Caribbean Teaching Scholar
Vol. 5, No. 1, April 2015, 5–24

ERA
EDUCATIONAL RESEARCH ASSOCIATION

An investigation of the influence of teacher variables on pre-training efficacy beliefs

Madgerie Jameson-Charles and Sharon Jaggernauth

School of Education, The University of the West Indies, St. Augustine, Trinidad and Tobago

This study investigated efficacy perceptions of untrained in-service Diploma in Education teachers. Two cohorts of students (2011-2012 and 2012-2013) were studied to determine whether perceptions of efficacy for in-service teachers (n=326) differed by (a) gender (b) area of specialisation (c) age and/or (d) years of teaching experience. The Teacher Efficacy Scale (long form) (Tschannen-Moran & Woolfolk Hoy, 2001) was the data collection instrument, and was administered during the first week of training, immediately following a lecture on teacher efficacy. The results suggest that classroom management efficacy beliefs had the lowest mean for both groups. Statistically significant differences in efficacy beliefs among curriculum specialisation were reported, with mathematics, science and modern language teachers' efficacy lower than other curriculum areas. There were statistically significant differences in perception of efficacy based on the age of the teachers: younger teachers (20-30 years) perceptions of efficacy were significantly lower than older teachers (41-59 years). There were also statistically significant differences of perceptions of efficacy based on years of teaching experience. Results are discussed in terms of the factors that that may affect teaching efficacy and how to maximise the efficacy of teachers.

Key words: teacher efficacy, in-service secondary teachers, teacher-training

Introduction

'I think I can, I think I can, I think I can… the little engine climbed until at last they reached the top of the mountain' (Piper, 1930, pp. 18-21). This excerpt from 'The Little Engine That Could' embodies the little engine's belief about its ability to climb the mountain even though it had never done so before. This kind of belief is referred to self-efficacy, a construct that is used in education to explain students' achievement (Bandura, 1977; 1997). Self-efficacy research has focused on a set of learned beliefs that individuals hold about their 'capabilities to organize and execute the courses of action required to manage prospective situations' (Bandura, 1997, p. 3). Research about self-efficacy suggests that an individual displays high self-efficacy when they are convinced that they can accomplish a task in a given circumstance, even if it initially appears insurmountable (Snyder & Lopez, 2007).

Over the last 40 years there has been extensive research into how teachers' beliefs influence how they feel about their work (Hoy, 2004); their effort on the job; persistence in overcoming obstacles, and resilience in the face of failure. Teachers

often mirror the beliefs of their own teachers and bring these beliefs with them into the classroom, which influence their behaviours and decision making (Hart, Smith, Smith & Swars, 2007). A specific set of beliefs that teachers possess relate to as teacher efficacy, and these beliefs influence teachers' perceptions about their ability to perform various teaching tasks 'at a specified level of quality in a given specified situation' (Dellinger, Bobbett, Olivier, & Ellett, 2007, p.2). Although individual teachers develop these beliefs differently, they begin to crystallise early in their careers. Teachers with strong efficacy beliefs have positive attitudes towards their work (Gresham, 2008); dedicate more time to planning their lessons (Allinder, 1995); experiment with student-centred instructional strategies (Turner, Cruz & Papakonstantinou, 2004); better manage their classrooms, and are more committed to teaching their students (Swars, 2007). While teachers' efficacy beliefs change over their career and changing contexts and their exposure to professional development and teacher training (Bayraktar, 2009), 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).

Theoretical framework

Teacher efficacy for classroom management

Teacher efficacy for classroom management refers to teachers' perceived ability to respond to disruptive student behaviour, and to establish expectations and rules that guide classroom behaviour. Highly efficacious teachers manage their classrooms effectively (Sridhar & Javan, 2011); negotiating control with their students (Hami, Czerniak, & Lumpe, 1996), and often giving them autonomy (Ross & Gray, 2006). They rely on positive strategies such as interacting with their students, demonstrating patience, and sharing responsibility with them, rather than insisting on appropriate behaviour and resorting to punitive strategies to maintain classroom control (Henson, 2003). Additionally, they promote positive and proactive approaches to conflict management that were mutually beneficial for them and their students (Morris-Rothschild & Brassard, 2006). Their classroom management style is a reflection of their instructional strategies (Woolfolk & Weinstein, 2006).

Teacher efficacy for instructional strategies

Teachers' beliefs influence their choice of specific instructional activities and strategies (Bandura, 1977). Teacher efficacy for instructional strategies refers to teachers' perceived ability to create classrooms that are conducive to learning, by making decisions about instruction that engage students in meaningful learning. Highly efficacious teachers are able to gauge students' comprehension, and to meet the students' needs by adjusting their questions, strategies, explanations, and assessment methods. They plan lessons to provide learning experiences that promote students' cognitive development and to develop their self-efficacy (Gibson & Dembo, 1984; Shaukat & Iqbal, 2012). They experiment widely with student-

centred instructional strategies and resources (Colbeck, Cabrera, & Marine, 2002; Tschannen-Moran & Woolfolk Hoy, 2007), rather than teacher-centred strategies (Plourde, 2002; Rule & Harrell, 2006; Shaukat & Iqba, 2012). Highly efficacious teachers also make decisions about improving their practice based on feedback from parents and administration (Tschannen-Moran & Woolfolk Hoy, 2007).

Teacher efficacy for student engagement

Teacher efficacy for student engagement refers to teachers' perceived ability to develop and nurture relationships with their students; to motivate them to think creatively; to value learning, and to improve their understanding. Highly efficacious teachers develop relationships with their students and believe all students can learn. They persist in their efforts to support and encourage, rather than avoid or abandon struggling students (Woolfson & Brady, 2009). They recognise achievements rather than condemn shortcomings (Gibson & Dembo, 1984), and develop intrinsic rather than extrinsic motivation to learn (Woolfolk & Hoy, 1990). Conversely, inefficacious teachers tend to group students by ability, and spend more time with the high-ability students (Ashton, Webb, & Doda, 1983; Tschannen-Moran & Woolfolk Hoy, 2007). They avoid topics in which their content knowledge is weak (Garvis & Pendergast, 2011) and tend to avoid students' questions (Rice & Roychoudhury, 2003).

Teacher efficacy and teacher characteristics

Research into the relationship between dimensions of teacher efficacy and teacher characteristics is ongoing and, to some extent, remains inconclusive. However, some studies reported that a teacher's gender does not significantly influence their teacher efficacy (Yeo, Ang, Chong, Huan, & Quek, 2008), while others reported that female teachers had stronger efficacy beliefs than males (Cheung, 2006). In fact, Klassen and Chiu (2010) reported male teachers held stronger efficacy beliefs than females in classroom management, but not in instructional strategies and student engagement. Edwards and Robinson (2012) associated stronger teacher efficacy beliefs with younger teachers than older teachers, while Tschannen-Moran and Woolfolk Hoy (2007) found no such relationship existed. Teaching experience may also strengthen teacher efficacy (Blackburn & Robinson, 2008; Tschannen-Moran & Woolfolk Hoy, 2007; Wolters & Daugherty, 2007), as teachers accrue mastery experiences and successes with students over time (Wolters & Daugherty, 2007). Wolters and Daugherty (2007) reported a small effect of teaching experience on efficacy for instructional strategies and classroom management, but not for student engagement.

Background to the current study

The current study examined the teacher efficacy beliefs of secondary school teachers in Trinidad and Tobago, who were newly enrolled in an in-service Postgraduate Diploma in Education (DipEd) programme (2011-2013) of the School of Education,

The University of the West Indies. The DipEd was developed in 1973 at the request of the Ministry of Education of Trinidad and Tobago to address the initial training needs of secondary school teachers. The teachers who enrol in the programme have subject content knowledge but no formal teacher training in secondary education. The programme exposes participants to the theory and practice of education, to provide 'a solid theoretical base in the foundation disciplines, curriculum theory, and methodology … [and] the opportunity to improve their control of specific content relevant to teaching in their subject area' (Faculty of Humanities & Education, Postgraduate Regulation & Syllabuses, 2012-13, p.72). DipEd participants' school and classroom practice are supervised by a faculty member, and they engage in classroom-based action research to investigate subject specific pedagogical strategies in mathematics, science, English, modern languages, social studies, educational administration, visual and performing arts, and information technology. Teachers differ in their entry qualifications to the teaching profession, but only teachers who possess an undergraduate degree (or its equivalent) in their subject of specialisation matriculate into the government-funded DipEd. These teachers are practicing secondary teachers who have been teaching for at least two years, and whose participation is completely voluntary.

Purpose of the study

Literature on teacher efficacy tends to focus on the experiences of pre-service primary school teachers. There seems to be a dearth in research that investigates the efficacy beliefs of experienced untrained secondary school teachers and there is little evidence of teacher efficacy research from a Caribbean context. The purpose of this study was to examine in-service DipEd teacher efficacy beliefs across disciplines, and teacher demographic characteristics of age, gender and years of teaching experience. The DipEd teachers were used for this study to determine experienced untrained teachers' efficacy beliefs prior formal teacher training.

Research questions

The research was guided by the following three questions:

1. *How strong are the relationships between teacher efficacy for classroom management, teacher efficacy for student engagement, and teacher efficacy for instructional strategies for in-service teachers?*
2. *What are the relationships for the in-service teachers' rating of teacher efficacy with age, gender, years of teaching experience and curriculum major?*
3. *How well do gender, years of teaching experience and curriculum major predict in-service teachers' overall teacher efficacy?*

Procedure

This research was part of larger study designed to investigate teacher efficacy before and after training. The focus of this paper is to report only on the teachers' rating of their efficacy before training. Teachers' perceptions of their efficacy as they relate to gender, age, years of teaching experience and curriculum major, were examined. Data were collected during the first week of the DipEd immediately following a lecture on teacher self-concept and teacher efficacy. Teachers were given consent forms to review; received full briefing information, and, if they agreed, were administered the questionnaire. They were assured of confidentiality of their responses, since only the last four digits of their student identification numbers were required to keep the pre-exposure to pedagogy and post-exposure to pedagogy data coordinated. They were required to complete the questionnaire during their break. One student was assigned to collect all the questionnaires and return then to the lecturer.

Participants

The entire population of students (n=400) enrolled in the DipEd programme over two years who attended the lecture on teacher self-concept and teacher efficacy was invited to participate. In total 339 questionnaires were completed and returned, reflecting a response rate of 85%. The participants were two cohorts of in-service postgraduate student teachers (Cohort 1: 2011-2012, n=157; Cohort 2: 2012-2013, n=178). They ranged in age from 20 to 59 years (35% were aged 20 to 30 years; 41% were aged 31 to 40 years; 24% were aged 41 to 59 years). There were 74 males and 263 females. Their areas of specialisation were mathematics (n=45); science (n=64); English (n=50); educational administration (n=25), visual and performing arts (n=29), social studies (n=76); modern languages (n=30); and information technology (n=16). The years of teaching experience ranged from one to 30 years. Of the participants surveyed, 9% reported that they had been teaching for more than 21 years, and 66% reporting fewer than 11 years teaching experience.

Instrumentation

The instruments used for this study consisted of a demographic questionnaire and the Teachers Sense of Efficacy Scale (TSES) (long form) (Tschannen-Moran & Woolfolk Hoy, 2001). The demographic questionnaire captured teachers' age, gender, area of curriculum specialisation, and number of years of teaching experience at the secondary level. The 24 item TSES was developed to measure teacher efficacy for classroom management (8 items); student engagement (8 items); instructional strategies (8 items), and overall teacher efficacy as a composite score of the entire scale. Each item was scored on a 9-point scale from 'nothing' (1) to 'a great deal' (9). Reliabilities were high: 0.90 for classroom management, 0.87 for student engagement, 0.91 for instructional strategies, and 0.94 for overall teacher efficacy (Tschannen-Moran & Woolfolk Hoy, 2001).

Results

Development of sub-scales

A principal component analysis (PCA), principal axis factoring method, with Varimax orthogonal rotation was conducted on the 24 items of the TSES. The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for analysis, KMO= .95. Bartlett's test for Sphericity indicated that correlations between the items were significantly large for PCA. An initial analysis was conducted to obtain eigenvalues for each component in the data. Four components had eigenvalues over Kaiser's criterion of 1 and in combination explained 61% of the variance. Items with loadings larger than .40 are presented in Table 1.

Table 1. Rotated component matrix for factor analysis

Scale Items		Factors			
		1	2	3	4
1.	How much can you do to get through to the most difficult students?		.668		
2.	How much can you do to help your students think critically?		.602		
3.	How much can you do to control disruptive behaviour in the classroom?	.745			
4.	How much can you do to motivate students who show low interest in school work?		.800		
5.	To what extent can you make your expectations clear about student behaviour?	.478			.467
6.	How much can you do to get students to believe they can do well in school work?		.534		
7.	How well can you respond to difficult questions from your students?				.677
8.	How well can you establish routines to keep activities running smoothly?	.401		.425	
9.	How much can you do to help your students' value learning?	.400	.557		
10.	How much can you gauge student comprehension of what you have taught?			.506	
11.	To what extent can you craft good questions for your students?			.627	
12.	How much can you do to foster student creativity?		.606	.421	
13.	How much can you do to get children to follow classroom rules?	.787			
14.	How much can you do to improve the understanding of a student who is failing?		.534		
15.	How much can you do to calm a student who is disruptive or noisy?	.763			
16.	How well can you establish a classroom management system?	.654		.433	
17.	How much can you do to adjust your lessons to the level of individual students?			.647	
18.	How much can you use a variety of assessment strategies?			.665	
19.	How well can you keep a few problem students form ruining an entire lesson?	.759			
20.	To what extent can you provide alternative explanations to confused students?				.578
21.	How well can you respond to defiant students?	.617			
22.	How much can you assist families in helping their children do well in school?		.488	.465	
23.	How well can you implement alternative strategies in your classroom?		.492	.629	
24.	How well can you provide appropriate challenges for very capable students?			.682	
	Eigenvalues	10.50	1.67	1.39	1.11
	%variance	43.77	6.95	5.79	4.62

There were minor variations in the results obtained in the current study as compared with the factors demonstrated by Tschannen-Moran and Woolfolk Hoy (2001). Table 2 compares the established item distribution according to Tschannen-Moran and Woolfolk Hoy with the initial factor analysis in this study.

Table 2. Comparison of data reduction of items from current study and established scale

Factors	Factor structure (established scale)	Factors structure (current study)
Teacher efficacy in classroom management	3,5, 8,13,15,16,19,21	3,5,13,15,16,19,21
Teacher efficacy in student engagement	1,2,4,6,9,12,14,22	1,2,4,6,9,12,14,22
Teacher efficacy in instructional practices	7,10,11,17,18,20,23,24	7,8,11,17,20
Additional factor		10,18,23,24

The items shown as a fourth 'Additional factor' were all related to assessment, which suggests that respondents in this study did not associate assessment with instructional strategies. However, after a Varimax rotation with restriction for three factors all items reverted to the dimensions identified by Tschannen-Moran and Woolfolk Hoy (2001). This suggests that the three factor structure was appropriate to represent in-service teachers' efficacy beliefs in this research. These three factors accounted for 54.2% of variance, and were consistent with those identified by its developers. None of the 24 items yielded loading values less than .40, therefore, they were all retained for analysis. Table 3 illustrates the three components in their final scale and the accounted-for variance.

Table 3. Eigenvalues and variance percentages and scale reliability values for current study

Measures of teacher efficacy	Eigenvalue	% of Variance	Cumulative %
Instructional strategies	4.318	41.922	41.922
Student engagement	3.950	6.569	48.491
Classroom management	3.926	5.752	54.243

Subscale reliabilities for teacher efficacy for instructional strategies (α=0.91), classroom management (α=0.86) and student engagement (α=0.90) were high. Similarly, the overall scale reliability was high (α=0.94). Table 4 compares the factor and overall reliabilities of the current study with the established scales. The overall consistency of the established scale and the current study was the same. It is also evident that both established scale and the current study had high factor reliabilities (greater than 0.80).

Table 4. Comparison of factors reliabilities of items from current study and established scale

Measures of efficacy	Cronbach's α for established scale	Cronbach's α for current study
Engagement	.81	.87
Instruction	.86	.91
Management	.86	.90
Overall internal consistency	.94	.94

Variables

In this study the dependent metric variables were overall teacher efficacy (TE), teacher efficacy for instructional strategies (IS), classroom management (CM), and student engagement (SE). The independent categorical variables were cohort groups (cohort), gender, age, years of teaching experience, and curriculum area of specialisation (major).

Data analysis

Prior to analysis, data were screened for accuracy, completeness, consistency, and reasonableness, to ensure that inferences premised on them were reliable and valid. Statistical analyses using IBM SPSS20 included descriptive statistics, tests of normality, tests of association, and tests of the underlying assumptions of statistical tests. There were few missing completely at random (MCAR) data points for which series mean values were imputed by SPSS. Outliers were found to lie within 3 SD of the mean, and were not deleted. Variables were found to be approximately normally distributed, and acceptable skewness and kurtosis eliminated the need for transformation.

Question 1: How strong are the relationships between efficacy in classroom management, efficacy in student engagement and efficacy in instructional practices?

Preliminary analyses revealed no violation of the underlying assumptions of normality, linearity and homoscedasticity. Pearson product-moment correlations were computed to explore the relationship among in-service teachers' overall teacher efficacy, and teacher efficacy for classroom management, instructional practice, and student engagement. Table 5 presents the findings. There were moderate levels of significant inter-correlation among the three dimensions of teacher efficacy, and strong significant relationships between the three dimensions and overall teacher efficacy.

Table 5. Pearson product-moment correlation between measures of teacher efficacy

Measures of teacher efficacy	Student engagement	Instructional strategies	Classroom management
Overall teacher efficacy	.880**	.856**	.868**
Student engagement	-	.587**	.691**
Instructional strategies	-	-	.589**

** *p < .001 (2-tailed)*

Question 2: What are the relationships for the in-service teachers' rating of efficacy with gender, age, years of teaching experience and curriculum major?

An independent samples t-test compared the means of male and female in-service secondary teachers' responses about their overall teacher efficacy, and teacher efficacy for classroom management, instruction, and student engagement. The results indicate that while male teachers (M=6.680, SD=1.101) reported higher scores than female teachers (M=6.582, SD=.971) on overall teacher efficacy, the difference was not statistically significant, t (305)= .992, p= .357. Similar non-significant results were observed for teacher efficacy for classroom management, instructional practices, and student engagement. The mean for teacher efficacy for classroom management was the lowest. A summary of the results is illustrated in Table 6.

Table 6. Summary of findings of teacher efficacy beliefs on all dimensions according to gender

Measures of teacher efficacy	Male		Female		df	t	sig.
	M	SD	M	SD			
Instructional strategies	6.927	1.651	6.740	1.161	329	1.097	.274
Student engagement	6.286	1.104	6.247	1.045	323	.278	.781
Classroom management	5.997	1.188	5.887	1.084	325	.824	.410
Overall teacher efficacy	6.680	1.101	6.582	.971	305	.992	.357

A one-way between-subjects ANOVA compared the effect of age on teacher efficacy across measures, and indicates that age was significant factor for teacher efficacy across all measures. Table 7 summarises teachers' perceptions of efficacy by age.

Table 7. Summary of results of teachers' perception of efficacy on all dimensions according to age

Measures of efficacy	20-30		31-40		41-60		df	F	sig
	Mean	SD	Mean	SD	Mean	SD			
Instruction strategies	6.497	.886	6.762	1.060	7.255	1.894	2	8.495	.000
Student engagement	6.073	.908	6.308	1.102	6.471	1.167	2	3.826	.033
Classroom management	5.693	.868	5.987	1.034	6.150	1.167	2	5.064	.007
Overall teacher efficacy	6.343	.792	6.648	.989	6.866	1.204	2	6.369	.002

Tukey HSD post hoc comparisons indicated the mean score for overall teacher efficacy for in-service teachers aged 20-30 years were significantly lower than teachers in the age ranges 41-60 years and 31-40 years. However, there was no significant difference between teacher aged 41-60 years and 31-40 years. Post hoc comparisons also indicated that in-service teachers aged 41-60 years reported significantly higher teacher efficacy across dimensions, than those aged 20-30. Teachers aged 31-40 reported higher teacher efficacy for classroom management than those aged 20-30. Teachers aged 41-60 reported significantly higher teacher efficacy for instructional strategies and classroom management than those aged 31-40 years. Taken together the results suggest that age was a factor for teacher efficacy. It is noteworthy that the mean for teacher efficacy for classroom management was the lowest across measures.

A one-way between-subjects ANOVA compared the effects of years of teaching experience across measures of teacher efficacy. Findings suggest that years of teaching experience was a significant factor for all measures of teacher efficacy. Of interest, the mean for teacher efficacy for classroom management efficacy was the lowest for all groups. Table 8 summarises these findings.

Table 8. Summary of teacher efficacy beliefs on all dimensions according to years of teaching experience

Measures of efficacy	0-10		11-20		21-30		df	F	sig
	Mean	SD	Mean	SD	Mean	SD			
Instructional strategies	6.586	.979	6.924	1.434	7.738	2.153	2	12.139	.000
Student engagement	6.172	1.038	6.295	1.043	6.727	1.357	2	3.478	.032
Classroom management	5.817	.974	5.918	1.126	6.500	.997	2	5.993	.003
Overall teacher efficacy	6.460	.925	6.624	1.000	7.318	1.206	2	8.920	.000

Tukey HSD post hoc comparisons indicated overall teacher efficacy for in-service teachers with 20-30 years of teaching experience was significantly greater than those with 0-10 years and 11-20 years of teaching experience. Overall teacher efficacy of teachers with 11-20 years of teaching experience was significantly higher than those with 0-10 years of teaching experience. Teachers with 21-30 years of teaching experience reported significantly higher teacher efficacy than those with 0-10 years of teaching experience across all dimensions, but significantly higher teacher efficacy for instructional strategies and classroom management than those with 11-20 years of teaching experience. These results suggest that years of teaching experience was a factor for all measures of teacher efficacy. It should be noted that years of teaching experience has to be high to see the effect in terms of teacher efficacy for student engagement.

One-way between-subjects ANOVA determined that there were significant differences in all measures of teacher efficacy across curriculum specialisation. Table 9 presents the means and standard deviations of teacher efficacy by curriculum major (mathematics [M], science [S], English [E], social studies [SS], modern languages [ML], educational administration [EA], and information technology [IT] and visual and performing arts [V]).

Table 9. Summary of mean and standard deviation for measures of teacher efficacy by curriculum major

Measure of teacher efficacy	**Curriculum major**							
	M	S	E	SS	ML	EA	IT	V
Student engagement	5.819 (.835)	5.821 (1.821)	6.493 (.948)	6.221 (.948)	6.133 (1.031)	7.244 (.945)	6.543 (.907)	6.252 (1.055)
Instructional strategies	6.326 (.931)	6.556 (.923)	6.768 (.990)	6.517 (1.047)	6.821 (.921)	7.985 (2.331)	7.295 (1.798)	6.772 (1.197)
Classroom management	5.567 (.769)	5.590 (1.003)	5.990 (1.023)	5.856 (1.069)	5.913 (1.291)	6.870 (.781)	6.091 (.818)	5.904 (1.033)
Overall teacher efficacy	6.182 (.709)	6.265 (.869)	6.706 (.926)	6.461 (1.010)	6.577 (.989)	7.067 (1.094)	7.066 (.922)	6.939 (.918)

SD shown in parentheses

An inspection of the means for measures of teacher efficacy indicates that educational administration and information technology majors reported the highest teacher efficacy and mathematics and science majors reported the lowest teacher efficacy across measures. Further, the means for teacher efficacy for classroom management was lowest across all curriculum specialisations. The ANOVA results in Table 10 indicate significant differences in teacher efficacy by curriculum specialisation across all dimensions.

Table 10. ANOVA measures of teacher efficacy by curriculum major

Measures of teacher efficacy	df	F	p
Instructional strategies	7	6.013	.000
Student engagement	7	7.782	.000
Classroom management	7	5.321	.000
Overall teacher efficacy	7	7.503	.000

Tukey HSD post-hoc comparisons indicated that educational administration majors reported significantly higher overall teacher efficacy than those majoring in all other curriculum specialisations, except information technology. Otherwise, there were no significant differences in teacher efficacy among other curriculum majors. Table 11 summarises means for groups in homogeneous subsets for overall teacher efficacy.

Table 11. Summary of means for groups in homogeneous subsets for overall teacher efficacy after Tukey HSD post hoc analysis

Curriculum area	N	Subset for alpha = 0.05		
		1	2	3
Mathematics	43	6.1589		
Science	57	6.2544		
Social studies	68	6.4865	6.4865	
Modern languages	29	6.5603	6.5603	
English	49	6.6973	6.6973	
Visual and performing arts	26	6.8093	6.8093	
Information technology	12		7.0104	7.0104
Educational administration	22			7.6837

Tukey HSD post hoc comparisons revealed that mathematics majors reported significantly lower teacher efficacy for instructional strategies than educational administration majors. Education administration teachers reported significantly higher teacher efficacy for instructional strategies than all other majors, except information technology. There were no significant differences in teacher efficacy for instructional strategies among the other curriculum specialisations. Table 12 gives a summary of means for groups in homogeneous subsets for teacher efficacy for instructional strategies after Tukey HSD post hoc analysis.

Table 12. Summary of means for groups in homogeneous subsets for instructional strategies efficacy after Tukey HSD post hoc analysis

Curriculum area	N	Subset for alpha = 0.05		
		1	2	3
Mathematics	43	6.3256		
Social studies	75	6.5167	6.5167	
Science	63	6.5556	6.5556	
English	50	6.7675	6.7675	
Modern languages	30	6.8208	6.8208	
Information technology	15	7.1500	7.1500	7.1500
Visual and performing arts	28		7.2946	7.2946
Educational administration	25			7.9850

The post-hoc revealed that those studying for educational administration majors reported significantly higher teacher efficacy for student engagement than those studying for mathematics, science, modern languages and social studies majors. Table 13 summarises the means for groups in homogeneous subsets for teacher efficacy for student engagement after Tukey HSD post hoc analysis.

Table 13. Summary of means for groups in homogeneous subsets for student engagement efficacy after Tukey HSD post hoc analysis

Curriculum area	N	Subset for alpha = 0.05		
		1	2	3
Mathematics	45	5.8194		
Science	61	5.8217		
Modern languages	30	6.1333	6.1333	
Social studies	72	6.2205	6.2205	
English	50	6.4925	6.4925	6.4925
Visual and performing arts	29	6.5431	6.5431	6.5431
Information technology	14		6.8304	6.8304
Educational administration	23			7.2446

Post hoc analysis revealed that educational administration majors reported significantly higher teacher efficacy for classroom management than all other majors, except information technology. There were no significant differences among other groups. It must be noted that mathematics teachers reported the lowest teacher efficacy for classroom management. Table 14 summarises the means for groups in homogeneous subsets for teacher efficacy for classroom management after Tukey HSD post hoc analysis.

Table 14. Summary of the means for groups in homogeneous subsets for classroom management efficacy after Tukey HSD post hoc analysis

Curriculum area	N	Subset for alpha = 0.05	
		1	2
Mathematics	45	5.5667	
Science	62	5.5988	
Social studies	73	5.8562	
Modern languages	29	5.9138	
English	49	5.9898	
Visual and performing arts	29	6.0905	
Information technology	14	6.2321	6.2321
Educational administration	24		6.8698

From the above results, it is reasonable to conclude that the area of curriculum specialisation was a significant factor for all measures of teacher efficacy. Moreover, educational administration and information technology majors reported the highest teacher efficacy across all curriculum concentrations, while mathematics and science majors reported the lowest. Further, educational administration and mathematics majors differed significantly across all measures of teacher efficacy. Mathematics teachers in the sample expressed significantly lower efficacy beliefs across all dimensions.

Overall, it was apparent that teachers' teacher efficacy beliefs were significantly influenced by their age, years of teaching experience at the secondary level, and the area of curriculum specialisation in which they majored.

Question 3: How well do gender, years of teaching experience and curriculum major, predict teachers' overall teacher efficacy?

A multiple regression analysis was conducted to determine the extent to which the dependent variable, overall teacher efficacy, could be predicted by the linear combination of independent teacher variables of gender, years of teaching experience, and curriculum major, as well as which of these teacher variables

were significant predictors of overall teacher efficacy. The underlying assumptions of multicollinearity, normality, outliers, linearity, homoscedasticity, and independence of residuals (Tabachnick & Fidell, 2013) were examined in advance. The Kolmogorov-Smirnov test of normality was non-significant, D(339)= .047, p= .067, indicating that overall teacher efficacy was normally distributed. The variance inflation factor (VIF) was low and tolerance was high for all independent variables (see Table 15).

Table 15. Tolerance and VIF values of gender, years of teaching experience and curriculum major

	Overall teacher efficacy	**Gender**	**Years of teaching experience**
Tolerance	.970	.947	.956
VIF	1.031	1.056	1.046

Pearson's correlation coefficient for pairs of the independent variables were less than 0.9, and were statistically significant for teacher efficacy and years of teaching experience; teacher efficacy and curriculum major; and years of teaching experience and curriculum major (Table 16). These results suggest multicollinearity was absent among variables.

Table 16. Pearson product-moment correlation between variables

	Gender	**Years of teaching experience**	**Curriculum major**
Teacher efficacy	-.041	.292**	.200**
Years of teaching experience			.177***

**p < .05 **p < .001*

Three outliers were investigated using Mahalanobis distances, and were found to lie below the critical value of 16.27 for three independent variables (Tabachnick & Fidell, 2013), so they were not deleted prior to analysis. The overall rectangular shape of the scatter plot (Figure 1) indicates that the underlying assumptions of linearity and homoscedasticity were satisfied. The independence of residuals assumption was satisfied with the Cook's distance of less than 1 for the three outliers. Since all of the assumptions were satisfied, the contributions of independent variables on dependent variable were examined.

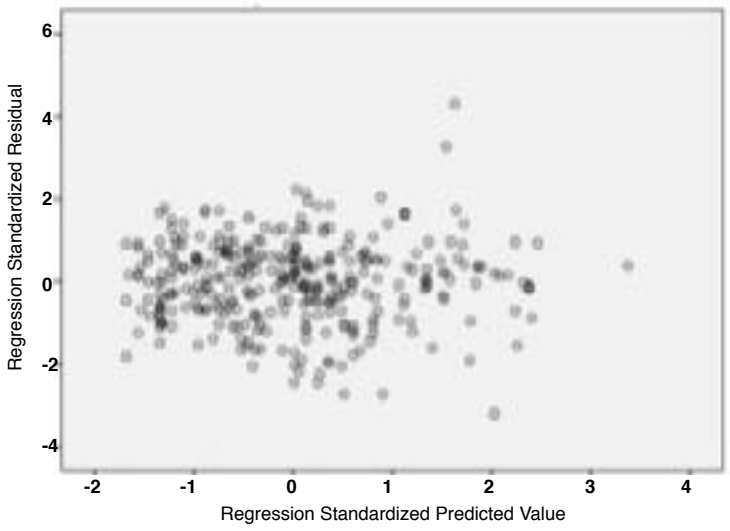

Figure 1. Scatterplot of the residual of overall teacher efficacy

Multiple linear regression analysis was used to develop a model for predicting overall teacher efficacy from teachers' gender, years of teaching experience and curriculum major. Table 17 shows the regression coefficients for the predictor variables.

Table 17. Results of standard multiple regression analysis for gender, years of teaching experience and curriculum major predicting overall teacher efficacy (n=339)

	B	Std. error B	Beta	Part correlation	*t*
Gender	-.048	.127	-.020	.020	.038
Years of teaching experience	.039	.008	.262	.255**	4.910
Curriculum specialisation	.072	.025	.155	.152*	2.929

Note. R2 = .108
B = unstandardised regression coefficient; Beta = standardised regression coefficient
Dependent variable = overall teacher efficacy total score from teacher efficacy beliefs questionnaire
**p < .05 **p < .001*

The regression model was a poor fit (R2 adjusted = 10%), but the significant predictors of overall teacher efficacy were years of teaching experience and curriculum major. The original three-factor model explained 10.8% of the variance in overall teacher efficacy (R2= .108), but years of teaching experience was the strongest predictor, explaining 6.5% of the variance, with curriculum major a weaker predictor explaining 2.3% of the variance; gender was the least predictor of teacher efficacy, explaining less than 1% of the variance.

Discussion

This study explored teacher efficacy of in-service secondary teachers, examining potential relationships among three dimensions of teacher efficacy and teacher variables of gender, years of teaching experience, age, and area of curriculum specialisation. It also sought to identify the predictors of overall teacher efficacy among the in-service teachers who participated in the research. To appropriately explain the relationship among the variables, a variety of statistical procedures were employed to provide answers to three research questions. The results indicated significant relationships among all dimensions of teacher efficacy, corroborating earlier research that correlated teacher efficacy with various aspects of their work: their perceived ability to manage their classroom; to make sound instructional decisions, and to engage their students in meaningful learning.

The study explored gender-based differences in teacher efficacy, and revealed no significant differences in any of the dimensions of teacher efficacy between the male and female teachers; hence, it was concluded that for teachers in this sample, gender did not influence their efficacy beliefs. Since the literature on teacher efficacy does not speak specifically to the role of gender on teachers' perception of their ability to perform specific teaching tasks, it is proposed that further research is conducted to more closely examine the role of gender in teacher efficacy beliefs. The influence of teachers' age on their teacher efficacy was evident in the higher means of efficacy beliefs of older teachers than younger teachers across all dimensions. It was concluded that efficacy beliefs strengthened with age, and change over time (Bandura, 1977). Similarly, teacher efficacy beliefs strengthened as their years of teaching experience increased, corroborating Bandura's (1997; 2006) proposition that teachers' efficacy beliefs improve with experience. It was concluded that as in-service teachers' exposure to the teaching-learning environment increased over time their efficacy beliefs would be positively influenced. This finding, however, is worthy of further exploration.

Of equal importance was that participants' curriculum major significantly influenced their efficacy beliefs; specifically participants in educational administration and information technology, who reported significantly higher teacher efficacy than those in the other curriculum majors. Teachers pursuing educational administration usually have been teaching longer than other teachers; have had more opportunities to lead than their colleagues, and have reported more successes with respect to student outcomes. Though this could account for their strong efficacy beliefs, this conclusion would be worth exploring further through interviews with them. Further research is also warranted to determine the reasons that mathematics and science teachers reported the lowest levels of teacher efficacy in all measures. This is critical so that teacher-training providers may be guided in the content and pedagogical experiences and support they provide teachers who pursue these programmes, since highly efficacious teachers tend to more successfully and positively influence student outcomes than their counterparts.

While curriculum major appears to be the most significant influence on teacher efficacy in this study, years of teaching experience was the strongest predictor of teacher efficacy, and gender was the weakest predictor. Three variables, curriculum major, years of teaching experience and gender, did not together explain a large proportion of the variance in teacher efficacy; and this seems to support the absence of any interaction effect of years of teaching experience and curriculum major, with gender displaying no significant effect on teacher efficacy at all. Perhaps a different combination of demographic characteristics may produce a more appropriate model to be explored in the future.

Summary and conclusion

Further research in the area of teacher efficacy is critical at this time. The results of this study indicate the need to probe the construct of teacher efficacy using an interpretive lens. It is necessary to understand how untrained secondary teachers describe their experience in the learning environment. This is especially important to understand the reason for low classroom management efficacy across certain demographics. In addition research on teacher agentic behaviour may help establish the influence of personal, proxy and collective agency on untrained teacher efficacy beliefs. Also a comparative analysis of untrained and trained secondary teacher efficacy could be conducted to determine differences among the two groups.

The purpose of this paper was to examine teacher efficacy beliefs across disciplines and teacher demographic characteristics of age, gender and years of teaching experiences. Other scholars, who have reviewed the construct of teacher efficacy, suggest that teacher efficacy appears to be informed by mastery and vicarious experiences (Bandura, 1997; Shaukat & Iqual, 2012). The results of this study suggest that teaching experience is a critical in understanding the teacher efficacy beliefs of untrained teachers. One noteworthy finding was that teacher efficacy for classroom management were lowest across all groups, which raises questions about the factors in the classroom environment that influence teacher classroom management efficacy beliefs. It is proposed that a qualitative approach to elucidate this relationship would be appropriate. While this study interfaced with a small subset of the secondary school teacher population, it is likely that it is representative of the wider community of teachers, providing an opportunity for larger scale research among both secondary and primary school teachers in Trinidad, Tobago and the wider Caribbean.

References

Allinder, R. (1995). An examination of the relationship between teacher efficacy and curriculum-based measurement and student achievement. *Remedial and Special Education, 16*(4), 247-254.

Ashton, P. T., Webb, R. B. & Doda, N. (1983). *A study of teacher's sense of efficacy* (Final report to the National Institute of Education, Executive Summary). Gainesville, FL:The University of Florida.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215.

Bandura, A. (1997). S*elf-efficacy: The exercise of control*. New York: W. H. Freeman and Company.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (Vol. 5, pp. 307-337). Greenwich, CT: Information Age Publishing.

Bayraktar, S. (2009). Pre-service primary teachers' science teaching efficacy beliefs and attitudes toward science: The effect of a science methods course. *The International Journal of Learning, 16*(7), 383-396.

Blackburn, J. & Robinson, J. (2008). Assessing teacher self-efficacy and job satisfaction of early career agriculture teachers in Kentucky. *Journal of Agricultural Education, 49*(3), 1-11.

Cheung, H. Y. (2006). The measurement of teacher efficacy: Hong Kong primary in-service teachers. *Journal of Education for Teaching, 32*(4), 435-451.

Colbeck, C. L., Cabrera, A. F. & Marine, R. J. (2002). Faculty motivation to use alternative teaching methods. Paper presented at the Annual Meeting of the American Educational Research Association. New Orleans, Louisiana.

Dellinger, A. B., Bobbett, J. J., Olivier, D. F. & Ellett, C. D. (2008). Measuring teachers' self-efficacy beliefs: Development end use of the TEBS-Self. *Teaching and Teacher Education, 24*(3), 751-766.

Edwards, M.C. & Robinson, J.S. (2012). Assessing the teacher self–efficacy of agriculture instructors and their early career employment status: A comparison of certification types. *Journal of Agricultural Education, 53*(1), 150-161.

Garvis, S. & Pendergast, D. (2011). An investigation of early childhood teacher self-efficacy beliefs in the teaching of arts education. *International Journal of Education & the Arts, 12*(9). Retrieved from http://www.ijea.org/v12n9/index.html

Gibson, S. & Dembo, M. H. (1984). Teacher efficacy: A construct validation, *Journal of Educational Psychology, 76* (4), 569-582.

Gresham, G. (2008). Mathematics anxiety and mathematics teacher efficacy in elementary pre-service teachers. *Teaching Education, 19*(3), 171-184

Hami, J., Czerniak, C. & Lumpe, A. (1996). Teacher beliefs and intentions regarding the implementation of science education reform strands. *Journal of Research in Science Teaching, 33*, 971- 993.

Hart, L.C., Smith, M.E., Smith, S.Z. & Swars, S.L. (2007). A longitudinal study of elementary pre-service teachers' mathematics pedagogical and teaching efficacy beliefs. *School Science and Mathematics, 107*(8), 325-335.

Henson, R. K. (2003). Relationships between pre-service teachers' self-efficacy, task analysis, and classroom management beliefs. *Research in the Schools, 10*, 53-62.

Hoy, A. W. (2004). What pre-service teachers should know about recent theory and research in motivation? Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

Klassen, R. M. & Chiu M.M. (2010). Effects on teachers' self-efficacy and job satisfaction: Teacher gender, years of experience, and job stress. *Journal of Educational Psychology, 102*(3), 741-756.

Morris-Rothschild, B. & Brassard, M. R. (2006). Teachers' conflict management styles: The role of attachment styles and classroom management efficacy. *Journal of School Psychology, 44* (2), 105-121.

Plourde, L.A. (2002). The influence of student teaching on pre-service elementary teachers' science self-efficacy and outcome expectancy beliefs. *Journal of Instructional Psychology, 29*, 245-253.

Rice, D. C. & Roychoudhury, A. (2003). Preparing more confident pre-service elementary science teachers: One elementary science methods teacher's self-study. *Journal of Science Teacher Education, 14*(2), 97-126.

Ross, J. A. & Gray, P. (2006). School leadership and student achievement: The mediating effects of teacher beliefs. *Canadian Journal of Education, 29*(30), 798-822

Rule, A. C. & Harrell, M. H. (2006). Symbolic drawings reveal changes in pre-service teacher mathematics attitudes after a mathematics methods course. *School Science and Mathematics, 106*, 241-258.

Shaukat, S. & Iqbal, M.H. (2012). Teacher efficacy as a function of student engagement. instructional strategies and classroom management. *Pakistan Journal of Social and Clinical Psychology, 10*(2), 82 - 85.

Snyder, C. R., & Lopez, S. J. (2007). *Positive psychology: The scientific and practical explorations of human strengths*. Thousand Oaks, CA: Sage.

Sridhar, Y. N. & Javan, S. (2011). Teacher efficacy and its relationship to classroom management style among secondary school teachers of Kigali city, Rwanda. *Journal of Education and Practice, 2*(2), 55-60.

Swars, S. L. (2007). Examining perceptions of mathematics teaching effectiveness among elementary pre-service teachers with differing levels of mathematics teacher efficacy. *Journal of Instructional Psychology, 32*(2), 139-147.

The University of the West Indies, Faculty of Humanities & Education. (2012). Postgraduate Regulations & Syllabuses.

Tschannen-Moran, M. & Woolfolk Hoy, A. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education, 17*, 783-805.

Tschannen-Moran, M. & Woolfolk Hoy, A. (2007). The differential antecedents of Self-efficacy beliefs of novice and experienced teachers, *Teaching & Teacher Education, 23*(6), 944-956.

Turner, S., Cruz, P. & Papakonstantinou, A. (2004). The impact of a professional development program on teachers' self-efficacy. Research Precession of the National Council of Teachers of Mathematics Annual Meeting, Philadelphia, PA.

Wolters, C. A. & Daugherty, S. G. (2007). Goal structures and teachers' sense of efficacy: Their relation and association to teaching experience and academic level. *Journal of Educational Psychology, 99*, 181-193.

Woolfolk, A. E. & Hoy, W. K. (1990). Prospective teachers' sense of efficacy and their beliefs about control. *Journal of Educational Psychology, 82*, 81-91.

Woolfolk, A. E. & Weinstein, C. S. (2006). Student and teacher perspectives in classroom management. In C. M. Evertson, & C. S. Weinstein (Eds.), *Handbook of classroom management: Research, practice, and contemporary issues* (pp. 685-709). Mahwah, NJ: Lawrence Erlbaum Associates.

Woolfson, L. & Brady, K. (2009). An investigation of factors impacting on mainstream teachers' beliefs about teaching students with learning difficulties. *Educational Psychology, 29*(2), 221-238.

Yeo, L. S., Ang, R. P., Chong, W. H., Huan, V. S. & Quek, C. L. (2008). Teacher efficacy in the context of teaching low achieving students. Current Psychology, 27(3), 192-204.