The Role of NGO's (Non- Governmental Organisations) in the Teaching and Learning of Mathematics in South Africa with Special Reference to CASME (Centre for the Advancement of Science and Mathematics Education)

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ABSTRACT

This paper is intended to reflect on the important role played by the Non- Governmental Organisations (NGO's) in the improvement of teaching and learning of mathematics in South Africa. The Centre for the Advancement of Science and Mathematics Education (CASME) is one such NGO involved in the improvement of Science and Mathematics results at a National Senior Certificate level. This paper focuses on one of its projects funded by Smith Manufacturing Company at a specific school in KwaZulu-Natal in partnership with the Department of Education (KZN). The study commenced in July 2011and ended in October 2011 and involved 90 learners.There were four tutors who facilitated the process.

Data was collected through a series of short tests, conducted after some sections had been covered, reports by tutors after every session and one on one interview with the subject teachers from the school.

The findings suggested that the intervention made a great impact on the final results of the learners. Recommendations were made as a way forward to the funder and to the school. The teachers from the school appreciated the involvement of CASME in the learning of their pupils. The pseudo names are used on the learners'' scores for confidentiality.

INTRODUCTION

Bank (1989) states that Non Governmental Organisations are private organisations that pursue activities to relieve suffering, promote the interest of the poor, protect the environment, provide basic social services, or undertake community development. It is with this breath that CASME as one of these organisations outsourced some funding to pursue a project to improve the pass rate in mathematics and science.

CASME is a non-profit education development agency whose stated vision is to be "**the leading agent for helping learners excel through the professional development of educators".** It does this by focusing on the teaching of mathematics and science at Senior Secondary schools in South Africa and on improving the practice of teaching in these subjects through the provision of teacher support services.

LITERATURE REVIEW

Learning

One should understand learning if one knows more about the functioning of the brain as a processor of information. Orton (1992) agrees with this idea when he states that "learning is a mental activity". He further states that "the brain receive the information, interprets it, stores it, transforms it, associates it with other information to be recalled"

Learning in its nature takes place inside the brain, but it is a process through which human beings acquire or adopt several skills. These skills are realized in the form of speech and logical reasoning.

> *Learning is more than the acquisition of the ability to think; it is the acquisition of many specialised abilities for thinking about a variety of things. It does not alter our overall ability to focus attention on a variety of things. (Vygotsky, 1978: 83)*

It is also important to note that learning takes place if the existing knowledge is sufficient. Piaget (1967) attests to this statement as cited by Ndaba (1997) when he considers learning as an interaction of assimilation and accommodation. Assimilation is the use of new knowledge in an already learned activity, whilst accommodation results from yielding to the pressure of new situations in the environment to learn new responses.

MATHEMATICS

The concept mathematics is the study of quantity, structure, space, and change. Mathematicians resolve the truth or falsity of conjectures by mathematical proof. Mathematics is used throughout the world as an essential tool in many fields, including natural science, engineering, medicine, and the social sciences.

Mathematics arises from many different kinds of problems. At first these were found in commerce, land measurement, architecture and later astronomy; nowadays, all sciences suggest problems studied by mathematicians, and many problems arise within mathematics itself.

The statement above shows that mathematics is the master and prerequisite for all other Sciences.

POPULATION

There were learners who did mathematical Literacy and other subjects. There were only ninety (90) learners in the project all from the same school. Learners from the school either did Mathematics and Physical Science or Mathematics and Commerce subjects.

MATERIAL USED TO ASSIST LEARNERS

- Each learner was provided with a 2 quire exercise book to write notes and exercises during the lesson.
- Each learner was provided with a text book with notes, exercises and solutions.
- Previous examination Papers for the past two years and 2011 March supplementary examinations.
- Each tutor was also provided with a similar text book and examination papers.

RESEARCH QUESTIONS

There were two main questions asked on this project, namely:

- Does intervention make any difference to the National Senior Certificate results?

- Is there a correlation between performance of learners in mathematics and their percentage attendance in extra classes?

METHODOLOGY

A letter to invite the school to take part in the project was sent to the school. This was subsequently followed by a meeting with the Headmaster and the Head of Department for Mathematics and Sciences.

The school was requested to submit the list of all learners to take part in the project. On another day, the learners were invited;

- for a briefing on the project
- stipulation of rules and regulation regarding attendance
- Learners expected conduct during these extra classes.
- Consent letters to the learners' parents.

The first session was conducted during the vacation period from the 4th July to the 8th July 2011.A pre test on the work which was prescribed on the Mathematics grade 12 work-schedule from the Department of Education KZN was executed. The sections for the first term were then taught during that week. These were namely:

- Algebra
- Calculus
- Application of calculus.
- Linear Programming
- Number Patterns.

Each contact session took two and a half hours a day for four days. On the last day, a post test was conducted on the same work and the paper was still the same.

Other sessions were conducted during Saturdays from the 23rd July to 17th September 2011. Learners were given a test on the paper two (P2) which comprised of Trigonometry and coordinate Geometry on a first Saturday, the 23 July 2011.The very same topics which appeared on their written test was taught from Saturday the 30th July till Saturday 27th August 2011.

Another session which was during vacation from the 1st October to 7th October 2011 was embarked on. The following topics were taught:

- Data Handling.
- Financial Mathematics
- Transformation Geometry
- Algebra

On the 6th October 2011, a test on topics shown above was executed. On the 7th October 2011 a revision of Feb/March 2011 Paper 2 was done. The revision process was followed as shown below:

- There was more emphasis on the definitions.

- Explanations, discussions and proving to show understanding were emphasised.
- Emphasis on redrawing a diagram to let learners be able to interact with their drawn figures.
- Learners were trained to express their good layout when solving problems.
- Learners were forced to read instructions with complete comprehension and understanding.

LIMITATIONS

- Contact time with these learners was insufficient.
- Learners did not have sufficient background knowledge in mathematics.
- Learners lacked reading and comprehension skills.
- Legibility in most of these learners needed more attention.

FINDINGS

Overall performance of learners showed a positive shift. If one looks at the tables below, there was an average of 16.4%, 6.1% and 0.03% shift for high, average and low achievers respectively. The analysis shows that 93.33%, 80% and 54.29% among high, average and low achievers respectively had a positive shift from the level they were found by CASME.

Only 3.33% of learners from the average group and 8.57% learners from low achievers did not show any significant change. None from the high achievers did not show any improvement in the performance of mathematics at a national level. It is observed that only 6.67% produced a negative shift.

The overall shift in the performance of learners was 7.5% which was a very significant improvement, taking into cognisance the level at which learners were found at the beginning of the project in July. .

TABLE 1: High Achievers in Mathematics

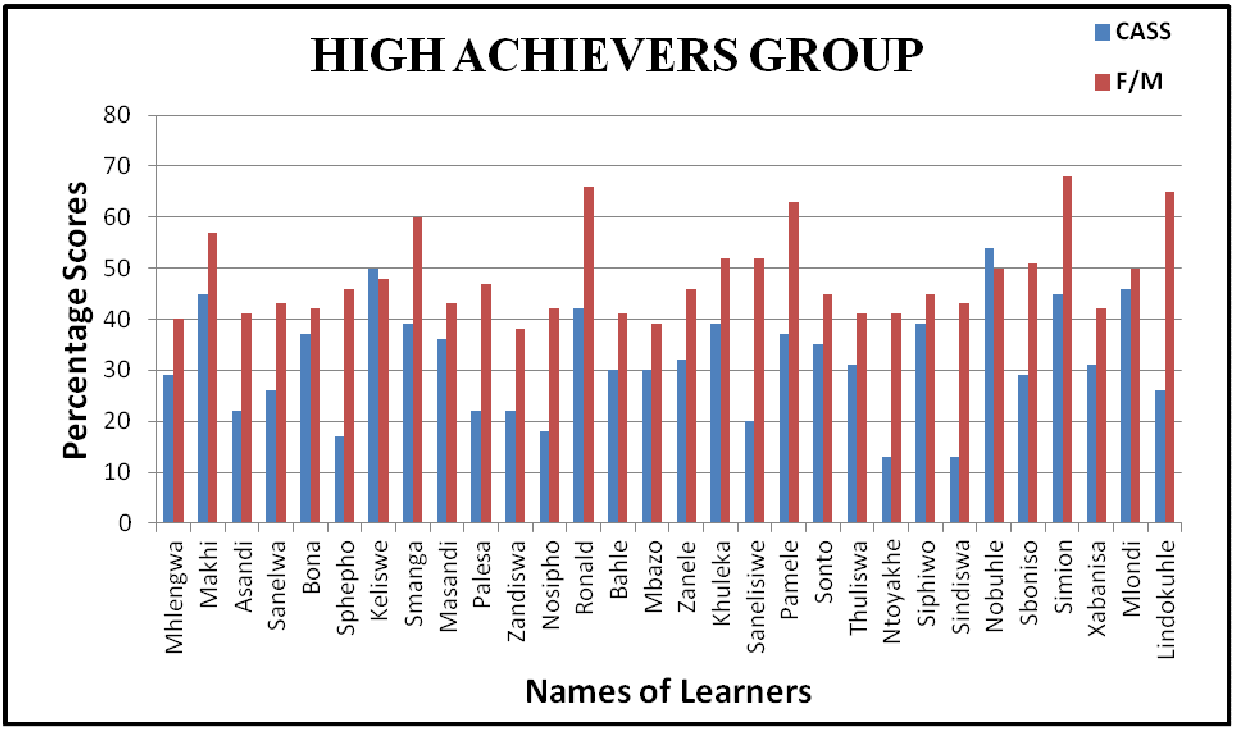


TABLE 2: Average Achievers in Mathematics

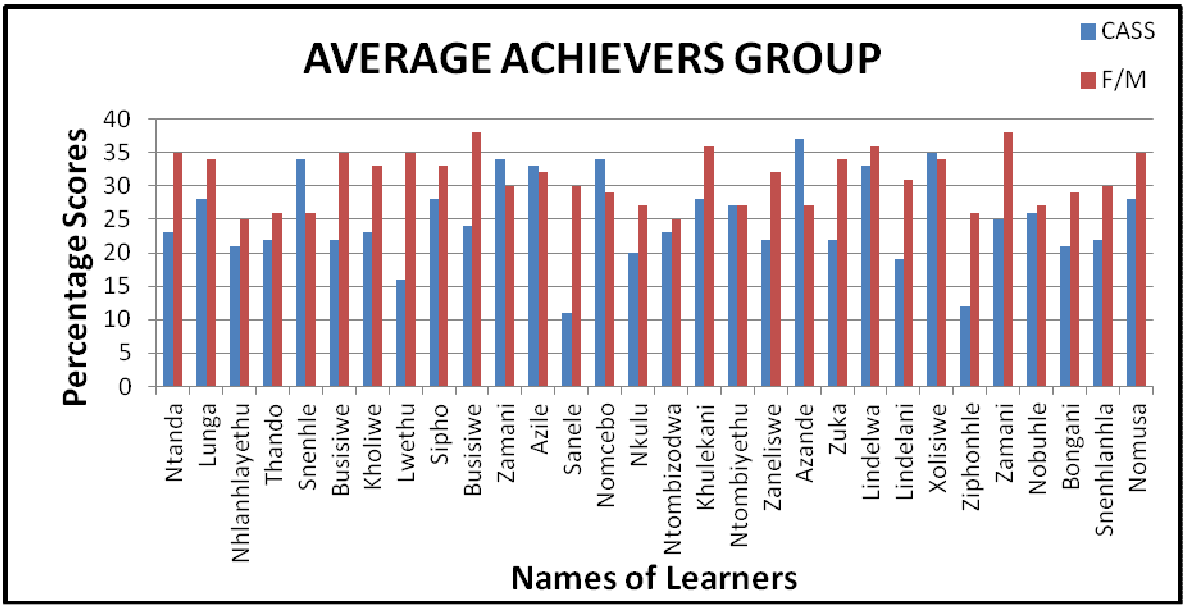
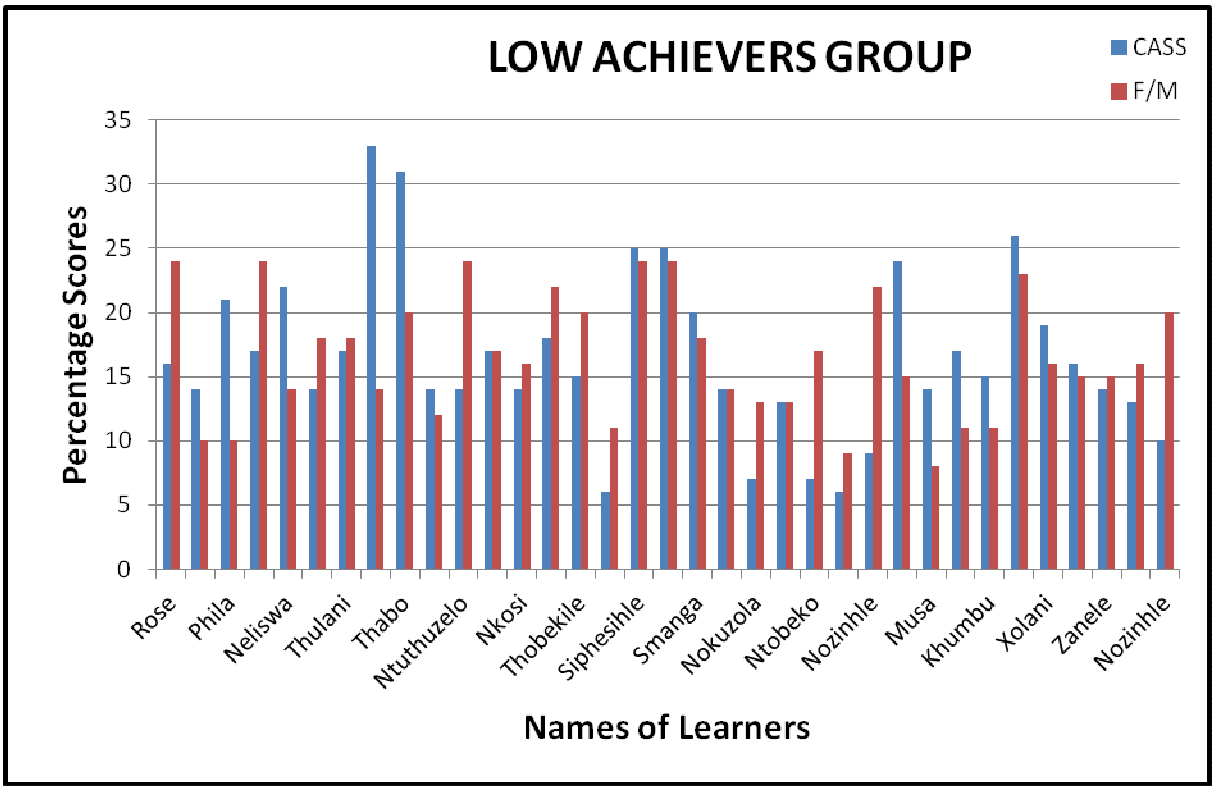
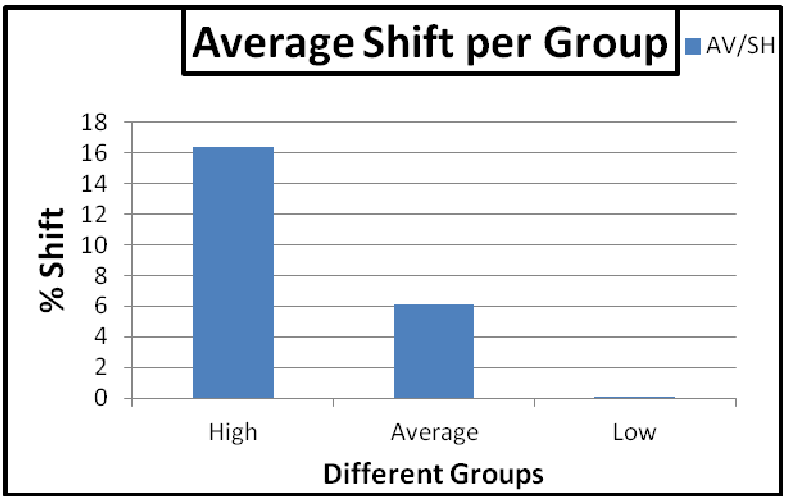


TABLE 3: Low Achievers in Mathematics



The tables above show the average shift per group and below the tables are summarised.

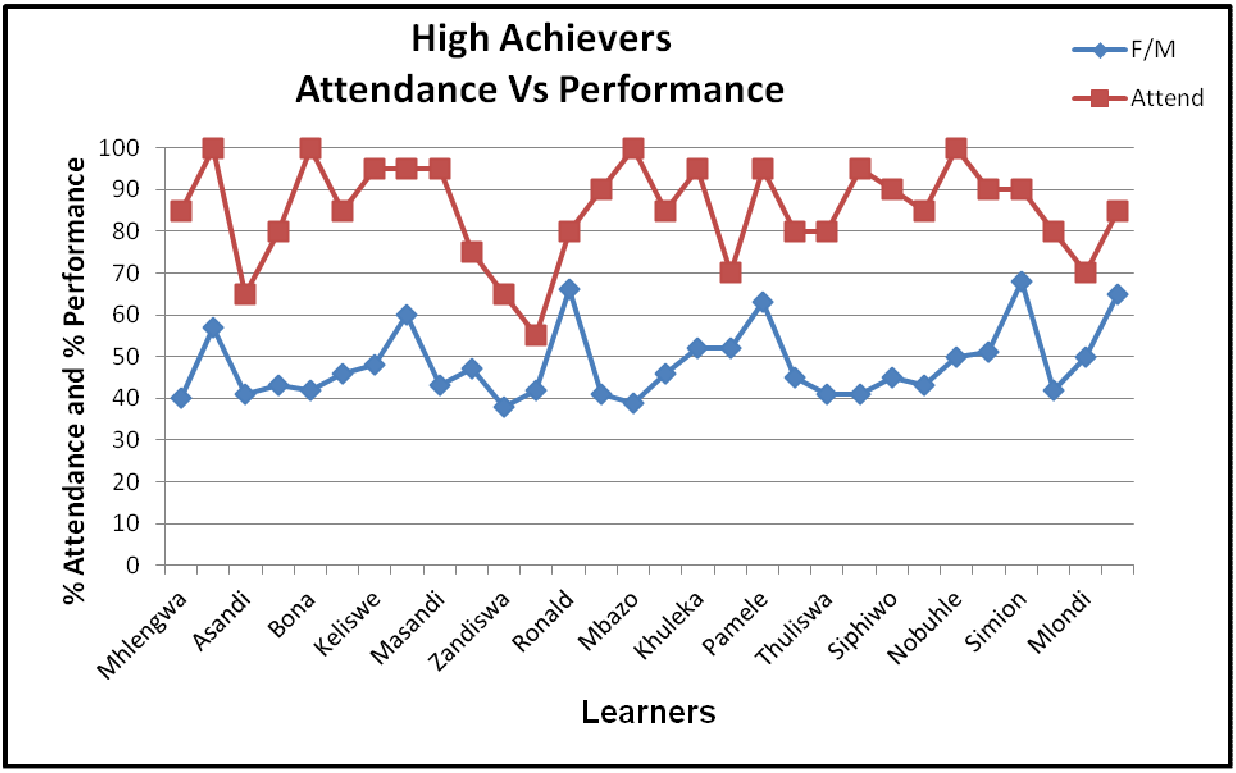


GROUP	AV/SHIFT
High	16.4
Average	6.1
Low	0.03
Total	**22.53**
AVERAGE	**7.51**

ATTENDANCE VERSUS PERFORMANCE

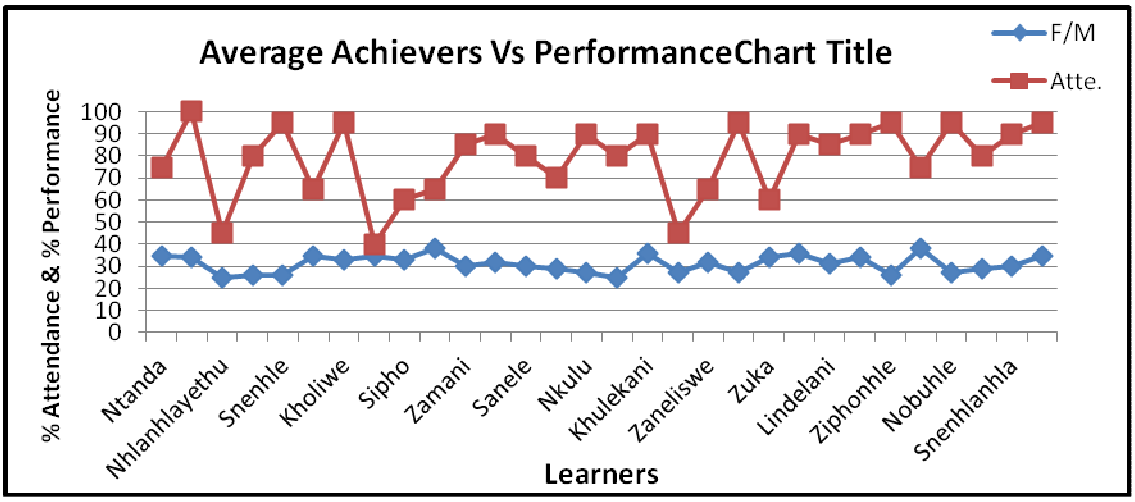
The tables below show clearly that learners who were attending regularly achieved more than those who were very irregular. This however, has got some exceptions among other learners which indicated that there were other reasons which resulted to some poor performance.

TABLE 4: High Achievers Attendance versus Performance



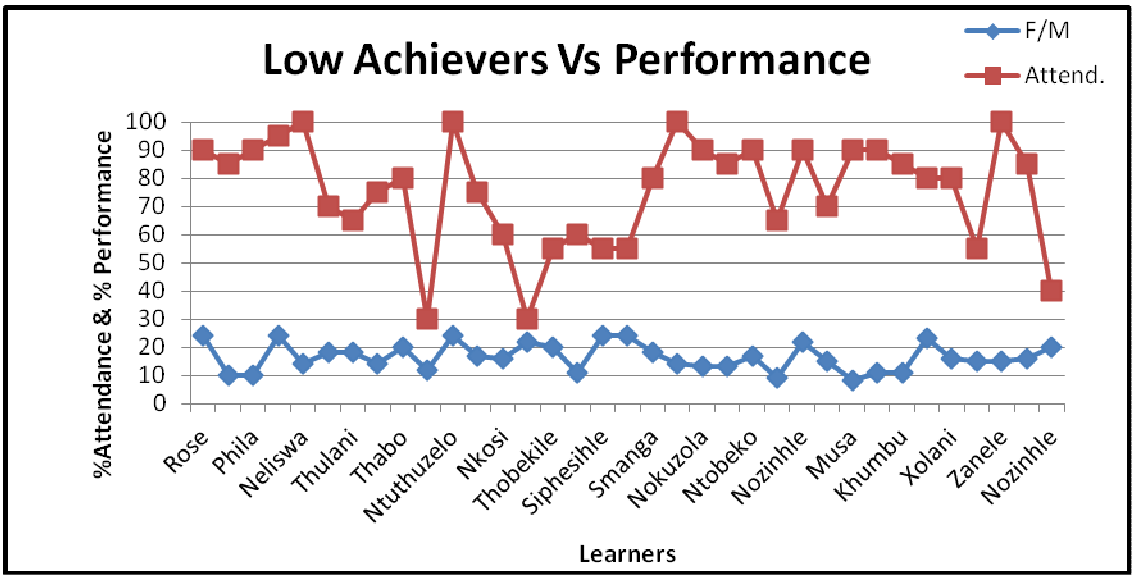
The general trend showed that attendance between 60% and above to up to 100% yielded results between 40% and slightly above 60%.

TABLE Average Achievers Vs Performance



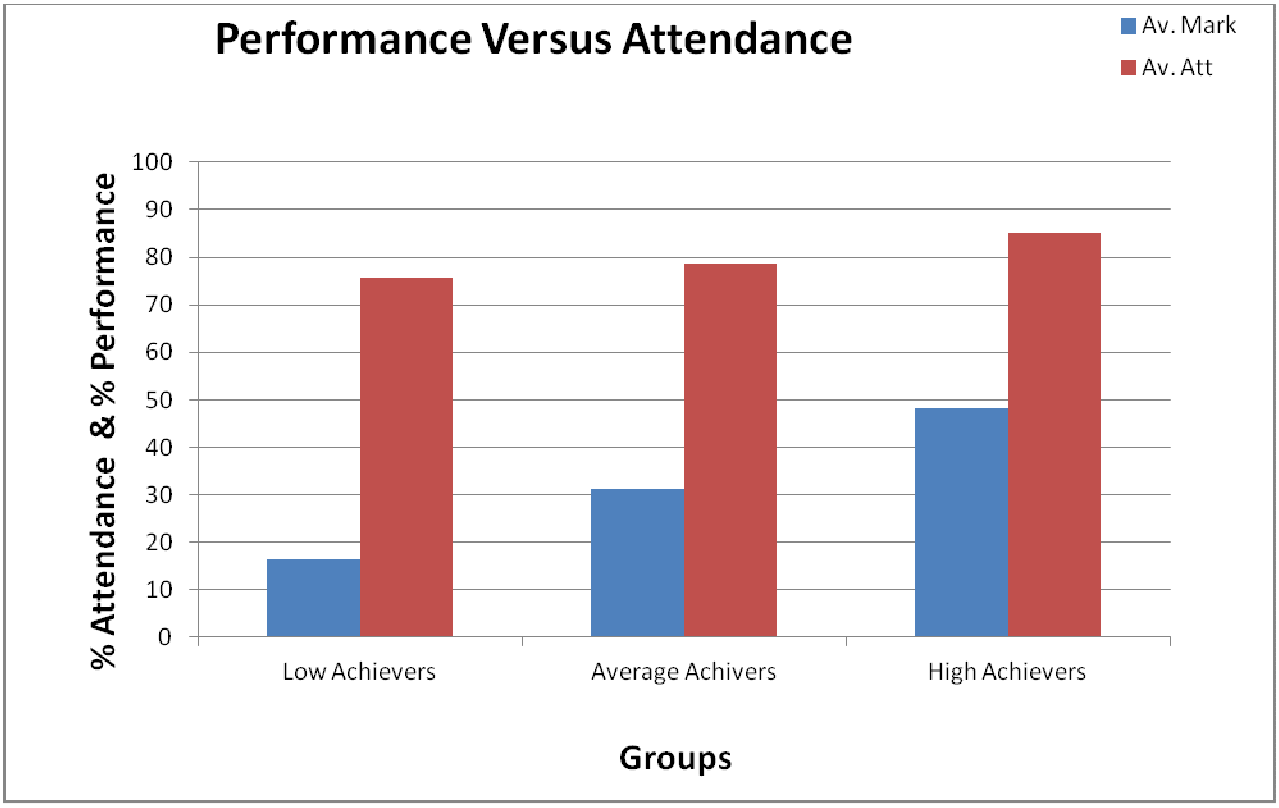
The tables above indicated that performance between 20% and slightly below 40% was a result of attendance between 40% and clustered between 65% and 90%

TABLE 6: Low Achievers Vs Performance



Attendance between 30% and clustered between 60% and 90% yielded performance between 10% and 24%.

Performance Versus Attendance			
Group	**Av. Mark**	**Av. Att**	
Low Achievers	16.5	75.6	
Average Achievers	31.2	78.8	
High Achievers	48.2	85.2	



IMPLICATIONS ON ATTENDANCE

There was a correlation between performance and attendance. This meant that it was very imperative for all learners to attend regularly.

CONCLUSION

The project demonstrated that intervention by NGO's plays a major role in the teaching and learning of mathematics in our communities. If NGO's should be granted necessary recognition to work with schools, the pass rate in our schools would be improved. There should be a control regarding attendance of learners. The graphs indicated a very convincing correlation between performance in mathematics and attendance during sessions

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