

Students' Perceptions of their Teachers' Teaching of Mathematics: The Case of Ghana

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ABSTRACT

The purpose of this study was to examine students' perceptions of their teachers' teaching practices and how it impact on their learning experiences. The sample of the study involved 358 students from 12 Junior High Schools (12-14years) who were randomly selected to complete a semi-structured questionnaire. The study revealed that students' perceptions of their teachers' teaching varies as the results established that both teacher-centred and student-centred teaching approaches were used by mathematics teachers. The study also established that teachers' actions and inactions impact positively or negatively on students learning experiences as majority of the respondents reported that their learning experiences are to a larger extent controlled by that teacher. Majority of the respondents indicated that their teachers normally tell them which questions to solve and which methods to use. Although the study was limited only to 12 schools, the findings provide a conceptual framework for further research into how students' views could be used by both teachers and educational authorities in improving the teaching and learning of mathematics as students' are in a better position to provide useful information regarding their teachers teaching and how it impacts on their learning. Among others, it is recommended that students' ratings or evaluation of their teachers' teaching should be considered in evaluating teachers' teaching and effectiveness.

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Keywords:

Perception, Teaching Methods and Learning Experiences

Introduction

The importance of mathematics in all realms of life and the recent debate on the falling standards of students' achievement in mathematics has triggered the growing attention for researchers, parents and education authorities in their quest for the way forward over the last two decades (Blum 2002). The teaching and learning of mathematics has therefore been an issue of considerable concern for some time now and the mathematics curriculum in Ghana has been under intense scrutiny coupled with a number of restructuring and the introduction of new syllabus and teaching methods. In response to this demand, researchers, educators and other stakeholders in the education sector have advanced educational arguments supporting the need for scientific evidence into the issue and the way forward. In Ghana, the government and other stakeholders in the education sector have introduced a number of initiatives to promote effective teaching and learning of mathematics with the aim of making the subject more enjoyable (Anku 2008). For example, in 2003 the Ministry of Education (MoE), in collaboration with the Teacher Education Division (TED), reviewed the teacher education curriculum and upgraded all Initial Teacher Training Colleges (ITTC's) to diploma awarding institutions with the aim of improving teachers' knowledge of content and pedagogical skills in the various subject areas. In addition, the Ministry of Education, in collaboration with

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other international agencies such as the Japan International Cooperation Agency (JICA), the United States Agency for International Development (USAID) and the Department for International Development (DFID), have shown enormous commitment by embarking on mathematics and science projects to improve the teaching and learning of mathematics and science at the basic, secondary, teacher training and tertiary levels (Ampiah et al. 2000). The latest of these initiatives was the introduction of a new mathematics curriculum in September 2007, which showed a paradigm shift in the teaching and learning of mathematics and other school curriculum subjects in the country.

In addition to this, researchers, educators and other stakeholders in the education sectors have conducted empirical research into the issue and the way forward and have identified different factors (e.g. Agyeman 1993; Kraft 1994; Asiedu-Addo and Yidana 2004; Mereku 2003). According to Lamb and Fullarton (2002) three different but interrelated factors affecting mathematics teaching and learning are distinguishable in the literature: personal, classroom and school related factors. Lamb and Fullarton (*ibid*) classified individual personal factors as believes and attitude, preparedness and willingness to learn; home factors as socio-economic status, parents' educational background and occupation and classroom and school factors as the school physical environment, learning resources, teaching and learning strategies.

Despite the importance of these different but interrelated factors, the core of the interplay between the learner and what is learned is accredited to the teacher who is recognized and accepted by the society to pass on the society's accumulated norms, values, knowledge and skills to the present and future generation. It is upon this that impact of teacher related factors on students learning of mathematics and students performance in mathematics has been receiving a considerable attention for sometime now. In examining the impact of teacher related factors on students learning and their performance, a number of studies (eg. Aubrey 1997; Ball 1991 and Mewborn 2001) have investigated into the impact of teachers' subject content knowledge on their teaching and established that teachers' subject content knowledge impacts on their teaching. Mewborn (2001) established that although mathematics teachers' subject content knowledge plays a vital role in their teaching, "merely knowing more mathematics does not ensure that one can teach it in a way that promote students conceptual understanding" (p. 28). Ernest (1989) explained that good subject knowledge and the kind of perception that the teacher have toward mathematics determines how he or she teaches. Ernest (*ibid*) further argued that the way a teacher teaches is immensely influenced by the teacher's theoretical perspective and more particularly his/her beliefs and perception toward the subject and a broad research has been conducted examining teachers' perception of their teaching (e.g. Jurdak 1991, Teo 1997 and Perkkila 2003). That is, teachers' perceptions of their teaching is a valuable variable in promoting effective teaching and learning of mathematics as what the teacher teaches and the way he/she teaches is a reflection of the experiences and beliefs he/she hold (Ernest 1989).

Jurdak (1991) argued that mathematics teachers' conception and the kind of beliefs they hold influence the way they teach. Teo (1997) in his investigation of the beliefs of 16 teachers in Singapore, reported that teachers beliefs and conception about mathematics has an influence on the individual teacher's teaching. Similarly, Pepin in his comparative study also established that there is a direct relationship between the teacher's beliefs and their teaching practices. Also Perkkila (2003) in his study involving Finish primary school teachers also revealed that teachers' recollection of their experiences and beliefs has great influence on their teaching. Perkkila further added that, the way a teacher teaches can be traced back to his/her school days how he/she experienced the teaching and learning of the subject. In all the above studies it was established that, although factors such as the demands of the mathematics curriculum and the national call for a change in the teaching and learning of mathematics impacts on teachers' teaching, the impact of the individual teacher's beliefs and experiences can not be underestimated.

That is, teachers' perception of their teaching and how they teach is of great importance in measuring the effectiveness of mathematics teaching and learning and it also reinforces teacher's decision making (Ahmed and Aziz 2009). Ernest (1989) explained that, teaching reforms can not take place unless teachers' deeply hold good beliefs about mathematics teaching and learning changes?" (p.249). Handal and Herrington (2003) also argued that "successful curriculum change is most likely to occur when the curriculum reform goals relating to teachers' practice takes into account of the teacher's belief" (p.65). In all the above studies, the main methods used in examining teachers perceptions of their teaching and

mathematics in general was through the collection of both quantitative data (through questionnaire) and qualitative data (through interviews) from teachers about how they perceived their own teaching.

Researching into teacher's beliefs and perceptions of their teaching has therefore been receiving considerable attention for some time now and this is broadly documented in the literature. However, Ahmed and Aziz (2009) argued that collecting data from students regarding their teachers' teaching provides meaningful data of what their teacher does. Ahmed and Aziz further argued that collecting data from students about their teachers' teaching is a valuable as their perceptions are "coloured by challenging and interesting experiences that allow them to observe learning and teaching behaviours more intimately than their teachers" (p.19). That is, students perception of their teacher's teaching contribute very much in improving the teaching and learning of the subject as it provides valuable suggestions and directions for the teacher's future improvement (Ahmed and Aziz 2009). Ahmed and Aziz (*ibid*) also found out that when students develop conceptual understanding of the concept presented when they perceive their teachers' classroom environment as cooperative rather than competitive. In describing students perception regarding their mathematics teachers' teaching, Rawnsley (1997) established that students develop a more positive attitude toward their mathematics lessons where the teacher is considered to be highly supportive and gives the students the chance to play an integral role in the teaching-learning process.

In addition to this, assessing teachers teaching practices using students' ratings and feedback has proved to be reliable, variable and as one of the best methods of measuring teachers' instructional practices by a number of studies (Arthur *et. al.* 2003; Cashin 1995; Centra 1993). Arthur *et. al.* (2003) argued that the current system of assessing teachers by examining their own perceptions of their teaching is neither reliable nor valid, since it most often considers students' views as unimportant although students are directly affected by the teacher's actions and inactions. For example, a number of studies have found some inconsistencies between teachers' perceived and actual teaching practices. Stigler and Hiebert (1999) disclose that most teachers, among teachers who normally express non-traditional beliefs, display inconsistent practices and, although all the teachers in their study reported that they hold non-traditional beliefs, their actual teaching practices were inconsistent with these beliefs. Perkkila (2003) also found that teachers' beliefs about mathematics were primarily non-traditional, but their instructional practices still focused on textbooks, rules and procedures in solving problems. Li and Yu (2010), who studied the relationship between a pre-service teacher's beliefs about mathematics and his/her teaching practices, divulged some inconsistencies between the teacher's beliefs and his teaching practices. They attribute these inconsistencies to a lack of pedagogical content knowledge about mathematics teaching.

In Ghana, students' rating of teachers instruction are widely used in colleges and universities. However, there are limited studies which have investigated teachers teaching practices by examining students' perceptions of their teacher's teaching at the basic and secondary education level. The assessment method used in evaluating teachers' teaching practices and effectiveness of their teaching where students' views have been ignored has not provided a reliable and valid information. In addition to this, within the Ghanaian context especially at the basic level, no study has specifically answered the research questions posed in this present study. This study is significant in different ways: firstly, the study can reveal information about teachers teaching by examining students' perceptions as they are the only actual witnesses of what happens in the classroom. In addition to this, the study is significant, since it may lead to further research in understanding mathematics teachers' teaching practices. Furthermore, the results may provide useful information to the Ministry of Education in providing new systems of assessing teachers' teaching. The purpose of this study, therefore, was to examine students' perceptions of their teachers' teaching and the study is guided by the following research questions:

- a) What are students' perceptions of their teachers' teaching methods in relation to teacher-centred and student-centred teaching methods?
- b) What are students' perceptions of their own learning in relation to passive and active learning experiences?

Methodology

Research Design

The study employed a mini survey method in investigating into students' perceptions of their teachers teaching. The target population for the study was all junior high schools in Ghana and the study sample was drawn from some selected junior secondary schools in the Cape Coast Metropolis of Ghana. In all, 358 (148 males and 210 females) junior high school students from 12 schools in the Cape Coast Metropolis took part in the study. The 72 junior high schools (JHS) in the metropolis were grouped into two (rural and urban schools) and six schools were randomly selected from each group. Ten students were randomly selected from 36 classrooms (that is three classrooms, JHS1, JHS2 and JHS3) for the collection of data.

Instrument

The instrument use for collecting data was a semi-structured questionnaire designed for eliciting information about students' perception of their teachers' teaching and questions were measured using a 4-point Likert-type response format (1=strongly agree, 2=agree, 3=disagree and 4=strongly disagree). The questionnaire was divided into three sections; section A had seven questions to elicit each student's personal data and the extent to which they like mathematics. The first three questions gathered personal information about the students and their school. The next three questions assess whether students like mathematics and if they intend to read mathematics related subjects at senior high school. Question seven gathers information about how often students learn mathematics at home. Section B had 10 questions assessing students' learning experiences which are intended to examine the students' perceptions regarding how they learn mathematics in their respective classrooms. Section C featured 10 questions which gathered information on students' perceptions of their teachers' teaching practices. The questionnaire was piloted with some 21 students from three other schools and the responses and feedback obtained were used in modifying the final instrument. In all, 422 questionnaires were sent out and 358 were returned representing 84.8% return rate. The questionnaire instrument was content validated by my three PhD supervisors at the faculty education. With a response rate of 84.8 percent and a Cronbach Alpha reliability coefficient of 0.74, the study results and findings could be replicated to other settings if the same research process was used.

Data Analysis

All the copies of the questionnaires were examined to check accuracy and completeness after which the schedules were numbered serially, edited, coded and fed into the computer. The data obtained was analyzed using the Statistical Package for Social Sciences (SPSS 16.0). Descriptive statistics were depicted using absolute numbers and simple percentages. For the analysis of degree of consensus regarding the teaching and learning practices, a minimum of 70% was chosen to describe the degree of agreement or disagreement. A consensus agreement is used to describe the total number of participants who "strongly agree or agree" with a statement. Similarly, a consensus disagreement is used to describe the total number of participants who "strongly disagree or disagree" with a statement.

Findings

Based on the purpose of the study and the research questions that the study sought to answer, the findings of the study are divided into two sections. The first part examines students' perception of their teachers' teaching method as to what extent students see the teacher's teaching method as teacher centred or student centred. The second part examines students' perception of their learning experiences.

Table 1: Students' perception of their teachers' teaching (n=358)

Climate	Statements	Percent	Type
Student-Led Climate	The teacher expects us to learn through discussing our ideas in class	90	Agree
	The teacher asks us to compare different methods for solving questions	87	Agree
	The teacher encourages us to make and discuss mistakes	84	Agree
	The teacher asks us to work in pairs or small groups	77	Agree
	The teacher encourages us to invent and use our own methods	54	*
Teacher-Led Climate	The teacher prevents us from making mistakes by explaining things carefully	97	Agree
	The teacher asks us to work through practice exercises	94	Agree
	The teacher shows us which method to use and then asks us to use it	92	Agree
	The teacher tells us which questions to attempt	92	Agree
	The teacher expects us to follow the textbook closely	74	Agree

To examine students' perception of their teachers teaching practices, students were asked to rate their perceptions of 10 items on a four point Likert scale. The questions were categorised into two domains: the first five questions examines student-centred approach which promotes active participation among students in the teaching learning process. The next five questions elicit information about students' perception of their teachers teaching regarding teacher-centred approach or method of teaching which promotes passive participation in the teaching learning process. The results show that, in general, students agree that their teachers are most likely to use both student-centred and teacher-centred approaches. For example, the majority of the students report that the teacher tries to explain things carefully to prevent them from making mistakes. In addition, the majority of students indicate that the teacher tells them which method to use and this is consistent with teachers' perceptions of their own teaching practices.

Similarly, the results displayed in table 1 show that the consensus percentages of students who indicate that their teachers use a teacher-centred approach is higher than the consensus percentages of those who indicate their teachers use a student-centred approach to teaching. In summary, the results have shown that students reported both teacher-centred and student-centred approaches to teaching are used by their teachers; however, the use of teacher-centred approaches was proportionately high as compared to student-centred approaches. Students ascribe higher percentages to teacher-led activities than student-led activities.

Table 2: Students' perceptions of their learning experiences (N=358)

Strategies	Statement	Percent	Type
Active Learning Strategies	I discuss my ideas in a group or with my colleagues	90	Agree
	I compare different methods used to solve questions	87	Agree
	I ask the teacher questions when I do not understand	87	Agree
	I look for different ways to solve problems	75	Agree
	I make my own questions and methods	61	*
Passive Learning Strategies	I listen while the teacher explains	99	Agree
	I copy down the method from the board or textbook	92	Agree
	I attempt easy problems first to increase my confidence	91	Agree
	I only attempt questions I am told to do	78	Agree
	I work on my own	75	Agree

In canvassing the opinions of students of their learning experiences, the 358 students who took part in the study were asked to rate their opinions to 10 questions using a four point Likert scale. Table 2 shows that students experience or learn mathematics differently. The most common experiences or learning strategies that students report could be described as passive. The majority of the students report that they listen while the teacher explains, follow instructions, memorise rules and procedures. The results also show that the learning experiences of the majority of the students are controlled by the teacher. In addition to this, a significant proportion of the students also indicate that they favour or use active learning strategies. In summary, the key opinion or voice from the students' perceived learning experiences is that they appreciate working in groups and following the teacher's procedures to develop new knowledge and an understanding of mathematics concepts. Students' learning experiences could be described as a mixed bag, incorporating both active and passive learning experiences, although they are more likely to use passive learning strategies.

Discussion

The main purpose of this study was to understand students' perception of their teachers teaching as well as students perception of their learning experiences. This research is significant in view of the unprecedented calls for new ways of mathematics teaching and learning which promotes students active participation in the teaching and learning process (Boaler 2009; Willis 2010). In addition to this, the research is significant in the sense that very little is known about students' perceptions of their teachers' teaching.

The results established that the kind of perception that students' hold varies. That is as much as the role of the teacher in the teaching-learning process can not be underestimated; the study revealed that most of the respondents perceive their teacher as the custodian of knowledge. For example the study revealed that the students' learning is highly influenced by the actions and inactions of the teacher as the teacher controls the students learning experiences by telling them what to do and which method to use. However, the study also revealed that in some cases the teacher employs a student-centred approach where students are given the chance to explore and develop new knowledge. This was consistent with students' perceptions of their learning as their learning experiences were characterised by both active and passive learning experiences. The recognised benefits of combining active and passive learning strategies is that they help students to structure their learning by following the teacher's instructions and also take responsibility for their own learning by actively participating in the teaching-learning process (Lim 2007). These learning skills agree with those described by Mathews (1997) as necessary to promote students' learning, as there are still some mathematics concepts that students cannot learn alone and which require the help of a knowledgeable adult. In general, students' perceptions of their learning goes beyond the principle of constructivism, as they see the teacher's role as more than a facilitator and guidance from the teacher cannot be underestimated or ignored completely.

Also despite the importance of using students' mistakes and misconception in promoting effective teaching and learning as highlighted by Willis (2010) it was interesting to note that an overwhelming majority of the respondents indicated that their teacher tries to prevent them from making mistakes. It can be argued that there is the need for the creation of a more receptive classroom environment through the use of variety of teaching methods that gives students maximum learning opportunities.

In a nutshell, it can be argued that students' perception of their teachers' teaching is a '*mixed bag*' where the teacher employs both teacher-centred and student-centred approaches in their teaching. The result echoes Ahmed and Aziz (2009) assertion that most students have a positive attitude toward their teachers' teaching and that their teachers' teaching methods have a direct impact on their learning experiences. The findings therefore provide some useful information for mathematics teachers' in varying their teaching methods to cater for individual student's needs. The present study provides mathematics teachers with new ideas in encouraging and stimulating students' active participation in the teaching-learning process in fulfilment of the trends in mathematics education. The findings also provide some useful information for mathematics teachers' and challenges them to be proactive in promoting a classroom environment free from intimidation and fear to motivate more students to be actively involved in teaching-learning process. This

calls on teachers and students to understand and see mistakes and misconceptions as part of the learning process and correcting such mistakes and misconceptions leads to the creation of new knowledge.

This therefore calls for new ways of examining teachers' teaching using feedbacks from students. That is to say, the voices of students' provide valuable information and data that can be used in their quest for improving their teaching to promote effective teaching and learning in schools.

Although the study was limited to some few selected schools in Ghana, however, the findings provide a conceptual framework for further research into using students' views and their perceptions of their teachers' teaching in evaluating teachers' teaching and the way forward. From the findings and conclusions, the following recommendations were made:

1. Students' evaluation of their teachers teaching should be considered as one of the main tools for evaluating teachers teaching and effectiveness.
2. Students' should be enlightened on how best to rate and evaluate their teachers' teaching practices and effectiveness.
3. Teachers' should conduct regular evaluation of their teaching by asking their students to rate and evaluate their teaching practices.

References

- Agyemang, D. K. (1993) *Sociology of education for African students*. Accra: Black Mask Ltd.
- Ahmad, F., and Aziz J. (2009) Students' perception of their teachers' teaching of literature communicating and understanding through the eyes of the audience *European Journal of Social Science*, 7(3) 17-26.
- Ampiah, J. G.; Akwesi, C.K; Kutor N. K. and Brown-Acquaye, H. A (2000) *Perception of teachers, pupils and parents about science and mathematics: stml/jica project, report 2*, Accra Ghana.
- Arthur, W., Tubre, T., Paul, D. S., and Edens, P. S. (2003) Teaching effectiveness: The relationship between reactions and learning evaluation criteria. *Educational Psychology*, 23:275-285.
- Asiedu-Addo, S. K. and Yidana I. (2004) Mathematics teachers' knowledge of the subject content and methodology, *Mathematics Connection* 4:45-51.
- Aubrey C. (1997) *Mathematics teaching in the early years: An investigation of teachers' subject knowledge*, London, Falmer Press.
- Ball, D. L. (1991) Research on teaching mathematics: making subject matter knowledge part of the equation. In J. Brophy (Eds.), *Advances in research on teaching*, Vol. 2, (pp. 1-48), Greenwich, CT: JAI Press.
- Blum M. K. (2002) *Enhancement of students learning and attitudes towards mathematics through authentic learning experiences*, Unpublished Dissertation, Curtin University of Technology, Australia.
- Boaler J. (2009). *The elephant in the classroom: Helping children learn and love maths*, London.: Souvenir Press Ltd.
- Cashin, W. E., (1995) *Student ratings of teaching: The research revisited*. IDEA Paper No. 32, IDEA Center, Kansas State University.
- Centra, J. A., (1993) *Reflective faculty evaluation: Enhancing teaching and determining faculty effectiveness*, San Francisco: Jossey-Bass.
- Ernest, P. and Greenland, P. (1990) Teacher belief systems: theory and observations, in S. Pirie and B. Shire, Eds. (1990) *BSRLM 1990 Annual Conference Proceedings*, Oxford: BSRLM: 23-26.
- Ernest, P. (1989) The impact of beliefs on the teaching of mathematics, in P. Ernest, Ed. (1989) *Mathematics teaching the state of the art*, London: Falmer Press: 249-254.
- Handal, B. and Herrington, A. (2003) Mathematics teachers' beliefs and curriculum reform. *Mathematics Education Research Journal*, 15(1), 59-69.

- Jurdak, M.E. (1991) Teachers' conceptions of math education and the foundations of mathematics. *Proceedings of the 15th International Conference for the Psychology of Mathematics Education (PME)*, pp. 137-144, Assisi, Italy: PME.
- Kraft, R. J. (1994) *Teaching and learning in Ghana: A curriculum, textbooks, syllabus and handbook analysis*, USA: University of Colorado.
- Lamb, S., and Fullarton, S., (2002) Classroom and school factors affecting mathematics achievement: A comparative study of Australia and the United States using TIMSS, *Australian Journal of Education* 46:154-171.
- Lim S. C. (2007) Characteristics of mathematics teaching in Shanghai, China: Through the lens of a Malaysian, *Mathematics Education Research Journal* 19(1): 77-89.
- Liu J. and Li Y. (2010) Mathematics curriculum reform in the Chinese Mainland: Changes and challenges In Leung and Li (Eds.) *Reforms and Issues in School Mathematics in East Asia: Sharing and Understanding Mathematics Education Policies and Practices*, pp. 9-32, Rotterdam, Sense Publishers.
- Mereku, D. K. (2003) Methods in Ghanaian primary mathematics textbooks and teachers' classroom practices, In Williams, J. (Ed.) *Proceedings of the British Society for Research into Learning Mathematics* 23 (2) 61-66.
- Matthews J. C. (1997) Intermeshing passive and active learning strategies in teaching biochemistry, *American Journal of Pharmaceutical Education* 61: 388-394.
- Mewborn D. (2001) Teachers content knowledge, teacher education, and their effects on the preparation of elementary teachers in the United States, *Mathematics Education Research Journal*, 8:28-36.
- Perkkila P. (2003) *Primary school teachers' mathematics beliefs and teaching practices*. In Proceedings of the 3rd Conference of the European Society for research in Mathematics Education, Bellazria Italia.
- Rawnsley, D. G. (1997). *Associations between classroom learning environments, teacher interpersonal behaviours and student outcomes in secondary mathematics classrooms*. Unpublished doctoral thesis, Curtin University of technology, perth, Western Australia.
- Stigler J. W and Hiebert J. (1999) *The teaching gap: Best ideas for improving education in the classroom*, New York, The Free Press.
- Teo W. L. (1997) *Espoused beliefs of singapore teachers about mathematics and its teaching and learning*, Master Paper, Ontario Institute for Studies in Education of the University of Toronto.
- Willis J. (2010). *Learning to love math: Teaching strategies that change student attitudes and get results*, ASCD, USA.