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Dimensions of Teacher Efficacy and Student Academic Achievement in Selected Primary Schools in Trinidad and Tobago

George Gowrie^{1*} and Mala Ramdass¹

¹*University of Trinidad and Tobago, Valsayn Campus Old Southern Main Road, Curepe, Trinidad and Tobago.*

Authors' contributions

This work was carried out in collaboration between both authors. Author GG designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author MR managed the analyses of the study and the literature searches. Both authors read and approved the final manuscript.

Original Research Article

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ABSTRACT

The study focussed on the efficacy of teachers in one Education District in Trinidad and Tobago. Three dimensions of teacher efficacy—student engagement, instructional strategies and classroom management [1] were examined in relation to teachers' attributes and teacher-student relationship. The study explored perceived differences in teacher efficacy based on school type, size, demography, gender and years of teaching experience. Comparisons were made between teachers' efficacy scores and student academic achievement. The participants were 532 teachers from 52 government and government-assisted primary schools in the St. George Education District of Trinidad and Tobago. A quantitative method employing a cross-sectional design was used in the study. The quantitative data were analyzed using the Statistical Package for Social Scientists (SPSS–SPG2). Descriptive and inferential statistics were employed to test hypotheses and answer research questions. The results indicated that there were no significant differences in the three dimensions of teacher efficacy according to school type, gender, location, size of school and years of teaching experience. There was also a moderate to strong correlation between the demographic and school-level teacher efficacy factors. The results indicated further that student engagement had the greatest influence on student

*Corresponding author: Email: georgegowrie@hotmail.com;

academic achievement. Implications and recommendations for teacher professional development were discussed.

Keywords: Dimensions of teacher efficacy; academic achievement; primary schools.

1. INTRODUCTION

Teacher efficacy is teachers' judgment of their capabilities to perform within the teaching environment and bring about desired outcomes of student engagement and learning [2,3]. It also reflects teachers' resilience and innovation in the classroom and their capacity to self-assess and self-reflect [4,5]. Research has shown that a strong sense of efficacy in teachers has been related to high student achievement [6], greater levels of planning and organization [7], willingness to experiment with new ideas to better meet the needs of their students [8], exhibit greater enthusiasm and commitment to teaching [9,10].

This study explored some of the important issues related to teacher efficacy in the classroom. First, it examined whether there were differences in teacher efficacy based on gender and their length of service in the profession. Second, it focused on the extent to which there were differences in teacher efficacy based on school type, school size and location. The study further explored the relation between the different dimensions of teacher efficacy and which dimensions teachers felt most competent. There were also attempts to show the relation between teacher efficacy and student academic achievement. Finally, the study investigated the underlying factor structure of the participants' teacher efficacy.

2. BACKGROUND

Trinidad and Tobago, a twin-island state, is the most southerly of all the Caribbean islands. The island, after five centuries of foreign domination, gained its independence from Britain in 1962. The island possesses a British-oriented model of bureaucracy, which is reflected in the education system. Within Trinidad and Tobago's education system, there are government schools, which are fully owned and operated by the state; government-assisted or denominational schools, which are managed by a private body (usually a religious denomination) but given financial assistance by the state; private schools, which are maintained and operated by private bodies without the assistance from the state; and special schools, which are designed for educating children with special needs and which provide education mainly at the primary level. Generally speaking the government-assisted schools are regarded as the better schools and there is a great demand for placement in these schools.

At present there are approximately 454 public primary schools in eight Education Districts in Trinidad and Tobago. Of these 322 are government assisted or denominational and 132 are government schools. Primary schooling is compulsory from age six to fourteen, but children may be admitted from age five and may remain enrolled until fifteen unless selected for secondary schooling at 11+. The transition from primary to secondary school is largely determined by performance at the Secondary Entrance Assessment (SEA). Students at 11+ are examined in three subject areas; Mathematics, Language Arts and Creative Writing, the results of which determine whether students are placed in schools of their choice or at the discretion of the Ministry of Education.

The quality of teachers' work life and teacher efficacy has received considerable attention decades ago. The Ministry of Education [11], Educational Policy Paper (1993-2003), for example, described many of our schools as 'organizational pathologies' with low levels of student and teacher motivation, teacher 'burnout,' teacher absenteeism, poor teacher leadership and bad working conditions. The physical and social conditions of many primary schools still do not facilitate the teaching and learning process. Primary school buildings vary severely in quality. Over the years, the focus on the expansion of the secondary level has been at the cost of the neglect of the primary sector. Many school buildings at the primary level are still dilapidated and ill-suited for the type of curriculum required to deliver the knowledge, skills, values and experiences required by students who must cope with the demands of a competitive and changing world. In addition to concerns of inadequate facilities, there are increasing problems of vandalism, robberies, and violence in our schools that negatively impact on the effective delivery of the curriculum by teachers. Some schools are labelled "high-risk" because of their locale. A study on delinquency in schools [12] identified an alarming increase in student delinquent behaviour such as bullying, truancy, verbal abuse, fighting, and disrespect of teachers.

Another challenge teachers face in our primary schools is the lack of guidance officers to assist them with students' social and emotional problems. In the past, the focus used to be on prevention and management of auditory and visual impairment [13]. The increasing diversity of our student population and changing family demographics mean that many students are in need of a wider variety of academic and behavioural programs, services and supports to succeed. According to Maharaj and Konings [14], no means of comprehensive assessment of physical and mental disabilities of children exist at schools in Trinidad and Tobago. Students are identified for disabilities only when these are indirectly brought to the attention of their teachers through poor academic performance or abnormal behaviour.

Teachers at the primary level are general practitioners. That is, each teacher is expected to teach all of the subjects on the prescribed syllabus for primary schools. In some primary schools, there is some degree of specialist teaching as many teachers have pursued further professional training beyond the Teacher's Diploma. The Ministry of Education is currently engaged in reforming the current system of teacher recruitment and selection to ensure teachers possess both academic and pedagogic qualifications. The academic qualification for entry requirements into the teaching service has been upgraded from the two-year Diploma programme to a four year Bachelor level degree. Many of our teachers are pursuing the Bachelor of Education four year degrees at different tertiary institutions such as the University of Trinidad and Tobago (UTT), University of the West Indies, University of Southern Caribbean, and other tertiary institutions. The training of these teachers is at two levels. At one level, there are the pre-service teachers who have no prior experience. There are also in-service teachers with a two year Diploma, who are being sent by the Ministry of Education to pursue the four year programme. These teachers pursue specializations in Special Education, Early Childhood Care and Education and Primary Education. Also, at UTT, teachers are exposed to core curricular courses and foundation courses. Indeed, the Ministry has just approved funding for 498 assistant teachers to pursue their Bachelor of Education at the University of Trinidad and Tobago in September, 2013.

At present, over eighty percent of primary school teachers are trained at the basic level but it is not uncommon to find a hierarchy of teachers with different levels of professional and academic qualifications. The more experienced teachers are allocated to the standard five classes while the less experienced are placed at the lower class levels. Such disparities in professional status, teacher allocation and academic qualifications may have some degree

of impact on teacher efficacy and the quality of teaching and learning in these schools on the whole.

3. RATIONALE FOR THE STUDY

There is a tendency in educational practice to emphasise the explicit formal curriculum, physical structures and academic achievement. Very little appears to be given to the human dimension that is integral to the school system. This study on teacher efficacy addresses the human aspect of the school system and dignity and sovereignty of teachers that could lead to greater job satisfaction and increased school productivity. This study is also timely and consistent with the current mood for education reform to create and sustain a humanized and democratized school system in Trinidad and Tobago.

4. REVIEW OF THE RELEVANT LITERATURE

The theoretical foundation of teacher efficacy is found in social cognitive theory. Bandura proposed that there were four general sources of efficacy building information: verbal expression, vicarious experiences, psychological arousal and mastery experiences [2]. According to Bandura, efficacy beliefs were explicitly self-referent in nature and directed toward perceived abilities given specific tasks, and were powerful predictors of behaviour [15]. Bandura argued that human behaviour is influenced by the individual's beliefs regarding two classes of expectations: an outcome expectation, "a person's estimate that a given behaviour will lead to certain outcomes," and an efficiency expectation, the conviction that one can successfully execute the behaviour required to produce an outcome [2, p.193]. Bandura further noted that teachers who have a high sense of efficacy visualize scenarios that provide positive guides and support for performance. Those who doubt their efficacy visualize failure scenarios and dwell on many things that can go wrong [16].

The study of teacher efficacy, although only two decades old, has emerged as a worthy variable in educational research and now stands on the verge of maturity. However, there still abounds some degree of measurement confusion with regard to its construct validity and measurement integrity [17,18]. The study of teacher efficacy, according to some researchers, has suffered an adolescent identity crisis as there is a struggle to clarify the construct [19].

In an effort to arrive at some degree of construct clarification and to bring some coherence to the meaning and measure of teacher efficacy, researchers have developed models to take a broader and more comprehensive look at the construct as it relates to teachers' judgments of their capabilities and a guide for future research efforts [20,6].

Gibson and Dembo [21] for example, were the earliest researchers to develop a more expanded measure of the teacher efficacy construct. They defined teacher efficacy as a multidimensional construct composed of two independent dimensions: personal teaching efficacy and teaching efficacy. Personal teaching efficacy involves teachers' evaluation of their own capabilities to bring about student learning. The other dimension teaching efficacy, reflects the degree to which teachers believe other educators can control the learning environment.

Further attempts have been made to extend the teacher efficacy construct with the focus on measuring the collective capability of staff [22,23,22] defined collective teacher efficacy as a

'construct measuring teachers' beliefs about the collective capability of staff to influence student achievement; it refers to the perceptions of teachers that efforts of the staff of a school will have a positive effect on student achievement'(p.486). Several other studies on collective teacher efficacy have used the school as the unit of analysis rather than the individual orientation of individual teachers [6,24].

Other teacher efficacy researchers proposed an integrated model of teachers' efficacy which describes the sources of efficacy as influencing task analysis and competence assessment from which efficacy beliefs are derived [1]. More recently a newer instrument to assess teachers' sense of efficacy was developed [3]. This instrument is consistent with the theoretical conceptualization offered by the model developed by Tschannen Moran et al. [1]. This newer instrument assessed teachers' sense of efficacy with respect to teaching tasks involved in student engagement, classroom management and instructional practices. Fives and Buehl [25] have tested the model and found that the 3-factor structure—efficacy for classroom management, instructional practices, and student engagement- are appropriate for practicing teachers.

Indeed, teacher efficacy has been found to enhance student academic achievement [26,27,28,29]. Numerous studies on this relationship between student achievement and teacher efficacy noted that teachers with positive teacher efficacy beliefs enhance student motivation [30]; encourage student autonomy [31]; increase student self-esteem [32]; foster student positive attitude toward school and involvement in school activities [33]; enhance problem-solving in the classroom [28] and help to create a positive classroom climate [9,4].

5. RESEARCH QUESTIONS

The following research questions guided the study:

1. Were there differences in teacher efficacy scores based on school type; gender; location of school; size of school; and teachers' length of service?
2. What is the nature of the relationship between demographic and the school-level teacher efficacy factors?
3. Which teacher efficacy factors were significant predictors of student academic achievement?

6. METHODOLOGY

The study was quantitative in nature and a cross-sectional design was used to test hypotheses and show relationships between variables. Such design was appropriate since this study was an exploratory one and a large sample of schools and teachers were involved. A questionnaire was administered to 532 teachers from 52 randomly selected schools in the St. George East Education Division of Trinidad and Tobago. The survey technique was also employed as it allowed the researcher to examine teacher efficacy factors individually and their correlations with each other [34]. It also allowed for some generalizations to emerge with more confidence than would not otherwise be possible [35].

The instrument used in this study was developed by Tschannen-Moran and Woolfolk-Hoy [3]. It consisted of 24 items that measured three dimensions of teacher efficacy: student engagement, instructional strategies, and classroom management. Student engagement items included motivating students, helping students to think critically, helping students to

value learning and getting through to the most difficult students. Classroom management items included establishing classroom management systems, controlling disruptive students and establishing routines. Instructional strategies involved crafting good lessons, adjusting lessons to individual needs and providing adequate challenges. A 5-point Likert rating scale was employed that ranged from Strongly Disagree to Strongly Agree. Principal component factor analysis was performed to ensure the validity of the three independent factors and their related factor loadings. The first factor–student engagement had eight items with factor loadings ranging .459 to .708; the second factor–classroom management had eight items with factor loadings ranging from .560 to .739 and the third factor–instructional strategies had eight items with factor loadings ranging from .579 to .713 (See Table 1).

The Cronbach Alpha tested the reliability of the teacher efficacy items. The Cronbach alpha coefficients of the three teacher efficacy factors were moderate: student engagement (.592); instructional strategies (.646); classroom management (.662) (Table 2).

Table 1. The three teacher efficacy factors and their factor loadings

Factor/ Item	Component		
	I	II	III
Student Engagement			
Getting through most difficult students	.560		
Helping students think critically	.459		
Motivating students	.567		
Making clear expectations	.619		
Responding to difficult questions	.640		
Helping students value learning	.708		
Improving student understanding	.647		
Good family school relationship	.509		
Classroom Management			
Controlling disruptive students		.560	
Establishing routines		.679	
Students follow instructions		.717	
Calming disruptive students		.710	
		Component	
	I	II	III
Establishing classroom management system		.739	
Student understanding of teaching		.680	
Responding to defiant students		.689	
Motivating students		.619	
Instructional Strategies			
Getting through difficult lessons			.640
Crafting good questions			.657
Responding to difficult questions			.699
Adjusting lessons to individual needs			.579
Variety of assessment strategies			.713
Providing alternative explanations			.646
Implementing alternative strategies			.686
Providing adequate challenges			.677

The dependent variable, student academic achievement, was measured by the National Test Scores designed to describe the achievement of students in Mathematics, Language Arts, Science and Social Studies at the Standard 1, 2, 3 and 4 levels. The test was developed and administered by the Ministry of Education to students in all public schools in Trinidad and Tobago. The objectives of the National Tests were to: gather information for decision-making at the school, district and national levels; identify areas of the system that need further investigation; identify national norms; compare students' performance by school and educational district; and track students' progress through school [36].

For this study, the average achievement levels in the National Test over the period 2005-2009 was used as an indicator of each school's academic performance. This average score was obtained from the Academic Performance Index (API) [37] which covers the period 2005-2009 in two critical areas at the primary school level : literacy and numeracy. This report for the period 2005-2009 was used because it was the most recently available from the Ministry of Education. A school's score or placement on the API was designed to be an indicator of a school's performance level and is calculated annually.

The school sample for the study was selected from the target population of all government and government assisted schools in the St. George East Education Division (88 schools). The researcher considered the St. George East Education Division appropriate for the study since there was a wide range in the distribution of different school types. A revised (2011) listing of these schools was obtained from the Planning Division of the Ministry of Education. Random sample with disproportional allocation was used to select the school and teacher sample given the wide variation in size and types of schools in this division [38]. Fifty-four (54) schools and 532 teachers were selected.

Table 2 . Cronbach Alpha coefficients of the three teacher efficacy factors

Factor	Number of items	Cronbach Alpha	Range
Student engagement	8	0.592	0.558-0.718
Instructional Strategies	8	0.646	0.579-0.713
Classroom management	8	0.662	0.560-0.739
Overall	24	0.662	0.560-0.739

The variables of urban, rural, small and large were considered important and taken into account in the study. The term 'rural' cannot be precisely defined nor cannot be strictly demarcated when compared to its urban counterpart [39]. Indeed, the notion of rural-urban has shifted from the traditional idea of a dichotomy to that of a continuum [40,41]. [40] assert that two dimensions of this continuum are population density and remoteness from large metropolitan areas. According to the [42] the term 'rural' should meet two criteria which are low population density and a dependence on primary production activities as a source of livelihood. In the Trinidad and Tobago context, the Central Statistical Office [43] classified a rural community based on the prevalence of a high level of agricultural activity and remoteness from the main urban areas. For the purposes of this study, 'urban' is defined as clustered settlements with a high degree of commercial/industrial activity and 'rural' is defined as dispersed settlements with some form of agricultural/pastoral activity.

The identification of small and large schools follows the guidelines of the Planning Unit, Ministry of Education. Schools with less than 250 students and no appointed vice-principal were deemed small, while schools with 500 and over pupils were viewed as large.

The study draws largely on the perceptions of teachers. Teachers play an integral role in creating healthy school environments. As teachers are so heavily involved in the overall climate of a school they can either contribute in positive or negative ways depending on their perceptions the situation at hand [44]. The teachers differed in their years of teaching experience ranging from under five years to more than ten years and also on sex, 21% being male and 77% female.

Research questions were analysed quantitatively. Basic descriptive statistics such as the means were used to arrive at aggregate scores for each school on each of the seven factors. Mean scores were used to compare schools according to school type, sex, location and size, on each of the seven school health factors.

Inferential statistics were also used in the study. T-tests and Analysis of Variance were used to test differences among schools on each teacher efficacy factor. Multiple regression analysis was employed to ascertain the relationship between each independent teacher efficacy factor on student academic achievement. The Pearson Moment coefficients were used to examine the relationship between the demographic variables and school-level teacher efficacy factors. Stepwise Regression analysis was also used to examine the predictive power of the independent teacher efficacy factors on the dependent student academic achievement.

7. FINDINGS

7.1 Research Question 1: Differences in Teacher Efficacy Based on School Type, Location, Size, Sex and Years of Teaching Experience.

With regard to significant differences based on school type the study found that there were no significant difference in overall teacher efficacy between government and government-assisted schools (0.298) (Table 3). With regard to school location the study also found that there were no significant differences on overall teacher efficacy between urban and rural schools (0.965) (Table 3). When small and large schools were compared there were no statistically significant differences between these schools (0.324) (Table 3). With regard to the sex of teachers (0.295) and their years of teaching experience (0.083) no significant differences were found at the 0.05 probability level (Table 3).

Table 3. T-Test showing differences between Government and Government- Assisted, Rural and Urban, Small and Large schools, Sex and Years of teaching experience

Variable	Mean	SD	Df	Mean difference	Significance
Government	118.09	14.33	218.95	1.464	
Government Assisted	119.55	12.65	416	1.464	0.298
Rural	119.18	13.38	413	2.46	
Urban	116.71	13.99	218.2	2.46	0.965
Male	118.070	13.98	127.2	1.95	
Female	120.02	13.39	419	1.95	0.295
Large	118.89	11.68	416	0.379	
Small	118.51	14.21	104.6	0.379	0.324
Over 5 years	118.63	11.42	418	0.151	
1-5 years	118.48	14.11	54.1	0.151	0.083

**Significant at 0.05 probability level*

7.2 Research Question 2: The Relationship Between the School-Level and Demographic Teacher Efficacy Factors

With respect to the three teacher efficacy factors, there was a significant positive correlation between them: classroom management and student engagement ($r=0.677, p<.01$); classroom management and instructional strategies ($r=0.648, p<.01$); instructional strategies and student engagement ($r=0.692, p<.01$) (Table 4).

Table 4. Pearson Correlation showing the relationship between the three teacher efficacy factors in every level of the school

		Classroom management	Student engagement	Instructional strategies
Classroom management	Pearson Correlation	1	** .677	** .648
	Sig.(2-tailed)		.000	.000
Student engagement	Pearson Correlation		1	** .692
	Sig.(2-tailed)			.000
Instructional strategies	Pearson Correlation			1
	Sig.92-tailed)			

***Correlation is significant at the 0.01 level*

7.3 What Was the Relationship Between the Demographic Teacher Efficacy Factors?

With respect to the demographic factors there was a significant relationship between school type and location ($r=-.129, p>.01$) (Table 5). The higher mean scores in the rural, government –assisted schools suggest the teacher efficacy was higher in these schools.

Table 5. Pearson Correlation showing the relationship between the demographic factors

Variable		Sex	Location	School Type	Teacher Experience	Size
Sex	Pearson Correlation	1	-.037	-.055	-.58	.015
	Sig (2-tailed)		.435	.238	.210	.756
Location	Pearson Correlation		1	-.129**	.091	-.079
	Sig (2-tailed)			.006	.053	.094
School Type	Pearson Correlation			1	-.088	- 0.60
	Sig (2-tailed)				.061	0.20
Teacher Experience	Pearson Correlation				1	.040
	Sig (2-tailed)					.391
Size	Pearson Correlation					1
	Sig (2-tailed)					

*** Correlation is significant at the.01 level(2-tailed)*

The partial correlation or unique variance of the three teacher efficacy factors on student academic achievement was examined. Student engagement had the highest variance (0.159) followed by classroom management (-.154) and instructional strategies (0.-54) (Table 6). The tolerance value ranging from .426 to .483 indicated that there was no multicollinearity between the three independent teacher efficacy factors (Table 6).

Table 6. Partial and part correlation of the three teacher efficacy factors

Teacher efficacy factor	Zero order	Partial correlation	Part correlation	Tolerance
Student engagement	.176	.159	.157	.426
Instructional strategies	.153	.096	.094	.483
Classroom management	.031	-.154	-.152	.459

The Beta value (weight) also indicated the degree of influence or weight of each of the three independent teacher efficacy factors on the dependent student academic achievement. Student engagement had the greatest weight ($\beta=0.240$), followed by classroom management ($\beta=-.224$) and instructional strategies ($\beta= 0.135$) (Table 7).

Table 7. The relative weight of the three teacher efficacy independent factors on the dependent academic achievement

Teacher efficacy factor	Beta	Significance
Student engagement	.240	*.001
Instructional strategies	.135	*.055
Classroom management	-.224	*.002

**Significance at .001 probability level*

The study further examined the explained variance of all the teacher efficacy factors on student academic achievement. The overall explained variance was 10.3% (Table 8).

Table. 8 showing R Square and Adjusted R Square

R	R square	Adjusted R square	F
.359	.129	10.3	4.92

8. DISCUSSION

The results of the *t*-tests for research question 1 suggested that teachers were of the view that school type, location, sex, teaching experience and school size had no influence on their teacher efficacy. These findings suggested that teachers perceived that demographic variables were not as important as school-level factors such as student engagement, classroom management and pedagogical issues in their efficacy. These contextual variables, according to Guskey [45], such as student-teacher interaction and teachers' locus of control were strong determinants of teachers' job satisfaction.

The significant inter correlation between school type and location (table 4) suggested that in the more rural, church-controlled schools there was greater interaction and 'collegial exchange' that helped to promote shared discourse in teaching [46]. Studies have also shown that these school were safer and verbal bullying were less likely to occur [47]. Supportive studies in Trinidad and Tobago have revealed that there was a strong bond between teachers and community in these rural, government- assisted schools [48].

The results also indicated that teachers were of the view student engagement was the strongest predictor of student academic achievement. These findings are very instructive for school administrators, University advisors, teachers, and policy makers to bring about

educational transformation and shape the normative environment of our schools. Principals as transformational leaders should ensure that there are adequate resources, manageable class sizes, physical conditions that enhance teacher job satisfaction and by extension student learning. The research on teacher job satisfaction has further emphasized that school leadership and policy makers must focus more on redesigning many of our schools [49,50]. The research indicated that there is a strong relationship between student learning and teaching, organizational design and management, class design and the overall physical environment. Such research is instructive for policy makers in Trinidad and Tobago since many schools are dilapidated with outdated school facilities, inadequate resources and poor school maintenance which impact negatively on teacher efficacy.

Another area in the school setting that cannot be ignored is enhancing the efficacy beliefs of novice teachers. In many of our schools in Trinidad and Tobago there are many newly appointed novice teachers. School polices should address induction and staff development programs to nurture the professional needs of these teachers so that they can develop a high sense of efficacy. Tschannen-Moran and Hoy [3] have lamented that there is a tendency for new teachers be given the most challenging and least desirable teaching assignments. Zeichner [51] succinctly makes the point that there is a need for more practice-based teacher education programmes to help novice teachers develop the ability to reflect on teacher effectiveness and view teaching as a student and as a teacher.

Although many of the above challenges exist in our schools in Trinidad an Tobago, it is heartening to note many key stakeholders such the University of Trinidad and Tobago, the Ministry of Education, school administrators and the National Teacher Parent Association have adapted the 'blended' approach or partnership model [52] to strengthen the link with novice teachers, experienced and master teachers to help create and develop a professional culture that would enhance strong teacher efficacy and student academic achievement. Such a professional culture would allow for competent teachers with high efficacy engaging in a process of collective learning in a shared domain of human endeavour.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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