

# Relationship between Computer Programming skills and English with the support of Mathematics

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## Abstract

It has been observed in various instances that majority of the computer science students after joining in engineering of courses worry about the new technical subjects in their syllabus. Though they have secured good marks in English language and mathematics at school and intermediate level, they are not able to succeed in programming skills as they are unable to see the interconnection between English writing skill and computer programming skills at engineering level. Due to this persistent problem, many of the computer science students of today are lagging behind in programming skills. Therefore this paper is aimed to illustrate the degree of relationship between learners' English writing proficiency and computer programming skills and also to find out whether there is any impact of English proficiency on improving computer programming skills.

## 1. Introduction

At present, due to the rapid technological developments in various fields across the world, the demand for the admission in the branch of computer science engineering has increased tremendously. Majority of the students in our state are opting Computer Science Engineering branch because of vast number of employment opportunities with lucrative salaries. It has been observed in various instances that the students after joining in this course start to worry about the technical study and also feel that they are fish out of water as the subjects they are going to study in respective technical subjects have no connection with their previous knowledge obtained in their previous study. Though they have secured outstanding marks in mathematics at school and intermediate level, they are not comfortable in studying technical subjects related to computer science engineering as they are unable to see the interconnection between English language, mathematics and computer science. Therefore, it is highly essential to create awareness among the students who are taking up technical courses for making beautiful career.

## 2. Review of Literature

As every computer professional strives hard to acquire his popularity and identity through his notable contribution for the field, no two computer scientists may give a same definition of computer science as no two mathematicians make same definition of mathematics. The French word for computer science is *informatique*, the German is *Informatik* and in Danish it is *Datalogi*. All of these terms wisely imply that computer science deals with

many things besides the solution to numerical equations. Several people have suggested the term 'Computing Science' is superior to 'Computer Science'. In consultation with the all the definitions given by the stalwarts of Computers, it can be stated that computer science is a study of algorithms in a simple form. An algorithm is a set of sequential rules which are indicating how to draw out intended output from the given information with a prescribed number of steps. Algorithms are the central core of the subject, the common denominator which underlies and unifies various branches. As the word 'data' stands for a particular representation of the word 'information', the specific representation of an algorithm is called a program. Algorithms are high in properties, and algorithmic point of view is a useful way to organize knowledge in general.

Computer Science has a deep rooted historical background in the society as it had been in usage before the advent of computers. It was brought into light recently that ancient Babylonians 3500 years ago were computer scientists. Computers are really necessary before we learn much about the general properties of algorithms. As a matter of fact human beings are not fully precise and fast enough to carry out any difficult tasks because their intellectuality and wisdom have limits. Many people say that computing machine is a necessary evil and a difficult tool used when other methods fail to do so.

#### **i. Computer Science as a Part of Mathematics:**

Claiming the belongingness of Computer Science, all mathematicians across the world raise their tone to say that algorithms are basically studied in mathematics even before the arrival of computer science. However a similar argument was already made by computer scientists that mathematics is a part of computer science. Having studied both of the disciplines in depth, it could be concluded that none of the above claims are valid as it is difficult to establish a precise boundary between these two disciplines. To provide a mutual impact on Computer Science and Mathematics, it can be stated that computer science is a bit more advanced and mature and sure of itself than mathematics even though there is no computer science without mathematics. Computer science and Mathematics will both exist as respected disciplines serving analogous but plays a significant role in an individual's education. According George Fortsythe, scientific and technical educations are two prominent tools which remain serviceable for a lifetime. Like mathematics, computer science is a subject which is considered from basic to a general education. Like mathematics and other sciences, computers science deals with two important areas such as 'theoretical' and 'applied'. Like mathematics, it deals with man-made laws which can be proved rather natural laws which are never known with certainty. Thus the two subjects are alike each other in many ways. The difference lies in the subject matter and approach. Mathematics deals with theorems, infinite processes, and static relationships and computer science deals with algorithms, finitary constructions and dynamic relationships. It is open secret that many computer scientists have been mathematicians and many more mathematicians have been doing computer science in disguise.

Therefore, a person who is well trained in computer science with the adequate knowledge in mathematics and with profuse English language skills knows how to deal with algorithms, how to write an algorithm, how to construct them, how to manipulate them, how to analyze and understand them. But the grip on English language along with mathematical skills helps a learner to write computer programs in a better way than others.

## **ii. Role of English Language Proficiency:**

The role of English language proficiency to achieve intended goals in computer science with the support of mathematics knowledge is very significant for writing programs. Although there are a number of computer application softwares are made available in the market for training the learners to excel in writing programs, and very importantly almost of these softwares are designed based on English language. Hence a learner is required to be competent enough in writing a program intelligently with his proficiency in English language because a programming language is a set of words, abbreviations and symbols that enables a programmer to interact and convey directions to a computer. A programmer can use different types of programming languages for writing programs such as Java, PHP, HTML, Objective-C, Java for Android, SQL, Javascript, Ruby, C#, Python, C++, C, Action Script, ASP.net, Perl, Scala, and Visual Basic etc. and considering the importance of the above computer languages many of the universities included these languages as part of syllabus in their curriculum. These languages are used for mobile programming, desktop programming and web programming etc. Unfortunately, the inadequate English language proficiency has become a major hindrance for many of computer programmers.

The proficiency of English language has a great impact on the students' academic performance. The students who are profusely strong in the English skills have a very few challenges in their academics when compare with the students with weak English proficiency. Based on this, it can be well said that English language proficiency has a crucial role in leading the learners for academic advancement in studies and technical enhancement in skills. English language not only helps to acquire knowledge and improving metacognitive abilities but also improves the abilities in using the keywords and grammatical rules aptly while giving commands to a computer. According to Veerasammy and Shillabeer the students who are weak in English skills struggle hard to complete the tasks and also find difficulty in understanding the concepts and because they are unable to see the errors in their programming. Tan and Lan, 2011 stated that we cannot reach to a solution of this problem by simplifying the content of English language to the level of students' competencies since it kills the hidden abilities of the learners to think of working beyond their capabilities. This paper is intended to find out the relationship between the learners' English proficiency and their computer programming skills.

### 3. Methodology

The present study is carried out with a view to overcome the setbacks and also to find out impact of English proficiency on writing Computer programming skills effectively. Prior to the beginning of the research, it was observed in several instances that computer science students were struggling hard to write computer programs effectively due to poor English writing skills. Hence the study was taken up while III-B.Tech students of Computer Science were studying Hyper Text Markup Language (HTML) subject in their second semester. During this period of time, the researcher closely observed how a computer science faculty was teaching HTML subject to the students. By the end of the semester, it was observed that though participants were good at understanding coding techniques taught by the teacher, they were unable to write the programmes appropriately without errors. When reasons for the failure were enquired by consulting the faculty of computer science, the researcher was informed that the students were unsuccessful in writing programs appropriately because of their weak proficiency in writings skills in English language. Hence the study is progressed on the below objectives.

#### 4. Objectives

1. To find out whether there is relationship between learners' English writing proficiency and computer programming skills
2. To find out impact of English writing proficiency on computer programming skills.

#### 5. Sample:

A sample of sixty 3<sup>rd</sup> year students of Computer Science Engineering (CSE) of Sri Sarathi Institute of Engineering & Technology, Nuzvid are used in the study.

#### 6. Procedure and Data Analysis:

##### i. Procedure and Analysis of TOEFL Writing Test

To achieve the objectives of the study, a sample of 60 students are taken as participants by using random sampling technique. The Test of English as A Foreign Language (TOEFL) is selected for the study because of its standard at international level. Usually, this exam is conducted for 120 marks to estimate the examinee's standard in four skills of English language i.e. Listening, Speaking, Reading and Writing. Since the present study is intended to examine the writing proficiency of participants in comparison with their computer programming skills, the writing section of TOEFL is taken for study to measure the learners' English proficiency. This writing section has two tasks such as Integrated Writing Task and Independent Task. The Integrated Writing Task lasts for 20 minutes. In this session, after reading a short passage and listen to a short lecture, the student is required to write the response to what he read and listened to. The Independent Task lasts for 30 minutes. In this section, the student is required to write an essay in response to the writing topic. While evaluating the Integrated Writing Task, organization of content, grammar, vocabulary, accuracy and completeness are observed. While evaluating the Independent Task, the

overall quality in writing, grammar and vocabulary are examined. The performance of the sample is is rated for a maximum of 30 marks. The scores are noted for data analysis.

## ii. Procedure and Analysis of Writing a Computer Programme in HTML

To understand the efficiency of the sample in writing HTML program, the sixty samples are asked to 'Write a Programme to Design an Application Form in HTML'. It is given the weightage of 30 marks. For the evaluation of the answer and the execution of a programme successfully, three areas are considered as important. They are Line of Code (LOC), Spelling check and User Understandability with the weightage of 15, 5 and 10 marks respectively. The scores of the participants are noted for data analysis. The results of the statistical analysis for the two tests is presented in the below table.

## Results

The answer scripts of the TOEFL and HTML tests are evaluated for 30 marks separately. The sum of TOEFL test marks of sixty samples is 740 and HTML is 733. The mean of TOEFL is 12.34 and HTML is 12.217. The SD of TOEFL is 7.624 and HTML is 7.4001. The variance of TOEFL is 58.1244 and HTML is 54.5617. The covariance of TOEFL and HTML tests is 54.0422. The correlation coefficient of the two tests is 0.9578. The results of the statistical analysis are presented in the below table.

**Table-1: The Results of Statistical Analysis**

Statistical Tests	Results TOEFL Test	Results HTML Test
Total	740	733
mean	12.34	12.217
Standard Deviation	7.624	7.4001
Variance	58.1244	54.7617
Covariance	54.0422	
<b>Correlation Coefficient</b>	<b>0.9578</b>	

## 7. Findings:

### i. Finding in TOEFL Writing Test

From the content and statistical analysis of the data, it is found that quite a small number of the students have profuse vocabulary in English and writing skills as well. The approach they followed in the selection of words while writing the essay after listening to the audio clip revealed their expertise in writing skills. It was also found that these participants paid careful attention while listening to a short lecture and also jotted down a few of the important points in rough notes while listening. Their organization of content, usage grammar and vocabulary with accuracy and completeness were appreciable. It was found that quite a large number of the participants secured average marks and many of the remaining participants failed. They were neither able to listen to the audio clip nor able to write on it hardly anything. They struggled hard while framing sentences and committed many spelling

mistakes and were unsuccessful in the organization of content, usage grammar and vocabulary with accuracy and completeness appropriately. It was found that their quality in writing was inadequate and needed strong improvement.

## ii. Findings in HTML Programme

It was found from the analysis of the HTML Programme written a quiet a few number of the participants had adequate programming skills to write a programme. From the observation of their programme, it was found that their line of code (LOC) was accurate and they were succeeded in completing the programme in a few lines. They completed writing programme in a few lines with correct spellings and good English and above all the coding had a good user understandability. Finally, their programme was executed successfully. It was found from the analysis of the participants who secured poor marks that they were unable to write the programme appropriately. They took more space while writing the programme. They failed in presenting their logic in a sequential order and committed multiple spelling errors. Due to these errors, their programme was failed in the execution and also it lacked user understandability. At last, their programme was failed.

## Conclusion

- From the findings of the study, it can be concluded that the participants who obtained good score in TOEFL test secured good score in HTML programme. The participants who remained failures in TOEFL test because of their poor performance were unable to write writing HTML programme appropriately.
- It is concluded that there is a strong positive correlation between learners' English writing proficiency and computer programming skills and there is an impact of English writing proficiency on writing computer programming skills.
- The study confirms that because of poor writing proficiency in English, the students are not able write computer programme appropriately.
- Finally the study suggests that there is a need for improving English writing skills of learners along with improving computer programming skills.

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