

EVALUATION OF THE 2010-2011 REASONING MIND PROGRAM IN BEAUMONT ISD

Submitted to
Reasoning Mind, Inc.

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Evaluation of *Reasoning Mind* Program 2010-2011

Executive Summary

The *Reasoning Mind* Mathematics Program was tested in the fifth grades of eight elementary schools in Beaumont Independent School District, Texas during 2010-2011. A quasi-experimental pretest-posttest control group experimental design study was conducted to examine the influence of the Reasoning Mind (RM) mathematics program on 637 fifth-grade students in eight schools: Curtis, Dishman, Dunbar, Fehl, Fletcher, French, Pietzsch-MacArthur, and Regina-Howell Elementary Schools. Six elementary schools voluntarily piloted RM for two years, in 2009-2010 and 2010-2011, while two voluntarily piloted the program only in 2010-2011. The use of RM was grade-wide with the exception of Pietzsch-MacArthur, where it was just used for the lower half of students based on their mathematics achievement scores. The comparison schools consisted of 777 fifth-grade students in the remaining eight elementary schools in Beaumont ISD.

All fifth-grade students from the 16 schools in Beaumont ISD were administered the Texas Assessment of Knowledge and Skills (TAKS) in the Spring of 2011 (posttest). Their TAKS mathematics scores from the previous year (2010) were used as the pretest measure. Their scores were analyzed to determine the extent to which the change in mathematics scores of *Reasoning Mind* students were different from those of the comparison group.

Students and teachers in the Reasoning Mind program completed brief questionnaires examining their perceptions of the program near the end of the school year in the Spring of 2011. This evaluation also reports on the results of surveys of over 300 students in six elementary schools in Beaumont, Texas and nine RM teachers from eight elementary schools.

The summary of achievement findings are listed below.

1. Overall, the Reasoning Mind program was effective; fifth-grade students who used the program in Beaumont ISD had significantly higher TAKS mathematics achievement scores in 2011 than those fifth-grade students in comparison schools in Beaumont ISD.
2. These findings are robust in that there are significant positive effects of the programs even after statistically controlling for the prior years' academic achievement and students' socio-economic status. Students' scale score gains in the RM treatment group were 38% higher than the comparison group, after controlling for prior achievement and SES.
3. The Reasoning Mind program was equally effective for males and females as well as for students from all ethnic groups.
4. The two RM program features that were found to be positively related to students' post-TAKS mathematics achievement were the percentage of correct answers students had and the number of objectives that students completed. The percent of correct answers is the best predictor of RM students' mathematics performance on the 2011 TAKS, and it has a much greater effect than students' prior performance in mathematics (2010 TAKS).

Fifth-grade students and their teachers completed surveys of their perceptions of the program and of mathematics. The summary of their perceptions follow.

5. Nearly half of the fifth-grade students (47%) listed mathematics as their favorite subject, more than any other content field, and look forward to a vocation that involves considerable mathematics.
6. Eighty-four percent (84%) of fifth-grade students liked RM City and half of the fifth-grade students (49.4%) *really liked RM City*.
7. After learning math in RM City, 62% liked learning mathematics even more than previously.
8. Students liked using the computer to learn mathematics, and thought it was fun. They were motivated by the Genie to pursue as long a streak of correct answers as possible.
9. More than half of the students (55%) preferred to study math in RM City than in a regular classroom.
10. Teachers valued the support from their Program Coordinator more than other support.
11. When asked to compare the support received in RM City with other educational service providers, 67% rated RM support *Among the Best* and 33% rated it *Above Average*. None rated it *Average* or lower.
12. One teacher wrote: "RM has given my students the opportunity to not limit themselves. They are allowed to make mistakes without feeling embarrassed. The Genie encourages them not to give up and that they will be successful... The RM program has allowed me to have more one-on-one sessions with my students who need that extra assistance." Her analysis mirrored those of other teachers.

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Evaluation of Reasoning Mind Program 2010-2011

This evaluation is organized into the following five major sections: (a) Reasoning Mind Math Achievement Results, (b) TAKS Achievement Test Results, (c) Student Questionnaire Results, (d) Teacher Questionnaire Results, and (e) Conclusions.

Results of TAKS Mathematics Achievement Analyses

The purpose of *Reasoning Mind* is to enhance student achievement in mathematics. It has been tested through several iterations involving fifth-grade students. The current report summarizes data on the extent to which the Reasoning Mind program was effective in enhancing fifth-grade student achievement in mathematics in eight elementary schools during 2010-2011.

A quasi-experimental pretest-posttest control group experimental design study was conducted to examine the influence of the Reasoning Mind (RM) mathematics program on 637 fifth-grade students in eight schools: Curtis, Dishman, Dunbar, Fehl, Fletcher, French, Pietzsch-MacArthur, and Regina-Howell Elementary Schools. Six elementary schools voluntarily piloted RM for two years, in 2009-2010 and 2010-2011, while two voluntarily piloted the program only in 2010-2011. The use of RM was grade-wide with the exception of Pietzsch-MacArthur, where it was just used for the lower half of students based on their mathematics achievement scores. The comparison schools consisted of 777 fifth-grade students in the remaining eight elementary schools in Beaumont ISD.

An Analysis of Covariance (ANCOVA) was used to maximize power in order to detect the treatment effect of the Reasoning Mind program. A one-way ANCOVA was conducted, using the treatment (i.e., treatment/comparison group) as the between-subject factor, the 2011 TAKS mathematics scaled score as the dependent measure, and the 2010 TAKS mathematics scaled score as the covariate. Initial analyses of the 2010 TAKS mathematics scaled scores indicated that there were no statistically significant achievement differences ($t(1,219) = 1.229, p = .219$) between the treatment and comparison groups. The ANCOVA results are reported in the following sections, and then summarized as Findings and Conclusions of this study.

ANCOVA TAKS Mathematics Achievement Test Results

Table 1 displays the TAKS results. A one-way ANCOVA was conducted to examine the effect of treatment/comparison group on 2011 Mathematics TAKS scaled scores, using 2010 Mathematics TAKS scores as a covariate (i.e., pretest). The results indicate that the group variable had a statistically significant effect on the dependent variable, after statistically controlling for any pretest differences.

Table 1
ANCOVA TAKS Mathematics Achievement Test Results

Dependent Variable: 2011 Mathematics TAKS Scaled Score

Source	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>	Partial <i>Eta</i> <i>squared</i>
Corrected Model	4.594E6 ^a	2	2.297E6	363.203	.000	.376
Intercept	1.632E6	1	1.632E6	258.099	.000	.177
TAKS Pretest	4.8449E6	1	4.449E6	703.570	.000	.369
Group	97490.823	1	97490.823	15.416	.000	.013
Error	7.614E6	1204	6324.093			
Total	5.921E8	1207				
Corrected Total	1.221E7	1206				

^a*R-Squared* = .376 (Adjusted *R-Squared* = .375)

The two adjusted means for treatment and comparison groups were 702.686 and 684.671 as reported in Table 2. In other words, the treatment group had significantly higher adjusted posttest TAKS scores than the comparison group. This indicates that the RM treatment group scaled scores gain ($M = 46.156$) was 64% higher than the comparison group ($M = 28.14$). Although these are statistically significant findings ($p < .001$), the effect size reflected by the *partial Eta-squared* indicates that this is a small effect.

Table 2
Adjusted Means for Treatment and Comparison Groups

Dependent Variable: 2011 Mathematics TAKS Scaled Score

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Comparison	684.671 ^a	3.147	678.497	690.844
Treatment	702.686 ^a	3.338	696.137	709.234

^aCovariates appearing in the model are evaluated at the following values: 2010 Mathematics TAKS Scaled Score = 656.53.

ANCOVA TAKS Mathematics Achievement Test Results, Including SES as a Covariate

Since students in the eight treatment schools appeared to have higher socio-economic status (as measured by the federal free lunch indicator) than students in the comparison schools, a second analysis using socioeconomic status (SES) as an additional covariate was included in the evaluation. Table 3 displays the one-way ANCOVA that was conducted to examine the effect of treatment/comparison group on 2011 Mathematics TAKS scaled scores, using 2010 Mathematics

TAKS scores and SES as covariates or statistical controls. The results indicate that the group variable had a statistically significant effect on the dependent variable, after statistically controlling for any pretest and SES differences.

Table 3
ANCOVA TAKS Mathematics Achievement Test Results including SES

Dependent Variable: 2011 Mathematics TAKS Scaled Score

Source	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>	Partial <i>Eta</i> <i>squared</i>
Corrected Model	4.759E6 ^a	3	1.586E6	256.153	.000	.390
Intercept	1.745E6	1	1.745E6	2581.750	.000	.190
TAKS Pretest	3.869E6	1	3.869E6	624.866	.000	.342
SES	164750.778	1	164750.778	26.605	.000	.019
Group	39228.687	1	39238.687	6.335	.012	.005
Error	7.449E6	1203	6192.400			
Total	5.921E8	1207				
Corrected Total	1.221E7	1206				

^a*R-Squared* = .390 (Adjusted *R-Squared* = .388)

The two adjusted means for treatment and comparison groups were 699.406 and 687.586 as reported in Table 4. In other words, the treatment group had significantly higher adjusted posttest TAKS scores than the comparison group. This indicates that the RM treatment group scaled scores gain ($M = 42.876$) was 38% higher than the comparison group ($M = 31.056$) after controlling for prior achievement and SES. Although these are statistically significant findings ($p < .01$), the effect size reflected by the *partial Eta-squared* indicates that this is a small effect.

Table 4
Adjusted Means for Treatment and Comparison Groups

Dependent Variable: 2010 Mathematics TAKS Scaled Score

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Comparison	687.586 ^a	3.165	681.377	693.794
Treatment	699.406 ^a	3.363	692.808	706.005

^aCovariates appearing in the model are evaluated at the following values: 2010 Mathematics TAKS Scaled Score = 656.53; SES = .25.

Multiple Regression Analyses Analyzing Effects of Student and Program Characteristics.

Table 5 displays the multiple regression results that analyze the effects of student and program characteristics on 2011 TAKS scores. The dependent variable, 2011 TAKS scores, was regressed on the independent variables of 2010 TAKS scores, students' socio-economic status, ethnicity, gender, the Reasoning Mind program characteristics of total hours completed, number of objectives completed, and the percentage of correct answers. The mean for number of objectives completed was $M = 53.98$ ($SD = 25.352$) and the mean for percentage of correct answers was $M = 72.98$ ($SD = 10.613$) with the range of 37% to 96%.

The regression results reveal that about 58% of the variance on 2011 TAKS scores were accounted for by the independent variables. As expected, the 2010 TAKS mathematics scaled scores had a significant, positive slight effect on the 2011 TAKS scores. Students' socio-economic status, ethnicity, and gender, however, did not have a significant effect. In terms of Reasoning Mind program characteristics, the percent answered correctly and the number of objectives completed had significant positive effects on the dependent variable, 2011 TAKS mathematics scores. The percent of correct answers had a positive, moderate effect and the number of objectives completed had a low, positive effect. The overall regression results indicate that the percent of correct answers is the best predictor of 2011 TAKS scaled scores and it has a much greater effect than students' prior performance in mathematics (2010 TAKS Mathematics Scaled Scores).

Table 5

Multiple Regression Results of the 2011 TAKS Scaled Scores on 2010 TAKS Scores, SES, Ethnicity, Gender, Total Hours, Percent Answered, and Number of Objectives Completed

Independent Variables	<i>B</i>	<i>SE</i>	β	<i>t</i>
2010 TAKS Mathematics Scaled Scores	.282	.038	.272	7.382 ***
Socio-economic Status (i.e., free lunch)	-.668	7.046	-.003	.095
Ethnicity (Black)	-13.169	8.595	-.066	1.532
Ethnicity (Hispanic)	-9.073	9.775	-.036	.928
Ethnicity (Other)	10.546	11.772	.030	.896
Gender	-7.636	5.545	-.038	1.377
Percent Answered	4.183	.383	.434	10.908***
Number of Objectives Completed	.601	.132	.150	4.549 ***
Multiple regression R^2	.575			
Adjusted R^2	.569			

Note. *** $p < .001$.

Student Survey Results

This section reports on the results of surveys of over 300 fifth-grade students who had studied mathematics using RM City. Students' perceptions were collected via an online survey that was specifically designed for the present evaluation. Students were in six elementary schools: Curtis, Dishman, Dunbar, French, Pietzsch-MacArthur, and Regina-Howell Elementary Schools. Results of the student surveys are presented in the following paragraphs.

Fifth Graders Favorite Subject: Mathematics

Students were asked three questions about their favorite subject. Their responses are summarized in this section of the report. Table 6 summarizes responses to a question about their favorite subject in fifth grade.

Table 6

What is your favorite subject in school?

Favorite Subject	Frequency	Percent
Math	154	47.2%
English/Language Arts	16	4.9%
Science	95	29.1%
Social Studies	28	8.6%
Other (Reading, Art, Music, PE)	33	10.1%
Totals	326	100%

Nearly half of fifth graders (47%) listed math as their favorite subject, more than any other content field. Science was a distant second choice with 29% of students selecting it.

Table 7 examines these same data by elementary school.

Table 7***Number and percent of students who selected math as their favorite Subject, by School***

Elementary School	What is your favorite subject in school?		
	Total RM City Students in School	Number of RM City Students Who Selected Math As Their Favorite Subject	%
Dishman ES	107	47	44%
Regina-Howell ES	52	20	38%
Pietzsch-MacArthur	35	20	57%
French ES	46	21	46%
Curtis ES	70	40	57%
Dunbar ES	16	6	38%
Total	326	154	47%

When the number of students in a school who were engaged in RM City were compared with the number who also chose math as their favorite subject, Dishman not only had the largest number of students, but the largest number who selected math, but not the largest percentage (44%). Fifty-seven percent (57%) of Pietzsch-MacArthur and Curtis students selected math. Dunbar had the smallest number of students in RM City and the smallest percentage of them who selected math as their favorite course.

The second question directed to students to ascertain their interest in math was, “How often do you feel you like math?” Their responses are summarized by school in Table 8.

Table 8
How often do you feel you like math?

Elementary School	How often do you feel you like math?					Total	Percent (4 or 3)
	NA	Always or almost always	Often	Sometimes	Never or hardly ever		
		4	3	2	1		
Dishman ES	1	22	26	47	11	107	45%
Regina-Howell ES	0	11	15	21	5	52	50%
Pietzsch-MacArthur ES	0	10	7	13	5	35	49%
French ES	0	19	8	18	1	46	59%
Curtis ES	2	26	19	16	7	70	64%
Dunbar ES	0	4	2	9	1	16	38%
Total	3	92	77	124	30	326	52%
Percent	1%	28%	24%	38%	9%	100%	

More than half of the students (52%) indicated they “Always” or “Almost Always” or “Often” thought about math. One-in-eleven (9%), “Never” or “Hardly Ever” thought about math. The range was from 38% to 64%, with Dunbar students feeling they least often felt they liked math.

The third question queried them on their potential job and its use of mathematics. Table 9 summarizes student perceptions of potential jobs that require extensive mathematics.

Table 9
When you get older, would you like a job that uses lots of math?

Elementary School	When you get older, would you like a job that uses lots of math?						Total
	Yes		Maybe		No		
	n	%	n	%	n	%	n
Dishman ES	23	32%	49	38%	34	33%	106
Regina-Howell ES	7	10%	26	18%	16	15%	49
Pietzsch-MacArthur ES	11	15%	17	8%	7	11%	35
French ES	10	14%	29	7%	6	14%	45
Curtis ES	21	29%	30	20%	18	22%	69
Dunbar ES	1	1%	7	9%	8	5%	16
Total / Percent	73	23%	158	49%	89	28%	320

Note: 6 students did not respond to this question.

Nearly three-fourths of students (72%) responded “Yes” or “Maybe” to a job that involved considerable mathematics.

We concluded that these students liked math better than other subjects, and would look forward to a vocation that involved considerable mathematics.

Student Reflections on RM City and Mathematics

Several questions explored how the students liked RM City. The first of these questions asked the question bluntly, “Did you like learning math in RM City?” Their responses are organized and reported in Table 10 by elementary school.

Table 10
Did you like learning math in RM City?

Elementary School	Number	% of RM Students	Liked RM*	Mean Rating**
Dishman ES	106	32.9%	79%	3.02
Regina-Howell ES	52	16.1%	75%	3.02
Pietzsch-MacArthur ES	35	10.9%	83%	3.23
French ES	44	13.7%	93%	3.75
Curtis ES	69	21.4%	90%	3.46
Dunbar ES	16	5.0%	81%	3.06
Total	322	100%	84%	3.24

* Percent of students marking “*I really liked it*” or “*I sort of liked it.*”

** **4**=*I really liked it*; **3**=*I sort of liked it*; **2**=*I sort of did not like it*; and **1**=*I really did not like it.*

Note: Four students of 326 did not respond to this question.

Table 11 compares the mean ratings of students in the six elementary schools that taught RM City mathematics to fifth grade students. The number of students ranged from 16 fifth grade students in Dunbar Elementary School to 107 in Dishman Elementary School. Students selected from the following options to the question: Did you like learning math in RM City? *4- I really like it; 3: I sort of like it; 2: I sort of did not like it; or 1: I really did not like it.*

The mean ratings of students ranged from 3.02 to 3.75, with a total mean of 3.24. Eighty-four percent (84%) of fifth graders liked RM City and half of all students (49.4%) *really liked RM City*. Only 16% indicated they “did not like it.” The highest percentage of students in French Elementary School (93%) indicated they liked RM City, while three-fourths (79%) of Dishman and 75% of Regina-Howell Elementary School indicated they liked it.

What did you like about learning math in RM City?

Eighty-five percent (85%) of the 326 students responded to this open-ended question. Their comments are summarized in this section by the six elementary schools they attended and the attributes they identified as positive elements of RM City.

Of the 107 Students from Dishman Elementary School, ten did not respond to this question. The 97 responses were quite varied, but 16 (15%) identified the computer and 9 (8%) thought it was “fun” (“Everything is on the computer and it is fun”). Students (15 or 14%) appreciated the “streak” and worked to extend their winning streak. Only 21 percent of students mentioned any of the mathematics functions (fractions were mentioned by 8 students, decimals by 6). The liked the pictures (Because you can answer a correct problem and it will give you a picture). The genie was praised by 5 students (“if you get a problem wrong Genie will review it with you).

Only 43 of 52 students in Regina-Howard Elementary School responded to this question. Eight of them identified a math function and 3 thought it was fun. The Genie was mentioned 6 times as a positive part of the program. One student wrote, "It wasn't just a simple piece of paper with problems on it; it was really different." Another wrote, "All kinds of things I didn't know and to find out stuff simpler!!!"

Twenty-nine (29) of 35 students in Pietzsch-MacArthur Elementary School responded to this question. Their responses were similar to the others—fun and math games, Genie, specific math ideas, but several replied that "Everything on RM City is awesome; it's a fun way to learn math; I really like the Genie solution--when you get a problem wrong you can read the Genie solution and you can understand it;" Another wrote, "You didn't have to write on paper."

Seventy three percent (73%) of students in the French Elementary School identified some of the things they liked about RM City. Twelve of them (35% of those responding) identified the Genie as the most important part of the program. One student wrote, "I like that we get to do all kinds of math."

Ninety percent (90%) of students (61 of 70) in Curtis Elementary School completed responses to this question. Of those who responded to this question, 18% mentioned that RM is "fun." One student described RM this way: "I think it is more fun than learning in class and you have to pay attention to the theory so you know what to do." Two others described their reasons for liking RM as "It made you think" and "The challenge of the problems." The variety of objectives included in the program was referenced by several students. Another wrote about the fact that students "learn more than one topic in just a day."

One student in Dunbar Elementary School summarized the perceptions of many, "You get to learn things you never learn in class" and another wrote, "You get prizes for achieving something." Only 13 of 16 students in 709 completed this question, an inadequate number to generalize responses.

What did you dislike about learning math in RM City?

While 80% of students responded to this question, 21% left the question blank, all from Dishman Elementary School, and 17% reported that "Nothing was wrong" or that they "did not dislike anything." The remaining responses were related to a wide range of "dislikes:" operations such as long division, multiplication, formulas, decimals and fractions, and "the theory." Several had a similar response to the student who wrote that he disliked it "when the Genie doesn't give us a clue about what the question is" and "when the Genie would say that's not right and you need to stay focused." Several disliked it when they got the answer wrong. Eighteen students felt it was too hard, 9 of whom were from Pietzsch-MacArthur Elementary School.

Table 11 summarizes student responses to the question: *Do you like learning math in RM City?* Eighty-four percent (84%) of students indicated they liked RM City. We wondered if the responses of the 16% who did not like RM City might provide insights into the program.

The comments of these 16% are summarized as follows. In general, those students who were negative about RM City listed negative perceptions in this question while those who were positive tended to list positive responses to a question that asked for negative feelings.

Table 11***Student Responses Concerning Extensiveness of Their Like or Dislike of RM, and Why***

I really did not like it. (17 wrote comments out of 31 responses that they really did not like RM City)

“Nothing” 8 of 17

Algebra, fractions, mixed numbers.

I sort of did not like it. (16 wrote comments of 21 responses that they did not like RM City (76%))

Fun; games, puzzle (5 of 16)

Could not work at home, so mostly learn in classroom

Genie told you when ready for the next objective

Learn at own speed (2).

I sort of liked it. (86 comments of 110; 78%)

It was fun, Games and prizes; the genie race

Learn new things

Algebra, fractions, statistics, multiplication, division

Learning math on the computer and at my own pace

Some questions were easy and RM gave you hints

Pictures

Easy but gets a little bit harder.

I really liked it. (126 comments of 160; 75%)

I really like the genie solution; when you get a problem wrong you can read the genie solution and you can understand it

Everything

A fun way to learn math

Easy and challenging

It made me want to learn more because you can get a streak.

It's on a computer

The genie

Decimals, Algebra,

Student Reactions to RM City

Students were asked two critical questions “Did you like learning math in RM City?” and “Would you like to learn math in RM City next year?” Because these are important questions, they were analyzed in several ways.

First, the basic question, “Would you like to learn math in RM City next year?” Thirty-seven percent (37%) responded “yes” while 40% were not certain and answered “Maybe” and 23% “No.” Table 12 includes their responses by elementary school.

Table 12

Student Responses to “Would you like to learn math in RM City next year?”

School	Would you like to learn math in RM City next year?						
	Yes	Maybe	No	Total	% "Yes"	% "Maybe"	% "No"
Dishman ES	35	35	36	107	32.7%	32.7%	33.6%
Regina-Howell ES	12	25	15	52	23.1%	48.1%	28.8%
Pietzsch-MacArthur	11	14	10	35	31.4%	40.0%	28.6%
French ES	27	18	1	46	58.7%	39.1%	2.2%
Curtis ES	30	29	10	70	42.9%	41.4%	14.3%
Dunbar ES	6	8	2	16	37.5%	50.0%	12.5%
Total	121	129	74	326	37.1%	39.6%	22.7%

Over 77% of students responded “Yes” or “Maybe” to this question. For French, Dunbar, and Curtis Elementary Schools, between 86% and 98% responded “Yes” or “Maybe.” Over half of the students in French Elementary School (58.7%) responded “Yes” to this question, and 98% responded “Yes” or “Maybe.”

The second issue is related to the extent to which students liked math after studying it in RM City. Table 13 compares their responses to this question with whether or not they would like to learn math from RM City next year.

Table 13
Influence of Changes in Math Attitude on Program Choices Next Year

Do you like math more or less after learning in RM City?	Would you like to learn math in RM City next year?				Total	%
	NR	No	Maybe	Yes		
Now, I like math a lot more.	0	3	43	88	134	41%
Now, I like math a little more.	0	11	41	17	69	21%
I like math the same as I did before	0	27	37	13	77	24%
Now, I like math a little less.	0	12	5	1	18	6%
Now, I like math a lot less.	0	21	2	2	25	8%
Total	2	74	129	121	326	100%
Percent	1%	23%	40%	37%	100%	

After taking math through RM City this year, 41 percent liked math a lot more and an additional 21 percent liked it a little more. Sixty-two percent (62%) liked math more, 24% about the same, and 14% less after studying math in RM City.

Three comparisons were made to elicit the perceptions of students. In the first comparison, students were asked if they liked math more or less after learning it in RM City. Their responses are analyzed by examining the differentiated reactions by their responses to the question, “Did you like learning math in RM City?” This analysis is included in Table 14.

Table 14
Comparison of Perceptions of math in RM City with Perceptions After Learning in RM City

Did you like learning math in RM City?	Do you like math more or less after learning in RM City?				Totals	%
	Less	Same as before	More			
I really liked it.	2	21	136	159	49.5%	
I sort of liked it.	12	40	58	110	34.3%	
I sort of did not like it.	10	7	4	21	6.5%	
I really did not like it.	19	9	3	31	9.7%	
Total	43	77	201	321	100%	
Percent	14%	24%	62%			

Those students who indicated they liked learning math through RM City indicated they liked it even more after RM City. 84% liked learning math in RM City, and 62% liked it even more after learning math in RM City.

The second comparison was between how well they liked studying math in RM City and whether they would like to learn math in RM City the following year. This analysis is included in Table 15.

Table 15

Analysis of Student Liking RM City with Studying RM City next year.

<i>Did you like learning math in RM City?</i>	<i>Would you like to learn math in RM City next year?</i>			Total	Percent
	No	Maybe	Yes		
I really liked it.	4	51	105	160	49%
I sort of liked it.	29	66	15	110	34%
I sort of did not like it.	13	8	0	21	6%
I really did not like it.	28	3	0	31	10%
Totals	74	128	120	322	100%
Percent	23.0%	39.8%	37.3%	100%	

More than three-fourths of students (77%) indicated “Yes” (37%) or “Maybe” (40%) would like to learn math in RM City next year. However, 23% responded “No,” 45% of whom had indicated they liked learning math through RM City.

The third analysis was by school, considering the question, In general, would you prefer to learn math in RM City or in a regular classroom? This is considered in Table 16.

Table 16
Preference for RM City or a regular classroom by school

Elementary School	In general, would you prefer to learn math in RM City or in a regular classroom?			
	Regular Classroom	I do not have a preference	RM City	Total
Dishman ES	33 31%	20 19%	53 50%	106 100%
Regina-Howell ES	18 35%	15 29%	19 37%	52 100%
Pietzsch-MacArthur ES	11 31%	3 9%	21 60%	35 100%
French ES	3 7%	5 11%	38 83%	46 100%
Curtis ES	17 24%	15 21%	37 53%	69 100%
Dunbar ES	3 19%	2 13%	11 69%	16 100%
Total	85 26%	60 18%	179 55%	324 100%

More than half of the students (55%) would prefer to study math in RM City rather than a regular classroom, and another 18% did not have a preference, but one-fourth (26%) would prefer the regular classroom. This balance varied by schools, ranging from 37% (Regina-Howell) to 83% (French Elementary School) preferring RM City. Conversely, about one-third of three schools selected the regular classroom (Regina-Howell-35%, Dishman-31%, and Pietzsch-MacArthur-31%).

Teacher Survey Results

Nine teachers from eight elementary schools completed the Teacher Survey; two were from Regina-Howell Elementary School. Two of the teachers taught in schools where students had not completed surveys (Fehl and Fletcher Elementary Schools). This section summarizes the nine teachers' perceptions of the program.

General Information

Two teachers had taught Reasoning Mind more than 2 years, six others had taught RM City from 1-2 years, and one teacher had taught RM City 1-2 semesters.

Overall RM Support

Teachers were asked several questions to elicit their perception of the support they received from the RM program, its coordinators and consultants. This is summarized in Table 17.

Table 17
How satisfied were teachers with RM Support?

Extent of Satisfaction with RM Support	N	N Missing	Mean	Std. Deviation
Satisfied with support from your program coordinator	9	0	4.67	.500
Satisfied with support from other RM staff	5	4	3.60	.894
Teacher interface and reports usability	5	4	3.80	.447
Overall RM experience	5	4	3.40	.548

Teachers valued the support from their Program Coordinator more than other areas of support. Seven of nine teachers rated the coordinator **5** and the other two a **4**. Three teachers rated the overall experience **3**, two **4**, and four left this question blank. None of the teachers provided any written comments on their appraisal.

When asked to compare the support received from other educational service providers in the past two years, teachers were very positive. Sixty-seven percent (67%) rated RM support *Among the Best* (5) and 33% rated it *Above Average*. None rated it *Average* or lower.

Two questions asked teachers about the PC support. Only one teacher made recommendations that were negative: she felt the support could have been more often and the requirements a bit

repetitive. Five wrote they were not dissatisfied and three others left this blank, presuming that they too were satisfied.

Seven of the nine teachers wrote positive comments while only one made a recommendation while five felt there was nothing they were dissatisfied with and three others left this blank, presuming that they too were satisfied.

Comments about both the male and female PC supporter were similar. They were lauded for being professional, always being available and willing to help, sensitive, and helpful and encouraging to students.

Program Coordinator Visits

Teachers were asked to appraise the effectiveness of coordinators. These are summarized in Table 18.

Table 18

To what extent were teachers visited enough times to maintain a successful implementation?

How often has your Program Coordinator visited you since you started using RM this year?	How Often do you feel visits are necessary?			Total
	3	4	5	
3 times	2	1	1	4
4 times	2	1	1	4
5 times	0	0	1	1
Total	4	2	3	9

Four teachers believed 3 visits would be necessary; two teachers felt 4 visits were needed, and three teachers indicated 5 visits would be necessary to successfully implement the program. In reality, coordinators visited four classrooms 3 times, 4 visited classrooms 4 times, and one center was visited 5 times. Seven of the nine teachers were visited at least as many times as they felt was necessary for success.

Implementation (2 of the 4 teachers who were visited 3 times; 2 of the 3 teachers who felt 4 visits were needed, and the teacher who felt 5 visits were needed was visited 5 times).

Teachers were asked to discuss the Program Coordinator Support; only two teachers responded:

- I need to see my PC more.

- As previously stated, Caitlin is a team player and has high expectations from my students and from me. She is truly dedicated to the mission of RM!

Effectiveness of Program Coordinator Support

Table 19

Perception of Benefit of Aspects of RM Professional Development

How beneficial did you find each of the following aspect of RM Professional Development towards your work as an RM teacher?	N	Mean	Std. Deviation
Teacher Resource Website	3	3.67	.577
Curriculum Study Sessions (in-person)	8	3.75	1.282
Remote Curriculum Study Sessions	6	3.50	1.378
Curriculum Study Exam	6	3.67	.516
Best Practices Workshop (in-person)	8	4.25	.886
Remote Best Practices Workshops	4	3.75	.957

Teachers rated the Best Practices highest (4.25), although all were rated high.

Teachers were asked to add any additional details regarding their answers above. Three of the nine teachers responded as follows.

- I didn't get to participate in any study sessions, so therefore study sessions were not beneficial at all. I wish we had had study sessions for the test. I know I could have done much better on the test if a study session were made available.
- I personally was not happy with the misinformation that was presented to me at the beginning of this school year. We (previous 5th grade teachers) were informed that we did not have to take another Mastery Exam after we took the first one, but then we were told that in order to get mastery this year, we would have to take another exam. I personally was not happy with that.
- Having just taken the Master Test, I felt we needed to have a study session as most of us teach 5th grade and many of our students have moved into the 6th grade core. I felt I wasn't as prepared but it was not my PC's fault totally.

Teachers were asked to comment on the overall convenience of the times and locations of RM Professional Development opportunities. Seven of the nine teachers responded as below.

- I can't complain about the location of the opportunities but the time is totally unfair on a professional level. We should not be taxed with having to go to these sessions on our own time. The district should provide subs so we can take days to learn what we need to learn in order to better prepare our students. We should work smarter not harder! Brow beating us by making us come on our own time is totally unfair.
- Location was fine.
- I don't like it because it conflicts with my after school tutorials
- No time is good when a teacher does tutorials 4 days a week (M-Th). The location is not a problem - getting there is.
- Everyone has great ideas to share, but I think it would be more beneficial to meet with the specific grade level that you teach.

- At this time, I feel the overall convenience of the times and locations of the RM Professional Development opportunities were suitable for me.
- I would like it if y'all didn't have afterschool meetings on Wednesday. Some people go to church on Wed. nights.

Usefulness of RM Tools and Methods

To assess the effectiveness of RM tools and methods, three questions were posed. The first was “How often have you used Reasoning Mind reports this year?” Responses were as follows:

No. of Teachers	Extensiveness of Use
8	More than one per week
1	Once per week
0	Once every other week
0	Once per month
0	Once every other month
0	Less than once every other month
0	Never

Eight of the nine teachers used RM reports more than once a week, and the ninth teacher indicated she used it once per week.

A second question asked teachers to identify any RM reports they had viewed most frequently this year? None of the eight reports were checked.

A follow-up question asked them to identify any other reports or features within current RM reports that they wish would be available.

- I would like to be able to print example problems from the Student Study History Report.
- For students to be able to review ALL homework assignments and solutions after they have turned them in. For the TAKS Prep, more challenging Mini-Quizzes.
- I would like to be able to pull up the student progress report and have the entire class listed as it is so difficult to pull each student up one at a time.
- None
- It would be very useful if there was a page that showed each individual student’s objective as a class. It is very, very incontinent to have to individually look up.

Teaching with Reasoning Mind

Teachers were asked to rate the impact of Reasoning Mind on their students. On a 5-point scale, the mean ratings for all was 4.33 on a 5.00 scale. The rating scale was as follows:

- 5-Significantly Improved
- 4-Improved
- 3-Neither Regressed nor Improved
- 2-Regressed
- 1-Significantly Regressed

The mean ratings for teachers are listed in Table 20.

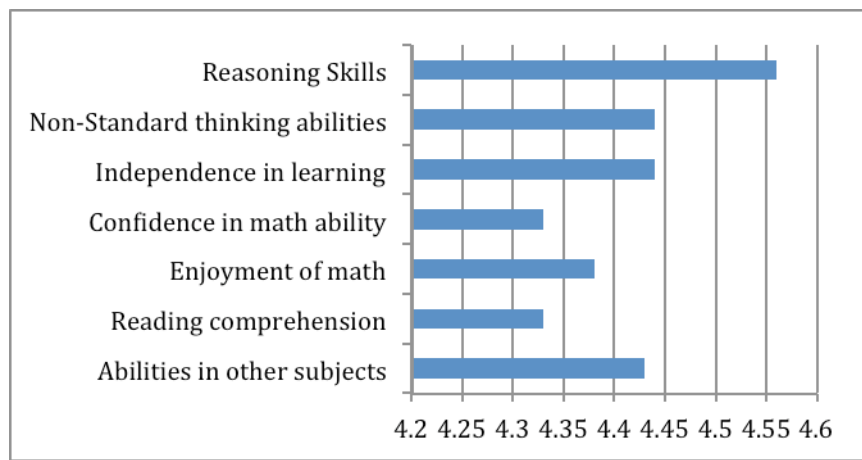
Table 20

To what extent did the use of Reasoning Mind impact the following in your students?

To what extent did the use of Reasoning Mind impact the following in your students?	N	Mean	SD
Reasoning Skills	9	4.56	.527
Non-Standard thinking abilities	9	4.44	.527
Independence in learning	9	4.44	.527
Confidence in math ability	9	4.33	.707
Enjoyment of math	8	4.38	.518
Reading comprehension	9	4.33	.500
Abilities in other subjects	7	4.43	.535
Mean Rating		4.42	.549

The mean rating of mathematics skills and abilities was 4.42 on a 5.00 scale. The highest rated skill was *Reasoning Skills* and the lowest *Reading Comprehension*. These are illustrated in the following chart.

Impact of Reasoning Mind on Students



The strongest influence was on *Reasoning Skills*, closely followed by *Non-standard Thinking Abilities* and *Independence in Learning*. The distinctions between these mathematics abilities were not statistically significant.

When asked to identify any additional details, one teacher wrote, “the thing that I see RM City helps most with is getting the student to use their reasoning skills to a level that makes learning math the conventional way much easier.”

Teachers were reluctant to commit to teaching RM next year. None answered this question directly as *Yes* or *No*, but four of the nine teachers responded with written responses, as follows.

- Not only do I want to teach with RM city next year, but I want to be entrenched with RM city for the next ten years. The possibilities are astronomical if I can stay teamed up with RM city. My unique teaching style accompanied with the discipline in learning math that RM brings could take teaching and learning math to levels never attained before.
- I would only like to use it as a supplement instead of my core curriculum. I feel like my low students were always frustrated and never felt successful. They moved very slowly through the curriculum, and did not complete much of it.
- I am looking forward to teaching RM next year. I feel that RM has allowed me to touch each student versus the traditional "math class" set up.
- Yes, but as a supplement, not as total curriculum. Students need too much backup support. I would like to spend 1/2 time teaching and the other half with RM.

Two teachers definitely plan to teach RM City next year, and look forward to it. Two others would like to teach RM City but as a supplement to their regular curriculum. Five teachers left this blank.

Final Considerations

In the final session of the teacher’s survey, participants were asked to consider other areas that RM City might influence. In the first open-ended question, they responded to “Are there ways in which using RM has saved either time or money for you as a teacher or for your school in general? If so, please explain. The responses of seven of the nine teachers are found below.

- RM city saves time and money! Example Time Saver: Work is graded as you go. Gives the teacher more time to teach skills and knowledge necessary to bring students to accountability levels. Example Money Saver: No need for expensive text books.
- Time in creating and generating reports for staff and for students...FAST and ACCURATE!
- Saves time in terms of lesson plans. Adds time in terms of reports to run, read and decipher. Adds time when being retested for the second year in a row!!
- Yes, helps with grading papers. This is a big time saver.
- Lesson plans were always the same. I like the fact that I didn't have to make many copies.
- N/A
- RM has cost me more money this year. I have to pay for incentives that motivate the class as a whole and as individuals. RM provides some, but not enough incentives.

The second question in this section was, “Have parents become more involved or motivated as a result of their children using Reasoning Mind? If so, please describe how with any anecdotes below.” Four of the nine teachers responded *No*, *N/A*, or *None at all*, but five others answered the question.

- Parents love being able to interact from their pc at home or the library.
- Some parents have really enjoyed how the program pushes their students and they are allowed to continue to move forward in their math learning.
- Parent support has been good!
- Yes and No. Yes, some parents would rather help students on a computer rather than paper, and no, because some do not have a computer or internet.

- When the students finally became interested and worked hard, the parents became involved with the RM work. Many parents without internet brought their students early (7:30) and let them stay after school for ACE (a tutorial program). After the first taking of the TAKS test, I had several parents come in and thanked me for making their student work and be responsible and that made the difference in a Yes or No.

The third question was, “In your best estimate, what impact has Reasoning Mind had on student attendance?” The impact statement and number of teachers selecting it are included in Table 21.

Table 21

Teacher assessment of the Impact of RM on Student Attendance

Number of Teachers Selecting Impact Level on Students	In your best estimate, what impact has Reasoning Mind had on student attendance?
2 Teachers	7. Very positive (on average, more than 2 additional weeks of attendance)
3 Teachers	6. Fairly positive (on average, 1-2 additional weeks of attendance)
0 Teachers	5. Slightly positive (on average, 1-2 additional weeks of attendance)
3 Teachers	4. No impact attributable to Reason Mind
1 Teacher	3. Slightly negative (on average, 1-2 additional days missed)
0 Teachers	2. Fairly negative (on average, 1-2 additional weeks missed)
0 Teachers	1. Very negative (on average, more than 2 additional weeks missed)

The mean impact of Reasoning Mind on student attendance was 5.2, “*Slightly positive.*”

The final question invited the teachers to submit testimonials about the Reasoning Mind program. Five of the nine teachers did.

- My best testimonial might be the fact that we finished with 100% passing on the TAKS test this year.
- I just overall feel like the RM program really helps bridging the gap between teachers and teaching our GT/High Achiever students. Those students usually do not have the opportunity to excel in their math skills in a regular math classroom setting. But, with the RM program, they have the opportunity to excel above and beyond! Which is a huge plus for them. They can finally get the challenge that they deserve and need.
- I really enjoy teaching math using the RM way!! It is challenging and rewarding.
- I have a very bright student in my class. He was always a behavior problem for teachers in previous years. RM allowed him to work at his own pace, and that's what he needed. He needed that challenge. He did not give me one problem this year.
- In my opinion, RM has given my students the opportunity to not limit themselves. They are allowed to make mistakes without feeling embarrassed. The Genie encourages them not to give up and that they will be successful. One student, A.W., who is extremely shy, with the help of the Genie has come out of his shell! He now has so much confidence in himself until he volunteers to be the “Genie Helper!” The RM program has allowed me to have more one-on-one sessions with my students who need that extra assistance. My hope and wish is that RM will become the standard in ALL schools!! My sidebar --Where was RM when I was in school? I sure could have used the Genie’s help!!! (LOL)

Summary and Conclusions

Summary of Findings from Study of Academic Achievement

Overall, the findings from this evaluation indicate that the Reasoning Mind program has been effective and that fifth-grade students who used the program in Beaumont ISD had significantly higher TAKS mathematics achievement scores in 2011 than those fifth-grade students in comparison schools in Beaumont ISD. These findings are robust in that there are significant positive effects of the programs even after statistically controlling for the prior years' academic achievement and students' socio-economic status. Students' scale score gains in the RM treatment group were 38% higher than the comparison group, after controlling for prior achievement and SES.

The multiple regression results that were just used for students in the Reasoning Mind program found that the program was equally effective for males and females as well as students from all ethnic groups. The two program features that were found to be positively related to students' post-TAKS mathematics achievement were the percentage of correct answers students had and the number of objectives that students completed. The percent of correct answers is the best predictor of RM students' mathematics performance on the 2011 TAKS, and it has a much greater effect than students' prior performance in mathematics (2010 TAKS).

Summary of Findings from Student and Teacher Surveys

1. Nearly half of fifth graders (47%) listed math as their favorite subject, more than any other content field, and look forward to a vocation that involves considerable mathematics.
2. Eighty-four percent (84%) of fifth graders liked RM City and half of the fifth graders (49.4%) *really liked RM City*.
3. After learning math in RM City, 62% liked learning math even more than previously.
4. Students liked using the computer to learn mathematics, and thought it was fun. They were motivated by the Genie to pursue as long a streak of correct answers as possible.
5. More than half of the students (55%) preferred to study math in RM City than in a regular classroom.
6. Teachers valued the support from their Program Coordinator more than other support.
7. When asked to compare the support received in RM City with other educational service providers, 67% rated RM support *Among the Best* and 33% rated it *Above Average*. None rated it *Average* or lower.
8. One teacher wrote: "RM has given my students the opportunity to not limit themselves. They are allowed to make mistakes without feeling embarrassed. The Genie encourages them not to give up and that they will be successful... The RM program has allowed me to have more one-on-one sessions with my students who need that extra assistance." Her analysis mirrored those of other teachers.

In conclusion, the achievement results, teacher questionnaire, and student questionnaire corroborate the positive effects of the Reasoning Mind program.