

# Study between Foundations of Analysis and English Performance Test: A Case of Solomon Mahlangu College of Science and Education

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## ABSTRACT

*The purpose of this study was to determine the association between English screening test and the Foundations of Analysis (MTH 100) course examination results among first-year students majoring in Informatics and Infomathematics degree programs as well as to determine the ratio of males and females enrolment for the past three years. Screening tests and MTH 100 examination results from 2015/16, 2016/17 and 2017/18 Informatics and Infomathematics students from Department of Mathematics, Informatics and Computing Science were used and analyzed using the chi-square test at  $\alpha = 0.05$ . The results of the study showed that the ratio of male and female students enrolled in Informatics and Infomathematics degree program for the past three years is low, below 1:6 and no clear association existed in performance between the Screening test and MTH 100. Findings are expected to provide the beneficial source of information to several education stakeholders as to why the gap between males and females has not been reduced to a reasonable level as well as to why there is more failure in screening tests compared to MTH 100.*

**Key Words:** Sex, Performance, Examination, Course, Student, University.

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## 1. INTRODUCTION

English Language is a medium of instruction in educational institutional in Tanzania from secondary school level [3]. It has been said by some researchers that English language proficiency has a link with Academic performance in general [11]. Several studies also have shown that problems related to English language knowledge are among the factors leading toward poor performance in science subjects [4].

Studies conducted by [7] aimed to determine the performance of students in mathematics course in relation to English proficiency revealed that students who mastered well English had a better understanding of mathematics hence achieved more grades in mathematics. [5] as well as [4] conducted a study related to English and math success at freshman level. They found out a significant correlation between freshman students' success in foreign language and mathematics and concluded that students who are successful in English also tend to be successful in Mathematics and vice versa.

Comparative study between mathematics and other subjects have been done also by [6] in his study titled “Correlation Study between Performances in Mathematics and Accounting Subjects among undergraduate students in the Nigerian Tertiary Institutions” found out that there was no significant relationship between test performances in mathematics and Accounting. He thus concluded that students with little or no background knowledge in mathematics can comfortably pursue a degree course in Accountancy at the tertiary level.

All first year students at the Sokoine University of Agriculture are required to take English proficiency test (English Screening test) upon entry to the university [8]. Students are expected to do well in this test since they have been learning this subject since they were in secondary levels and have been using it as a medium of communication in other subjects [3]. For those students who do not pass the test, are required to learn the course during the first semester and retake the test while those who pass will not be required to attend its course lessons and retake it at the end of the semester. Those who do not pass the course in the second attempt will continue to learn it during the second year and retake it again. Also students taking Informatics and Infomathematics degree programs are required to have a good pass in Advanced Mathematics or its equivalent, so they would be expected to have a good foundation in mathematics [9]. It has been observed that a good number of students do not meet the pass requirements at the first attempt and have to retake the course at least once again. Based on these observations, an interest in the possible relationship between success in English proficiency test and Mathematics for students from Mathematics, Informatics and Computing Sciences department (DMICS) emerged. Therefore, this paper aims to look at students’ achievements in Foundations of analysis course (MTH 100) assessed based on final university examination marks obtained and its relationship to English proficiency tests marks.

## **2. RESEARCH OBJECTIVES**

- i. To determine the ratio of male and female students enrolled in Informatics and Infomathematics degree program students.
- ii. Measure if a relationship exists between English screening test and Foundations of Analysis (MTH 100) final examination.

## **3. RESEARCH HYPOTHESIS**

$H_0$ : No relation exists between students’ performance in English screening test and MTH 100 university examination.

$H_1$ : A relation exists between students’ performance in English screening test and MTH 100 university examination.

## **4. RESEARCH DESIGN**

This study is a qualitative method of research in which qualitative variables from the same group of participants will be used to determine if there is a relationship between the variables. A relationship between English screening test and MTH 100 will be analyzed to see if performance in one affects the other.

## **5. SUBJECTS**

The study was undertaken on students from the DMICS located at Solomon Mahlangu College of Science and Education campus, from two different degree programs from first years of 2015/2016, 2016/2017 and 2017/2018. Students’ data were extracted from the records office section after getting approval to use the data. It was observed that some students either discontinued or postponed their degree programs. Such data from students were not considered since some data from them were missing. For instance, a student may do the screening test upon arrival and pass the test but later on postpone his/her degree program before the end of semester examinations and not be able to perform the Foundations of Analysis (MTH 100) exams. Such data would be missing and such student would be disregarded as a whole as the data pair would not be complete.

## **6. RESEARCH DATA**

Data were obtained from the English screening test assessment as well as the final examination marks of Foundations of

Analysis course. Course works under Foundations of Analysis such as assignments and quizzes were not considered since they tend to deceive the overall results of students. With assignments for example, students are given more time to complete it, they may seek help among themselves or instructors and at times even copy their work from other sources, something which is different from the final examination which is a timed test just like the English screening test itself. This branch of mathematics was preferred over other branches because it was deemed to be closer to English language compared to other branches taught during the first year first semester that included Introductory Statistics, Linear Algebra I and Numerical Analysis I. Its course contents include Logic Propositions ( declarative statements that are either true or false), local connectives, truth table contents, proofs of Mathematical statements, converse and contrapositive of a statement, methods of proof and mathematical induction. These concepts are said to be language related. Chi-square test was used to measure whether a pass or fail in one of the test was related to a pass or fail to the other.

**7. ANALYSIS 1: 2015/16 INFORMATICS AND INFOMATHEMATICS STUDENTS**

115 students were enrolled in 2015/16 in DMICS for students taking Informatics and Infomathematics degree programs. Of those, 10 were females and 105 were males. Thus this intake had fewer number of females enrolled compared to males by almost a ratio of 1:10.5. Table1 below shows a summary of their results in the Screening test and MTH 100 examination.

**Table 1: Overall results in 2015/16**

			MTH 100 EXAMINATIONS		Total
			PASS	FAIL	
<b>SCREENING TEST</b>	PASS	Count	37	5	42
		Expected Count	31.4	10.6	42
	FAIL	Count	49	24	73
		Expected Count	54.6	18.4	73
Total count			86	29	115

**Pearson Chi-Square =6.218, df = 1, p-value = 0.012646**

**7.1 Verdict-1**

Table 1 shows that 37 students passed both tests (32.2%), 5 students passed the Screening test but failed the MTH 100 examination (4.3%), 49 students failed the Screening test but passed the MTH 100 examination (42.6%) while 24 students failed both the Screening tests and the MTH 100 examination (20.9%). The result is significant at  $\alpha = 0.05$ . Thus we reject  $H_0$  in favor of  $H_1$  and conclude that an association exists between students' performance in English screening test and Foundations of Analysis (MTH 100) final examination for students majoring in Informatics and Infomathematics 2015/16. Overall there were more Fails and Passes combination in Screening tests and MTH 100 examinations respectively ( $49/115 = 42.6\%$ ) than there were in any other combinations while Pass/Fail combinations in Screening tests and MTH 100 examinations respectively produced the lowest results ( $5/115 = 4.3\%$ ).

**8. ANALYSIS 2: 2016/17 INFORMATICS AND INFOMATHEMATICS STUDENTS**

69 students were enrolled in 2016/17 in DMICS for students taking Informatics and Infomathematics degree programs. Of those, 12 were females and 57 were males. Thus this intake also had fewer number of females enrolled compared to males by a ratio of more than 1:4.5. Table below shows a summary of their results in the screening test and MTH 100 examination.

**Table 2: Overall results in 2016/17**

			MTH 100 EXAMINATION		Total
			PASS	FAIL	
<b>SCREENING TEST</b>	PASS	Count	19	6	25
		Expected Count	19.2	5.8	25
	FAIL	Count	34	10	44
		Expected Count	33.8	10.2	44
Total count			53	16	69

*Pearson Chi-Square =0.0141, df = 1, p-value = 0.905479*

**8.1 Verdict-2**

Table 2 indicates that 19 students passed both tests (27.5%), 6 student passed the Screening test but failed the MTH100 examination (8.7%), 34 students failed the Screening test but passed the MTH examination (49.3%) while 10 students failed both the Screening tests and the MTH examination (14.5%). The result is not significant at  $\alpha = 0.05$ . Thus we fail to reject  $H_0$  and conclude that an association does not exist between students’ performance in English Screening test and Foundations of Analysis (MTH 100) final examination for students majoring in Informatics and Infomathematics 2016/17.

**9. ANALYSIS 3: 2017/18 INFORMATICS AND INFOMATHEMATICS STUDENTS**

29 students were enrolled in 2017/18 in DMICS for students taking Informatics and Infomathematics degree programs. Of those, 8 were females and 21 were males. Thus this intake also had fewer number of females enrolled compared to males by almost a ratio of 1:2.5. Table below shows a summary of their results in the screening test and MTH 100 examination.

**Table 3: Overall results in 2017/18**

			MTH100 EXAMINATIONS		Total
			PASS	FAIL	
<b>SCREENING TEST</b>	PASS	Count	5	1	6
		Expected Count	4.6	1.4	6
	FAIL	Count	17	6	23
		Expected Count	17.4	5.6	23
Total count			22	7	29

**9.1 Verdict-3**

Table 3 indicates that 5 students passed both tests (17.2%), 1 student passed the Screening test but failed the MTH 100 examination (3.5%), 17 students failed the Screening test but passed the MTH 100 examination (58.6%) while 6 students failed both the Screening tests and the MTH 100 examination (20.7%). Because one of the cells in the expected cell count is below five, Chi-square test cannot be performed in this table.

## 10. OVERALL RESULTS 2015-2018

Table 4 below shows overall results for the past three years. This table was extracted by taking total cell counts from tables 1-3.

**Table 4: Overall results for the past 3 years**

			MTH 100 EXAMINATIONS		Total
			PASS	FAIL	
SCREENING TEST	PASS	Count	61	12	73
		Expected Count	55.2	17.8	73
	FAIL	Count	100	40	140
		Expected Count	105.8	34.2	140
Total		Count	161	52	213
		Expected Count	161	52	213

**Pearson Chi-Square =3.8008, df = 1, p-value = 0.051228**

### 10.1 Verdict-4

Table 4 shows that out of 213 students, 61 of them passed both tests (28.6%), 12 passed the screening test but failed the MTH examinations (5.6%), 100 of them failed the screening test but passed the MTH 100 exams(47.0%) and 40 of them failed both tests(18.8%). Also during this time, 30 females were enrolled compared to 183 males which is a ratio of more than 1:6. The result is slightly not significant at  $\alpha = 0.05$ . Thus we fail to reject  $H_0$  and conclude that an association does not exist between students' performance in English Screening test and Foundations of Analysis (MTH 100) final examination for students majoring in Informatics and Infomathematics for the past three years, 2015-2018.

## 11. CONCLUSION

From the analysis performed, overall we may conclude that only once, 2015/16 did an association in performance between English Screening test and MTH 100 examinations exist, only once, 2016/16 an association in performance between English Screening test and MTH 100 examinations did not exist and only once, 2017/18 we could not complete the test since one of the cells had expected value lower than five. Overall, between years 2015-2018, there was no clear association was noted in performance between English proficiency test and MTH 100 examinations performed by students. A trend is noted where in all the tables 1-4, number of passes in MTH 100 is greater than number of fails in MTH 100, (86 passes and 29 fails in 2015, 53 passes and 16 fails in 2016, 22 passes and 7 fails in 2017, 161 passes and 52 fails overall) while number of passes in the screening tests is lesser than number fails in the screening tests, (42 passes and 73 fails in 2015, 25 passes and 44 fails in 2016, 6 passes and 23 fails in 2017, 73 passes and 140 fails overall). Thus there were more passes in MTH 100 and more fails in the Screening test and this slight association is noted in the cells where fail in screening test and pass in MTH 100 intersect by having more percentage appearance in each table.

Also we note a low number of female students enrolled in each of the three years. This may be due to the fact that females perceive science related courses as hard courses to study because they involve a lot of computations, a notion that is even common in low levels of education.

## 12. RECOMMENDATIONS

Further research in this area is recommended. Further research is needed into determining the association between Screening tests and MTH 100 not only among students in DMICS but also from other departments in SUA. The Chi- square test was used as a preliminary test that gave a hint on the relation between these variables assuming other variables are controlled.

Also low number of enrolment of females needs to be brought to attention. Infomathematics is an education degree program where graduate students are expected to be teachers of the future generation. Female teachers will be highly needed as part of this future. They are better motivators compared to males who are more of rigid. This distinction is needed for science teachers in order to produce low level students who would be motivated to like science subjects and university courses. Thus motivations in one way or the other should be given to female students so as to encourage them to have interest in science subjects during early stages of education.

