



## **A Study of the Factors that Cause Lower Performance in Grade 11 Mathematics: A Study Conducted in the Gampaha District**

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### **ABSTRACT**

This study was done to find the factors that affect the poor mathematics performance of the Grade 11 students in the Gampaha district of Sri Lanka. To do this, the best-performing and the poor-performing zones in the Gampaha district were selected and a school was selected from each zone through simple random sampling. The data was collected through questionnaires and interviews. Thirty grade 11 students were selected at random from each school as the sample. Five students from each school were interviewed and 25 students from each school responded to the questionnaire. The major findings of the study were poor student-teacher interactions, no practice in solving sums, lack of basic knowledge, low motivation in students, and no instructional materials were used by the teachers when teaching. Therefore, the findings suggest that the teachers should be advised and trained on the ways to maintain good interactions with the students and on the ways of using instructional materials to deliver lessons. Moreover, workshops can be held to revise the basic knowledge. The parents and the teachers can be advised through workshops on the ways that they can motivate the students to learn mathematics and the ways that they can make the students practice more.

## 1. INTRODUCTION

Education is one of the most important and accepted tools to help people live a much more organized lifestyle. Mathematics is regarded as one of the most significant subjects in the education system worldwide. Excellence in mathematics can make positive changes in developing countries to develop education systems to shape the future and prospects of young people; develop infrastructure; and improve economic knowledge, culture, and morality, as well as the living standards of their people (Roohi, 2012). Mathematics is defined as the science and study of quality, structure, space, and change and in short, mathematics can be described as the science of reasoning and computations. Mathematics was also defined as the language that helps to describe ideas and relationships drawn from the environment (Kitta, 2004). Competency in mathematics is considered a key component in intelligent decision-making and daily life activities in the society of the 21st century. Teaching mathematics in primary and secondary schools has become compulsory in most schools worldwide. According to the G.C.E (General Certificate of Education) Ordinary Level (O/L) Examination in Sri Lanka, a fail mark in mathematics for O/Ls is regarded as an examination failure. In Sri Lanka, Grade 11 students are recognized as O/L students since they are on the verge of taking their G.C.E O/L examinations. If a student fails the mathematics subject in the G.C.E O/Ls, schools in Sri Lanka do not allow the student to join the Advanced Level (A/L) classes (which is the 12th grade) till they pass the mathematics subject in the G.C.E O/L examination. Annual performance reports published by the Ministry of Education in Sri Lanka show that various programs and workshops were conducted to guide and improve the teaching methods of Mathematics teachers in the country. Documents containing mathematics revision questions were published on the Internet by the NIE (National Institute of Education). However,

the mathematics performance of the students in the country as a whole and also in the Gampaha district was not satisfactory. The mathematics performance index of the students who have sat for the G.C.E Ordinary Level examination in the year 2021 in the Gampaha district is 47.09, which is a low index, according to the "School Performance Indices, G.C.E O/L Examination 2021" report. An awareness of the causes that lead to poorer mathematics performance is critically needed.

The objectives of this research are;

- To find the factors that affect the low mathematics performance in Grade 11 students.
- To recommend solutions to mitigate the low performance in mathematics of Grade 11 students.

## 2. MATERIALS AND METHODS

### 2.1 Research Design

In this study, the researcher used a mixed-mode research design using both quantitative and qualitative data to conduct the research. The Gampaha district, which consists of the population of the research is divided into four educational zones namely, Gampaha, Minuwangoda, Negombo, and Kelaniya. The "School Performance Indices, G.C.E O/L Examination 2021" report is used to find the ranges of the school performance indices of all four zones. The zone which has the highest upper bound in terms of the school performance indices and the zone which has the lowest upper bound in terms of the school performance indices were selected. The Gampaha zone in the Gampaha district was found to be the zone that has the highest upper bound and the Kelaniya zone in the Gampaha district was found to be the zone with the lowest upper bound in terms of the school performance indices. One school, either type 1AB, type 1C, or type 2, from the Gampaha zone and the Kelaniya zone respectively was selected through simple random sampling and the research sample was retrieved from the selected two schools in the Gampaha district.

## 2.2 Sample and Instruments

A sample is a group or subset of all populations that have been chosen for observation and study (Best & Kahn, 1993). The source of the sample to conduct the research study is the two schools selected at random from the Gampaha zone and the Kelaniya zone in the Gampaha district respectively. Twenty-five Grade 11 students were selected at random from each school respectively making a total of 50 students selected from simple random sampling. A separate set of 5 students was selected again from each school at random through simple random sampling. A sample size of  $n = 60$  was selected as the sample of the research study.

## 2.3 Methods of Data Collection and Analysis of Data

Data collection instruments used to collect the primary data from the students were interviews and questionnaires. This study used more than one instrument since relying solely on one instrument could generate distortions or biases about certain pieces of information (Kothari, 2000).

First, the printed closed-ended questionnaires were distributed among the 25 students selected at random from each school. The study used responses from a total of 50 questionnaires. Next, the 5 students selected at random from each school were interviewed. The study used interviews from a total of 10 interviewees. The researcher conducted a structured interview and according to the interviewees' responses, the interviewer asked further questions making the interview a semi-structured interview.

The questionnaire consisted of 14 closed-ended questions in two parts, part 1 and part 2. The questions included in the questionnaire mainly focused on asking the students' views, experiences, and interests in mathematics. The questions also focused on finding the students' ideas about the weight of the curriculum, the helpfulness of the

mathematics textbooks provided, the practice in doing sums, and the students' confidence with the subject of Mathematics.

The grounded theory-based analysis was used to analyze the data collected from the interviews. The qualitative data collected from interviews were transcribed and the transcribed data were grouped in a spreadsheet according to patterns, connections, and relationships between the data collected for easy analysis. Tables, bar charts, pie charts, line charts, and narrations are used to present the qualitative and quantitative data found from the interviews and the questionnaires. The quantitative data collected from questionnaires were analyzed using percentages and counts for each option under each question in the questionnaire.

## 3. RESULTS AND DISCUSSION

Most students interviewed responded that they do not go to school daily. The majority of the students responded that their teacher gives them homework but that the teacher does not discuss the homework questions in the class or that the teacher does not check if they have done the homework. The students responded that the content in the mathematics textbook was not helpful when learning or revising a lesson. The majority of the students responded that they were not content with the mathematics notes that they received. All students responded that their teachers do not use any teaching aids or instructional materials other than the whiteboard or the textbook to explain the lessons.

Many students responded that they do not receive good motivation from home to score good marks in mathematics. Many interviewees responded that they have no good student-teacher relationship with their mathematics teachers and that their mathematics teachers do not like to respond to questions that they ask. It was said that the students find it difficult to attempt sums since

they lack basic knowledge of mathematics. The students also responded that the time duration of the mathematics paper was very low and that the mathematics examination paper consisted of a large number of questions.

**Figure 1: Bar chart representation of the results from part 1 of the questionnaire**

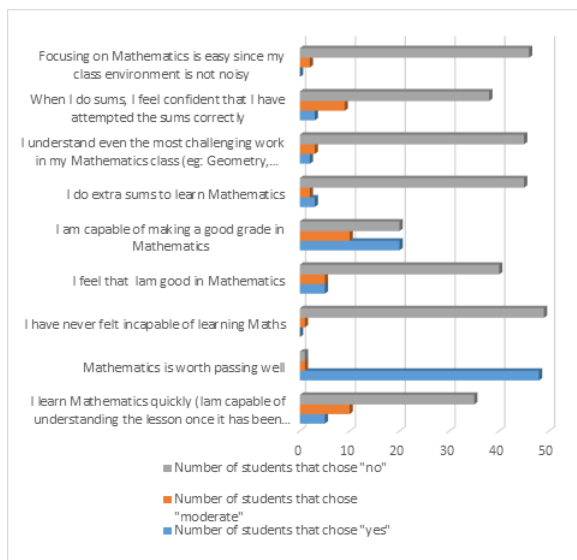


Figure 1 shows the number of “yes,” “no” or “moderate” options under each question of part 1 of the questionnaire

**Figure 2: Bar chart representation of the number of students who chose each option in questionnaire part 2**

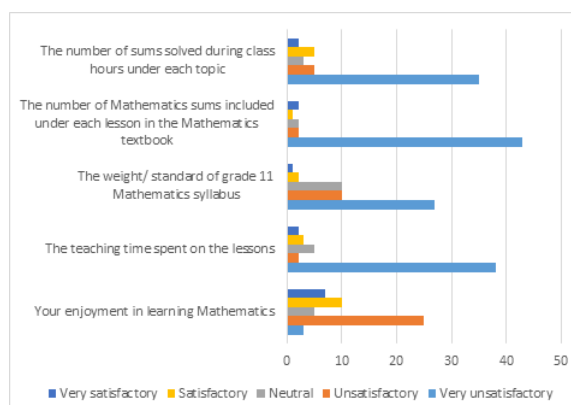


Figure 2 shows the number of “very satisfactory,” “satisfactory,” “neutral,” “unsatisfactory” and “very unsatisfactory” options under each question in part 2 of the questionnaire

#### 4. CONCLUSIONS AND RECOMMENDATIONS

Low student-teacher interactions have a strong negative effect on the mathematics performance of the students. Negative thoughts in the minds of the students about mathematics and their inability to achieve well in mathematics made the students feel that they are unable to achieve good marks in mathematics. The lack of basic knowledge in mathematics lowered the students’ performances in mathematics. The lack of basic knowledge and competency in additions, subtractions, divisions, and multiplications can be a reason for the difficulty in understanding. The teachers assigned homework to the students, but the teachers did not check if all the students had done the homework and the teachers did not correct the answers provided by the students to the questions assigned. The purpose of providing homework is not achieved.

The students’ lack of practice in solving sums leads to low mathematics performance. Irregularity to school affected the mathematics performance of the students. Lack of good motivation and time management difficulty in examinations reduced the mathematics performance in students. Instructional materials were not used to deliver lessons to the students and the textbooks did not help the students to the level that they expected. The class environments were noisy and disturbing. The content in the mathematics textbooks was less elaborative and did not help much in revision.

It is suggested that the teachers should be advised and given good training to maintain good student-teacher interaction during teaching. The teachers should be advised to welcome the students to raise questions or doubts. A few lessons in mathematics can be taught through play to grab their attention on the subject and to make them feel that mathematics is an interesting and an easy subject. (E.g.: certain lessons like locus of a point, geometry). The teachers can use different voice tones and various teaching methods while

teaching to make the lesson interesting to the students.

Workshops, where the basic mathematics will be revised, can be conducted after school. The school management can request the teachers' coordinator to monitor if the mathematics teacher will check the students' status of the homework done and will discuss all the homework questions given in the class. The mathematics teacher can check the homework status and discuss the homework questions allocating a period from the week for this purpose. The teachers can allocate more time during the mathematics period to do questions to give more practice with mathematics.

The teachers and the parents can encourage the students to do more sums at home for practice. The school management and teachers can advise all the parents on the methods that they can use to motivate their students to score better marks in mathematics. The schools can organize several workshops to explain to the parents about the students' mentalities and the students' psychological factors. The school can allocate more mathematics periods for the Grade 11 classes for the teachers to spend more time teaching lessons under mathematics. The teachers can be advised to use instructional materials to deliver the lessons at least once a week. The school management can take the necessary steps to locate the classrooms in less noisy areas. The schools can motivate the students to attend the school regularly by awarding the students who attend the school regularly. The DEP (Department of Educational Publications) can include more explanations under each topic in the Grade 11 mathematics textbook. The DEP can take steps to advise the board of writers to include more sums under each topic in the Grade 11 mathematics textbook. The teachers can be given training at the start of each year in the best styles to provide mathematics notes to the students.

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