Evaluation of the Reasoning Mind Mathematics Program 2012-2013

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At-a-Glance

The Reasoning Mind (RM) technology-based, math curriculum program was provided as a supplement for Dallas Independent School District (ISD) second-grade students in 2011-12 and expanded to second- and third-grade students in 2012-13. Students at all but two schools (Allen, Dealey) were enrolled in RM during 2012-13. All teachers were required to complete the RM qualification course prior to implementing the program. In addition, per the RM support model, supported teachers received extra training (12 hours) and support from an RM Program Coordinator. Whereas all teachers were supported in 2011-12, one teacher per campus was supported in 2012-13 due to cost. The purpose of this report is to summarize context, implementation, and outcome findings.

Methodology

Context. The workscopes for Title I, Part A and Title II, Part A were reviewed to determine budgeted amounts for RM student and teacher costs, respectively. Student demographic information was extracted from the Public Education Information Management System (PEIMS) October 29, 2012 file.

Implementation. Using RM files, frequency and descriptive analyses were carried out to examine implementation of teacher training and student use of RM. Fall data used in this report differ from the data used in the interim report because RM provided updated data that included students that were missing in the previous fall files. Online surveys (administrator, supported teacher, non-supported teacher) were administered in May 2013 to assess campus staff perceptions of RM. Response rates were high for campus administrators (N=215; 72%), supported teachers (N=121; 83%), and non-supported teachers (N=425; 69%); frequency analyses were used to analyze quantitative items, and qualitative analyses were conducted to summarize open-ended items.

Outcomes. Student outcomes for second-grade Iowa Tests of Basic Skills (ITBS) and third-grade State of Texas Assessments of Academic Readiness (STAAR) mathematics were reviewed using the Dallas ISD Data Packet for 2013-14 Planning. Correlation analyses were computed to assess the strength of relationships between RM (hours online, objectives completed, accuracy rates) and student achievement (ITBS, STAAR, Assessment of Course Performance [ACP]). Multiple regression analyses were used to determine the strongest predictors of 2013 math achievement. Follow-up frequency analyses were conducted to look at math achievement by RM hours online and learning mode Level A accuracy rates. Assessment descriptions follow.

- **ITBS**, a nationally normed achievement battery, is administered in grades K-2 each spring. Percentile ranks were utilized in the review of districtwide data and in follow-up frequency analyses, whereas normal curve equivalent (NCE) scores were used in the regression analyses.

- The state's criterion-referenced assessment, **STAAR**, is administered each spring for students in grades 3-8. STAAR was used for the first time in spring 2012. The percentage of students that met the Level 2 Satisfactory and Level 3 Advanced levels were used in the frequency analyses; raw scores were used in the correlation and regression analyses.

- The third-grade district criterion measure, **ACP**, was given at the end of each semester. ACPs are aligned to the Texas Essential Knowledge and Skills using the third-grade math Curriculum Planning Guide. A scale score of 70 is passing.

Sources and Amounts of Funding

The total district budget for RM during 2012-13 was $1,494,500, which included $969,500 of Title I funds and $525,000 of Title II, Part A funds. Title I funds were allotted to pay for 27,700 individual student accounts at a cost of $35 per student account; this included 14,200 second-grade and 13,500 third-grade student accounts. As for Title II, funds were allocated to pay for 150 supported teachers' professional development at a cost of $3,500 per teacher.

Program Goals

The overall goal and action steps to achieve it were summarized in a November 2012 memorandum from Superintendent Miles to the Board of Trustees and presented at the November 8, 2012 School Board Briefing. The goal of RM was to increase mathematics achievement for second- and third-grade students. As for action steps, the district agreed to ensure that all campuses implemented the program with fidelity to the RM model, that all teachers completed the training on the program, and that every campus had a schedule
that provided each student with the required amount of time for the program. RM promised to provide training, on-site coaching, and support as well as weekly summaries of student time spent on RM, so the district could make adjustments as needed.

**Demographic Characteristics**

A total of 26,151 students were enrolled in RM schools (all but Dealey and Allen) during 2012-13 including 13,398 second-grade students (98.8% of Dallas ISD students) and 12,753 third-grade students (98.8% of Dallas ISD students). There were slightly more male (52%) than female (48%) students. The major ethnic groups were Hispanic (70%) and African American (23%). Most RM students (92%) were economically disadvantaged. Half (51%) were limited English proficient (LEP). Ten percent were gifted, and six percent received special education services.

**Staff Participation in RM Training**

A total of 584 teachers completed the RM Qualification Course; this included 129 supported teachers, 402 non-supported teachers, and 53 inactive teachers. Less than half (48%) completed the course by the end of the first six weeks, which meant student use of RM was delayed for many. More supported (72%) than non-supported (40%) teachers were trained by the end of the first six weeks. Most supported teachers (92%) met the twelve-hour training requirement to complete Best Practice and Curriculum Study workshops.

**Reasoning Mind Student Use**

To meet RM’s two-hour per week requirement, the evaluators used 30 hours or more per semester as the goal to compensate for instructional time lost due to holidays or school events. Average implementation in terms of hours online was about 35 percent of what it should have been in the fall and about 80 percent of what it should have been in the spring. As seen in Figure 1, mean hours of student use increased from 10.71 (fall) to 24.19 (spring) for second-grade students and from 10.52 (fall) to 24.33 (spring) for third-grade students. When compared to the previous year, fall 2013 second-grade hours (10.71) were lower than fall 2012 hours (13.4); however, spring 2013 mean hours (24.19) were higher than in spring 2012 (17.2).

A few second- (2%) and third-grade (1%) students met the 30-hour goal in the fall, and about a third of second- (31%) and third-grade (32%) students did so in the spring. (See Figure 2.) The mean number of objectives that students completed increased from fall to spring for both second- and third-grade students. Student participation was highest for Level A (easiest) learning mode problems in the fall and spring and for Level B (medium difficulty) learning mode problems in the spring; noticeably fewer completed Level C (difficult) learning mode, Wall of Mastery review mode (A, B, C), or test mode items.

**Campus Staff Perceptions of RM**

Results of selected satisfaction items showed that over half of staff members “agreed” or “strongly agreed” that they would like to continue using RM (62% to 76%), that they believed students benefited from RM (68% to 85%), and that they would recommend RM to others (55% to 75%). (See Figure 3.) Results were mixed for RM benefits for teachers. Supported teachers were more positive than administrators and non-supported teachers. Over half of supported (61% to 80%) and non-supported teachers (53% to 82%) believed students improved in all areas assessed such as reasoning skills, independent learning, and so forth. More than half were “satisfied” or “extremely satisfied” with support from the RM program coordinator, RM technology staff, other RM staff, and district technology staff. Supported teachers were more positive than campus administrators and non-supported teachers toward support for implementing RM. This is likely due to the extra support that RM supported teachers received.
Over 50 percent of administrators were “satisfied” or “extremely satisfied” with administrator training (54%) and the RM administrator interface and reports (67%). More supported than non-supported teachers viewed the in-person (82% versus 53%) and on-line (50% versus 28%) Qualification Course training as “very helpful.” Also, more supported than non-supported teachers rated the resource website (76% versus 49%), professional development website (63% versus 35%), and reports (83% versus 59%) as “very helpful.”

Across surveys, a sizeable percentage noted “frequently” or “very frequently” experiencing COW issues (47% to 53%), wireless connectivity issues (42% to 49%), and network issues (36% to 39%). Technology (N=178) and scheduling issues (N=158) were the most referenced barriers. The most common suggestion was to improve technology (N=89).

**Student Mathematics Achievement Outcomes**

Overall analyses provided a big picture of how district students progressed in mathematics over time; however, due to low RM implementation, use of RM as a supplemental program, and lack of a control group, findings were limited and did not show true impact of RM on student math achievement. The percentage of second-grade students that scored at or above the 40th percentile on ITBS Mathematics Total marginally decreased from 2012 (57.9%) to 2013 (56.2%), whereas the percentage of third-grade students that met the STAAR Satisfactory Level 2 standard slightly increased from 2012 (55.2%) to 2013 (57.3%).

Correlation results revealed that students’ mastery of objectives (.211 to .315) and accuracy rates (.594 to .725) on Level A (easy) learning mode problems were more strongly related to math achievement than time spent online (.058 to .137). Per second-grade regression analyses, three predictors (prior 2012 ITBS math achievement, mastery of objectives, learning mode Level A accuracy rates) explained 64 percent of the variance of spring 2013 ITBS scores. Similarly, three predictors (learning mode Level A accuracy rates, 2012 ITBS math achievement, STAAR test mode Level A accuracy rates) explained 68 percent of the variance in STAAR scores and 61 percent of the variance of spring ACP scores. Thus, the higher the value of the major predictor variables, the higher a student’s test score is expected to be.

Follow-up frequency analyses revealed that RM time is important; however, students with accuracy rates at 75 percent or higher did notably better on ITBS (over 60% scored at or above the 40th percentile in all time categories) and STAAR (over 80% met the Level 2 Satisfactory standard in all time categories). (See Figures 4 and 5.)

**Figure 3.** Percentage of Campus Administrators, Supported Teachers, and Non-Supported Teachers that “Agreed” or “Strongly Agreed” with Selected Survey Satisfaction Items

**Figure 4.** Percentage of Second-Grade Students At or Above the 40th Percentile on Spring 2013 ITBS Mathematics by Level A Accuracy and Total Hours Online

**Figure 5.** Percentage of Third-Grade Students that Met Level 2 Satisfactory on Spring 2013 STAAR Mathematics by Level A Accuracy and Total Hours Online
Summary

Like 2011-12, 2012-13 district implementation of RM did not meet RM fidelity requirements for teachers or students. As for teachers, 52 percent did not complete the RM Qualification Course by the end of the first six weeks, which delayed the use of RM with students. Most students did not meet the 30-hour per semester requirement in fall (98%-99%) or spring (68%-69%). Even with limited implementation, survey results showed that staff members were positive toward RM overall and that supported teachers were more positive than administrators and non-supported teachers on all areas assessed.

In general, districtwide math achievement did not change much from 2012 to 2013; however, due to low implementation of RM, the use of RM as a supplemental program, and the lack of a control group, findings were limited and did not show the true impact of RM on student achievement. RM-specific outcome analyses showed that spending adequate time online using RM was essential; however, student accuracy rates at 75 percent or above on Level A problems best predicted student success on ITBS (over 60% scored at or above the 40th percentile in all time categories) and STAAR (over 80% met the STAAR Level 2 Satisfactory standard in all time categories).

Recommendations

RM Monitoring Data. Two challenges precluded accurate tracking of student and teacher RM implementation. First, RM received a data upload with district data at the beginning of the fall semester but there was no automatic system in place to ensure RM received all campus-level changes related to students moving in and out of a school after the first upload. The district project director requested information be sent upon teacher request; however, many students were missing from the files because some teachers did not put in requests to add missing and/or new students. Second, RM did not receive student identification numbers as part of the district data, which precluded accurate matching of students to district data. The evaluators updated identification numbers as much as possible “after the fact,” but the result was that many students could not be matched to district data. As a result, it will be important that RM receive data files on an automatic, ongoing basis and that files include student identification numbers, teacher identification numbers, and school numbers. A few teachers were not included in RM data files or weekly reports due to never implementing RM as expected. It will be important to ensure that the weekly reports include all second- and third-grade teachers so that school- and teacher-specific implementation can be monitored on a consistent basis.

RM Teacher Training. In 2012-13, 28 percent of supported teachers and 60 percent of non-supported teachers did not complete the RM Qualification Course by the end of the first six weeks, which means many teachers could not use RM with their students at the beginning of the school year. As a result, it will be important to monitor teacher training closely and ensure campus-level deadlines are set within the first few weeks of the school year. Executive directors and principals should work closely together to make sure teachers complete the course at the beginning of the school year.

RM Support Model. RM supported teachers were noticeably more positive than non-supported teachers on most survey items. Most likely, the difference was due to supported teachers receiving more training, encouragement, and monitoring from RM than non-supported teachers. Due to the large size of the district, the RM support model may need to be altered to better assist non-supported teachers and to ensure that the district can reach high fidelity to the RM model without adding more teacher cost. The 2013-14 evaluation of RM should include additional measures to study the effectiveness of the RM support model within the district.

RM Technology and Scheduling Issues. Per survey results, the most mentioned barriers to implementation were technology and scheduling issues. Some of the scheduling issues were related to limited computer access and/or challenges related to sharing computers. Executive Directors should review campus RM technology schedules to ensure adequate time is being allotted to RM; also, principals should work with Executive Directors and central technology administrators to resolve computer access issues.

RM Student Time Online and Accuracy. Results of outcome analyses showed that Level A accuracy rates on learning mode problems (second and third grade) as well as accuracy rates on STAAR test mode problems (for third grade) were strong predictors of student math achievement. That is, students that had accuracy rates of 75 percent or higher on Level A learning mode and test mode problems had a higher likelihood of having higher test scores than those with lower accuracy rates. During 2013-14, it will be important to monitor student accuracy rates in addition to time online to ensure students are mastering math concepts with a high level of accuracy (75% or higher).

Based on RM hour/accuracy analyses and RM teacher observation data, most students did not spend much time completing Wall of Mastery review mode math problems. Also, a sizeable proportion of third-grade students did not spend time in STAAR test mode to prepare for STAAR. Rather, most student time was spent in learning mode and confined to Level A
(easiest) problems in the fall and restricted to Level A (easiest) and B (medium difficulty) problems in the spring. Teachers should make sure students spend time in learning mode, review mode, and test mode (third grade only) during 2013-14, so that students make full use of the RM program.

References


The full final report can be found at www.dallasisd.org/Page/888#sthash.1rlQ87N8.dpbs.
For more information, contact Program Evaluation at 972-925-6457.