Research Study[1]

What perceptions do individuals, involved in mathematics teaching and learning, hold of the use of mathematics specialist teachers in Grades 6-8?

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General Information

This research study, taking place in the province of Saskatchewan (Canada), was conducted with five different stakeholder groups: 1) elementary (K-8) school administrators, 2) Grade 6-8 teachers, 3) Grade 6-8 students, 4) their parents, and 5) university pre-service middle years teachers. Since these five groups of individuals are connected with mathematics education at the middle years/intermediate level, they each offer important perspectives on the benefits (perceived and/or observed) of educating mathematics specialist teachers for Saskatchewan elementary schools, specifically at the Grade 6-8 level. The research study was funded by a *Social Sciences and Humanities Research Council of Canada* (SSHRC) Insight Grant and was approved on ethical grounds by the University of Regina Research Ethics Board (REB). In addition, each of the four Saskatchewan school divisions involved in the study granted approval for schools within the division to participate in the research study.

Report on
Grade 6-8 PARENT/GUARDIAN QUESTIONNAIRES

The key aim of this part of the research study was to understand parents' experiences of, and perceptions on, the role of mathematics specialist teachers in grades 6-8 classrooms. This report represents a summary of responses to select questions from completed parent/guardian questionnaires returned by mail to the researcher (Dr. Kathleen Nolan). In total, approximately 1200 parent/guardian questionnaires were distributed to Grade 6-8 students in 15 schools across 4 Saskatchewan school divisions. Students were asked to take the questionnaire home for their parent or guardian to complete and then return by mail in the postage paid envelope provided. **Seventy-four (74) parent/guardian questionnaires were returned** (approximately a 6% response rate).

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PART A: Current Attitudes and Practices

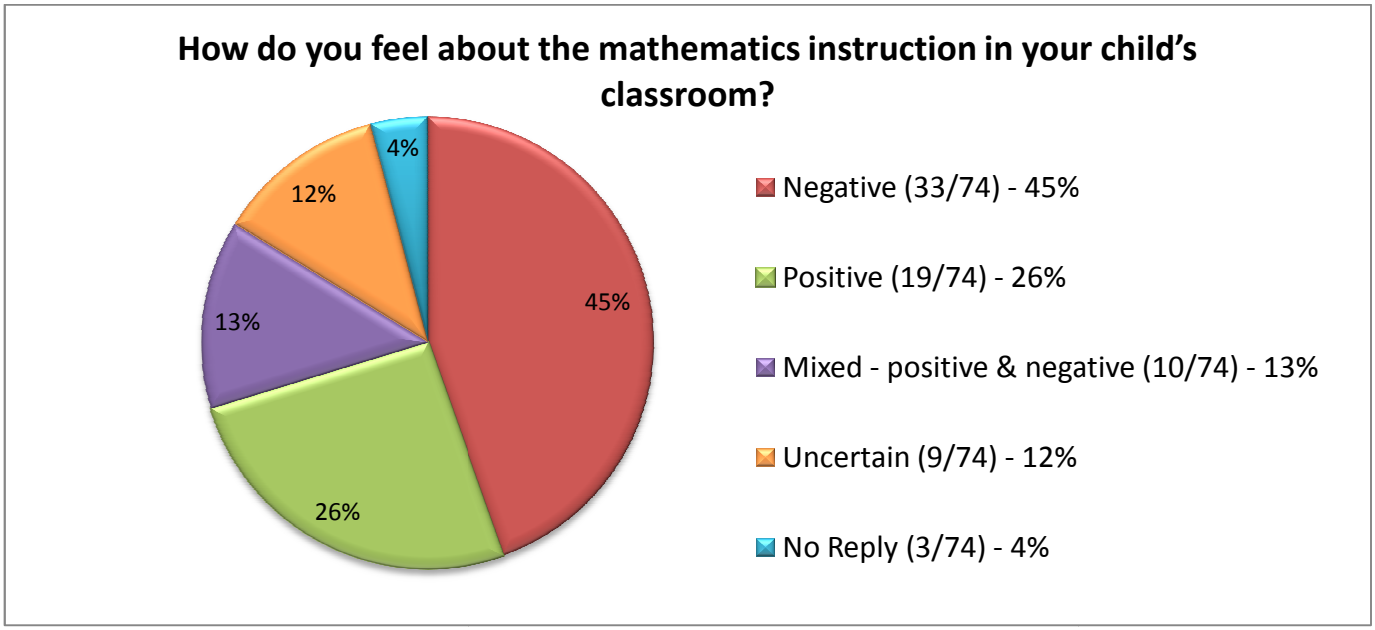
1. Overall, would you describe your own experience of learning mathematics in school as positive, negative, or somewhat mixed? Please explain.

Question 1 has not been analysed at this time.

2. How would you describe your current relationship with mathematics (attitudes toward, feelings about, perceived value of, use for, etc)?

Question 2 has not been analysed at this time.

3. How do you feel about the mathematics instruction in your child's classroom?

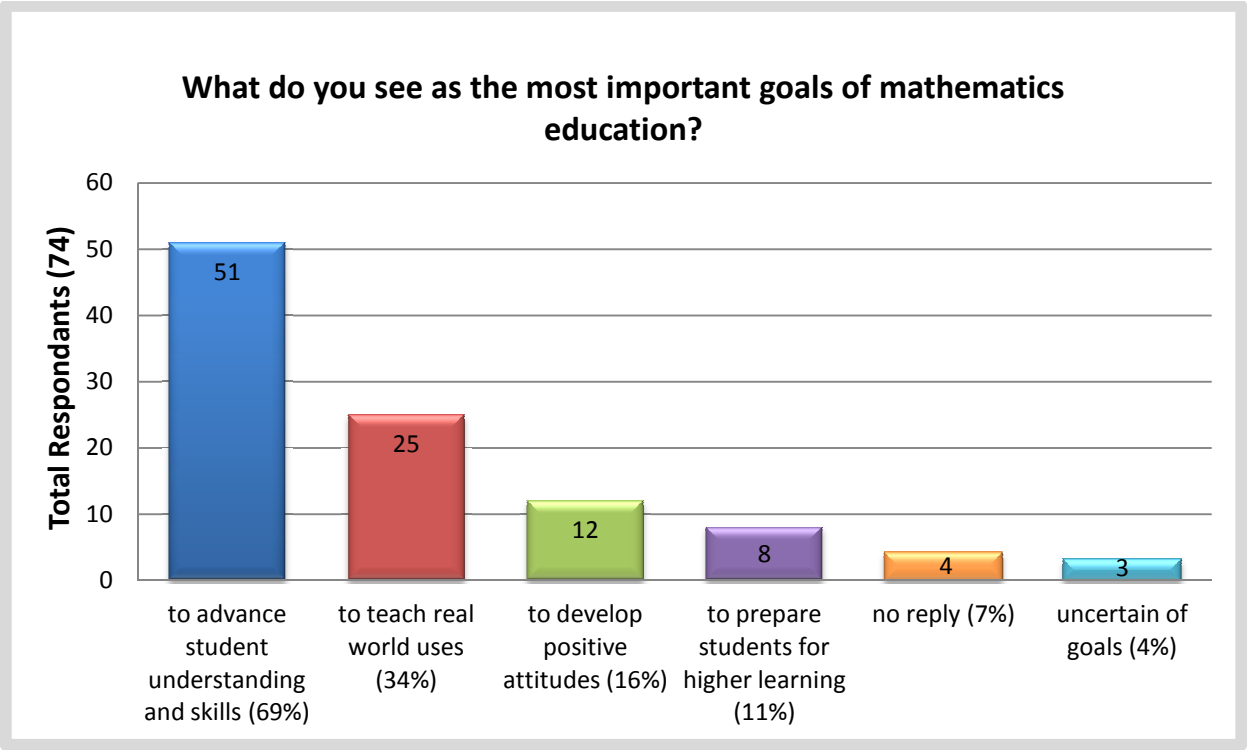


Response Type	Example Questionnaire Responses
Negative (33/74) – 45%	**I think the teachers are ill prepared to be teaching the 'Math Makes Sense' techniques. They should have been upgrading their education before the new program was introduced.** **Not acceptable for a student in grade 6. They must be learning at their level and they are consistently learning below it. Each year the students demonstrate a lower understanding and it is extremely frustrating to have to supplement her education.**

Response Type	Example Questionnaire Responses
Negative, continued	I think it's awful. While teaching so many different strategies may have been thought to help kids who had trouble with traditional methods, I think this has led to confusion. Far better to help each student find a strategy that works for them. Not happy with it. Teachers seem to require students to use many methods to solve basic math questions when they are already able to do it easily one way. There is little practice in new skills, curriculum is rarely finished.
Positive (19/74) – 26%	Great. The teacher is very understanding and adapts it to my childs needs. Seems good. She enjoys math. I have two boys and they seem to do fine at math. Hence I think the instruction that they have received is adequate.
Mixed – negative and positive (10/74) – 13%	Either they (my children) love it or hate it. It all seems to come down to how well it was taught and did the child understand enough to apply the concepts. My children love math when things click and then on the next unit they are turned off by it because it does not make sense. So between them & the instruction it seems a bit hit & miss. Neither positive nor negative. It's ok. I believe the problem with teaching math through any program such as "Math Makes Sense" is prescriptive but doesn't address all areas & all ways to teach. While it has some good aspects, if I can't answer a question, I question the usefulness. Also I think basic facts need to also be stressed more.
Uncertain (9/74) – 12%	I am not familiar with the teaching strategies my child's teacher is using. I am unable to comment. Not sure b/c I'm not in his classroom. However, he has strong marks and understands concepts not taught in school.
No Reply (3/74) – 4%	

4. What do you see as the most important goals of mathematics instruction?

See graph next page.

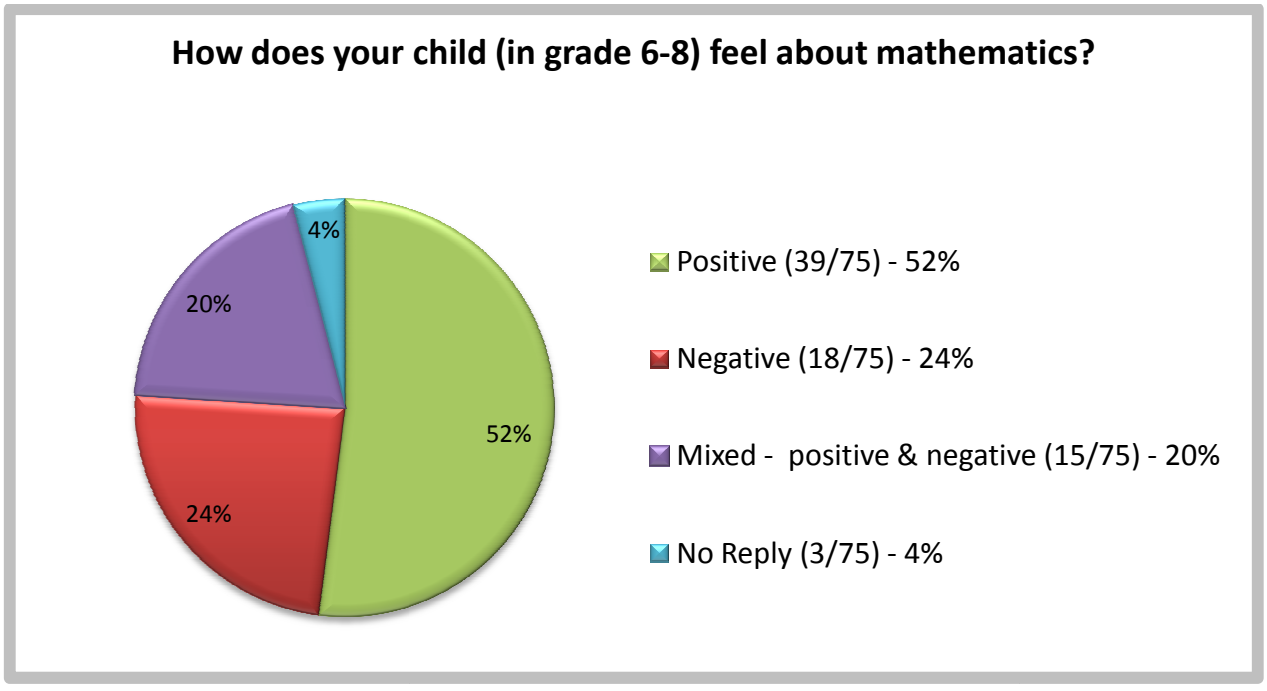


Identified goals of mathematics education	Example Questionnaire Responses
To advance student understanding and skills (51/74) – 69%	**Mastery of foundational arithmetic skills** **To be able to work with numbers and be comfortable and competent with basic math skills.** **To understand how it works and why.** **The most important goal is having the student understanding it and doing well on their own.** **I think it should be a solid understanding of basic concepts & skills.**
To teach real world uses (25/74) – 34%	**Real world applications (calculating interest, mortgages, balancing cheque book).** **In real life our math mistakes on the seed drill or sprayer cost us thousands. We will use a calculator on phone for complex problems. Learn to cross multiply, multiply, divide, add, subtract easy numbers in your head. Know how to estimate about what answer should be. [*sic*]**

Identified goals of mathematics education	Example Questionnaire Responses
To develop positive attitudes (12/74) – 12%	I think you want to teach kids to enjoy math & not be afraid of it (especially girls). Develop positive attitude (lifelong learning).
To prepare students for higher learning (8/74) – 8%	Ensuring that a solid foundation is laid for when the student moves into high school or beyond
No reply (4/74) – 4%	
Uncertain of goals (3/74) – 3%	Not sure what the goal of the school board is. Unsure

5. How does your child (in grade 6-8) feel about mathematics?

**Note: one parent provided details with regard to each of two children, thus, there are 75 replies counted in response to this question.



As shown in the pie graph above, (39/75) or 52% of the parent responses indicated that their child expressed **positive feelings** about mathematics. Of the 39 responses that indicated positive feelings about mathematics, the most frequent words used to describe their child's feelings were:

- likes (12/39)
- loves (9/39)
- enjoys (8/39)
- positive (3/39)
- excited (2/39)

Examples from the 39 responses that associated positive feelings with either doing well in mathematics or the ease of learning mathematics
Likes math, comes easily to him
Loves it. Does well
He is very strong in math & enjoys it.
Feels positive & successful
Challenging and exciting, easy to learn.

As shown in the pie graph on the previous page, (18/75) or 24% of the parent responses indicated that their child expressed **negative feelings** about mathematics. Of the 28 responses that indicated negative feelings about mathematics, the associated themes were:

- frustration or irritation (7/18)
- confusion or hard to understand (4/18)
- boredom (2/18)
- of no value (4/18)
- lack of confidence (1/18)

Examples from the 18 responses that expressed negative feelings about mathematics
Frustrated – help is not readily available from teacher or otherwise
Does not like math. Finds it hard & confusing.
That it is silly the way it is taught & moves way to [*sic*] slowly. It takes to long for everyone to get all the strategies.
She does not see the use of learning what she is learning.
Her confidence is so low she just says she doesn't know instead of trying to figure it out.

As shown in the pie graph for Part A Question 5, some (15/75) parent responses were interpreted as their child having **mixed feelings**:

Examples of questionnaire responses interpreted as mixed.
Enjoys the subject, but does feel intimidated at times about this subject
She likes it but is frustrated when forced to use many methods to solve problems
They are on the fence, he doesn't hate it but also doesn't like it either.
She does not enjoy math but she does well in math.

PART B: Mathematics Teaching Specialists

A mathematics specialist teacher is one who acts as a catalyst for promoting and supporting good attitudes and good pedagogical practices in mathematics classrooms in schools and in school divisions. Mathematics specialists may act as mentors or coaches to their colleagues, or they may take on the exclusive role of mathematics teacher in many classrooms, while other teachers take on the responsibility for teaching other subjects.

1. Have you had any experience with mathematics teacher specialists? If so, please describe the experience.

20/74 parent responses indicated having experience with mathematics teacher specialists. Example questionnaire responses follow:
I think I had one before back home (PHILIPPINES**). We call them math teachers not specialists. They teach us certain areas of mathematics depending on grade. For example: for grade 7 – algebra, grade 8 – geometry. It's a wonderful experience because you get to solve different problems & think of solutions too. [*sic*]**
Yes – personal in high school. As a teacher we switched to this in the school I teach in to some extent we try to have one H. S. math teacher 8-12 & one elem. who teaches majority math although not all. I see it as very positive b/c they can see the links of the things needed & can have ongoing support. Not so choppy. [sic]
A 'math specialist' came to our school to teach the children 'new and interesting techniques to assist them in math'. I questioned my son as to these techniques and apparently it involved looking up answers on a multiplication table. I was not impressed with that level of expertise.
The school system I was in had specific math teachers, this allowed them to focus with students on core mathematics as they themselves had a solid understanding of what they were teaching.

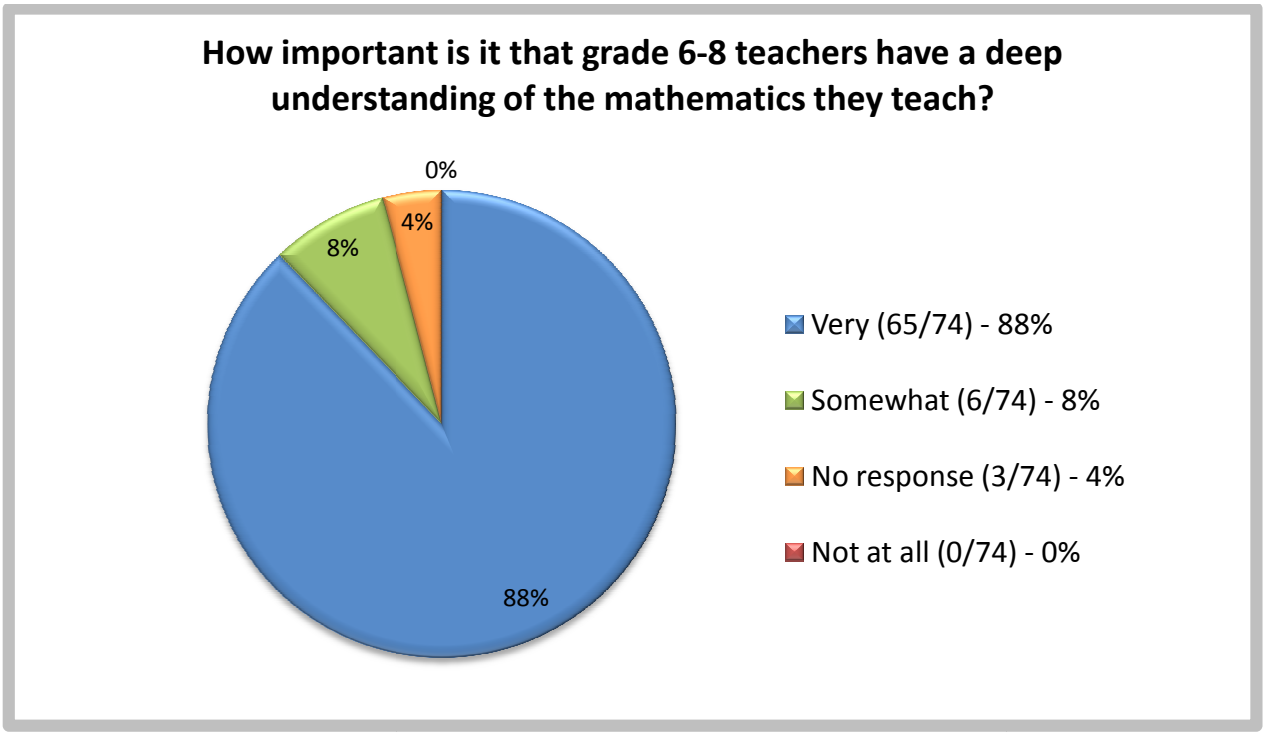
20/74 parent responses indicated having experience with mathematics teacher specialists. Example questionnaire responses follow:
Yes – by far the best instruction I ever received! We need to get back to specialist-based instruction in mathematics classes in schools!
My own grade 11 and 12 teacher had also been a university mathematics prof. He knew the material inside and out. He made it easy to understand.
Yes – one was assigned to take over instruction in one of my children's classes when the teacher could not understand fifth grade fractions and thus could not teach it.
My son didn't enjoy the experience with the consultant because he said the instruction became more confusing. Maybe if the consultant had been there from the beginning it would have been better.

2. How important is it that grade 6-8 teachers have a deep understanding of the mathematics they teach?

    a. Not at all

    b. Somewhat

    c. Very

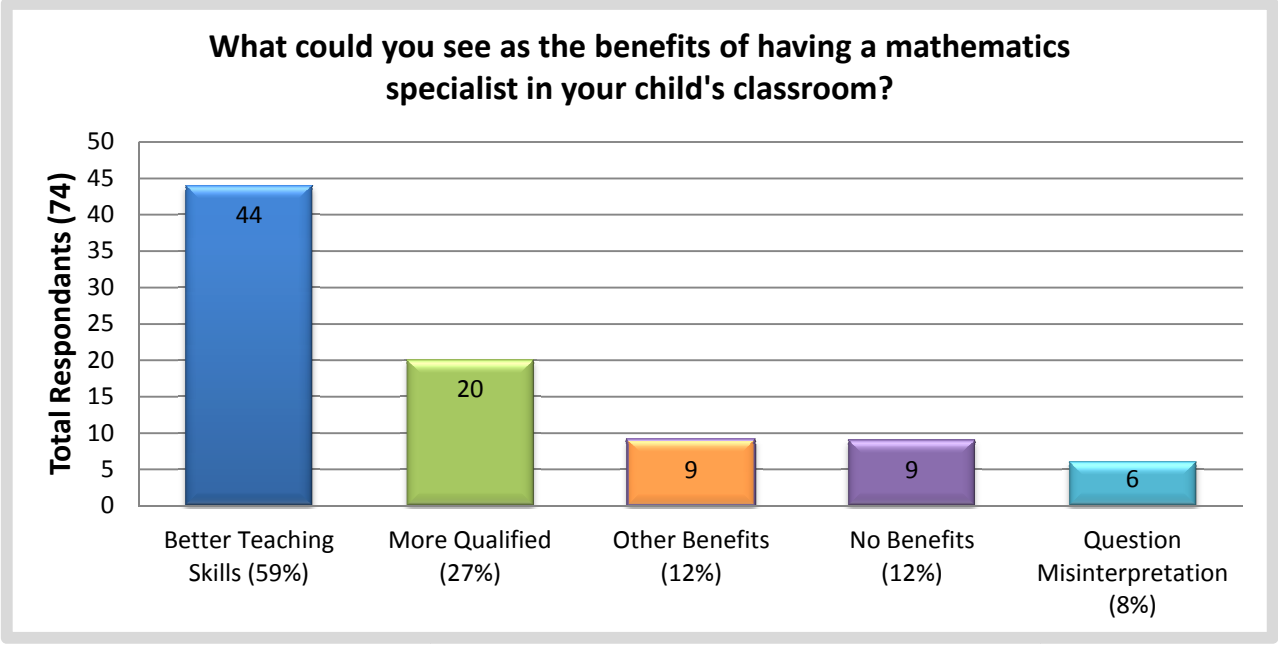


With respect to the pie chart on the previous page,

Example reasons offered as to why it is very (65/74) important that grade 6-8 teachers have a deep understanding of the mathematics they teach:
Grade 6-8 math prepares students for high school.
A teacher who is not particularly knowledgeable cannot teach it well to students who are struggling with it.
How can you teach what you don't understand yourself.
Important so they can transfer their knowledge & understanding to their students.
This would allow to be able to explain the concepts; trying different methods in order to reach all students.

Example reasons offered as to why it is somewhat (6/74) important that grade 6-8 teachers have a deep understanding of the mathematics they teach:
Deep understanding of math concepts is not as important as understanding in HOW to present & how children learn.
Math in grades 6-8 not rocket sciences so deep understanding is unnecessary at this age. [*sic*]
It's more important that the information and/or methods can be relayed to the students in an effective manner.

3. What could you see as the <u>benefits</u> of having a mathematics specialist in your child's classroom?



With respect to the bar graph on the previous page,

The majority of parent survey responses (44/74) indicated that an MST would likely provide better ways of teaching students. Example questionnaire responses are:
Someone that could offer additional methods of communicating a concept to their students
More attention to individual learning styles & needs.
The best teaching comes from teachers who are enthusiastic about their subject matter - they can pass on their enthusiasm for the subject matter.
Clarity of explanations of numerous ways of solving mathematical problems
They can help where the teacher cannot
They correctly teach the basic fundamentals of mathematics and the rationale behind mathematical theory.
I believe specialists would make math simpler again.
They would also have the ability to challenge gifted students in math.
I think a math specialist is able to go deeper into the subject and make connections for the students.
Able to give more practical applications for math
Having a specialist might result in helping those kids, particularly those that struggle, to achieve better results in math.
Enhancing the mathematical skills of all students

Note: (3/44) responses indicated that the MST would likely be able to provide "more one-on-one help to understand concepts."

The next most commonly identified benefit (20/74) was that an MST would be more qualified. Example questionnaire responses are:
It is very important to have a credentialed, and expert math specialist in the classroom.
Someone who both values and understands their subject is more likely to convey understanding in a variety of ways, with a flexible problem-solving approach, than someone who does not grasp concepts and is academically challenged themselves.
I think some current classroom teachers 'fear' math & don't always do the best job of teaching math.

With respect to the bar graph for question 3, other identified benefits (9/74), in descending order of frequency, included:

Other Identified Benefits	Example Questionnaire Responses
An MST would have more time to prepare for teaching mathematics (6/74)	**They would have the time to work with the darn 'Math Makes Sense Program.'** **More concentrated knowledge, time, focus.**
An MST could assist colleagues (2/74)	**Any extra help in a classroom is a benefit** **To help teachers teach.**
An MST might aid in consistent ways of learning mathematics (1/74)	**Few gaps in learning math experienced from switching from one teacher to another. Less confusion.**

** This last quote has been identified separately because it emphasized not switching math teachers, rather than the skill set the MST might bring.

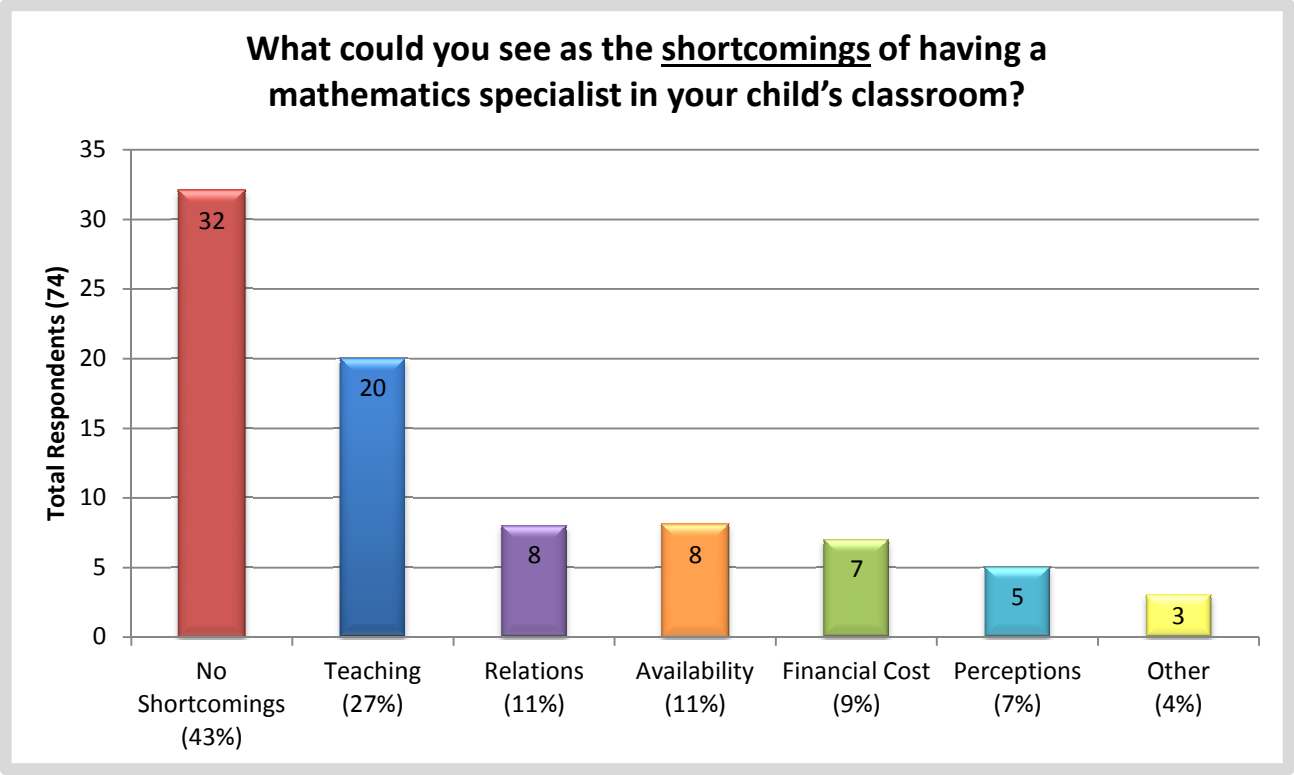
Some respondents expressed that there would be no benefits (9/74) associated with MSTs.

This interpretation is composed from:	Example Questionnaire Responses
Direct replies that there would be no benefit (6/74)	**I do not see any benefit of having a mathematics specialist in my child's classroom. The specialist would be only prolonging our agony of a doomed mathematics model for learning."** **I don't. I think that teachers should be required to complete upgrading.**
Blank responses (3/74)	

It is noteworthy that 3/6 of the direct replies recommended professional development for teachers instead of the development of programs for MSTs.

Some responses (6/74) suggested an MST might be beneficial but neglected to specify what the benefits might be.	**I think it would be a good idea.** **Math is 'required' for all kinds of everyday functions. It is important.**

4. What could you see as the shortcomings of having a mathematics specialist in your child's classroom?



The most frequent parent survey response (32/74) was that there were no identified shortcomings. This interpretation is a combination of both direct and blank responses, as follows:

No Shortcomings – 43%	Example Questionnaire Responses
Direct Responses (25/74)	**None** **Nothing immediate comes to mind**
Blank Responses (7/74)	

In descending order with regard to frequency of occurrence, shortcomings included:

Teaching – 27%	Example Questionnaire Responses
The MST may not teach well (20/74)	**May have unrealistic expectations of students who struggle in math** **If the specialists are not good communicators, they can make math seem even more complicated.** **An expert is not necessarily a great teacher.**

Relations – 11%	Example Questionnaire Responses
The MST may not form good relations with students (8/74)	**In not spending as much time with the children, it may take longer to figure out how each child learns best.** **Kids not feeling connected to the specialist.**

The availability of an MST combines two ideas: the availability of an MST to work with students and the available numbers of MSTs to fill vacant MST positions as follows:

Availability – 11%	Example Questionnaire Responses
MSTs may not be available to assist students often (4/74)	**Specialists require that math is very scheduled as the individual will have to come & go so there can be no extra time allotted.** **Would the specialist be available consistently or would they be spread too thin?**
Concerns about the ease of filling MST positions (3/74), especially in rural positions (1/74)	**I can anticipate there being problems fulfilling this role in rural schools, which will have later implications for students in post secondary programs or career paths.**

Perhaps it is noteworthy that if MSTs are not available in rural settings, it is assumed that rural students may be negatively affected as a result.

Financial Cost – 9%	Example Questionnaire Responses
Financial Cost (7/74)	**There may not be funds to accommodate such move for one. [*sic*]** **I would be concerned with the school budgets for these teachers if other programs were cut back**

Perhaps it is noteworthy that concern of the financial burden from MSTs was related to the possibility of directly impacting other programming.

Perceptions – 7%	Example Questionnaire Responses
Use of MSTs may strengthen the perception that math is not for everyone (5/74)	**Perhaps sending a message that math is too hard for normal teachers & only for a special few.** **They might always look for a math specialist instead of their normal teacher.**

Other (3/74) – 4%	Example Questionnaire Responses
Comments related to concerns about underlying issues of mathematics teaching and teacher education:	**I fear this will be another "attempt" to fix the gaps in students educations, which ultimately ends in failure. [*sic*]** **The designation of mathematics specialists does nothing to alleviate the underlying problem: teachers themselves do not necessarily possess the academic skills to teach (although they might understand "teaching" as a subject matter in itself).** **The idea that teachers in general don't have to have a basic grasp of mathematics, because they wouldn't have to teach it anymore. These are still BASIC math skills in elementary school, not calculus, not trigonometry. The thought that someone without basic math skills made it through University to become a teacher is ludicrous, or should be.**

5. Do you have any additional thoughts or comments to offer on the topic of mathematics teaching and mathematics teaching specialists?

Example Questionnaire Responses
Math Makes Sense too often presents too many strategies and does not give students the chance to pick the strategy that works for them and practice this. Would a math specialist be able to address this?
I would support the concept of an exclusive role for a mathematics teacher. My experience so far with consultants or 'coaches' is that they do not really benefit the students.
I've encountered a constant bias in public education that 'good students make poor teachers.' There is a perception that learning struggles create innovative teachers, while good students learn too quickly to be able to convey their learning process to others. This seems oddly messed up, and connected to an underlying problem in education. An assumption that a thorough understanding of a field will negate one's empathy for those entering (and beginning) their learning process. Why does this exist?
The best teaching comes from teachers who are enthusiastic about their subject matter – they can pass on their enthusiasm for the subject matter. A disinterested teacher doesn't inspire anyone to do anything, especially if the subject matter is not intrinsically interesting.
I don't know why the school board's hanging onto this system that is clearly not working. I honestly feel like we are completely failing our kids. Both my kids, Gr. 7 & 5, are probably at a Gr. 2 or 3 level with math. Parents & teachers I know all feel the same way – high school is going to be horrible for this generation. Many parents have hired tutors & I am about to do the same. Not fair for those who can afford it.
I believe math to be another language that is understood around the world and the more comprehensive the program the larger the benefit to the general student body. I believe that International math exchange programs would be very enlightening.
I think math is a vital component of a child's education and should be taught by an educator who is competent in the subject.
Use math in all subjects deliberately so less likely that people will develop poor attitudes to 'a subject – math' & see its daily relevance.
My daughters do not need 46 strategies to learn that 8x8 = 64. They just need to be able to multiply. Do not overwhelm them with too many ways to do simple things.
Hope they get back to drilling multiplication tables in younger grades as a math fundamental.
Elementary school (especially Grades 6-8) should all have math clubs where students can go some noon hours for extra help with a math specialist.
Please return to the old way of teaching math. Yes, it may be a little redundant, but it works. We are discovering kids nowdays [*sic*] that are in grade 7 or 8 and still struggle with basics like multiplication tables or being able to add or subtract in their head the simplest calculations.
I believe this is a very good idea. Having a math specialist can only strengthen my child's understanding of math. This is also very beneficial to children who may be struggling with math to have a teacher who can dedicate more time and effort to help them.
New math is neat but extremely hard to understand and teach to people who don't get it. Afraid this makes a bigger gap between 'good at math' vs 'hating math'. Only teaching to make some great. Others will be left behind.

They need to go back to the basic in the younger grades to make sure the basics are strong (basic facts, operations). The use of manipulatives in the younger grades is necessary, but cumbersome in the older grades (ex. Coloured tiles for integers seems to confuse many students.) More work on word problems.
I hope you have a lot of patience when helping your students.
Not enough focus on rote learning. There are some skills that must be memorized. There are no 'discovery' methods to learning the alphabet, you just memorize it.
Drill & practice!! Direct instruction in mathematics from the early grades on!
Maybe teachers should teach instead of finding all the places to take them on outings to 'round' them. I counted 10 days of outings – 10 less days to teach!! On top of PD days and school holidays.
Children need to know the basic concepts before they get more complex rules.
I am very opposed to the new way of teaching mathematics. My child has come home numerous times to ask for help because it did not make sense in class, but it does when I help. I think the mathematics curriculum has been changed so that it is allowing our children to be lazy & uneducated.
The kids should be taught the basics over and over and over so that when they get into the higher grades they aren't struggling with the basics.
Better resources/texts – more examples & step by step how to – no good to just let kids figure own method it only leads to frustration / poor attitude in math. More focus on basics.
Fundamentals! Every human being has a calculator in pocket. We must be able to approximate on our own. Conversions are important in Canada.
Understanding mathematics could be easily facilitated when teaching is focused on application and not purely theoretical.
Drop the 'Math Makes Sense' program until teachers are properly trained.
An effective math program encompasses drill & practice <u>and</u> strategies that teach a deeper understanding of math principles.