# Relationship Between Amount of Homework and Performance in Mathematics among Public Day Secondary School Students in Hamisi Sub-County, Kenya 

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#### Abstract

Various endeavors have been employed to improve performance in mathematics in Hamisi Sub-County including homework which teachers give to students at various amounts to no avail. Performance in mathematics is still the lowest not only in the county but also in the entire region. Appropriately managed homework may not have been exploited as research done so far has not established the amount of homework which impacts positively on the performance of secondary school students in mathematics. Existing literature indicates that teachers give various amounts of homework tasks based on their own discretion yet little is known about how much homework task is beneficial to learners in terms of improved performance in mathematics. In this study, questionnaires and document analysis guide were used to collect quantitative data which were then analyzed by use of frequencies, percentages and Pearson moment correlation coefficient. Qualitative data were analyzed by creating thematic categories and reported as verbatim excerpts. The study revealed that students assigned $21-30$ mathematics questions staggered through different days within a week performed better than those assigned more or less questions for the entire topic but as a single assignment done within a period of one day. The findings of this study may be useful to the Ministry of Education, school managers and administrators to develop a policy on homework as a tool for enhancing performance in mathematics and other subjects instead of leaving its management exclusively at the discretion of teachers.


Key words: - Homework, amount of Homework, relationship, performance in mathematics.

## I. INTRODUCTION

Homework was defined as the tasks assigned by teachers to students to be completed outside the class [4]. Homework was also identified as a natural connector of school and home [8]. In these ways, homework is one of the most common school activities involving teachers, students and parents [8]. Recently, however, there have been serious debates worldwide about whether or not teachers should assign homework. The debates involve students' complaints about the time required to do their homework, parents' complaints about the amount of homework assigned and their lack of ability to guide their children on homework, and
teachers' complaints about the lack of time to design effective homework assignments and deliver feedback to students [5].
[13] confirms that the effect of homework on student achievement is a highly debated issue and has been for over a century. [14] found that comparing of education systems worldwide has led to a push to raise the standards of education in schools and to compete in the global marketplace. The results of international surveys as well as other research evidence point to the fact that low achievement in Mathematics is a complex phenomenon [23]. The researchers go on to conclude that underachievement in mathematics occurs for a number of reasons linked to home background and school-related factors that often reinforce each other. How much homework to give, how often to give it and what it should entail are all questions that researchers studying homework-achievement relationship have strived to address [13].
[12] confers that America's Mathematics problems are serious and goes on to say that these problems begin when children are very young and persist throughout primary and secondary school. Harold also found that American children are not doing as well in Mathematics as their peers in other countries. [2] in a research work entitled "Parental involvement and its effects on students' academic performance in public secondary schools in Korogwe, Tanzania" found that parents were not buying their children supporting materials' at home and this is due to low level of education and poverty among the families.

The concept of extending work done in the school environment to the home setting is intrinsic to education system in most African countries. A Namibian study states, "homework is an everyday part of school life" [7] and comments on the benefits of parental involvement in mathematics homework to consolidate learning. It goes on to add that a successful homework policy is predicated on parental involvement in children's education. As such, parents' role in supporting homework is part of a wider understanding of community, parent and school cooperation in the education process.

High school research by [29] suggests that black parents who have been disadvantaged by the schooling situation do not feel confident in helping their children with mathematics homework, an area in which they themselves faced major challenges. In addition, some teachers had stopped assigning homework to their learners, since the teachers believed that no assistance was forthcoming from students' homes [24]. It is noteworthy that the work done by continental researchers mainly dwelt on parental involvement on their children's homework activities.
[2] found that many students were involved in various domestic work including fetching water, cooking, cleaning, and income generation activities. Those activities consume most of students' time, which they could use for studying. The length and frequency of their participation in domestic chores greatly affected students' academic achievement because they lacked time to study at home, they arrived to school late and slept in class because of being tired.
[16] agrees that in Tanzania, the home set up such as space, furniture (chairs and tables), home chores distribution, silence and reading rooms provide encouragements for the students to take studies at home thus contribute to better academic achievements. [21] also consolidates the above observation on the roles of the parents in facilitating students' academic achievement when established that the heavy agricultural work at home, bricks making and involvement in the petty businesses among the students hindered academic performance among the secondary students in rural Korogwe District Council. The work done in Tanzania also talks about parental involvement in students' homework activities. There is no research done regionally on effect of amount of homework on performance.
[6] found that too much homework has negative effects on student well-being and behavioral engagement and adds that too much homework can diminish its effectiveness and even be counterproductive. Denise cites prior research involving homework in mathematics indicating that homework benefits plateau is at about 2 hours per night, and that 90 minutes to two and a half hours is optimal for high school students. [6] study found that too much homework is associated with greater stress as indicated by $56 \%$ of the students in the survey data. $43 \%$ viewed homework as a $1^{0}$ stressor. Less than $1 \%$ of the students said homework was not a stressor. Many students said that their homework load led to sleep deprivation and other health problems. Researchers at the secondary level conclude that high amounts of homework do not guarantee high performance [19].

According to [15] spending too much time on homework meant that students were not meeting their other developmental needs or cultivating other critical life skills. [14]adds that there is no relationship between the time spent on homework and how much the students enjoy it. The research calls into question the value of assigning large
amounts of homework and that homework should not be simply assigned as a routine practice.
[19], citing an analysis of 1994 and 1999 trends in mathematics and science study data from 50 countries by researchers Daniel Baker and Gerald Letendre found that there was not only lack of positive relationship but the overall correlations between national averages in amount of homework assignment were all negative. [19] adds that there is no reason to think that most students would be at any sort of disadvantage if homework were sharply reduced or even eliminated. [19] wonders why something whose cons (stress, frustration, family conflict, loss of time for other activities, a possible diminution of interest in learning) so clearly outweigh the pros should be allowed to go on.
[6] in a review of more than 60 research studies on homework between 1987 and 2003 showed that, within limits, there is a positive correlation between the amount of homework done and student achievement. The research synthesis also showed that too much homework could be counterproductive.
However, [17] found that students who spent more time doing homework performed better than those who spent less time. They were however not clear on whether students spent more time on homework because they were given more tasks to accomplish or whether they were weak or had limited knowledge on the concept taught.
[17] further found the relationship between time spent on homework and achievement to be statistically significant. [18] surveyed 15 -year-olds and found that there was a negative correlation between time spent on Mathematics homework as reported by students and achievement. [18] goes on to narrate that most authors speculated that when students are given large amounts of homework, their motivation toward the topic declines.
[22] found that one extra hour of Mathematics per week improved Mathematics achievement by 0.243 standard deviation. McMullen adds that this change is large enough to move a student from $50^{\text {th }}$ percentile in Mathematics to $59^{\text {th }}$ percentile over the course of a school year. A prevalent type of study in the field of homework investigates how the design of homework can affect student achievement. More specifically, whether homework is checked for computation, collected and graded.
Many education systems worldwide lack a direct policy on homework at any level [25]. This is also the case in Kenya. Even the Basic Education Act, 2013 [28] is silent on it. Homework is therefore left at the discretion of the teacher. Due to lack of policy guideline, teachers often misuse this provision and end up administering too much homework assignments [19]. Cases where every teacher gives homework and expects it to be completed the following morning are on the increase [6]. The student may end up missing sleep as he /she struggles to complete the assignment, fearing punishment. According to [19], the work therefore lacks in
quality, as the student attempts only to complete the work, whether it is correctly done is not an issue of concern. With all the pressure mounted on the student to complete the work given, it is observed that most teachers are also keen on the completeness of the work rather than its quality since they hardly have time to mark these assignments or to discuss them in class [4]. [4] adds that most students, having discovered the complacency on the side of their teachers to mark these assignments, have formed a habit of copying the completed work from the high achievers. The Kenyan situation reveals that the benefit of homework cannot be established [26].

In Hamisi Sub-county, attempts such as capacity building workshops to improve teaching methods, improving access to instructional materials, several in-service trainings of teachers, early completion of syllabus, creating adequate time for revision, improved curriculum supervision by principals and Heads of departments, improved condition of school buildings and teacher and student motivation to address negative attitude towards mathematics, remedial and holiday tuition, hiring qualified teachers, etc have been made to improve performance in Mathematics but have not born any meaningful fruit. In addition, teachers give extended amounts of homework in mathematics on daily basis.

Although homework is an important area of concern to parents, students, teachers and education managers, it has not been adequately addressed in Kenya. Very few researchers have concentrated on what is done, how it is done or how homework can be planned to meet the needs of different learners in mathematics. [25] carried out a study on nature of mathematics homework, teachers' perception on the value of homework and opinion of students regarding homework but did not identify the beneficial amount of homework activities. According to [25], teachers give several questions from the same topic to the extent that students feel some degree of monotony. Students who fail to present completed work are often punished. Learners therefore spend longer hours trying to answer homework questions. Amount of homework given by teachers varies from teacher to teacher. For the above reasons, this study aims at establishing how amount of homework impacts on students' performance in mathematics.

The purpose of this study was to establish the relationship between amount of homework and performance in mathematics among public day secondary school students in Hamisi Sub-County, Kenya.

## Objectives of the study

i) To establish the amount of homework assigned to students by their teachers in mathematics.
ii) To determine the students' performance in mathematics.
iii) To find out the relationship between amount of homework administered to students and their performance in Mathematics.

## Research Questions

i) What amounts of homework do teachers assign to their students in mathematics?
ii) How do students' perform in mathematics?
iii) What is the relationship between amount of homework administered to students and their performance in Mathematics?

## II. METHODOLOGY

## 1. Research Design

This study adopted a correlation research design whose purpose was to discover relationships between variables through correlation statistics. The Basic design involved collecting data on the three variables (the amount of homework administered to students in mathematics, performance of students in mathematics and the relationship between the amount of homework and performance in Mathematics) and computing correlation coefficient. To establish the effect of the amount of homework, different groups of students were each assigned different number of questions as homework at any given time. For example, they were assigned 1 to 10,11 to 20,21 to 30,31 to 40 and above 40 questions respectively. They were then subjected to a test and their performance measured.

## 2. Area of Study

The study was carried out in public day secondary schools in Hamisi Sub-county, Vihiga County, Kenya. The sub county was curved from Vihiga district in 2007. It borders Kisumu West to the South, Vihiga and Sabatia to the West; Kakamega South to the North and Nandi South to the East. It is located between $0^{0} 15^{\prime} \mathrm{N}$ and $0^{\circ} 5^{\prime} \mathrm{S}$ and $34^{\circ} 27^{\prime} \mathrm{E}$ and $35^{\circ} 0^{\prime} \mathrm{E}$. It was selected because of all the sub-counties in Vihiga County; it is the one realizing the lowest performance in mathematics at a mean score of 2.566 over the five year period. So it was chosen to determine if an effectively managed homework would have an impact on performance in Mathematics.

## 3. Study Population

The study population comprised of 1,600 form 2 students and 30 mathematics teachers from 30 day schools. This information was obtained from 2014 Education Management Information System records in the Sub-County Director of Education's office, Hamisi. Form 2 class was chosen because they had more experience in secondary school life as compared to Form 1s and were not under heavy pressure of time as Forms 3s and 4s who had KCSE exams closely before them hence could freely participate in the study.

Day scholars were chosen in this study because their performance in mathematics was low as compared with that for boarders. Moreover, due to the so many challenges they face on daily basis, it was important to establish the amount of homework that would be beneficial to them. Mathematics teachers were the ones responsible for implementing the mathematics curriculum hence gave valuable information on
homework and how it influences performance in Mathematics.

## 4. Sample Size and Sampling Techniques

Cluster sampling procedure was used to select 12 public day secondary schools, constituting $40 \%$ of all the day secondary schools in the sub County. Systematic sampling was used to select Form 2 students in every school at regular intervals through their attendance registers. Out of the target population of 1,600 day secondary school students in Form two, 310 constituting $19 \%$ of the population were accessible. Saturated sampling method was used to select 27 teachers of mathematics with a teaching experience of 5 years and above. These teachers were selected because they were not novice
hence had the requisite mastery of content and were adequately competent to handle the questionnaire.

## 5. Instruments of Data Collection

The study used Questionnaire for students and Questionnaire for teachers as a primary source of gathering both qualitative and quantitative data. Document analysis guide focused on documents that were deemed relevant to the study.

## III. RESULTS, DISCUSSIONS AND CONCLUSION

## 1. Results

a). Amount of homework

For example, in the topic Trigonometry I, teachers opted to give varying amounts of homework to the respondents.

Table I: Amount of homework administered to students (Form 2 students, $\mathrm{n}=310$ )

|  | Questions | f | \% |
| :---: | :---: | :---: | :---: |
| Number of questions given as homework at a time | 1-5 | 192 | 62 |
|  | 6-10 | 78 | 25 |
|  | 11-15 | 34 | 11 |
|  | Above 15 | 6 | 2 |
| Number of questions students preferred to be given as homework at a time | 1-5 | 189 | 61 |
|  | 6-10 | 96 | 31 |
|  | 11-15 | 19 | 6 |
|  | Above 15 | 6 | 2 |
| Total number of questions given as homework in the topic Trigonometry 1 | 1-10 | 62 | 20 |
|  | 11-20 | 40 | 13 |
|  | 21-30 | 124 | 40 |
|  | 31-40 | 72 | 23 |
|  | Above 40 | 12 | 4 |

The figures in the table show that most teachers gave very few homework assignments at any given time. $62 \%$ of the respondents indicated that their teachers gave them between 1-5 questions, $25 \%$ were assigned 6-10 questions, and $11 \%$ were taking home 11-15 questions while only $2 \%$ were being given over 15 questions. In the topic Trigonometry I, most students, $40 \%$, were given between 21 and 30 questions while only $4 \%$ were given over 40 questions.

Table II: Amounts of homework teachers assigned to their learners.

| Question | No. of teachers <br> responding <br> (f) |
| :--- | :--- |
| What is the average number of questions <br> you gave as homework to your students <br> in the topic Trigonometry I? |  |
| 1 to 10 | 5 |
| 11 to 20 | 4 |
| 21 to 30 | 11 |
| 31 to 40 | 6 |
| Above 40 | 1 |

5 teachers representing $20 \%$ of the respondents gave less than 10 homework questions to their learners. 4 or $13 \%$ gave less than 20,11 or $40 \%$ gave between 21 and 30 questions while $23 \%$ and $4 \%$ gave less than 40 and above 40 questions respectively. This is in tandem with the students responses on the total number of questions given as homework in the topic Trigonometry 1.

The number of questions teachers assigned to students at a given time depended upon such factors as:

1) Class size. Teachers with large classes give a few homework assignments to ease marking.
2) Text book ratio. Where there are few text books, the teacher would give a few questions which students can easily copy and answer later.
3) Teacher's workload. Teachers who have several lessons usually give a few homework tasks.

## b). Performance of students in mathematics

Table III: Performance at various amounts of homework administered in the topic Trigonometry I.

| PERFORMANCE (\%) |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amount of <br> Homework | No. | $0-19$ | $20-29$ | $30-39$ | $40-49$ | $50-59$ | $60-69$ | $70-100$ | Mean \% |
| $\mathbf{1 - 1 0}$ | 63 | 5 | 15 | 24 | 14 | 4 | 1 | 0 | $\mathbf{3 3 . 9}$ |
| $\mathbf{1 1 - 2 0}$ | 39 | 6 | 9 | 12 | 5 | 5 | 1 | 1 | $\mathbf{3 7 . 7}$ |
| $\mathbf{2 1 - 3 0}$ | 123 | 4 | 19 | 37 | 34 | 24 | 4 | 1 | $\mathbf{4 0 . 4}$ |
| $\mathbf{3 1 - 4 0}$ | 72 | 5 | 24 | 19 | 16 | 4 | 3 | 1 | $\mathbf{3 4 . 6}$ |
| Above 40 | 13 | 1 | 3 | 5 | 2 | 2 | 0 | 0 | $\mathbf{3 2 . 2}$ |
| TOTAL | $\mathbf{3 1 0}$ | $\mathbf{2 1}$ | $\mathbf{7 0}$ | $\mathbf{9 7}$ | $\mathbf{7 1}$ | $\mathbf{3 9}$ | $\mathbf{9}$ | $\mathbf{3}$ | $\mathbf{3 5 . 5 6}$ |

These findings show that the amount of homework given per topic in mathematics has a direct relationship with performance. Performance increases with the amount of homework up to between 21-30 questions where it reaches peak then begins to decline. The law of diminishing returns probably takes effect as additional amount of homework starts causing fatigue to the learners leading to decline in
performance. It was established that when homework is given in excess, some students lose interest and start copying from others just to satisfy the teacher. Such work therefore adds no value to them when it comes to performance.
c). Relationship between amount of homework and students'
performance in mathematics

| Table IV: Relationship between amount of homework and performance in mathematics |  |  |  |
| :---: | :---: | :---: | :---: |
|  |  | The amount of homework administered to students in Mathematics. | Performance |
| The amount of homework administered to students in Mathematics. | Pearson Correlation | 1 | . $971{ }^{* *}$ |
|  | Sig. (2-tailed) |  | . 004 |
|  | N | 310 | 310 |
| Performance | Pearson Correlation | .971** | 1 |
|  | $\begin{gathered} \text { Sig. (2-tailed) } \\ N \end{gathered}$ | . 004 | 310 |
| ** Correlation is significant at the 0.01 level (2-tailed)). |  |  |  |

The Pearson Product-Moment correlation coefficient ( $\mathrm{r}=$ .971) was computed and indicated that there was high positive correlation between the amount of homework administered to students in Mathematics and performance among public day secondary school students in Hamisi Sub-County. However, this was only up to a given extent. Additional homework assignments were found to be detrimental to improved performance. The analysis revealed highly significant (p < 0.05 ) positive relationship between the amount of homework administered to students in Mathematics and performance.

## 2. Discussions

These findings of this study are similar to those echoed by [11] who investigated homework and attainment in primary schools and pointed out that amount of homework impact negatively on homework completion and final achievement. In addition, this finding is similar to that of [3] who asserts that within limits, the more hours allowed for instruction in a subject, the higher the student achievement and that at the end of secondary school cycle, it was noted that the
more teachers gave homework and corrected them, the higher the students' achievement levels. The findings are also similar to that of [30] who found that lengthy homework assignments had negative effect on achievement gains. Qualitative findings confirm that there is a relationship between homework and academic achievement in Mathematics just as quantitative findings also found.
The more homework students complete, the better they do in school, according to research conducted by psychologists Harris Cooper, James J. Lindsay and Scolt Greathouse of the University of Missouri, Colombia. [4] confers that longer assignments-in one instance twice as long; in the other, three times as long-are no more effective than shorter assignments, but the difference is not statistically significant.

This is supported by the findings of [2] who conducted a study whose focus was on the association between time spent on homework and academic performance in science and mathematics by assessing survey and transcript data from two national representative samples of high school students
collected in 1990 and 2002 and results indicated that there is consistently positive significant relationship between homework and performance on standardized exams.

Furthermore, the findings are in agreement with [6], who investigated the efficiency of students completing homework verses class work and indicated that homework did have a significant effect on student achievement. Moreover, the findings are also in agreement to those of [25], who found that students believe that there is a relationship between amount of homework and achievement. In addition, the findings are in agreement to those of [4] who found that the homework can improve students' scores on the class test that come at the end of a topic. Similarly, according to [7], pupils who do their homework perform better in tests and assessment situations.

The findings were in contrast to those of [14] who carried out a study whose purpose was to determine whether or not giving homework affects student mathematics achievement in the fourth grade and the two-tailed p-value determined that amount of homework does not affect student mathematics achievement in the fourth grade. These findings were also in contrast to those of [31] who carried out a study whose purpose was to examine the effects of amount of homework in mathematics on performance among elementary school students demonstrating varying levels of achievement in mathematics and the post-test results indicated no statistically significant differences between the two homework types overall or within each level of achievement group.

The findings are in contrast to the words echoed by [19] who found that at the high school level, the correlation between amount of homework and achievement is weak and tends to disappear when more sophisticated statistical measures are applied. These findings are also in contrast to those of those of [26] who found that there is no positive correlation between the average amount of homework assigned in a nation and corresponding level of academic achievement. He confers that many countries with the highest scoring students such as Japan, the Czech Republic and Denmark, have teachers who give little homework. Regardless of students' ability or prior coursework, the amount of time they devote to homework increases their achievements [17].

## 3. Conclusion

Homework was found to be a tool that is quite useful in learning, revision and attainment of better scores and grades in Mathematics so long as it is administered in amount which is less strenuous to learners and teachers use it to evaluate learners as far as the recently taught concept is concerned.

The benefits of homework would only be realized when teachers present learner-centred lessons such that mathematical concepts are clearly understood in class.
In other words, it would be futile to present shoddy lessons and then bombard learners with several homework assignments and expect them to obtain superior grades in exams. Students alluded to the fact that most teachers did not
consistently mark homework assignments. The few who did never revised these tasks with the learners and did not emphasize the need for learners to make correction to their failures. Furthermore, most teachers never made constructive comments on the learners' written work hence learners were less guided on what was expected of them.
Staggering homework assignments made them less stressful to students. In addition students subjected to this kind of treatment achieved higher scores in Mathematics compared with those who were assigned several homework tasks to work on at a go. There was high positive correlation between the amount of homework administered to students in Mathematics and academic achievement up to a certain point. Students who were assigned an average of 5 homework tasks per day performed better in mathematics than those who were assigned above 15 homework tasks per day.

## 4. Implication

Teachers should give few (between 1-5) homework tasks per day as this has proven to yield improved performance in mathematics. Teachers should design quality homework tasks to fit the needs of each individual student. They should mark such assignments regularly, give constructive remarks and encourage learners to do correction in case they fail to get correct answers. In addition, the Ministry of Education should consider developing a policy on homework so that it is not left at the discretion of teachers who might end up loading it upon students hence making learning a stressful venture.

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