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Considering the roles of Mathematics specialist teachers in grade 6-8 classrooms

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ABSTRACT

This paper is part of a larger study focusing on the perceptions of five different stakeholder groups about the role of a specialist teacher in the teaching of Mathematics in grades 6-9. Using a research questionnaire, the perceptions of 21 pre-service Mathematics teachers (13 Canadian and 8 South African) regarding whether they would consider becoming a Mathematics specialist teacher and what they considered to be the benefits and shortcomings of Mathematics specialist teachers, were obtained. It is on these perceptions (both the positive and negative ends of the spectrum relating to the use of Mathematics specialist teachers in grades 6-9) that the paper reports. The data indicate how our pre-service teachers think about their future careers as teachers and how they, even as students, take into consideration particular aspects that may benefit or hinder their teaching.

KEYWORDS
Empowerment of teachers, in-depth Mathematics subject knowledge, Mathematics education, Mathematics specialist teacher, multiple teaching strategies, pre-service teacher perspectives

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Introduction

In Mathematics teaching and learning in K-12 schools, questions of *what* Mathematics should be taught and *how* it should be taught are frequently discussed by the various educational stakeholders (Hart & Swars, 2009; Sullivan, 2011; Tait-McCutcheon, Drake & Sherley, 2010). Additionally, the issue of *who* should teach the Mathematics content at a given level has now also been introduced and debated (Clarkson, 2015). The debate is especially prevalent on the matter of the Mathematics education of elementary (K-8) school children, where the notion of Mathematics specialist teachers (MSTs) is front and centre (Aubrey, 2006; Li, 2008; Schmidt, Blömeke & Tatto, 2011; Switzer, 2010).

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In the study informing this paper, the two authors/researchers (one located at a university in Canada and one at a university in South Africa) sought to study what perceptions individuals, involved in Mathematics teaching and learning, hold of the use of MSTs in grade 6-9. In other words, to study from multiple perspectives the phenomenon of the MST and how various educational stakeholders perceive it. In the research study, participants involved in Mathematics teaching and learning who were surveyed as to their perceptions (i.e. the five stakeholder groups) included school administrators, grade 6-9 classroom teachers, grade 6-9 learners and their parents, as well as pre-service teachers enrolled in the two universities' undergraduate teacher education programs.

This paper focuses on one particular stakeholder group: the pre-service teachers from the two participating universities who were being trained to teach Mathematics at the middle years/senior phase level (grades 6-9). This particular stakeholder group – the pre-service teacher perspective – is especially important to the authors/researchers. We both work as Mathematics teacher educators and, in spite of our university contexts being located in very different parts of the world, have identified the challenges in educating middle years/senior phase generalist teachers as a significant area of overlap in our respective work. As Mathematics teacher educators, we understand the impact (both negative and positive) that middle years/senior phase teachers have on grade 6-9 learners' understanding of, and interest in, Mathematics. It is with this in mind that we set out to study pre-service teachers' perceptions of the role that might be played by Mathematics specialist teachers at this middle years/senior phase level.

Literature review

According to some, all schools should have access to Mathematics specialist teachers; that is, teachers who have deep mathematical knowledge, extensive pedagogical knowledge of how Mathematics is best taught and learned, and the skills needed to support their colleagues (Campbell, Ellington, Haver & Inge, 2013; Donaldson, et al., 2012). Secondary schools have long been using subject area specialists in the education of its students, specifically Mathematics specialist teachers. Additionally, it is common practice in many countries to use teacher specialists in elementary schools for the subject areas of, for example, physical education, music, languages and literacy (Ardzejewska, McMaugh & Coutts, 2010). The education and use of Mathematics specialist teachers in elementary schools (including middle/senior phase school level) are still heavily debated issues (Schmidt, et al., 2011). In this review of the literature, research in the field of Mathematics specialist teachers (MSTs) will be discussed by first providing working definitions for the MST, and then considering the perceived benefits and shortcomings of using MSTs in elementary schools. Finally, a case will be made for the need to understand the benefits and shortcomings of the MST as perceived by elementary pre-service teachers, since the views of this particular stakeholder group are valuable to understand if there is to be a more global move toward educating and promoting the use of MSTs.

There is not one clear definition of a Mathematics specialist teacher. In fact, several models exist that describe variations of the concept. According to Reys and Fennel (2003), one model places a Mathematics specialist teacher in the role of mentor or coach, what is referred to as the Lead-teacher Model. This lead-teacher works as a support to colleagues, either within a single school or in multiple

schools in the wider school division. This form of specialist often does not have a classroom of their own, but instead serves as a resource to other teachers, providing support through observation and offering suggestions to their colleagues for improving Mathematics instruction. A second model of teacher specialist is referred to as the Specialized-teaching Assignment Model. In this model, the teaching staff in a school is organized into teams where one teacher has the responsibility for the Mathematics instruction, while other teachers take on this responsibility for different subject areas. This model of teacher specialist generally means that teachers take on the role of exclusively teaching Mathematics in their school. Alternatively, the role of a semi-specialist teacher is to teach Mathematics along with one or two other subjects (for example Science), again within a single school.

On our own study's research surveys, we provide the following general definition for an MST which provides a version of MST that encompasses both the Lead-teacher Model and the Specialized-teaching Assignment Model: 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.

Our own experiences as teacher educators over the years had us questioning whether it is unreasonable to expect elementary school teachers to be experts in every subject. For instance, it is unlikely that teachers will approach all subjects with the same level of competence (Ardzejewska, et al., 2010) and/or interest (Wilkins, 2010) and, as curriculum standards change, many teachers are ill-equipped to implement such changes in all subject areas (Miller, 1992). Thus, it is proposed that a greater competence in one specific content area will lead to teachers possessing a higher degree of confidence, an ability to empower students, and greater enthusiasm and consistency in instruction (Ardzejewska, et al., 2010; Attard, 2013). Furthermore, teachers who focus on one disciplinary area of teaching will likely incorporate more dynamic and varied ways of responding to and encouraging student learning (Aubrey, 1994; Lum, 1977).

Research on prospective and practicing teachers has shown that teachers feel a strong pull toward teaching in a manner similar to how they were taught (Golafshani, 2013; Hill, 1997; Nolan, 2012) which, in many cases, is more rule-based than it is dynamic and responsive to student needs. In fact, research indicates that teachers with more limited content knowledge will put more emphasis on facts over understanding, will rely on textbooks over hands-on experiences, and will interact less with students, who, in turn, are expected to work more individually (Aubrey, 1994; Golafshani, 2013). On the other hand, teachers with a broader content knowledge tend to teach in a more dynamic manner, represent the subject in more varied ways, and are generally encouraging and more responsive to students' questions and comments. One key benefit to having Mathematics specialist teachers is that limited content knowledge is addressed, generally through additional university courses in a teacher education program (in some cases, leading to a special certificate in Elementary Mathematics teaching) or through other professional development workshops and courses for in-service teachers (Barnes & Solomon, 2014).

Related to limited content knowledge is the suggestion that Mathematics understanding is greatly affective (Brown, McNamara, Hanley & Jones, 1999). As such, students who struggle to learn mathematics and to gain a sense of confidence in their foundational skills in elementary school will most likely also struggle with learning and confidence in high school (Newton, 2007). Viewing learning and school as affective experiences makes it easy to understand why generalist elementary teachers who have had negative experiences with Mathematics may teach in limited ways — that is, in ways that do not encourage students to engage with Mathematics through student-centred approaches and active involvement in their own learning. As outlined by Hodgen and Askew (2007), any anxiety or apprehension that primary teachers feel towards Mathematics is frequently transferred to their students through their teaching. Teachers can break the cycle of anxiety and apprehension by changing their relationship with Mathematics. This relationship change can transpire in teacher education programs if pre-service teachers have opportunities to learn Mathematics concepts in the same manner as they are expected to teach Mathematics (Lowery, 2002; Nolan, 2010). In other words, pre-service (and in-service) teachers who are taught to seek deeper understanding will themselves be able to teach students to find deeper understanding of content (Barnes & Solomon, 2014), thus breaking the cycle of teaching as one was taught in school Mathematics classrooms. Having a Mathematics specialist as a mentor or coach in a school, helping to address feelings of anxiety or apprehension on a professional level, could also help to break this cycle for many teachers.

Research points to both benefits and shortcomings of using MSTs in elementary schools (Gerretson, Bosnick & Schofield, 2008; Miller, 1992; Reys & Fennell, 2003). It is expected that not every teacher can and will be an effective Mathematics specialist teacher. Mathematics specialists need to have extensive content and pedagogical knowledge, leadership skills, experience with teaching at the elementary level, and interest in serving in this role (Reys & Fennell, 2003). Professional development opportunities and teacher education programs must be designed for teachers and pre-service teachers to develop the knowledge and skills necessary to be successful Mathematics teacher specialists (Li, 2008). A Mathematics specialist teacher must serve as the nucleus for achieving best pedagogical practice within a whole school with an understanding of key Mathematics principles and progression, cross-curricular and real world understanding, as well as the ability to mentor-coach colleagues (Donaldson, et al., 2012). The MST is charged with developing enthusiasm and mathematical learning across the whole school with crucial support from administration.

While research presents many of the perceived benefits and shortcomings of Mathematics specialist teachers, only a small selection of studies solicit this information directly from the stakeholders involved in Mathematics teaching and learning (see, for example, Blount & Singleton, 2007; Miller, 1992; Sowder, Philipp, Armstrong & Schappelle, 1998). With such a long list of desirable attributes for the Mathematics specialist teacher, as presented in this brief literature review, it seems clear that successful design and implementation of the MST is closely tied to understanding more about *who* makes the best MST. To understand this, we obtained the views of the various stakeholders involved in Mathematics teaching and learning. In its focus on pre-service teachers' perceptions of the MST, this paper contributes to understanding the views of one

very important stakeholder — one whose views can help make or break the case for educating and employing Mathematics specialist teachers.

Methodology

This is a qualitative study, nestled in the interpretive paradigm. The collection of data by the two individual researchers (one Canadian and one South African) took place simultaneously, but on two different continents, and by using two different groups of participants. The same research instrument was used, however, and all pre-service teacher participants had the same goal in mind: to become middle years/senior phase teachers (grade 6-8 in the Canadian context and grade 7-9 in the South African context) when they graduate from university. Although subject-specific teaching, Mathematics included, takes place in most South African schools as of grade 4, it is not a given that any teacher who is trained as a Mathematics teacher will only teach Mathematics once employed. The use of Specialist Mathematics Teachers in the grade 7-9 South African context is not a general occurrence, as the teachers almost always teach other subjects as well in these grades. Similarly, in Canada, grade 6-8 teachers are generally hired to teach a number of subjects (including Mathematics) but Mathematics specialist teachers are generally not used or available in most provinces across the country. Thirteen (13) Canadian and eight (8) South African Mathematics teacher education students (pre-service teachers) constituted the sample for the study.

The open-ended questionnaire (see Appendix) was qualitative in nature and designed to elicit perceptions on mathematics experiences and pedagogies of grade 6-9 pre-service teachers. It was posted in an easily accessible site on the internet for the Canadian participants; and on the institution's online learning management system for the South African participants. All participants were able to easily access, complete and submit the questionnaire from where it was made available to them. Participation was completely voluntary and anonymous.

The questionnaire consisted of two main sections, namely a Part A on 'Current Attitudes and Practices' and a Part B entitled 'Mathematics Specialists'. This paper focuses on the participant responses regarding questions 3, 4 and 5 in Part B of the questionnaire. These questions address whether or not a participant would consider taking on the role of an MST in a school (question 3), as well as the benefits (question 4) and possible shortcomings (question 5) of MSTs. The data provided by these three questions were analysed by the authors through a process of identifying, extracting and organizing the responses from each question. By completing this process for each of the three questions, several themes were identified and the similarities and differences across responses could then easily be identified and reported on.

Results and discussion

The results will be discussed question by question, starting with question number 3. Out of 13 Canadian pre-service teacher participants who chose to respond to the question of whether they would consider taking on the role of an MST in a school, 6 (46%) responded 'yes', and 7 (54%) responded 'no'. The 'yes' responses were similar to each other, with participants reporting that they enjoyed learning Mathematics and so would enjoy teaching it. A certain 'yes' response stated, "Yes, because I love math and I would love to inspire others to

love it as well." Reasons for responding with a 'no' were a bit more diverse in terms of the participants' reasoning. A 'no' response read, "Nope, don't feel comfortable with the content." Another mentioned, "The new math program is horrendous. It makes teaching difficult and not enjoyable." In addition to explanations focusing on not feeling comfortable, not being confident, or not enjoying the teaching of Mathematics, there were also 'no' responses highlighting positive feelings toward Mathematics, but not wanting to specialize in Mathematics as the participant did not want to be restricted to the teaching of only one subject. A certain participant explicitly stated that, "I enjoy teaching other subjects too."

The 8 South African participants responded to the question of whether they would consider taking on the role of an MST in a school with 6 (75%) 'Yes' responses and only 2 (25%) 'No' responses. Reasons for the 6 'Yes' responses were quite similar to Canadian participants' responses and included a love of Mathematics, enjoying a challenge, wanting to help learners understand the Mathematics content better, and supporting Mathematics teachers. One student in particular noted that, "I want to motivate children to enjoy Mathematics as it is part of almost every component of life. Learners need someone they feel comfortable with to give advice and help when they are struggling."

The two South African 'No' responses came very much from a learner's perspective as they mentioned that, "I do not have enough experience yet" and "Not straight away when I start teaching, as experience is essential. With time, however, I would like to become a mathematics specialist teacher." These two candidates were therefore hesitant to act as a specialist teacher right from the start, but thought that experience would better prepare them for the job. Experience was therefore most important to them.

The responses of the Canadian and South African participants show that there are, in fact, pre-service Mathematics teachers who would be interested in fulfilling the role of an MST in the middle/senior teaching phase once they are employed. The reasons for the participants wanting to be MSTs were quite similar, yet obviously subjective. Reasons for the participants not wanting to be MSTs were more varied, yet still subjective, and primarily focused on the participants' feelings and capabilities, rather than on any other possible external factor.

Question 4 in Part B of the questionnaire considered the benefits of Mathematics specialist teachers in the middle/senior phase. Responses from the Canadian and South African participants were summarised and are shown in Table 1. Colour-coding is provided to promote ease of understanding the themes constructed from the data. An interpretation guide, to the colour-coded themes in Table 1, is provided in Table 2.

Table 1. Benefits of Mathematics specialist teachers

No	Canadian participants (N=13)	South African participants (N=8)
1	Experts offer a higher standard of teaching and empowers teachers to exercise skills they excel in.	You know the learners receive the best possible education.
2	More learners would succeed in Mathematics, because they would have someone to turn to.	MSTs can help teachers teach Mathematics in a simple and easily understandable way.
3	Learners will learn more and have the opportunity to develop Mathematics skills.	An MST can assist Mathematics teachers in effective Mathematics teaching.
4	Teachers can use interesting learner groupings when teaching problem solving.	MSTs can assist colleagues and help train younger teachers. Good attitudes taught in the Mathematics class will be transferred to other classes.
5	Having a specialist with a deep understanding of and confidence in the subject is important.	The ability to use vast mathematical knowledge in problem solving; to guide other teachers in their presentation and assessment; learners who obtain better marks and are motivated to continue with Mathematics.
6	MSTs can focus all their attention on teaching Mathematics. It could take the pressure off those teachers who are afraid to teach Mathematics.	It creates a positive attitude among the learners towards Mathematics. An MST is someone learners can look up to. He can purposefully guide the learners.
7	An MST can teach with different strategies and have in depth knowledge of the subject.	The marks of the learners could improve which would improve the school's standing in the community.
8	An MST can introduce multiple ways of doing things in Mathematics, e.g. use technology. He may have a more sound understanding of mathematical principles and concepts.	No response
9	They create confidence, help with questions, create a network and a sense of community.	
10	Learners who struggle or excel have someone to help them out.	
11	An MST can build on previous skills in his teaching.	
12	Teachers who are not strong in teaching Mathematics can go to the specialist for help and support.	
13	No response	

The majority of responses focused on the benefits of MSTs in terms of teaching and learning. This means that the participants perceived the role and benefits of a Mathematics specialist teacher to be one in which learners benefit from their vast knowledge and understanding of the subject (red and pink highlighted text), and the teachers benefit from their guidance with respect to the successful teaching of the subject (turquoise and yellow highlighted text). Empowering and assisting teachers was perceived by the pre-service teachers as the greatest benefit of employing an MST at a school. Three out of 13 Canadian participants (23%) made up 43% of the responses, while four out of eight South

African participants (50%) made up the other 57% of the responses. Help and assistance to learners was the second most important perceived benefit, with three responses each from the Canadian and South African participants. This relates to 23% of the Canadian participants and 38% of the South African participants each contributing 50% to the responses.

Table 2. Interpretation guide to Table 1

Benefit	Colour	Number of related responses from Canada	Number of related responses from South Africa	Total number of related responses
Empowerment and assistance of teachers	Turquoise	3	4	7
Help and assistance to learners	Red	3	3	6
An MST has in-depth subject knowledge	Pink	4	1	5
The use of multiple teaching strategies and higher quality teaching	Yellow	5	0	5
Attitude among learners	Grey	0	2	2
Community	Green	1	1	2
No response	No colour	1	1	2

MSTs' in-depth subject knowledge, as well as their ability to use multiple teaching strategies which promote higher quality teaching, each received 5 responses from the participants. These perceived benefits therefore took third place in order of importance. Four out of 13 Canadian participants (31%) made up 80% of the responses with respect to the in-depth subject knowledge an MST has, while only one out of eight South African participants (13%) made up the remaining 20%. Five out of 13 Canadian participants (38%) made up 100% of the responses with respect to the use of multiple teaching strategies and higher quality teaching. It is noteworthy that in summary therefore, nine of the 10 responses came from Canadian participants and only one response from a South African participant. This might suggest that the Canadian participants assigned greater importance to aspects such as in-depth subject knowledge and the ability to use multiple teaching strategies which promote higher quality teaching at the middle school level/senior phase, than their South African counterparts.

The development of a positive attitude towards Mathematics received two responses from South African participants (grey highlighted text). This relates to 25% of the South African participants contributing 100% of the responses. The concept of 'community' was noted by a Canadian and South African participant, albeit in completely different contexts (green highlighted text). The Canadian participant anticipated that an MST would create confidence among the learners and assist them with questions; thereby creating a network and a sense of community among the learners. The benefit was therefore anticipated within the school community. The South African participant, on the other hand, anticipated that an MST would contribute to the improvement of the learners' marks, which would, in turn, improve the school's standing in the wider community. This benefit was therefore anticipated outside the school community.

Question 5 in Part B of the questionnaire asked respondents to identify possible shortcomings of Mathematics specialist teachers in the middle/senior phase. The views of the Canadian and South African participants were again summarised and are shown in Table 3. Colour-coding is provided once again to promote ease of understanding the themes constructed from the data. An interpretation guide, to the colour-coded themes in Table 3, is provided in Table 4.

Table 3. Shortcomings of Mathematics specialist teachers

N	Canadian participants (N=13)	South African participants (N=8)
1	An MST would not have the relationship a classroom teacher has with the learners.	An MST might teach at a higher level than the learners can grasp and not realize it.
2	An MST coming in and out of the classroom for Mathematics lessons might cause inconsistency with classroom routines and procedures.	Overworking the specialist could end up in a situation where promises or dreams on the learners' side are not fulfilled.
3	The MST could use Mathematical terminology the learners do not understand. Learners could then struggle and not like Mathematics.	The specialist teacher may become too focused on assisting the teacher and neglect the learner. Perhaps too specialized and not focused on simplicity.
4	Grasping and understanding all the Mathematics concepts might initially be time consuming for an MST.	None
5	An MST who has always done well in Mathematics might not have sympathy or understanding for struggling learners. Having understood concepts in one way, MSTs may struggle explaining it another way.	All learners might want to attend the classes of the specialist teachers and other teachers might feel left out or inferior.
6	If the learners do not have access to the MST all the time, there might not be a strong relationship between the specialist and the learners.	Specialist teachers might not have knowledge of the types of learners in the grade, their circumstances at home, their learning styles or learning barriers. The specialist might not connect the Mathematics to the learners' living world and life experiences.
7	Too many different teachers for elementary school learners might impact negatively on the learners.	Mathematics specialist teachers who do not have the necessary time and resources to make an impact on the learners.
8	The MST might take over a teacher's class, be rude or not have enough time to help.	No response
9	Learners might be singled out in a negative way when they need extra help.	
10	Conflict between the MST and the learners might create a dislike for Mathematics.	
11	The development of dependency on the MST and consequent burnout.	
12	One is not enough, so it's pointless.	
13	None	

Table 4. Interpretation guide to Table 3

Shortcomings	Colour	Number of related responses from Canada	Number of related responses from South Africa	Total number of related responses
The relationship between the MST and learners	Yellow	3	3	6
An MST might operate at too high a level	Green	2	3	5
Exhausting the MST	Turquoise	2	1	3
Impact on classroom routine and procedure	Grey	3	0	3
None	Red	2	1	3
Emotional impact on teachers and learners	Pink	1	1	2
No response	No colour	0	1	1

Two main concerns were anticipated by the Canadian and South African participants. The first concern is with regard to the relationship between the MST and the learners (yellow highlighted text). The participants anticipated that if the MST only worked with the learners on an ad-hoc basis, no true relationship would form between the learners and the MST. Three out of 13 Canadian participants (23%) made up 50% of the responses with respect to the relationship between the MST and the learners, while three out of eight South African participants (38%) made up the remaining 50%. The second concern was that the MST would teach and facilitate at too high a level (green highlighted text), with the learners not being able to understand the content. It is an observation that contradicts the purpose of an MST in some sense, as issues of improved instruction are exactly those which the MST is supposed to address. Two out of 13 Canadian participants (15%) made up 40% of the responses with respect to an MST who might operate at too high a level, while three out of eight South African participants (38%) made up the balance of 60%.

Other concerns raised in response to Question 4 included overworking or overburdening the MST (turquoise highlighted text), the impact on classroom routine and procedure (grey highlighted text), and the emotional factors impacting on teachers and learners (pink highlighted text). Except for 'the impact on classroom routine and procedure' these anticipated concerns received a near-equal number of responses from Canadian and South African participants. Two out of 13 Canadian participants (15%) made up 67% of the responses with respect to exhausting the MST, while one out of eight South African participants (13%) made up the other 33% of the responses. One out of 13 Canadian participants (8%) made up 50% of the responses with respect to the emotional impact on teachers and learners, while one out of eight South African participants (13%) made up the other 50% of the responses. All three responses regarding 'the impact on classroom routine and procedure' came from Canadian participants. This amounts to 23% of the Canadian participants contributing 100% of the responses. The reason for this observation might lie in the fact that learners at school are already introduced to subject-specific teachers as from grade 4 in South Africa. Lastly, two out of 13 Canadian participants (15%), which made up 67% of the responses, noted that MSTs had no shortcomings, while one out of eight South African participants (13%) made up the other 33% of the responses.

Conclusion

The perceptions of pre-service teachers regarding the use of Mathematics specialist teachers in grade 6-9 classes clearly evoked mixed feelings among the participants. While there were many positive aspects mentioned, valid concerns that should be addressed, were also raised. This observation concurs with our literature review in which many desirable attributes for Mathematics specialist teachers were presented. The successful use of an MST in the middle/senior phase school set-up is therefore closely tied to understanding what type of Mathematics educator would make the best possible MST in any specific school context, as circumstance and the perceptions of the possible MST candidates about acting as an MST, vary. These concerns will have to be considered and handled on an individual basis by each school embarking on the use of MSTs. Furthermore, various reasons were identified why not all pre-service teachers were enthusiastic about becoming MSTs. These include aspects such as the accompanying responsibility and the need for experience explicit in the position. As with any specialist field, Mathematics specialist teachers should preferably receive managerial training in addition to their middle/senior phase subject specific Mathematics teacher training. The findings of this study, interpreted directly from the perspective of pre-service teachers, could contribute to the identification of aspects that need to be included in such further training of Mathematics specialist teachers.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix

PRESERVICE TEACHER QUESTIONNAIRE

Research Question:

What perceptions do individuals, involved in mathematics teaching and learning, hold of the use of mathematics specialist teachers in Grades 6-9?

The key aim of this part of the research study is to understand pre-service teachers' experiences of, and perceptions on, the role of mathematics specialist teachers in grades 6-9 classrooms.

If you choose to participate in this study, please complete the attached questionnaire electronically or in hard copy and return it to Dr KE Junqueira as soon as possible. You can email your answers to junqueirake@ufs.ac.za or simply slide the hard copy under my office door in the New Education Building, room 1.3. The closing date for completion of the questionnaire is as soon as possible. Please keep this page of information for your records so you can contact the researcher if you have any questions or concerns.

- The research questionnaire is intended to be anonymous and should take less than 30 minutes to complete. The information collected on the questionnaire will be kept strictly confidential and reviewed only by the researcher and/or the research assistant. Responses from all questionnaires will be compiled and will not be attributed to any particular respondent within the research report.
- Participation in this study is voluntary. If you choose not to participate in this study, there will be no repercussions. However, your input into this study is important and very much appreciated.
- If you choose to participate by completing the questionnaire, please feel free to omit any questions that you prefer not to answer. All responses will be included as data even if you omit some questions or parts of questions.
- A summary of findings from this study will be available on the researcher's website (http://www2.uregina.ca/ktnolan) in early Spring 2014. The completed questionnaires will be stored on a password protected computer in the researcher's office for five years after completion of the study, at which point all questionnaires and data will be deleted from the computer.
- If you have any questions, or would like to discuss the research further, please contact the researcher: Dr. KE Junqueira, Lecturer, School of Mathematics, Natural Sciences and Technology Education, Faculty of Education, University of the Free State, junqueirake@ufs.ac.za.

This project has been approved on ethical grounds by the University of Regina Research Ethics Board (REB). Any questions regarding your rights as a participant may be addressed to research.ethics@uregina.ca).

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.
2. Do you find mathematics easier or harder to teach than other subjects? Why?
3. Do you feel that grade 6-9 students find mathematics easy to learn or hard to learn? Why?
4. Is it important to you that grade 6-9 students enjoy mathematics?
5. Of the following areas of focus, what would you say are your top 3 considerations when creating a mathematics lesson plan?
   a. Following the textbook
   b. Teaching algorithms
   c. Teaching concepts
   d. Problem solving
   e. Practicing skills
   f. Providing notes for students
   g. Following the curriculum
   h. Being able to communicate mathematically
   i. Having all students at the same level
   j. Maximizing student involvement
   k. Other (please specify): _____
6. How important is it to you to "stay with" your plan for a lesson?
   a. Not at all
   b. Somewhat
   c. Very

PART B: Mathematics 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. How important is it that teachers have a deep understanding of the mathematics they teach?
    a. Not at all
    b. Somewhat
    c. Very
2. How comfortable are you with the mathematics concepts in the grades 6-9 curricula that you will be asked to teach?
    a. Not at all
    b. Somewhat
    c. Very
3. Would you consider taking on the role of a mathematics specialist teacher in a school? Why or why not?
4. What would you consider to be the benefits of a mathematics specialist teacher in a school? Or in a classroom?
5. What would you consider to be the shortcomings of a mathematics specialist teacher in a school? Or in a classroom?
6. Do you have any additional thoughts or comments to offer on the topic of mathematics teaching and mathematics teaching specialists?