathPost	PrePostGain	PrePostGain Percent
			Mean	Mean	Mean	Mean	Mean	Mean
School 1	Control	Teacher 65	413.28	15.20	3.84	1332.71	67.52	5.26
	Treatment	Teacher 66	413.56	16.08	4.41	1349.26	84.88	6.76
School 3	Control	Teacher 67	450.22	40.38	10.59	1412.92	99.65	7.62
		Teacher 68	436.67	35.22	9.31	1387.92	92.32	7.21
		Teacher 34	394.00	51.00	14.71	1276.00		
		Teacher 37	373.75	17.33	4.99	1248.33	-1.33	-0.16
		Teacher 69	443.24	33.04	8.44	1413.88	142.85	11.20
	Treatment	Teacher 70	439.52	26.75	6.53	1408.65	118.33	9.01
		Teacher 71	440.36	45.95	12.01	1412.68	143.57	11.20
		Teacher 72	448.54	40.17	9.99	1428.52	162.86	12.72
		Teacher 73	422.78	31.55	8.51	1354.00	81.64	6.46
		Teacher 74	448.33	33.87	8.40	1427.69	152.16	12.00
School 4	Control	Teacher 75	451.56	44.30	10.89	1434.56	135.88	10.50
		Teacher 76	459.59	34.40	8.25	1450.38	155.16	12.13
		Teacher 77	379.42	19.59	5.55	1256.12	14.44	1.21
		Teacher 78	373.88	20.32	5.98	1227.88	11.86	1.05
		Teacher 79	464.96	14.58	3.31	1450.46	95.60	7.17
	Treatment	Teacher 80	396.52	25.24	7.25	1287.21	8.88	0.87
		Teacher 81	360.21	16.92	5.15	1244.85	33.67	2.87
		Teacher 82	410.33	25.00	6.51	1292.73	16.68	1.38
School 2	Control	Teacher 83	420.50	24.72	6.26	1319.87	57.77	4.69
		Teacher 84	408.78	25.68	6.78	1292.55	61.20	4.94
		Teacher 85	454.21	24.44	5.83	1458.25	120.21	9.21
		Teacher 86	441.94	33.00	8.41	1376.47	91.91	7.02
		Teacher 87	443.71	26.58	6.51	1403.29	108.64	8.21
	Treatment	Teacher 88	425.84	15.69	4.18	1396.29	65.75	4.88
School 5	Treatment	Teacher 22	366.22	30.00	9.25	1232.60	-8.50	-0.32
		Teacher 89	453.05	36.63	9.13	1395.17	104.06	8.07
		Teacher 90	411.03	2.68	1.14	1342.31	20.75	1.68
School 5	Treatment	Teacher 63	372.00	30.67	9.02	1277.17	73.00	6.17
		Teacher 91	405.47	23.33	6.39	1310.50	48.76	3.85

Part C: Correlations (Treatment Group Only)

Significance level is 0.10 for all analyses.

C.1. Overall

Table 21

	Mean	Std. Deviation	N
TotalTime	376.3607	754.36252	1312
TotalFreq	6.2195	10.48339	1312
AIMS2011MathScale	410.2601	48.39955	1311
AIMSGain	21.4976	29.63596	1059
AIMSGain%	5.7652	7.68532	1059
MathPost	1272.8651	131.50341	1238
PrePostGain	105.5372	94.28176	1022
PrePostGain%	9.1894	8.33826	1022

Table 22 shows that

- The total time spent using Adaptive Curriculum is positively correlated with PrePostGain and PrePostGain%.
- The number of times of using Adaptive Curriculum is positively correlated with PrePostGain and PrePostGain%.

Table 22

		AIMS2011MathScale	AIMSGain	AIMSGain%	MathPost	PrePostGain	PrePostGain%
TotalTime	R	-.015	-.027	-.022	-.060	.088	.104
	Sig. (2-tld)	.582	.373	.468	.036	.005	.001
	N	1311	1059	1059	1238	1022	1022
TotalFreq	R	.001	.013	.018	-.020	.085	.092
	Sig. (2-tld)	.958	.663	.548	.491	.007	.003
	N	1311	1059	1059	1238	1022	1022

C.2. By Grade

Table 23

Grade		Mean	Std. Deviation	N
6	TotalTime	612.2632	1097.44134	501
	TotalFreq	8.5968	13.84244	501
	AIMS2011MathScale	403.8800	50.29055	500
	AIMSGain	23.4070	30.83417	398
	AIMSGain%	6.3941	8.19501	398
	MathPost	1217.4741	119.98496	483
	PrePostGain	139.3852	87.26902	366
	PrePostGain%	12.9431	8.30095	366
7	TotalTime	250.4806	410.92118	451
	TotalFreq	4.1109	7.27743	451
	AIMS2011MathScale	402.9712	41.91687	451
	AIMSGain	12.7743	26.24019	350
	AIMSGain%	3.5731	6.74760	350
	MathPost	1257.4045	107.76498	403
	PrePostGain	81.2682	85.09849	343
	PrePostGain%	6.9163	7.27114	343
8	TotalTime	205.7628	249.58397	360
	TotalFreq	5.5528	7.35964	360
	AIMS2011MathScale	428.2528	48.80568	360
	AIMSGain	28.8714	29.31953	311
	AIMSGain%	7.4274	7.45730	311
	MathPost	1366.5710	120.71636	352
	PrePostGain	92.5527	100.40191	313
	PrePostGain%	7.2911	7.94560	313

Table 24 shows that

- At grade 7, the total time spent using Adaptive Curriculum is positively correlated with AIMS2011MathScale and MathPost.
- At grade 7, the number of times of using Adaptive Curriculum is positively correlated with AIMS2011MathScale, MathPost, PrePostGain and PrePostGain%.
- At grade 8, the total time spent using Adaptive Curriculum is positively correlated with all success indicators.

- At grade 8, the number of times of using Adaptive Curriculum is positively correlated with AIMSGain, AIMSGain%, PrePostGain and PrePostGain%.

Table 24

Grade		AIMS2011MathScale	AIMSGain	AIMSGain%	MathPost	PrePostGain	PrePostGain%	
6	TotalTime	R	-0.03	-0.026	-0.022	0.009	-0.008	-0.005
		Sig. (2-tld)	0.508	0.606	0.66	0.85	0.878	0.928
		N	500	398	398	483	366	366
	TotalFreq	R	-0.064	-0.042	-0.032	-0.04	-0.04	-0.037
		Sig. (2-tld)	0.152	0.406	0.531	0.38	0.446	0.481
		N	500	398	398	483	366	366
7	TotalTime	R	.142	-.206	-.205	.118	0.028	0.022
		Sig. (2-tld)	0.002	0	0	0.018	0.6	0.689
		N	451	350	350	403	343	343
	TotalFreq	R	.135	-0.034	-0.041	.141	.131	.124
		Sig. (2-tld)	0.004	0.528	0.444	0.005	0.016	0.022
		N	451	350	350	403	343	343
8	TotalTime	R	0.099	.138	.133	.107	.156	.154
		Sig. (2-tld)	0.06	0.015	0.019	0.045	0.006	0.006
		N	360	311	311	352	313	313
	TotalFreq	R	0.076	.119	.121	0.081	0.097	0.098
		Sig. (2-tld)	0.149	0.035	0.033	0.128	0.087	0.083
		N	360	311	311	352	313	313

C.3. By Grade and School

Grade 6

Table 25

Grade = 6		N	Sum	Mean	SD
School 3	TotalTime	140	66154.40	472.53	674.06
	TotalFreq	140	801.00	5.72	7.53
	AIMS2011MathScale	140	57001.00	407.15	46.90
	AIMSGain	140	1970.00	18.41	29.96
	AIMSGain%	140	522.92	4.89	7.65
	MathPost	140	160779.00	1218.02	116.72
	PrePostGain	140	12160.00	133.63	87.12
	PrePostGain%	140	1123.87	12.35	8.22
School 4	TotalTime	158	112288.34	710.69	1312.88
	TotalFreq	158	1758.00	11.13	14.00
	AIMS2011MathScale	158	62461.00	395.32	48.67
	AIMSGain	158	2061.00	16.76	31.61
	AIMSGain%	158	579.43	4.71	8.74
	MathPost	158	183250.00	1197.71	116.03
	PrePostGain	158	11897.00	112.24	78.23
	PrePostGain%	158	1096.50	10.34	7.35
School 2	TotalTime	105	18841.11	179.44	357.61
	TotalFreq	105	141.00	1.34	0.95
	AIMS2011MathScale	105	43075.00	414.18	46.96
	AIMSGain	105	3463.00	39.80	23.90
	AIMSGain%	105	946.92	10.88	6.59
	MathPost	105	129341.00	1255.74	114.27
	PrePostGain	105	16315.00	179.29	88.49
	PrePostGain%	105	1533.36	16.85	8.58
School 5	TotalTime	98	109460.00	1116.94	1458.09
	TotalFreq	98	1607.00	16.40	21.16
	AIMS2011MathScale	98	39403.00	402.07	58.58
	AIMSGain	98	1822.00	22.49	31.56
	AIMSGain%	98	495.60	6.12	7.95
	MathPost	98	114670.00	1207.05	128.63
	PrePostGain	98	10643.00	136.45	82.39
	PrePostGain%	98	983.46	12.61	7.75

Table 26 shows that

- For School 4 at grade 6, the total time spent using Adaptive Curriculum is positively correlated with AIMS2011MathScale, MathPost, PrePostGain and PrePostGain%.
- For School 4 at grade 6, the number of times of using Adaptive Curriculum is positively correlated with all success indicators.
- For School 2 at grade 6, the number of times of using Adaptive Curriculum is positively correlated with PrePostGain and PrePostGain%.

Table 26

School			AIMS2011MathScale	AIMSGain	AIMSGain%	MathPost	PrePostGain	PrePostGain%
School 3	TotalTime	R	-0.102	-0.064	-0.053	-0.118	-0.039	-0.024
		Sig. (2-tld)	0.228	0.51	0.587	0.179	0.712	0.819
		N	140	107	107	132	91	91
	TotalFreq	R	-0.077	-0.065	-0.056	-0.097	-0.029	-0.017
		Sig. (2-tld)	0.368	0.505	0.566	0.271	0.782	0.876
		N	140	107	107	132	91	91
School 4	TotalTime	R	.225	0.139	0.11	.330	.241	.220
		Sig. (2-tld)	0.005	0.125	0.226	0	0.013	0.024
		N	158	123	123	153	106	106
	TotalFreq	R	.196	.179	0.159	.279	.245	.224
		Sig. (2-tld)	0.013	0.048	0.078	0	0.011	0.021
		N	158	123	123	153	106	106
School 2	TotalTime	R	0.076	0.011	-0.006	0.098	0.1	0.087
		Sig. (2-tld)	0.442	0.916	0.958	0.326	0.345	0.413
		N	104	87	87	103	91	91
	TotalFreq	R	0.11	0.033	0.022	0.14	0.188	0.178
		Sig. (2-tld)	0.265	0.762	0.842	0.157	0.074	0.092
		N	104	87	87	103	91	91
School 5	TotalTime	R	-.242	-0.07	-0.026	-.212	-0.107	-0.072
		Sig. (2-tld)	0.016	0.532	0.818	0.04	0.349	0.53
		N	98	81	81	95	78	78
	TotalFreq	R	-.218	-0.075	-0.033	-0.187	-0.108	-0.077
		Sig. (2-tld)	0.031	0.506	0.771	0.069	0.346	0.505
		N	98	81	81	95	78	78

Grade 7

Table 27

Grade 7		N	Sum	Mean	SD
School 3	TotalTime	156	29698.89	190.38	195.21
	TotalFreq	156	825.00	5.29	7.63
	AIMS2011MathScale	156	63904.00	409.64	41.49
	AIMSGain	156	1971.00	15.77	23.74
	AIMSGain%	156	539.70	4.32	6.18
	MathPost	156	162709.00	1281.17	101.30
	PrePostGain	156	11871.00	98.93	85.64
	PrePostGain%	156	1011.45	8.43	7.31
School 4	TotalTime	184	1847.31	10.04	39.59
	TotalFreq	184	226.00	1.23	5.88
	AIMS2011MathScale	184	73226.00	397.97	41.92
	AIMSGain	184	2491.00	17.54	25.30
	AIMSGain%	184	682.15	4.80	6.63
	MathPost	184	220113.00	1243.58	107.86
	PrePostGain	184	10622.00	75.33	84.37
	PrePostGain%	184	904.88	6.42	7.24
School 2	TotalTime	19	17224.78	906.57	2.30
	TotalFreq	19	137.00	7.21	0.92
	AIMS2011MathScale	19	8271.00	435.32	35.30
	AIMSGain	19	351.00	23.40	17.98
	AIMSGain%	19	85.32	5.69	4.29
	MathPost	19	22239.00	1308.18	123.80
	PrePostGain	19	1143.00	81.64	81.45
	PrePostGain%	19	94.67	6.76	6.71
School 5	TotalTime	92	64195.75	697.78	593.05
	TotalFreq	92	666.00	7.24	7.87
	AIMS2011MathScale	92	36339.00	394.99	39.58
	AIMSGain	92	-342.00	-5.03	26.77
	AIMSGain%	92	-56.59	-0.83	6.71
	MathPost	92	101673.00	1239.91	105.90
	PrePostGain	92	4239.00	62.34	82.34
	PrePostGain%	92	361.29	5.31	7.03

Table 28 shows that

- For School 3 at grade 7, the number of times of using Adaptive Curriculum is positively correlated with MathPost, PrePostGain and PrePostGain%.
- For School 4 at grade 7, the time spent using and the number of times of using Adaptive Curriculum is positively correlated with PrePostGain and PrePostGain%.
- For School 5 at grade 7 the time spent using and the number of times of using Adaptive Curriculum is positively correlated with AIMS2011MathScale.
- For School 5 at grade 7 the time spent using Adaptive Curriculum is positively correlated with MathPost.

Table 28

School			AIMS2011MathScale	AIMSGain	AIMSGain%	MathPost	PrePostGain	PrePostGain%
School 3	TotalTime	R	0.092	0.014	0.011	0.137	0.054	0.046
		Sig. (2-tld)	0.252	0.875	0.907	0.126	0.558	0.616
		N	156	125	125	127	120	120
	TotalFreq	R	0.121	0.109	0.1	.235	0.17	0.162
		Sig. (2-tld)	0.133	0.225	0.269	0.008	0.064	0.078
		N	156	125	125	127	120	120
School 4	TotalTime	R	0.061	0.075	0.063	0.104	0.152	0.149
		Sig. (2-tld)	0.413	0.374	0.456	0.169	0.072	0.079
		N	184	142	142	177	141	141
	TotalFreq	R	0.015	0.056	0.045	0.017	0.152	0.15
		Sig. (2-tld)	0.842	0.505	0.594	0.817	0.072	0.076
		N	184	142	142	177	141	141
School 2	TotalTime	R	-0.331	-0.345	-0.35	-0.279	-0.129	-0.119
		Sig. (2-tld)	0.166	0.208	0.2	0.278	0.659	0.686
		N	19	15	15	17	14	14
	TotalFreq	R	-0.331	-0.345	-0.35	-0.279	-0.129	-0.119
		Sig. (2-tld)	0.166	0.208	0.2	0.278	0.659	0.686
		N	19	15	15	17	14	14
School 5	TotalTime	R	.344	-0.158	-0.154	.253	0.195	0.182
		Sig. (2-tld)	0.001	0.197	0.21	0.022	0.111	0.138
		N	92	68	68	82	68	68
	TotalFreq	R	.303	0	-0.009	0.16	0.139	0.127
		Sig. (2-tld)	0.003	0.997	0.939	0.151	0.257	0.303
		N	92	68	68	82	68	68

Grade 8

Table 29

Grade 8		N	Sum	Mean	SD
School 3	TotalTime	161	53109.36	329.87	309.37
	TotalFreq	161	1427.00	8.86	8.99
	AIMS2011MathScale	161	71689.00	445.27	56.81
	AIMSGain	161	5321.00	38.28	31.15
	AIMSGain%	161	1339.55	9.64	7.80
	MathPost	161	222654.00	1418.18	131.66
	PrePostGain	161	19761.00	139.16	102.55
School 4	PrePostGain%	161	1545.34	10.88	8.20
	TotalTime	82	8816.36	107.52	153.01
	TotalFreq	82	163.00	1.99	3.54
	AIMS2011MathScale	82	33937.00	413.87	29.13
	AIMSGain	82	1779.00	25.06	20.87
	AIMSGain%	82	459.45	6.47	5.40
	MathPost	82	104283.00	1303.54	74.99
School 5	PrePostGain	82	3432.00	45.16	74.16
	PrePostGain%	82	278.75	3.67	5.90
	TotalTime	71	7314.67	103.02	97.23
	TotalFreq	71	309.00	4.35	5.36
	AIMS2011MathScale	71	28771.00	405.23	34.41
	AIMSGain	71	797.00	13.74	26.59
	AIMSGain%	71	231.65	3.99	7.02
School 5	MathPost	71	92553.00	1322.19	96.94
	PrePostGain	71	1970.00	36.48	84.43
	PrePostGain%	71	158.69	2.94	6.57

Table 30 shows that

- For School 4 at grade 8, the number of times of using Adaptive Curriculum is positively correlated with AIMS2011MathScale, AIMSGain and AIMSGain%.
- For School 5 at grade 8 the time spent using and the number of times of using Adaptive Curriculum is positively correlated with AIMSGain and AIMSGain%.

Table 30

School			AIMS2011MathScale	AIMSGain	AIMSGain%	MathPost	PrePostGain	PrePostGain%
School 3	TotalTime	R	-0.064	-0.03	-0.025	-0.08	-0.062	-0.06
		Sig. (2-tld)	0.421	0.723	0.767	0.32	0.463	0.475
		N	161	139	139	157	142	142
	TotalFreq	R	-0.089	-0.014	0	-0.106	-0.084	-0.081
		Sig. (2-tld)	0.264	0.874	0.998	0.186	0.322	0.339
		N	161	139	139	157	142	142
School 4	TotalTime	R	-0.014	0.097	0.105	-0.04	0.094	0.097
		Sig. (2-tld)	0.902	0.423	0.384	0.725	0.417	0.406
		N	82	71	71	80	76	76
	TotalFreq	R	.261	.244	0.227	0.181	0.01	0.015
		Sig. (2-tld)	0.018	0.04	0.056	0.109	0.931	0.899
		N	82	71	71	80	76	76
School 5	TotalTime	R	-0.023	.264	.261	-0.221	-0.039	-0.018
		Sig. (2-tld)	0.847	0.045	0.047	0.066	0.777	0.9
		N	71	58	58	70	54	54
	TotalFreq	R	0.061	0.125	0.129	-0.161	-0.082	-0.051
		Sig. (2-tld)	0.614	0.349	0.335	0.182	0.558	0.716
		N	71	58	58	70	54	54

Part D: Comparative Analyses

Significance level is 0.10 for all analyses.

D.1. Overall

All analyses are single factor which is a fixed factor that indicates the group and has 2 levels (control and treatment).

ANCOVA - Dependent Variable: AIMS2011MathScale, Covariate: AIMS2010MathScale (Table 31).

The treatment group outperformed the control group in terms of AIMS2011MathScale in reference to AIMS2010MathScale. The results are not statistically significant at the 0.10 level.

Table 31

Group	N	Adjusted Mean	Std. Error	F	Sig.
Control	691	411.432 ^a	1.035	.171	.680
Treatment	1059	411.982 ^a	.836		

a. Covariates appearing in the model are evaluated at the following values: AIMS2010MathScale = 390.2954.

ANOVA - Dependent Variable: AIMSGain (Table 32)

The treatment group outperformed the control group in terms of AIMSGain. The results are not statistically significant at the 0.10 level.

Table 32

Group	N	Mean	Std. Error	F	Sig.
Control	691	21.425	1.063	.003	.958
Treatment	1059	21.498	.859		

ANOVA - Dependent Variable: AIMSGain% (Table 33)

The treatment group outperformed the control group in terms of AIMSGain%. The results are not statistically significant at the 0.10 level.

Table 33

Group	N	Mean	Std. Error	F	Sig.
Control	691	5.815	.280	.019	.889
Treatment	1059	5.765	.226		

ANCOVA - Dependent Variable: MathPost, Covariate: MathPre (Table 34)

The treatment group outperformed the control group in terms of MathPost in reference to MathPre. The results are not statistically significant at the 0.10 level.

Table 34

Group	N	Adjusted Mean	Std. Error	F	Sig.
Control	664	1282.446 ^a	3.671	1.199	.274
Treatment	1022	1287.614 ^a	2.958		

a. Covariates appearing in the model are evaluated at the following values: MathPre = 1182.8612.

ANOVA - Dependent Variable: PrePostGain (Table 35)

The treatment group outperformed the control group in terms of PrePostGain. The results are not statistically significant at the 0.10 level.

Table 35

Group	N	Mean	Std. Error	F	Sig.
Control	664	98.378	3.700	2.269	.132
Treatment	1022	105.537	2.982		

ANOVA - Dependent Variable: PrePostGain% (Table 36)

The treatment group outperformed the control group in terms of PrePostGain%. **The results are statistically significant at the 0.10 level.**

Table 36

Group	N	Mean	Std. Error	F	Sig.
Control	664	8.394	.324	3.661	.056
Treatment	1022	9.189	.261		

D.2. By Grade

All analyses are 3 by 2; both factors are fixed; 1st factor is the grade and has 3 levels (6, 7 and 8); second factor is the group and has 2 levels (control and treatment).

ANCOVA - Dependent Variable: AIMS2011MathScale, Covariate: AIMS2010MathScale (Table 37)

- The treatment group at grade 6 outperformed the control group in terms of AIMS2011MathScale in reference to AIMS2010MathScale. **The results are statistically significant at the 0.10 level.**
- The treatment group at grade 8 outperformed the control group in terms of AIMS2011MathScale in reference to AIMS2010MathScale. The results are not statistically significant at the 0.10 level.

Table 37

Group	Grade 6					Grade 7					Grade 8				
	N	Adjusted Mean	Std. Error	F	Sig.	N	Adjusted Mean	Std. Error	F	Sig.	N	Adjusted Mean	Std. Error	F	Sig.
Control	197	395.242 ^a	2.022	10.533	.001	215	410.358 ^b	1.588	10.588	.001	279	426.335 ^c	1.644	2.576	.109
Treatment	398	403.277 ^a	1.420			350	403.789 ^b	1.244			311	429.970 ^c	1.557		

a. Covariates appearing in the model are evaluated at the following values: AIMS2010MathScale = 379.4118.

b. Covariates appearing in the model are evaluated at the following values: AIMS2010MathScale = 390.6283.

c. Covariates appearing in the model are evaluated at the following values: AIMS2010MathScale = 400.9525.

ANOVA - Dependent Variable: AIMSGain (Table 38)

- The treatment group at grade 6 outperformed the control group in terms of AIMSGain. **The results are statistically significant at the 0.10 level.**
- The treatment group at grade 8 outperformed the control group in terms of AIMSGain. The results are not statistically significant at the 0.10 level.

Table 38

Group	Grade 6					Grade 7					Grade 8				
	N	Mean	Std. Error	F	Sig.	N	Mean	Std. Error	F	Sig.	N	Mean	Std. Error	F	Sig.
Control	197	16.756	2.064	6.943	.009	215	20.358	1.694	12.421	.000	279	25.545	1.687	2.050	.153
Treatment	398	23.407	1.452			350	12.774	1.327			311	28.871	1.598		

ANOVA - Dependent Variable: AIMSGain% (Table 39)

- The treatment group at grade 6 outperformed the control group in terms of AIMSGain%. **The results are statistically significant at the 0.10 level.**
- The treatment group at grade 8 outperformed the control group in terms of AIMSGain%. The results are not statistically significant at the 0.10 level.

Table 39

Group	Grade 6					Grade 7					Grade 8				
	N	Mean	Std. Error	F	Sig.	N	Mean	Std. Error	F	Sig.	N	Mean	Std. Error	F	Sig.
Control	197	4.816	.555	5.402	.020	215	5.549	.445	12.205	.001	279	6.727	.437	1.357	.245
Treatment	398	6.394	.391			350	3.573	.349			311	7.427	.414		

ANCOVA - Dependent Variable: MathPost, Covariate: MathPre (Table 40)

- The treatment group at grade 6 outperformed the control group in terms of MathPost in reference to MathPre. **The results are statistically significant at the 0.10 level.**
- The treatment group at grade 8 outperformed the control group in terms of MathPost in reference to MathPre. **The results are statistically significant at the 0.10 level.**

Table 40

Group	Grade 6					Grade 7					Grade 8				
	N	Adjusted Mean	Std. Error	F	Sig.	N	Adjusted Mean	Std. Error	F	Sig.	N	Adjusted Mean	Std. Error	F	Sig.
Control	193	1192.098 ^a	6.312	12.253	.001	215	1295.584 ^b	6.217	15.419	.000	256	1359.767 ^c	6.195	3.866	.050
Treatment	366	1219.416 ^a	4.582			343	1264.441 ^b	4.921			313	1376.200 ^c	5.602		

a. Covariates appearing in the model are evaluated at the following values: MathPre = 1080.0000.

b. Covariates appearing in the model are evaluated at the following values: MathPre = 1183.1685.

c. Covariates appearing in the model are evaluated at the following values: MathPre = 1283.6134.

ANOVA - Dependent Variable: PrePostGain (Table 41)

- The treatment group at grade 6 outperformed the control group in terms of PrePostGain. **The results are statistically significant at the 0.10 level.**
- The treatment group at grade 8 outperformed the control group in terms of PrePostGain. **The results are statistically significant at the 0.10 level.**

Table 41

Group	Grade 6					Grade 7					Grade 8				
	N	Mean	Std. Error	F	Sig.	N	Mean	Std. Error	F	Sig.	N	Mean	Std. Error	F	Sig.
Control	193	112.155	6.301	12.227	.001	215	112.423	6.209	15.477	.000	256	76.195	6.185	3.848	.050
Treatment	366	139.385	4.576			343	81.268	4.916			313	92.553	5.594		

ANOVA - Dependent Variable: PrePostGain% (Table 42)

- The treatment group at grade 6 outperformed the control group in terms of PrePostGain%. **The results are statistically significant at the 0.10 level.**
- The treatment group at grade 8 outperformed the control group in terms of PrePostGain%. **The results are statistically significant at the 0.10 level.**

Table 42

Group	Grade 6					Grade 7					Grade 8				
	N	Mean	Std. Error	F	Sig.	N	Mean	Std. Error	F	Sig.	N	Mean	Std. Error	F	Sig.
Control	193	10.492	.599	10.949	.001	215	9.493	.530	14.507	.000	256	5.890	.484	4.607	.032
Treatment	366	12.943	.435			343	6.916	.420			313	7.291	.438		

Part E: Summary of Results

At grade 6 and 8 a greater percentage of the treatment group teachers than the control group teachers had 35% or more students scoring 3 or 4 and passing the AIMS test while at grade 7 level the individual percentages of control and treatment group teachers that had 35% or more students scoring 3 or 4 and passing the AIMS test were very close and marginally in favor of the control group. At all grades a greater percentage of the treatment group teachers than the control group teachers had students with 5% or more gain in the AIMS test score as well as from pretest to posttest.

The results show that in the overall sense the treatment group outperformed the control group with more people scoring 3 and 4 people and passing the AIMS and less people scoring 1 and 2 and failing the AIMS. At grades 6 and 8, there was a greater gap between the two groups in favor of the treatment group, whereas at grade 7, the control group performed marginally better than the treatment group. At grade 6, the treatment group in School 3, School 4 and School 2; at grade 7, the treatment group in School 4 and School 2; and at grade 8, the treatment group in School 1, School 3 and School 4 had more students scoring 3 and 4 and passing the AIMS and fewer students scoring 1 and 2 and failing the AIMS.

The treatment group outperformed the control group in terms of AIMS2011MathScale in reference to: AIMS2010MathScale; AIMSGain; AIMSGain%; MathPost in reference to MathPre; and PrePostGain, however these results are not statistically significant at the 0.10 level. Also, the treatment group outperformed the control group in terms of PrePostGain% and the results are statistically significant at the 0.10 level.

The treatment group at grades 6 and 8 outperformed the control group in terms of: AIMS2011MathScale in reference to AIMS2010MathScale; AIMSGain and AIMSGain%. The results for grade 6 are statistically significant at the 0.10 level whereas those for grade 8 are not.

The treatment group at grades 6 and 8 outperformed the control group in terms of MathPost in reference to MathPre and the results are statistically significant at the 0.10 level.

The treatment group at grade 8 outperformed the control group in terms of PrePostGain and PrePostGain%. The treatment group at grade 6 outperformed the control group in terms of PrePostGain%. These results are statistically significant at the 0.10 level.

The total time spent using Adaptive Curriculum is positively correlated with PrePostGain and PrePostGain%. The number of times of using Adaptive Curriculum is positively correlated with PrePostGain and PrePostGain%.

At grade 7, the total time spent using Adaptive Curriculum is positively correlated with AIMS2011MathScale and MathPost. At grade 7, the number of times of using Adaptive Curriculum is positively correlated with AIMS2011MathScale, MathPost, PrePostGain and PrePostGain%. At grade 8, the total time spent using Adaptive Curriculum is positively correlated with all success indicators. At grade 8, the number of times of using Adaptive Curriculum is positively correlated with AIMS2011MathScale, AIMS2011MathGain, AIMS2011MathGain%, PrePostGain and PrePostGain%.

For School 4 at grade 6, the total time spent using Adaptive Curriculum is positively correlated with AIMS2011MathScale, MathPost, PrePostGain and PrePostGain% while the number of times of using Adaptive Curriculum is positively correlated with all success indicators. For School 2 at grade 6, the number of times of using Adaptive Curriculum is positively correlated with PrePostGain and PrePostGain%. For School 4 at grade 8, the number of times of using Adaptive Curriculum is positively correlated with AIMS2011MathScale, AIMS2011MathGain and AIMS2011MathGain%. For School 5 at grade 8 the time spent using and the number of times of using Adaptive Curriculum is positively correlated with AIMS2011MathScale and AIMS2011MathGain%.

For School 3 at grade 7, the number of times of using Adaptive Curriculum is positively correlated with MathPost, PrePostGain and PrePostGain%. For School 4 at grade 7, the time spent using and the number of times of using Adaptive Curriculum is positively correlated with PrePostGain and PrePostGain%. For School 5 at grade 7 the time spent using and the number of times of using Adaptive Curriculum is positively correlated with AIMS2011MathScale. For School 5 at grade 7 the time spent using Adaptive Curriculum is positively correlated with MathPost.

9. DISCUSSION

This study shows that Adaptive Curriculum was successful in the overall sense as a means of curricular support at the 5 middle schools in the school district, which is title 1. In particular, the program was successful at grade 6 and 8 being more successful at grade 6 than at grade 8. Furthermore, more of the treatment group students than the control group students passed the AIMS test. At grade 7, the program did not create a noticeable difference between the control and treatment groups while the control group performed marginally better at this grade level. The study also showed that there is positive correlation between the success indicators and the usage of Adaptive Curriculum.

Adaptive Curriculum is an online learning environment that has all the “bells and whistles” and if all of its capabilities are exploited, it can create a major improvement for the performance of students in the AIMS Mathematics test at the middle school level. However, the extent to which Adaptive Curriculum can be successful depends on many factors that include: (1) The technical infrastructure of school, such as the computer labs or laptop carts used, the speed and reliability of the internet connection, etc. (2) How technologically competent the teacher using Adaptive Curriculum is, i.e. whether or not the teacher has the computer knowledge to effectively use Adaptive Curriculum. (3) The belief system of the teacher using Adaptive Curriculum, i.e. whether or not s/he believes in the use of technology to assist traditional curriculum. (4) How effectively the teacher can use Adaptive Curriculum, i.e. is s/he aware of all of what Adaptive Curriculum does offer and can s/he effectively access and use them as needed; this is directly related with the professional development of teachers which is an absolutely essential component of adopting an online learning environment as a means of curricular aid. (5) Is Adaptive Curriculum exploited to the fullest extent? What is used must comprise most if not all of what Adaptive Curriculum has to offer.

Adaptive Curriculum is developed with the intention of making often difficult concepts easier for being taught by teachers and more enjoyable for students to learn. Adaptive Curriculum demonstrates the fact that technology can be effectively integrated into middle school mathematics enabling teachers to grow into roles of adviser, content expert, and coach helping make teaching and learning more meaningful and fun and enhancing the relationship between teacher and student.

All in all, this study reveals the fact that Adaptive Curriculum may increase student success and create high scorers on state wide high stakes tests; but it must be noted that the extent to which Adaptive Curriculum can be successful depends highly upon how effectively it is implemented.

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