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Final Report:

Raytheon's MathMovesU Survey

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BACKGROUND AND METHODOLOGY

This research project was conducted in order to investigate the retention of math skills during the summer break and possible strategies for engendering interest in mathematics among middle school students.

The Raytheon MathMovesU Back-to-School survey was conducted online with a sample of 1,032 sixth through eighth grade teachers representing a cross-section of US middle school teachers. Research was conducted in July 2006.

The overall sampling error for this survey is +/- 3% at the 95% level of confidence.

SUMMARY AND CONCLUSIONS

This project includes survey responses from 1,032 middle school teachers representing educators in Math, Science, Social Studies, Language Arts, and “Other” (e.g. P.E., Art, Computers).

All of the educators surveyed taught only one subject area, and each subject was represented by a comparable number of teachers (approximately 200 teachers in each subject area).

Regardless of the subject they taught, most teachers believed students’ math skills regressed most during the summer break – greater than any other subject.

50.4% of all teachers believe that students’ math abilities are threatened the most by the learning hiatus in the summer months. However, 71.2% of math teachers, more familiar with students’ ability to retain math skills, recognize that their students regress most over the summer break.

Most teachers (66.8%) recognize that math is the single subject most difficult for students to get back up-to-speed after summer break

And more math teachers recognize the getting back up-to-speed problem (72.1%).

Of the 211 math teachers surveyed, 57.9% believe that less than 10% of students make a conscious effort to keep their math skills sharp over the summer break. While the majority of teachers believe very few students truly attempt to exercise their math skills, a miniscule 1.8% of teachers believe that over half their students consciously keep abreast of their math skills.

Upon the commencement of a new school year, the majority of teachers spend two weeks or more reviewing previously taught material.

54.6% of math teachers spend two weeks or more reviewing previously taught material and 15.2% of math teachers spend five weeks or more in review.

Despite all of the doom and gloom about students forgetting their math skills over the summer break, 63.2% of math teachers believe that students would need to only focus on math for 15 to 60 minutes a week over the summer to retain their math skills.

Most math teachers (87.7%) responded very positively to the idea of an innovative math program in which students could exercise their math skills during the summertime. Only 12.3% would not.

Almost all math teachers believe that capitalizing on kids' fascination with celebrities and professional athletes would be a good strategy for encouraging students to keep up math skills during the summertime.

89.5% of math teachers believe that kids would be more likely to attend to their math skills during the summer months if celebrities and pro-athletes demonstrated how they use math everyday and created math challenges related to their "cool careers". Clearly teachers understand that math would be more readily accepted by students if it were associated with "cool" role models and visible entertainment figures.

Most teachers (63.2%) believe the internet is the most preferable format for keeping kids involved with math over the summer.

Only 14% of teachers prefer classes or classroom activity instead, and only 12.3% believe take-home workbooks are the best way to keep kids involved with math during the summer months. School text books are the least preferred, with only 10.5% of teachers supporting text books as the best avenue by which to keep kids involved with math during the summer.

Regardless of the method utilized, 68.4% of math teachers agree that involved parents are the most important factor in keeping students' math skills sharp over the summer.

Private tutoring was cited by 17.5% of teachers as the most important factor, while only 7% each of teachers believed summer school or pressure to pass a standardized national test are the most important factors in keeping students' math abilities up to speed during the summer months

DETAILED FINDINGS

1. Subjects Taught

This project includes survey responses from 1,032 middle school teachers representing educators in Math, Science, Social Studies, Language Arts, and “Other” (e.g. P.E., Art, Computers).

All of the educators surveyed taught only one subject area, and each subject was represented by a comparable number of teachers (approximately 200 teachers in each subject area).

Table 1. What middle school subject(s) do you teach?

	<u>Math</u>	<u>Science</u>	<u>Social Studies</u>	<u>Language Arts</u>	<u>Other</u>
TOTAL:	211	211	210	204	196
Social Studies (Geography or History)	0.0%	0.0%	100.0%	0.0%	0.0%
Language Arts (English, Reading, Writing or Foreign Language)	0.0%	0.0%	0.0%	100.0%	0.0%
Math	100.0%	0.0%	0.0%	0.0%	0.0%
Science	0.0%	100.0%	0.0%	0.0%	0.0%
Other (P.E., Art, Computers)	0.0%	0.0%	0.0%	0.0%	100.0%
None	0.0%	0.0%	0.0%	0.0%	0.0%

2. Time Spent Reviewing Old Material

Upon the commencement of a new school year, the majority of teachers spend two weeks or more reviewing previously taught material.

54.6% of math teachers spend two weeks or more reviewing previously taught material and 15.2% of math teachers spend five weeks or more in review.

Table 2. How many days of the school year are usually spent reviewing previously taught material in your subject following summer break?

	<u>Total</u>	<u>Math</u>	<u>Science</u>	<u>Social Studies</u>	<u>Language Arts</u>	<u>Other</u>
BASE: Total	1032	211	211	210	204	196
None	18.8%	21.2%	17.3%	21.4%	14.2%	20.0%
1 week or less	24.4%	24.2%	29.0%	20.0%	23.5%	25.0%
2 weeks	17.4%	15.2%	17.9%	15.7%	19.1%	19.3%
3 weeks	10.7%	12.1%	9.3%	7.1%	13.7%	11.4%
4 weeks	10.7%	12.1%	10.5%	11.4%	11.3%	7.9%
5 weeks	4.7%	6.1%	4.3%	5.7%	4.9%	2.5%
6 weeks	2.5%	1.5%	3.1%	1.4%	2.0%	4.6%
7 weeks	0.6%	0.0%	0.0%	2.9%	0.0%	0.4%
8 weeks	3.4%	1.5%	3.1%	5.7%	5.4%	1.1%
Over 8 weeks	6.8%	6.1%	5.6%	8.6%	5.9%	7.9%
Average # of weeks:	3.1	2.8	2.8	3.5	3.2	3.0

3. Regression Over Summer Break

Regardless of the subject they taught, most teachers believed students' math skills regressed most during the summer break – greater than any other subject.

50.4% of all teachers believe that students' math abilities are threatened the most by the learning hiatus in the summer months. However, 71.2% of math teachers, more familiar with students' ability to retain math skills, recognize that their students regress most over the summer break.

Table 3. In your experience, which subject do students regress in most over summer break?

	<u>Total</u>	<u>Math</u>	<u>Science</u>	<u>Social Studies</u>	<u>Language Arts</u>	<u>Other</u>
BASE: Total	1032	211	211	210	204	196
Social Studies (Geography or History)	10.0%	15.2%	4.9%	15.7%	5.4%	8.6%
Language Arts (English, Reading, Writing or Foreign Language)	20.7%	7.6%	15.4%	21.4%	40.2%	19.3%
Math	50.4%	71.2%	44.4%	41.4%	47.5%	46.8%
Science	12.4%	1.5%	30.9%	12.9%	6.4%	10.0%
Other	6.6%	4.5%	4.3%	8.6%	0.5%	15.4%

4. Difficulties Getting Back Up-To-Speed

Most teachers (66.8%) recognize that math is the single subject most difficult for students to get back up-to-speed after summer break

And more math teachers recognize the getting back up-to-speed problem (72.1%).

Table 4. When returning to school after summer break, in what subjects do kids struggle the most to get back up-to-speed?

	<u>Total</u>	<u>Math</u>	<u>Science</u>	<u>Social Studies</u>	<u>Language Arts</u>	<u>Other</u>
BASE: Total	1032	211	211	210	204	196
Social Studies (Geography or History)	10.3%	16.4%	5.8%	14.5%	4.1%	8.4%
Language Arts (English, Reading, Writing or Foreign Language)	15.7%	6.6%	13.1%	27.3%	15.6%	18.1%
Math	66.8%	72.1%	65.7%	60.0%	76.2%	61.5%
Science	26.1%	19.7%	41.6%	23.6%	25.4%	19.9%
Other	5.0%	4.9%	1.5%	5.5%	1.6%	11.1%

5. Percentage of Students Who Keep Up Their Math Skills

Of the 211 math teachers surveyed, 57.9% believe that less than 10% of students make a conscious effort to keep their math skills sharp over the summer break. While the majority of teachers believe very few students truly attempt to exercise their math skills, a miniscule 1.8% of teachers believe that over half their students consciously keep abreast of their math skills.

5. What percentage of students do you think make a conscious effort to keep their math skills sharp over the summer break?

	<u>Math Teachers</u>
BASE: Math teachers	211
Less than 10%	57.9%
10 - 20%	28.1%
20 - 35%	10.5%
35 - 50%	1.8%
More than 50%	1.8%

6. Amount of Time Required to Keep Up Math Skills

Despite all of the doom and gloom about students forgetting their math skills over the summer break, 63.2% of math teachers believe that students would need to only focus on math for 15 to 60 minutes a week over the summer to retain their math skills.

Table 6. How much time per week would a student need to focus on math over the summer for their skills not to slip during that time?

	<u>Math Teachers</u>
BASE: Math teachers	211
15 to 30 minutes	24.6%
30 to 60 minutes	38.6%
1 to 2 hours	17.5%
2 to 3 hours	15.8%
3 hours or more	3.5%

7. Support for a Summer Math Program

Most math teachers (87.7%) responded very positively to the idea of an innovative math program in which students could exercise their math skills during the summertime. Only 12.3% would not.

Table 7. If there were something similar to a summer reading program for math, would you encourage your students to participate?

	<u>Math Teachers</u>
BASE: Math teachers	211
Yes	87.7%
No	12.3%

8. Support for Celebrity and Athlete Involvement

Almost all math teachers believe that capitalizing on kids' fascination with celebrities and professional athletes would be a good strategy for encouraging students to keep up math skills during the summertime.

89.5% of math teachers believe that kids would be more likely to attend to their math skills during the summer months if celebrities and pro-athletes demonstrated how they use math everyday and created math challenges related to their "cool careers". Clearly teachers understand that math would be more readily accepted by students if it were associated with "cool" role models and visible entertainment figures.

Only 22 of the 211 math teachers surveyed did not agree with this notion.

Table 8. If celebrities and pro-athletes teamed together to show kids the math they use everyday, and created math challenges about their cool careers, could that help students keep their math skills sharper over the summer?

	<u>Math Teachers</u>
BASE: Math teachers	211
Yes	89.5%
No	10.5%

9. Best Avenue For Summertime Math Involvement

Most teachers (63.2%) believe the internet is the most preferable format for keeping kids involved with math over the summer.

Only 14% of teachers prefer classes or classroom activity instead, and only 12.3% believe take-home workbooks are the best way to keep kids involved with math during the summer months. School text books are the least preferred, with only 10.5% of teachers supporting text books as the best avenue by which to keep kids involved with math during the summer.

Table 9. What would be the best avenue for keeping kids involved with math over the summer?

	<u>Math Teachers</u>
BASE: Math teachers	211
Interactive Internet programs	63.2%
Classes / classroom activity	14.0%
Take-home workbooks	12.3%
School text books	10.5%

10. Most Important Factor in Keeping Math Skills Sharp

Regardless of the method utilized, 68.4% of math teachers agree that involved parents are the most important factor in keeping students' math skills sharp over the summer.

Private tutoring was cited by 17.5% of teachers as the most important factor, while only 7% each of teachers believed summer school or pressure to pass a standardized national test are the most important factors in keeping students' math abilities up to speed during the summer months.

Table 10. What is the most important factor in keeping students' math skills sharp over the summer?

	<u>Math Teachers</u>
BASE: Math teachers	211
Involved parents	68.4%
Private tutoring	17.5%
Attending summer school	7.0%
Pressure to pass standardized national testing	7.0%

Question - 11. What are simple, every-day things parents can do with their kids over the summer to keep kids' math skills from slipping?

All 1,032 teachers surveyed responded to this open-ended question with advice about how parents can work with their kids to keep math skills sharp. Dr. Anne Collins, a mathematician with 20 years of teaching experience and a member of the Massachusetts Math Educators Hall of Fame, synthesized the responses into these 10 simple tips for parents:

- 1. Fuel for thought...**No one likes a backseat driver, but challenging your kids to calculate the amount of fuel your car uses, or the highest sum of digits in license plates are great ways to sharpen math skills en route to summer camp, soccer games or the neighborhood pool.
- 2. Double down...**Whether baking brownies or mixing a pitcher of lemonade, have your children double or half the recipe and determine the right amount of ingredients.
- 3. Go from "bored" to board game...**Board games aren't just great for passing time on rainy days. They also empower students to count intervals and practice basic math skills. If a game calls for a banker or score keeper, nominate your child for the role.
- 4. Track the trek...**Give your kids an odometer for their bikes and have them record the number of miles pedaled during the day. Once the distance is determined, challenge them to calculate their average rate of speed pedaled.
- 5. Shop till you drop...**While back-to-school shopping, practice fractions with your children by asking them to calculate prices if they were saving 10%, 25% or 40% off the price.
- 6. Stack the deck, with math...**When playing a card game, encourage your kids to count the difference between cards as they are played. Face cards equal 10 and aces equal 11.
- 7. Paint by numbers...**Doing a fixer-upper project around the house? Have your kids do all the measuring. For painting projects, challenge your children to figure the square footage of the room and calculate how many gallons of paint or stain is needed.
- 8. The tip is in the tip...**When eating out at a restaurant, have your children figure out the gratuity for the waitstaff, without the pen and paper. Challenge them to try to do the math in their heads.

9. *Speak up in school...*Encourage your children's teachers to get creative and use free tools like www.mathmovesu.com as well as other websites and resources in their classrooms.

10. *Log onto MathMovesU.com...*Looking for a fresh way to excite your kids about math? Make www.mathmovesu.com the home page on your family computer. Encourage your kids to try the weekly challenges for a chance to win prizes from boom boxes to celebrity-signed gear. They can also practice math with celebrities, as well as learn the math behind kid-cool careers.