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Research Article

TEACHERS' INSTRUCTIONAL COMPETENCE AND ATTITUDE TOWARDS TEACHING AS PREDICTORS OF STUDENT LEARNING BEHAVOUR IN MATHEMATICS

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ABSTRACT

This study investigated teachers' instructional competence and attitude towards teaching as predictors of students' learning behaviour in mathematics. Three research questions and two hypotheses guided the study. Descriptive survey and correlational research designs were in the study. A sample of 400 students from the 2nd and 3rd year senior secondary school was used. Pearson product moment correlation coefficient and the coefficient of determination were used to answer the research questions while regression analysis was used to test the null hypotheses at $p < 0.05$. The result showed a strong correlation between teachers' instructional competence and students' learning behaviour in mathematics; and a strong correlation between teachers' attitude towards teaching and students' learning behaviour in mathematics. It was recommended that Mathematics teachers should develop positive attitude towards the subject. Teachers should improve and use their instructional competences making Mathematics interesting and appealing to students in order to help them develop a positive learning behaviour towards the subject.

INTRODUCTION

The study of Mathematics has been an issue of serious concern to stakeholders in secondary school education in secondary schools. Many secondary school students' response to the study of mathematics is negative and varies differently amongst the different class levels. Consequently, Mathematics teachers are saddled with an enormous responsibility of not just teaching mathematics but also developing positive behaviours in students that support and promote the learning of mathematics. For any education system to achieve its set goals and objectives of learning mathematics, highly professional and competent teachers dedicated to their jobs are crucial. It is suspected that there is high correlation between what teachers know and what they teach. The ability to teach effectively seems to depend mainly on the teachers' pedagogic knowledge, skills, and beliefs about teaching-learning process, which collectively define instructional competence.

Accountability in education has been a critical issue among stakeholders in the schools system. Among these stakeholders, teachers and students are mostly held accountable for educational outcomes. Each time students' academic performance falls below expectation, they are usually blamed for unpreparedness to study and teachers for lack of instructional competence and dedication to their jobs. The fact however, is that there is a dearth of professional mathematics teachers in the schools system. As a result, graduates of mathematics and science subjects who had no formal training in pedagogy are employed to teach mathematics in the schools. Ezeali (2010) explained that 'before one is employed as a science teacher, the individual is required to choose one other subject. Many science teachers combine the subject with mathematics, which they find stressful, and many students dread it'.

Adeogun (2003) opined that the quality of education in a given schools system depends on the quality of its teaching staff. The fact is that a school without adequate supply of competent human resources may not to be able to achieve the goals and objectives of the education system. Adesina (1981) noted that teachers are the major indicator and determinant of quality of education, the general view is that high quality teachers are education's best resources and assets (Ayodele 2004). Teachers therefore, are expected to bear part of the blame that arises when there is a shortfall in expected educational outcome.

Teacher effectiveness is impeded if the teacher is unfamiliar with the body of knowledge taught and or lacked appropriate pedagogic skills. The implication of this for teachers is that they must thoroughly understand the content of what they

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teach, especially in mathematics. Teachers whose understanding of a topic is thorough use clearer language to provide better explanation to students than those teachers with weaker and poor knowledge of the topic. Olaleye (2001), noted that the way the students perceive their teachers in terms of the teachers' knowledge of the content of subject matter, may significantly affect the students' academic performance. Okorie and Agah (2014) assert that 'classroom teachers wield enormous power and their activities and attitude have great influence on the students' behaviour. This is particularly true in primary and secondary schools where the pupils look up to their teachers as role models'. Olaleye (2001) observed that nonchalant ***attitude*** of some teachers to work, contribute to poor academic performance of students. Attitude is 'mind set or mental state of readiness acquired and developed through experience that influences individual's response to a given situation or object' (Okorie and Agah, 2014).

Eggen and Kauchak (2001) noted that teachers' positive attitude is fundamental to effective teaching. They identified kinds of teachers' attitude that engender a caring and supportive classroom environment, as followed: enthusiasm, caring, firm, democratic practices to promote students responsibility, effective use of lesson time, having established efficient routines, and interacting freely with students and providing motivation for them. Schofield (1981) showed that teachers' positive attitude towards Mathematics was significantly related to high achievement of the pupils in the subject. Bridget, Vemberg, Twemlow Fonag and Dill (2008), studied how teachers' attitude contributed to students' academic performance and behaviour. The study revealed, among other things, that students with more devoted teachers were regarded by their peers as helpful to victims of bullying relative to students with less devoted teachers. The study also disclosed that students with devoted teachers had the courage and determination to face difficulties in school life. Teachers are recognised as those who provide support, encourage students and their value for love, and eradicate unwanted behaviour in students. Therefore, teachers invariably are role models whose behaviours are easily copied by students. What teachers like or dislike, appreciate and how they feel about students' learning or studies could have a significant effect on the students. Unfortunately, however, many teachers seldom realize that how they teach, their behaviour and how they interact with students can be more paramount than what they teach (Yara, 2009).

Teachers' beliefs about Mathematics, such as its usefulness and the way it should be learned affect their attitude towards the subject, and influence the way they present the subject to the students' performance. Philippou and Christou (1998) opined that teachers' beliefs about the utility of Mathematics are often found to correlate with either a more positive or negative attitude towards the subject. Teachers who see no usefulness of Mathematics in the real world and believe that Mathematics should be learnt as a set of rules and algorithms will probably require their students to memorise procedures and rules and formulae without meaningful learning of the concepts. This is a negative outlook that will make his students develop a negative attitude towards the subject. In addition, teachers who believe that gender bears on students' mathematical ability and that girls are poor in Mathematics are likely to impact negatively on girls behaviour towards mathematics. The girls might in turn believe that they cannot excel in Mathematics.

Another aspect of the teachers' attitude towards Mathematics, which affects students' attitude and performance, include such mathematics-related behaviour as avoidance of Mathematics, pursuit of Mathematics and the way the teachers present Mathematics in the classroom and perceived by students. Even when teachers believe that, their manner of presentation of mathematical concept is authentic and context dependent, it may stand to alienate many students from Mathematics (Barton, 2000, Furinghelti and Pekhoren, 2002).

Teachers' attitude towards Mathematics can be measured by their emotional (affective) response towards Mathematics, knowledge of Mathematics (cognitive), as well as behaviour towards the subject (Mensah, Okyere and Kuranchie, 2013). Clarke, Thomas and Vidakovic (2009), suggested that 'attitudes and practices of teaching Mathematics are complexly affected by beliefs, emotions, social context and content knowledge'. Studies confirm that emotional responses toward Mathematics made by teachers include like and dislike of Mathematics, anxiety associated with Mathematics and self-confidence in relation to Mathematics (Phillipou & Christou, 1998, Brady and Bowd, 2005, Henderson & Rodrigues, 2008). These emotional responses impact on students' performance. In their study of teachers' self-esteem connected to Mathematics, Henderson and Rodrigues (2008) found that approximately half of the participating pre-service teachers, some of who were highly qualified, lacked self-esteem in relation to Mathematics. Burks, Heidenburg, Leoni and Ratliff (2009) asserted that teachers' exhibition of self-confidence when teaching Mathematics motivates student to greater achievement in Mathematics. The learners draw from the teachers' disposition to form their own attitude, which may affect their learning outcomes.

Ogunniyi, as cited in Yara, (2009) showed that students' positive attitude towards Mathematics is enhanced by the following teacher-related factors: teachers' enthusiasm, resourcefulness, helpful behaviour, thorough knowledge of the subject-matter and their pedagogic approach, making Mathematics quite interesting. Teachers can foster in students positive attitudes towards Mathematics that help to build confidence in them by: encouraging the belief that everyone can 'do' Mathematics – emphasizing effort, not innate ability; modelling enthusiasm for teaching and learning Mathematics; addressing the learning styles of students by providing a variety of ways for students to gain an understanding of difficult concepts; helping students to appreciate the value of Mathematics in their lives; and choosing activities carefully (not too easy, not too hard), so that students can be both challenged and successful (Ministry of Education, Ontario (2004).

Ehindero and Ajibade (2000) asserted that students, who are curious stakeholders in educational enterprise, have long suspected and speculated that some of their teachers lack the necessary professional qualifications and attitudes for teaching. That is, skills, techniques, strategies required to communicate concepts, ideas, principles in a way that would facilitate

effective learning. They believed that these deficiencies contribute significantly to the growing rate of students' failure and subsequent secondary school dropouts. These observations by stakeholders necessitated the need to undertake this study and raised the question: Are teachers' instructional competence and attitude towards teaching predictors of student learning behaviour in mathematics? This is the problem of this study.

Purposes

This study is designed to ascertain:

- Proportion of students' learning behaviour (SLB) in mathematics attributable to teachers' instructional competence (TIC);
- Proportion of students' learning behaviour in mathematics attributable to teachers' attitude (TA) toward teaching;
- Proportion of teachers' instructional competence and attitude towards teaching that account for students' learning behaviour in mathematics.

Research Questions

The following research questions guided the study.

1. What proportion of students' learning behaviour in mathematics is attributable to teachers' instructional competence?
2. What proportion of students' learning behaviour in mathematics is attributable to teachers' attitude toward teaching?
3. What proportion of teachers' instructional competence and attitude towards teaching that is accountable for students learning behaviour in mathematics?

Research Hypothesis

The following null hypotheses guided the study.

H_{O1}: There is no significant relationship between students' learning behaviour in mathematics and teachers' instructional competence.

H_{O2}: There is no significant relationship between students' learning behaviour in mathematics and teachers' attitude toward teaching.

H_{O3}: Teachers' instructional competence and attitude do not significantly predict students learning behaviour in mathematics.

Research Method

Descriptive survey and correlational designs were adopted for this study. Four hundred students were sampled from the 2nd and 3rd year classes of six senior secondary schools. The choice of students in this cadre of learners was based on the number of years they have spent in the secondary school, which had afforded them the opportunity of relating with and knowing their mathematics teacher(s) very well. It was assumed that this would help the researchers in obtaining reliable data on teachers' attitude and competence.

A four Likert- scale questionnaire was used to elicit response from the sample. The questionnaire was designed in four segments, the first requiring general and personal information of the respondents. The other three consist of ten standardized items each, for measuring teachers' competence, teacher's attitude and students' learning behaviour in mathematics.

RESULT AND DISCUSSION

Research Question One

What proportion of students' learning behaviour (SLB) in mathematics attributable to teachers' instructional competence (TIC)?

To answer this question, scores from teachers' instructional competence was correlated against students' learning behaviour in mathematics. The result is shown in Table 1 below.

Table 1 Pearson's Product Moment Correlation Analysis of students' learning behaviour in mathematics and teachers' instructional competence.

Variable		SD	N	r	R^2
Students' learning behaviour	28.84	6.52	400	0.85	0.73
Teachers' instructional competence	29.22	6.84			

$\alpha = 0.05$, R^2 = coefficient of determination

The result in Table 1 shows the correlation between students' learning behaviour and teachers' instructional competence in Mathematics. The result shows a strong correlation coefficient of 0.85 between students' learning behaviour and teacher instructional competence and a coefficient of determination of 0.73. This implies that 73% of students learning behaviour is attributable to teachers' instructional competence.

Hypothesis 1

H_{O1}: There is no significant relationship between students' learning behaviour in mathematics and teachers' instructional competence.

Table 2 Regression Analysis of students' learning behaviour in mathematics and teachers' instructional competence

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	12345.793	1	12345.793	1068.16	.000
	Residual	4599.967	398	11.558		
	Total	16945.760	399			

$\alpha = 0.05$

In order to test hypothesis 1 (H_{O1}), regression analysis was used. The result in Table 2 shows that an F-ratio of 1068.16 with associated exact probability value of 0.00 was obtained. This exact probability value of 0.00 was less than 0.05 level of significance set as benchmark for testing the hypothesis and it was found to be significant. The null hypothesis was therefore, rejected and inference drawn was that, there was significant relationship between students' learning behaviour in mathematics and teachers' instructional competence.

Research Question Two

What Proportion of students' learning behavour (SLB) in mathematics attributed to teachers' attitude (TA) toward teaching?

To answer this question scores from teachers' attitude towards teaching was correlated against students' learning behaviour. The result is shown in table 2 below

Table 3 Pearson's Product Moment Correlation Analysis of students' learning behaviour in mathematics and teachers' attitude towards teaching.

Variable	Mean	SD	N	r	R^2
Students' learning behaviour	28.84	6.52	400	0.93	0.87
Teachers' attitude towards teaching	28.54	6.35			

$\alpha = 0.05$, R^2 = coefficient of determination

The result in Table 3 above shows the correlation between students' learning behaviour in Mathematics and teachers' attitude toward teaching. The result shows a strong correlation coefficient of 0.93 between students' learning behaviour and teachers' attitude toward teaching and a coefficient of determination of 0.87. This implies that 87% of students learning behaviour in Mathematics are attributable to teachers' instructional competence.

Hypothesis 2

H_{O2}: There is no significant relationship between students' learning behaviour in mathematics and teachers' attitude toward teaching.

Table 4 Regression Analysis of students' learning behaviour in mathematics and teachers' attitude towards teaching

	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	14747.664	1	14747.664	2670.23	.000
	Residual	2198.096	398	5.523		
	Total	16945.760	399			

$\alpha = 0.05$

In order to test hypothesis 2 (H_{O2}), regression analysis was used. The result in Table 4 shows that an F-ratio of 2670.23 with associated exact probability value of 0.00 was obtained. This exact probability value of 0.00 was less than 0.05 level of significance set as benchmark for testing the hypothesis and it was found to be significant. The null hypothesis was therefore, rejected and inference drawn was that, there was significant relationship between students' learning behaviour in mathematics and teachers' attitude toward teaching.

Research Question Three

What is the inter-relationship between teachers' instructional competence and attitude towards teaching that is accountable for students learning behaviour in mathematics?

Table 5 A model summary of the inter-relationship between teachers' instructional competence, attitude towards teaching and students learning behaviour in mathematics

Model	R	R Square	Adjusted R Square
1	0.945	0.893	0.892

Result in Table 5 seeks to find how much of the overall variance of students learning behaviour in mathematics is explained by the predictor variables. Results in Table 5 showed that the relationship of the predictor variables and the criterion variable was 0.95 and the coefficient of determination (R Square) was 0.89, this means that the model as a whole explained 89% of the total variance of students learning behaviour in mathematics. This also means that 89% of the predictor variables are accountable for students learning behaviour in mathematics.

Hypothesis 3

H_{O3}: Teachers' instructional competence and attitude do not significantly predict students learning behaviour in mathematics.

Table 6 Regression Analysis of Teachers' instructional competence, attitude and students learning behaviour in mathematics

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	15128.842	2	7564.421	1652.70	.000
Residual	1816.918	397	4.577		
Total	16945.760	399			

$\alpha = 0.05$

In order to test hypothesis 3 (H_{O3}), multiple regression analysis was used. The result in Table 6 shows that an F-ratio of 1652.70 with associated exact probability value of 0.00 was obtained. This exact probability value of 0.00 was less than 0.05 level of significance set as benchmark for testing the hypothesis and it was found to be significant. The null hypothesis was therefore, rejected and inference drawn was that, Teachers' instructional competence and attitude is significantly accountable for students' learning behaviour in mathematics.

DISCUSSION AND RECOMMENDATIONS

The study has shown that both teachers' instructional competence and attitude towards teaching (collectively referred to as teacher factors) were highly related to students' learning behaviour in Mathematics. A significant relationship was found between these teacher factors and students' learning behaviour in Mathematics. This implies that irrespective of the mathematical capabilities of students, if teachers display negative attitude towards Mathematics students may not develop positive learning behaviour towards the subject. The more positive a Mathematics teachers' attitude toward the subject, the positive the students' attitude would be and vice versa. Our finding is in agreement with that of Kunter, Klusmann, Baumert, Richter, Voss, & Hachfeld (2013), which shows that 'teachers' competence affected students' achievement and enjoyment'. The authors discovered that 'classes in which the teacher had higher enthusiasm showed an increase in mathematics enjoyment'. The attitude of teachers resonates in the attitude of their students toward the subject. Teachers' attitude towards Mathematics, therefore, matters a great deal as it has a powerful influence on student attitude formation. It is, therefore, important and imperative for Mathematics teachers to develop and display positive attitude towards the subject and make Mathematics interesting and appealing to students in order to help them develop a positive learning behaviour towards the subject.

The high correlation between teachers' instructional competence and students' learning behaviour towards Mathematics is understandable and obvious; teachers cannot give what they do not possess. In this regard Mathematics

teacher must appreciate the fact that it requires much more than having a certificate in Mathematics to teach the subject effectively. Therefore, many of those who teach mathematics in the schools and who have no formal training in pedagogy should be encouraged to acquire such training. There is also the need to encourage and sponsor mathematics teachers to benefit from continuing professional development programmes. In addition, teachers should ensure that in every lesson they make effort to present mathematics concepts in simplified, interesting and attractive ways.

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