Chapter 5

PRIMARY TEACHER MATHEMATICS ANXIETY, TEACHER EFFICACY AND MATHEMATICS AVOIDANCE

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ABSTRACT
This exploratory study examined the relationships among mathematics anxiety, mathematics teacher efficacy, and mathematics avoidance, among 68 primary teachers in Trinidad and Tobago, using a self-reporting questionnaire. Stata12 was used to compute means and standard deviations, and to conduct correlation, means-difference, and regression analyses. High mathematics anxiety was associated with low teacher efficacy and high mathematics avoidance among both male and female teachers. There were no significant relationships among mathematics anxiety, mathematics teacher efficacy, and mathematics avoidance by age and years of teaching experience. Gender was a significant factor for mathematics avoidance, with males reporting significantly higher mathematics avoidance than females. While a regression model with teachers' gender, age, teaching experience, and mathematics attainment could not significantly predict mathematics anxiety, mathematics attainment significantly predicted mathematics anxiety, and mathematics anxiety significantly predicted mathematics teacher efficacy. Further research is imperative to determine if mathematics anxiety is problematic at the primary level, with priority to unearthing links between teacher anxiety and student anxiety, and how student achievement, attitudes and beliefs are affected by teacher mathematics anxiety. Such research should inform teacher preparation and development programs to strengthen teachers' efficacy beliefs by addressing teachers' mathematics anxiety by equipping teachers with tools to manage their anxiety and strengthen individual efficacy beliefs about teaching mathematics.

Keywords: mathematics anxiety, teacher efficacy, mathematics avoidance, primary teachers.

1. INTRODUCTION

Mathematics pervades daily life, and "those who understand and can do Mathematics will have significantly enhanced opportunities and options for shaping their futures" (National Council of Teachers of Mathematics [NCTM], 2000, p. 5). Mathematics undergirds many professions in fields like engineering, medicine, business, finance, technology, and most importantly, education. Despite this, educators are concerned with the many individuals who struggle with performing simple mathematical tasks, and who express frustration about not understanding the Mathematics they are taught (Kalloo & Mohan, 2012). This concern is also evident in the Caribbean where the pass rate in the Mathematics examination averaged around 40% from 2004 to 2013 (Caribexams, 2014). This suggests that 60% of Caribbean students struggle with Mathematics and have not attained the minimum required competence in Mathematics by the time they leave secondary school. Factors that affect student success and attitudes towards Mathematics include students' lack of self-confidence (Brady & Bowd, 2005); low levels of conceptual understanding of mathematical concepts (Uusimaki & Nason, 2004); and teachers instructional practices, content knowledge, and beliefs about Mathematics (Iossi, 2007).

Trinidad and Tobago, the southern-most Caribbean island, is regarded as the economic mecca in the Caribbean because of its significant deposits of oil and natural gas. It relies heavily on innovations in science, technology and business for economic viability, and its citizens should be competent and confident in their Mathematics ability to hold jobs related to the oil and gas industry. Growing concerns about student underachievement, particularly among males, and increasingly negative attitudes towards Mathematics (Trinidad and Tobago Ministry of Education, 2008) have not stimulated sufficient research into factors that influence these outcomes. The deeply-rooted high-stakes-assessment educational orientation that lingers from Trinidad and Tobago's colonial heritage, despite its independence from Britain in 1962, positions the teacher as the *sage-on-the-stage* well versed in traditional instructional. The resulting intergenerational legacy of Mathematics as product rather than process sacrifices conceptual for procedural understanding, and propagates Mathematics as *something* for *bright* people. Many students complete their schooling with compromised mathematical competence, confidence and efficacy. In reality, some of these individuals become primary teachers.

Novice primary teachers in Trinidad and Tobago have attained at least secondary-school Mathematics certification and have had little or no pre-service training. Within the last decade the government has invested heavily in pre-service training for primary teachers and now offers training for many teacher candidates annually. However, like elementary teachers elsewhere, primary teachers in Trinidad and Tobago have not had specialized training to teach any particular curriculum subject; yet, they are required to teach every examinable subject at the primary level, including Mathematics. Primary teachers are not necessarily those who like or enjoy Mathematics, or appreciate the beauty of Mathematics and its real-world applications (Buhlman & Young, 1982).

The 3 to 1 ratio of female to male primary teachers echoes loudly the perceptions about teaching and teachers in Trinidad and Tobago. This ratio also suggests a reduction in the number of male role models for boys in the classroom, and a resulting feminization of the primary classroom in Trinidad and Tobago. Primary teachers also face societal expectations that they can do Mathematics competently and can teach Mathematics effectively. As such, they are expected to have a deep and connected understanding and knowledge of Mathematics, and confidence in their own ability to learn the Mathematics (Wilson, 2009). Such expectations, though not unreasonable, may cause mental distress and affect their belief in their capability to teach Mathematics.

The current study was inspired by a group of primary teachers who were enrolled in an undergraduate education course at a university in Trinidad and Tobago. One female teacher explained, "I don't think I have the right mind for maths. Sometimes I exchange maths for language teaching with my co-teacher because I just don't feel comfortable teaching it". Her colleagues indicated their agreement, and reportedly had performed poorly at Mathematics as students. They attribute their beliefs about Mathematics to their school experiences, and their teachers' attitude and instructional approaches. They were not confident that they possessed the required content and pedagogical knowledge to teach Mathematics effectively. All of these teachers had been teaching for more than five years, and were Teachers College graduates. These teachers' comments raised concerns about what is happening in primary classrooms.

It is believed that elementary teachers hold negative attitudes towards Mathematics that affect their confidence to teach Mathematics, and that mathematics anxiety is prevalent among them (Malinsky, Ross, Pannells, & McJunkin, 2006). However, in the absence of empirical evidence it is difficult to say the same about primary teachers in Trinidad and Tobago. A more reasonable conjecture is that some primary school teachers in Trinidad and

Tobago are math-anxious, believe themselves to be less efficacious at teaching Mathematics, and may attempt to avoid teaching Mathematics. Even so, identifying teachers as math-anxious does not interrogate its influence on the teaching and learning environment. Much research on Mathematics anxiety has focused on adolescents, college-aged students and pre-service elementary teachers, leaving a gap in what is known about practicing primary teachers, and more specifically, teachers in developing countries like Trinidad and Tobago. Thus, this exploratory study sought to clarify relationships among the constructs of mathematics anxiety, mathematics teacher efficacy and mathematics avoidance of a group of primary teachers in Trinidad and Tobago to determine if their gender, age, Mathematics attainment at secondary level, and their number of years of teaching experience were factors for these three constructs.

2. REVIEW OF THE LITERATURE

Before undertaking this literature review, it is imperative to highlight the inconclusiveness of research findings about mathematics anxiety, teacher efficacy, and mathematics avoidance. While there have been general trends identified in some studies, others have contradicted them in some way. The disparity among researchers may be attributed to differences in research contexts, populations from which samples are drawn, the definition of the constructs, and the precision of the instruments used to measure them. The latter point has been highlighted most recently by Klassen, Tze, Betts, and Gordon (2011), who argued that the voluminous research about teacher efficacy has not resolved issues around the clarifying the construct, the lack of "attention to the sources of teacher efficacy, continued measurement and conceptual problems, a lack of evidence for the links between teacher efficacy and student outcomes, and uncertain relevance of teacher efficacy research to educational practice" (p. 21). This view may be extrapolated to the constructs of mathematics anxiety and mathematics avoidance. Hence, the following review of the literature reflects this tension.

2.1. Mathematics anxiety

Global concerns abound about falling student achievement in Mathematics and increasing negative attitudes towards Mathematics (Gresham, 2007; Malinsky et al., 2006). Learning and doing Mathematics arouse stronger emotions than other subjects (Hembree, 1990), and individuals develop attitudes and emotional reactions towards Mathematics quite early. Negative attitudes persist well into adulthood (Brady & Bowd, 2005) and affect individual success and attitudes towards Mathematics (Shores & Shannon, 2007). Mathematics anxiety is an intensely negative emotional reaction to anything related to Mathematics (Ashcraft, Krause & Hopko, 2007). It arouses negative feelings that compromise one's ability to manipulate numbers and solve every-day mathematical problems (Richardson & Suinn, 1972). It is a learned emotional response (Austin, Wadlington, & Bitner, 1992) that is associated with teachers' beliefs and attitudes towards Mathematics (Sousa, 2008), with instruction (Hasbee, Sam, Nur, & Tan, 2009; Uusimaki & Nason, 2004) and gender stereotypes (Good, Rattan, & Dweck, 2012). More than a dislike of Mathematics, mathematics anxiety comprises attitudinal, cognitive and emotional dimensions (Ma, 1999). It is rooted in emotional and cognitive fear of Mathematics (Tobias, 1978) and actual experiences of failure and inadequacy (Perry, 2004). It interferes with conceptual thinking and memory processes (Ashcraft, 2002), causing individuals to "perform less efficiently on tasks requiring working memory resources because their worrisome thoughts interfere with working memory, making them unable to fully utilize

their working memory capacity for task performance" (Ganley & Vasilyeva, 2014, p. 2). It initiates the development of negative attitudes towards Mathematics and avoidance of it (Tobias, 1987).

Math-anxious teachers experience feelings of tension; heightened nervousness; difficulty concentrating in noisy environments; extreme agitation at students; and negative self-talk (Levine, 1999). They struggle during lesson preparation and instruction (Gardner & Leak, as cited in Peker, 2009a, p.336) because of their compromised content and pedagogical knowledge, which foster negative attitudes towards Mathematics and low self-confidence for doing and teaching it (Pecker, 2009b). Hence, they rely on traditional teaching strategies rather than collaborative strategies (Swars, Daane, & Giesen, 2006). They often communicate and transfer their anxiety to the students (Gresham, 2008).

There is inconclusive evidence on the effects of teacher variables of gender, age and experience on mathematics anxiety. Whereas some researchers argue that females more math-anxious than males (Brady & Bowd, 2005; Ganley & Vasilyeva, 2014), others believe this difference is contrived (Mji, 2009). Hembree (1990) found no age-related differences in mathematics anxiety among. More experience teachers were also found to be less anxious about teaching mathematics than less experienced ones (Hadley & Dorward, 2011). It is therefore likely that continued experience and maturity on the job minimise teachers' mathematics anxiety, or they employ strategies to help them manage their anxiety. However, researchers seem to agree that math-anxious teachers are less confident about teaching Mathematics (Bursal & Paznokas, 2006; Brady & Bowd, 2005); and have low mathematics teacher efficacy (Swars et al., 2006).

2.2. Mathematics teacher efficacy

Teachers often mirror the beliefs and attitudes of their own teachers. Teachers' beliefs influence their behaviours and their decision making (Hart, Smith, Smith, Swars, & Tolar, 2007), as well as how they "feel, think, [and] motivate themselves" (Bandura, 1993, p.118). Self-efficacy beliefs are situation- or context-specific beliefs that influence how an individual interprets his or her ability to perform a task within a specific situation or context (Bandura, 1997). A particular self-efficacy belief, teacher efficacy, refers to teachers' beliefs in their "capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998, p. 233). Mathematics teacher efficacy, then, may be described as teachers' beliefs about their perceived ability to effectively teach Mathematics in their particular context, to all students in a way that they can learn. Teacher efficacy crystallizes early in teachers' careers and is thought to become relatively stable once established (Hoy, 2000), but can strengthen with teaching experience (Wenner, 2001).

Teacher efficacy affects the way teachers feel about their work (Hoy, 2004). Highly efficacious teachers have positive attitudes towards their work, and are less math-anxious than those with weak efficacy beliefs (Gresham, 2008; Swars et al., 2006). They spend time planning their lessons (Allinder, 1995) and experiment with student-centered instructional strategies (Wenta, 2000). They manage their classrooms and are committed to teaching their students (Swars et al., 2006). They experiment with student-centered instructional strategies (Turner, Cruz & Papakonstantinou, 2004), and thus, positively influence student motivation (Perry, 2004) and academic achievement (Gibson & Dembo, 1984). Conversely, teachers with low teacher efficacy tend to become less tasks-oriented and motivated over time, and view themselves as less competent than their peers (Bandura, 1997).

The effects of teachers' gender, age and teaching experience on teacher efficacy remain inconclusive. Cheung (2006) found that female teachers had stronger efficacy

beliefs than males, but Tschannen-Moran and Woolfolk Hoy (2002) and Yeo, Ang, Chong, Huan, & Quek (2008) found no relationship existed. Younger teachers have been reported to have higher teacher efficacy than older teachers (Robinson & Edwards, 2012), and teachers with more teaching experience have been reported to have stronger teacher efficacy than less experienced teachers (Cheung, 2006; Wolters & Daugherty, 2007); however, some suggest that teacher efficacy weaken through the latter years of teaching (Gu & Day, 2007; Klassen & Chiu, 2010) as teaching contexts change.

2.3. Mathematics avoidance

Though mathematics anxiety may be motivating and exciting to some, beyond a tolerable level it may cause others to avoid or attempt to escape from a situation involving Mathematics, including Mathematics-related careers (Gunderson, Ramirez, Levine, & Beilock, 2012). The cyclic nature of mathematics avoidance (Preis & Biggs, 2001) begins with a negative reaction to a mathematical situation that is usually based on prior negative experiences with Mathematics. Attempts to avoid any mathematical situations then follow, and lead to poor performance in Mathematics. This exacerbates the negative associations with Mathematics and leads to further avoidance. Enough repetitions of this cycle convince individuals that they cannot do Mathematics, and requires deliberate intervention is required to break the cycle. Math-anxious teachers avoid teaching Mathematics when possible (Trice & Ogden, 1986).

3. METHODOLOGY

3.1. Research design and procedure

This quantitative study explored interrelationships among mathematics anxiety, mathematics teacher efficacy, and mathematics avoidance of primary teachers, by age, gender, mathematic attainment at Ordinary level, and years of teaching experience. Non-probability purposive sampling was used to select a representative sample of the study-population. Prior to administering the Mathematics Beliefs Questionnaire five primary teachers were asked to comment on its layout, language appropriateness for Trinidad and Tobago, its length, and the applicability of items to the constructs being measured. All inconsistencies were addressed and the amended questionnaire returned to these teachers for further comment. Once the questionnaire was deemed satisfactory for the local context it was reproduced for administration. Participants were invited from 20 primary schools Trinidad. They were provided with the questionnaire, introductory letter, consent form and a manila envelope within which to place the completed questionnaire before returning it to the researcher. None of the initial five respondents were invited to be participants in the study.

3.2. Description of participants

The primary teacher population of Trinidad and Tobago has not changed substantially over the last decade. Primary teachers in Trinidad and Tobago range in age from 18-60 years. The most recent official figures indicate that the primary teacher population remains approximately 7,000 (72% female; 28% male), of which approximately 81% are trained (Education Policy and Data Center [EPDC], 2012). For this study, questionnaires were distributed to 100 primary teachers from six of the eight education districts in Trinidad and Tobago, who had been teaching for more than 2 years, and were practicing in the primary classroom at the time of the study. However, the authors acknowledge that math-anxious individuals are likely to be math-avoidant and may have avoided participating in this study.

There was an initial response rate of 72%, which was reduced to 68% because some respondents did not meet all the criteria. Participants in this study primary teachers whose ages varied from 30 to 59 years, with 44 (64.7%) of them age 30 – 39 years, 21 (30.9%) aged 40 – 49 group, and 3 (4.4%) aged 50 -59 age group. Of the 68 participants 44 (64.7%) were female and the remaining 24 (35.3%) were male; this distribution is closely aligned with the current primary teacher population in Trinidad and Tobago. Forty-three participants were teaching at the primary level for up to five years; 22 participants were teaching for between 5 and 16 years; and 3 were teaching for more than 16 years. Forty (58.8%) of the participants were in-service primary school teachers enrolled in an undergraduate Bachelor of Education (B.Ed.), while 28 (22.1%) already possessed a B.Ed. A further 43 (63.2%) participants possessed a Teachers College Diploma, with only 8 (11.8%) of these having specialized in Mathematics.

3.3. Description of instrument

The self-reporting questionnaire elicited responses about participants' gender, age, Mathematics grade earned at Ordinary level and number of years teaching at the primary level. It comprised 33 randomly sequenced 4-point Likert-type items that constituted three subscales – mathematics anxiety (10 items), mathematics teacher efficacy (13 items), and mathematics avoidance (10 items). Items were adapted from Allen (2001) who designed his instrument to "define the constructs that potentially affect students' attitudes, feelings, and beliefs with respect to Mathematics" (p. 47). The mathematics anxiety subscale comprised five positively-phrased items and five negatively-phrased items. The mathematics avoidance subscale was similarly comprised. The mathematics teacher efficacy subscale comprised five positively-phrased items and eight negatively-phrased items. Sample items are provided in Table1.

Table 1. Sample Items for subscales on Mathematics Beliefs Questionnaire.

	Sample Item
Low anxiety	I don't worry about my ability to solve maths problems.
High anxiety	My mind goes blank and I can't think clearly when doing maths
Strong efficacy	I understand maths concepts well enough to effectively teach them.
Weak efficacy	I don't believe that l have the necessary skills to teach maths.
Low avoidance	I look forward to teaching math.
High avoidance	I avoided taking math classes after I left secondary school.

Responses for each item were *strongly disagree*, *disagree*, *agree* and *strongly agree*, and were scored from 1 – 4, respectively, for positively-phrased items and reversed scored for negatively-phrased items. Item and subscale scores are interpreted in the Table 2.

Table 2. Summary of item and subscale scores and their interpretation.

Score range	Interpretation of range
score < 2.5	low anxiety / low avoidance / weak efficacy
score ≥ 2.5	high anxiety / high avoidance / strong efficacy

3.4. Data analysis

Stata12 was used to analyze the data collected. Means and standard deviations for each item and for overall mathematics anxiety, mathematics teacher anxiety and mathematics avoidance were computed. Pearson product-moment correlations coefficients were computed (i) to determine the nature of the relationships between positively- and negatively-phrased items comprising the subscale for each of the three constructs, and (ii) to determine the nature of the relationships among the three constructs themselves. Univariate analysis of variance (ANOVA) were computed to determine whether there were significant differences in mathematics anxiety, mathematics teacher anxiety and mathematics avoidance by participants' gender, age, and years of teaching experience at the primary level. Finally, regression analysis was conducted to determine if collectively, gender, age, teaching experience, and Mathematics grade would significantly predict mathematics anxiety, and whether mathematics anxiety significantly predicted mathematics teacher efficacy.

4. FINDINGS

4.1. Descriptive statistics for each construct

4.1.1. Mathematics anxiety. Of the respondents, 58.8% felt at ease during Mathematics courses, and 51.5% felt at ease during Mathematics tests. Approximately 35% were not bothered about taking more Mathematics courses in the future. While 62% were not worried about their problem-solving ability, 76% experienced a sinking feeling when trying to solve a difficult Mathematics problem. Approximately 12% of respondents felt uncomfortable and nervous about Mathematics, and 13% felt uneasy and confused about Mathematics.

4.1.2. Mathematics teacher efficacy. Of the respondents, 97.9% continually found better ways to teach Mathematics, while 10.3% believed that they did not know how to motivate students to engage in Mathematics. Of the sample, 97% understood Mathematics concepts well enough to teach Mathematics effectively, and 85.3% believed that they could teach Mathematics effectively. However, 7.4% did not believe they had the necessary skills to teach Mathematics, and 10.4% believed that they did not teach Mathematics as well as other subjects. Although 97% welcomed and could answer students' questions about Mathematics, 16.2% did not believe that they could help students who were experiencing difficulties in Mathematics, and 13.2% believed that they were ineffective at monitoring their students' Mathematics activities.

4.1.3. Mathematics avoidance. Of the sample, 92.7% looked forward to teaching Mathematics, but 7.3% did not want to teach Mathematics in the future. More than half of the sample (64.7%) did not participate in Mathematics competitions at school, and 64.7% did not assist others with Mathematics homework. As much as 72.1% did not select Mathematics as their area of emphasis, and 22.1% chose an area of study that did not require Mathematics. Approximately 73% of respondents took Mathematics classes that they were not required to take, and 7.4% dropped Mathematics courses because they experienced difficulty with them.

4.2 Relationship between constructs

Pearson's product-moment correlation coefficients were significant between positively- and negatively-phrased items. Moderate to strong inverse relationships were observed (Table 3) for mathematics anxiety ($r = -.708$, $p < .01$), mathematics teacher

anxiety (r = -.534, p < .01), and mathematics avoidance (r = -.483, p < .01). These findings indicated internal consistency among items related to each construct.

Table 3. Pearson's product-moment correlations for positively and negatively phrased items.

	Mathematics Anxiety (-)	Mathematics Teacher Efficacy (-)	Mathematics Avoidance (-)
Mathematics Anxiety (+)	-.708**		
Mathematics Teacher Efficacy (+)		-.534**	
Mathematics Avoidance (+)			-.483**

** Correlation is significant at the 0.01 level (2-tailed)

Pearson's product-moment correlation coefficients indicated significant associations among constructs (Table 4). The moderate positive association between mathematics anxiety and mathematics avoidance (r = .618, p <.01) indicated that teachers who reported lower mathematics anxiety also reported lower mathematics avoidance tendencies, a finding that is consistent with those of Kelley and Tomhave (1985). The moderate inverse relationship between mathematics anxiety and mathematics teacher efficacy (r = -0.550, p <.01), suggested that highly math-anxious teachers believed themselves to be less efficacious that teachers with low mathematics anxiety (cf. Swars et al., 2006). Further, the moderate inverse relationship observed between mathematics teacher efficacy and mathematics avoidance (r = -0.609, p <.01) suggested that teachers with strong efficacy beliefs were less math-avoidant than those with weak efficacy beliefs.

Table 4. Pearson product-moment correlations for constructs by gender.

	Mathematics anxiety	Mathematics avoidance
Mathematics avoidance	0.618**	
Mathematics teacher efficacy	-0.550**	-0.609**

** Correlation is significant at the 0.01 level (2-tailed)

4.3 Differences between and within constructs

Low mathematics anxiety (M = 2.28, SD = .28), low mathematics teacher efficacy (M = 2.26, SD = .25) and low mathematics avoidance (M = 2.03, SD = .27) were evident among teachers surveyed (Table 5). While male teachers reported higher mathematics anxiety (M = 2.32, SD = .208) than females (M = 2.25, SD = .280), both males (M = 2.15, SD = .234) and females reported low mathematics avoidance (M = 1.97, SD = .274). These findings contradict Brady and Bowd (2005). Males (M = 2.25, SD = .229) and females (M = 2.26, SD = .263) reported similar weak mathematics teacher efficacy (cf. Ghaith & Shaaban, 1999).

Table 5. Descriptive statistics for constructs by gender.

	Male		Female		Overall	
	M	SD	M	SD	M	SD
Mathematics Anxiety	2.32	0,208	2.25	0.280	2.28	.28
Mathematics Teacher efficacy	2.25	0.229	2.26	0.263	2.26	.25
Mathematics Avoidance	2.15	0.234	1.97	0.274	2.03	.27

Univariate ANOVA indicated that gender was significant only for mathematics avoidance (Table 6). Males teachers (M = 2.15, SD = 0.234) reported significantly higher avoidance that females (M = 1.97, SD = 0.274), F (1, 66) = 6.865, p = 0.011, which contradicts the findings of Kelley and Tomhave (1985).

Table 6. Univariate ANOVA for age and teaching experience (equal variances assumed).

	Gender		Age		Teaching experience	
	F (1, 66)	*p*	F (2,65)	*p*	F (2,65)	*p*
Mathematics Anxiety	0.127	.282	1.711	.080	1.109	.341
Mathematics Teacher efficacy	0.004	.953	0.884	.418	1.165	.318
Mathematics Avoidance	6.865	.011	0.111	.896	0.383	.683

4.4. Regression analysis

Regression analysis was proceeded by ensuring that the predictor variables were independent and normally distributed. No outliers were identified, and homoscedasticity across observations was observed. Multiple linear regression (enter method) indicated that collectively, gender, age, teaching experience, and Mathematics grade did not significantly predict mathematics anxiety, F (4, 63) = 1.848, p = 0.131. The overall model predicted 9% of the variance in mathematics anxiety. However, only one of the four predictor variables, teachers' Mathematics attainment, contributed significantly to the prediction of mathematics anxiety ($\beta = 0.347$, $p < 0.05$). Further, simple linear regression confirmed that mathematics anxiety was a significant predictor of mathematics teacher efficacy ($\beta = 0.66$, $p < 0.05$).

5. DISCUSSION AND RECOMMENDATIONS

The study sought to explore the relationships among mathematics anxiety, mathematics teacher efficacy and mathematics avoidance among a small sample of primary teachers in Trinidad and Tobago. While research on mathematics anxiety, mathematics teacher efficacy and mathematics avoidance has been undertaken globally, such research focused on teachers outside of Trinidad and Tobago, resulting in a knowledge gap about teachers in Trinidad and Tobago. The study attempted to address that perceived gap, though in a limited way, given the limited size of the sample considered.

That mathematics anxiety was present among participants is unquestionable, as it is among any other group of individuals. However, mathematics anxiety among primary teachers in this study's sample was low. One explanation is that the teachers surveyed were practicing classroom teachers, and in their experiences with teaching Mathematics may have found strategies to manage their anxiety. Overall, respondents reported positive feelings about Mathematics. Those who reported high mathematics anxiety also reported low mathematics teacher efficacy and high mathematics avoidance, while those who reported low mathematics anxiety also reported strong mathematics teacher efficacy and low mathematics avoidance. These findings are consistent with the literature on mathematics anxiety and with the researcher's observations and informal interactions with primary teachers. However, it was unexpected that male teachers in this sample were more math-anxious than females, and significantly more math-avoidant than females. Trinidad and Tobago still positions mathematics as a male domain and teaching as a female

profession. While it is not possible to conjecture outside of this study sample, these finding may be indicative of the declining male achievement in Mathematics and the increasingly underwhelming presence of male teachers in primary classrooms in Trinidad and Tobago. It is also possible that sampling bias may have skewed the findings in the direction noted. However, the findings on gender differences in mathematics anxiety and mathematics avoidance warrant further investigation given lingering gender stereotypes about Mathematics that favour males in Trinidad and Tobago.

Mathematics attainment significantly predicted participants' mathematics anxiety. Sousa (2008) associated anxiety to conceptual understanding of Mathematics rather than ability, and ability is often measured by attainment. Further, Goulding, Rowland and Barber (2002) linked conceptual understanding to effective Mathematics teaching. Implicit, then, is that Mathematics attainment is indicative of conceptual understanding of Mathematics, which potentially influences teachers' mathematics anxiety and teacher efficacy beliefs. While it is not certain that this generational passing-on of attitudes and beliefs has occurred, it does raise questions about the Mathematics that these primary teachers know, how they know it, how they came to know it, and what pedagogical practices they employ to teach Mathematics. Peker (2009b) attributed negative attitudes about efficacy to teachers' self-confidence, and content and pedagogical knowledge, and when teachers' self-confidence to teach Mathematics declines, so too does their mathematics teacher efficacy (Godbey, 1997). It is important, then, to further clarify the connection among these constructs since primary teachers are required to teach Mathematics regardless of their confidence, competence, effectiveness, or desire to avoid it.

Though the results of this study do not suggest that mathematics anxiety is problematic among the teachers in this sample, or even at the primary level in Trinidad and Tobago, further research is imperative to determine if it is, and to identify its contributing factors. Hence, a national study is recommended, using at least a mixed-method design to investigate mathematics anxiety in the Trinidad and Tobago context. Priority should be given to teachers' early classroom experiences with Mathematics to determine if these experiences have affected females and males differently, how these experiences are manifested in classroom relationships between teachers and students and in the ways mathematics is taught and learned. Research must probe students' perspectives to provide a holistic understanding of mathematics anxiety, and to unearth links between teacher and student anxiety, and its influence on student achievement, attitudes and beliefs in Trinidad and Tobago.

Mathematics teacher efficacy is another critical component of the teaching and learning environments and with growing concerns about falling student achievement in Mathematics and its link to Mathematics instruction, research into the factors that affect how teachers teach is imperative. Further research ought to investigate the sources of teacher efficacy information to which teachers are most attentive in their practice, and how they use (or do not use) this information to inform their practice. Research designs that include methods outside of the quantitative paradigm are important and relevant, especially since there remain conceptual issues around measuring the construct of teacher efficacy, and there must be explication of the processes by which teacher efficacy develops and evolves over time, and how these beliefs can be strengthened (Klassen et al., 2011). Teacher efficacy research, specific to the teaching of mathematics, is critical as well, to build teachers' competence and confidence in their ability to teach Mathematics effectively.

Research about mathematics anxiety and teacher efficacy must be driven by, and inform teacher preparation and development programs to strengthen teachers' efficacy beliefs (Bandura, 1986) by addressing teachers' mathematics anxiety. Research should

inform the development of appropriate training courses that focus on content, methods, pedagogy and the psychology of how Mathematics is learned. Training must provide teachers with opportunities to reflect on their attitudes and beliefs about Mathematics and Mathematics instruction, and equip them with tools to manage their anxiety and reduce its long-term effects in the classroom. Training that provides appropriate experiences that equip teachers with realistic and effective strategies to strengthen their efficacy for teaching Mathematics should increase the number of efficacious primary teachers in Trinidad and Tobago. Since highly math-anxious teachers have low mathematics teacher efficacy beliefs, addressing their anxiety strengthens their teacher efficacy beliefs (Bandura, 1986) to break the cycle of mathematics anxiety and its effects.

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