Science and Mathematics Education Centre

Gender and Other Factors Impacting on Mathematics Achievement at the Secondary Level in Mauritius

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DECLARATION

This thesis contains no material which has been accepted for any award of any other degree or diploma in any university.

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made.

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ABSTRACT

Mathematics has been seen to act as a 'critical filter' in the social, economic and professional development of individuals. The Island of Mauritius relies to a great extent on its human resource power to meet the challenges of recent technological developments, and a substantial core of mathematics is needed to prepare students for their involvements in these challenges.

After an analysis of the School Certificate examination results for the past ten years in Mauritius, it was found that boys were out-performing girls in mathematics at that level. This study aimed to examine this gender difference in mathematics performance at the secondary level by exploring factors affecting mathematics teaching and learning, and by identifying and implementing strategies to enhance positive factors.

The study was conducted using a mixed quantitative and qualitative methodology in three phases. A survey approach was used in the Phase One of the study to analyse the performance of selected students from seventeen schools across Mauritius in a specially designed mathematics test. The attitudes of these students were also analysed through administration of the Modified Fennema-Sherman Mathematics Attitude Scale questionnaire.

In Phase Two a case study method was employed, involving selected students from four Mauritian secondary schools. After the administration of the two instruments used in Phase One to these selected students, qualitative techniques were introduced. These included classroom observations and interviews of students, teachers, parents and key informants. Data from these interviews assisted in analysing and interpreting the influence of these individuals on students, and the influence of the students' own attitudes towards mathematics on their learning of mathematics.

The results of Phases One and Two provided further evidence that boys were outperforming girls in mathematics at the secondary level in Mauritius. It was noted that students rated teachers highly in influencing their learning of mathematics. However, the teaching methods usually employed in the mathematics classrooms

were found to be teacher-centered, and it was apparent that there existed a lack of opportunity for students to be involved in their own learning. It was also determined that parents and peers played a significant role in students' learning of mathematics.

After having analysed the difficulties students encountered in their mathematical studies, a package was designed with a view to enhance the teaching and learning of the subject at the secondary level. The package was designed to promote student-centred practices, where students would be actively involved in their own learning, and to foster appropriate use of collaborative learning. It was anticipated that the package would motivate students towards learning mathematics and would enhance their conceptual understanding of the subject. The efficacy of the package was examined in Phase Three of the study when students from a number of Mauritian secondary schools engaged with the package over a period of three months.

Pre- and post-tests were used to measure students' achievement gains. The What Is Happening in This Class (WIHIC) questionnaire also was used to analyse issues related to the affective domains of the students. An overall appreciation of the approaches used in the teaching and learning package was provided by students in the form of self-reports.

The outcomes of the Third Phase demonstrated an improvement in the achievement of students in the areas of mathematics which were tested. The students' perceptions of the classroom learning environment were also found to be positive. Through their self-reports, students demonstrated an appreciation for the package's strategies used in motivating them to learn mathematics and in helping them gain a better understanding of the mathematical concepts introduced.

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LIST OF ABBREVIATIONS

ASEI: Activity, Student, Experiment and Improvise-

B.Ed: Bachelor of Education

B.Sc: Bachelor of Science

CPE: Certificate of Primary Education

DAST: Draw-A-Scientist-Test

ELP: Limited English Proficient

FIMS: First International Mathematics Study

HSC: Cambridge Higher School Certificate

IEA: International Association for the Evaluation of Educational Achievement

JICA: Japan International Cooperation Agency

MIE: Mauritius Institute of Education

NCTM: National Council of Teachers of Mathematics

PCEA: Roman Catholic Education Authority

PDSI: Plan, Do, See and Improve

PGCE: Post Graduate Certificate in Education

QTI: Questionnaire on Teacher Interaction

RDO: Research and Development Officer

SAC: Student centred, Activity based and Cooperative learning

SC: Cambridge School Certificate

SIMS: Second International Mathematics Study

SMASSE: Strengthening of Mathematics and Science in Secondary Education

SPSS: Statistical Package for Social Sciences

TIMSS: Third International Mathematics and Science Study

WIHIC: What Is Happening In this Class?