

ANALYSIS OF THE FACTORS RESPONSIBLE FOR GENDER DIFFERENCE IN PROGRAMMING: A TOOL FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

With the trend in development of the nation, it is eminent that information technology(IT) plays a vital role in alleviating unemployment, innovations and sustaining socio-economic development. Software development is a key player in the IT sector of the society, which helps in providing solutions to problems faced by the economy. Researches over years have proved that women are more than men, especially in developing nations. This study focuses on the factors responsible for gender difference in programming. A quantitative research was carried out, data collected using questionnaire, data analysed using statistical tools such as Statistical Packages for Social Sciences(SPSS), and the results were presented using tables and chart. It was observed that the involvement of gender in programming has little or nothing to do with the gender status, rather the interest and passion of individuals. It is therefore recommended that educational planners and policy makers in developing nations should introduce measures of building the interest of the students from secondary level.

KEYWORDS: Programming, software development, socio-economic development, gender difference

1 INTRODUCTION

Computer programming is the process of designing and building an executable computer program for accomplishing a specific computing task. Programming involves tasks such as analysis, generating algorithms, profiling algorithms' accuracy and resource consumption, and the implementation of algorithms in a chosen programming language (commonly referred to as coding).The purpose of programming is to find a sequence of instructions that will automate the performance of a task (which can be as complex as an operating system) on a computer, often for solving a given problem.(Wikipedia).

In developing nations, most females view the act of writing computer program as a difficult task, which is the contrary when compared with the past. In the history of computer programming, feminine gender has played a vital role and have contributed immensely to the development of the field of computer science and Information Technology (IT). A London-born Ada Lovelace(1815-1852) had a passion and gift for mathematics from a young age. She was credited with being the world's first computer programmer, as she drafted a plan for how a machine called the Analytical Engine could perform computations.The machine, invented by her friend, mathematician and inventor Charles Babbage, is considered to be the first general computer. Lovelace detailed applications for the Analytical Engine that relate to how computers are used today (Purdue global, 2018).

Also, Grace Murray Hopper, (1906-1992) was an American computer scientist and United States Navy rear admiral. She was considered to be one of the first programmers of Harvard Mark I the computer, inventor of the first linkers. Also, made accessible the idea of machine-independent programming languages, which later led to the development of the Common Business Oriented Language (COBOL) an early high-level programming language, released in the early 1960s'. These women are notable for their contribution to the field of computer programming.

According to the statistics from women who code, women hold 24% of jobs in the United States. That number is expected to decline if no one makes an effort to educate and involve more women in coding and developing software programs and operating systems. Throughout the 19th century and early 20th century

and up to the world war II, programming was predominantly done by women, significant examples include the Harvard computers code-breaking at Bletchley Park and Engineering at NASA.

According to data compiled by virtual event solutions company, Eva, women make up less than 20% of the US Tech job, even though they make up more than half of the US workforce. Even worse, women now hold a lower share of Computer Science jobs than they did in the 1980s. This is surprising because unemployment across tech positions in

2016 at 2.5% was significantly lower than the 4.9% national average. In 1960, 65% of United States citizens' estimated

2000 computer programmers were women (Lookhed, 1993). US Department of Labour, Bureau of Labor Statistics stated as, at 2012, computer programming is a field dominated by men with women making up 22.5% of computer programmers worldwide. **Objectives of the study**

This research study aims at testing for the effect of the supposed factors responsible for the gender difference in programming. Using some variables: age range, gender, interest, programming skills and marital status.

Problem statement

Women have been poorly represented in the field of Computer Science, most especially computer programming. In this technology age that we are, most of the major contribution we have had have been coming from men.

Consequently, the nation's potentials have been underutilized because women population is higher than men. If they are more involved, we have more innovations springing up as a result of the massive contributions from both genders.

2.0 RELATED WORKS

Women have been said to be poorly represented in computing most especially in computer programming. However, there is a dearth of empirical research to support this evidence. Akinola, (2015) in his study, employed an experimental proof approach to verify the wide acclaimed gender difference in computing. Two parallel student-gender groups (male and Female) were subjected to two different computer programming problems. The problems were given to them to solve, starting from the analysis phase to the final implementation. Their outcomes measured in terms of the accuracy and efficiency of codes turned out from the experiments, were compared statistically. Briefly, the results showed that gender difference may not come into play at all when it comes to computer programming. Other factors like fear, interest or attitudes may, however, be responsible for the low representation of females in computing. Students' self-efficacy perception levels do not differ with respect to gender (Korkmaz, Altun, 2014).

Humphrey, 1999; Brooks, 1995; Boehm, 1981 were of the opinion that learning process of programming skills might be investigated into two main perspectives. The first is the professional software engineering perspective, which aims to undertake big projects requiring a complete competence and synchronized teamwork. On the other hand, the pedagogical perspective is focused on acquiring individual programming skill in a well-defined, limited-scope of framework. In summary, it was believed that the well researched gender difference in risk perception and acceptance is significant for a variety of reasons. First, accepting risks may be perceived as an indicator of confidence, and perhaps, competence. Thus, within the context of programming contests, women may be perceived as less competent because they adopt less risky approaches. This matter is even more deleterious, given that stereotypical beliefs, such as "people view me as less competent because I am female" often lead directly to depressed performance [SA95]. Second, rather

than gambling on their ability to guess the correct approach, women will take more time to explore one solution as opposed to implementing a “fast and dirty” solution that may not work. This less risky strategy will allow less time for trying a wider assortment of potential solutions, and less time to attempt remaining questions. Third, women will not guess at a response as readily as men, nor direct team mates to consider a possible solution, when they are not sure of themselves. They will also feel uncomfortable when, in a mixed-sex team, they are asked to pursue high-risk strategies (Fisher and Cox, 2006). Anxiety can play an important role in gender computer programming. As cited by (Akinola, 2015) Women experience a decrease in self-confidence when they perceive that their work will be compared to others for evaluation (Lenney, 1997).

Hence, previous work shows that gender is the main reason for gender difference.

3.0 RESEARCH METHODOLOGY

In this research work, quantitative approach was used to determine the most pinning factors responsible for gender difference in programming, some variables such as gender, marital status, and interest were analysed.

3.1 Subject

Questionnaires were administered to student of Computer Science Department, considering their levels. Students in their first year (ND1) have been voluntarily taken out of consideration, since we believe that they are still new to the field and could be biased in their judgement with respect to the questions that they were being asked. So, 100 students were selected randomly from ND2 (second year), HND I (third year) and HND II (Fourth Year). These level are expected to be sincere in their response to the questions.

3.2 Questionnaire Design

In the questionnaire design, those student were asked questions such as: Age group, Gender, Marital status, their level of performance in programming courses, factors they thought were responsible for gender difference in programming, their level of performance in programming courses, do they think programming is difficult as a career, do they desire to be a programmer and their interest in programming as a profession.

3.3 Performance Evaluation

This was done making use of percentage ratio which was analysed using SPSS (Statistical Packages for Social Sciences).

FORMULA

$$\frac{x}{n} \times 100 = p$$

where:

x = given quantity
 n = total amount
 p = percentage of the quantity compared to the total

4.0 RESULTS AND DISCUSSION

4.1 Results

The result from this study was presented making use of tables and charts: Below are some of the results analysed.

4.1.1 Opinion of respondent on the gender participation in programming

Table 1.1: Gender participation in programming

	Frequency	Percent	Valid Percent	Cumulative Percent
Male Only	8	8.0	8.0	8.0
Female Only	3	3.0	3.0	11.0
Both	89	89.0	89.0	100.0
Total	100	100.0	100.0	

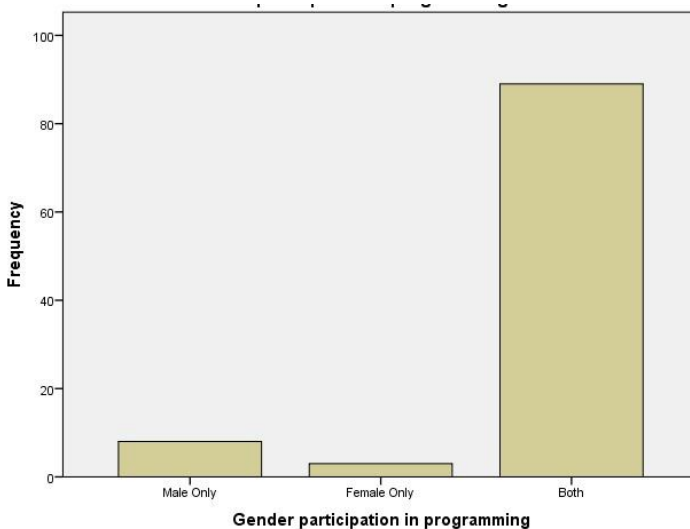


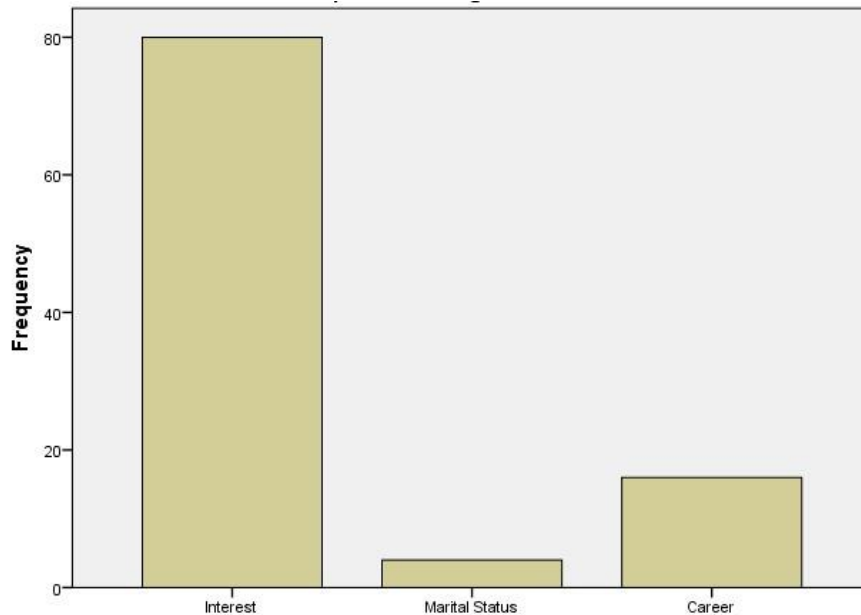
Figure1: Gender Participation in Programming

4.1 Discussion

From the above table, the data clearly depicts that 8% of the respondents believe that programming is meant for the male gender alone, 3% of the respondent from their response believe that programming should be meant for the female gender alone. Whereas 89% of them believe that programming should be meant for both genders. With this fact, the output suggests that programming should be meant for both gender.

Table 2: Factors responsible for gender difference

	Frequency	Percent	Valid Percent	Cumulative Percent
Interest	80	80.0	80.0	80.0
Marital Status	4	4.0	4.0	84.0
Career	16	16.0	16.0	100.0
Total	100	100.0	100.0	

**Figure 2: Factors responsible for gender difference**

The result suggests that the interest of students in programming is the most important factor responsible for the gender difference. From the respondents, 80% believes that interest is the major factor responsible for gender difference, 16% believed that career is the responsible factor, while only 4% believes that marital status is responsible for the present gender difference in programming. From this fact, it can be concluded that interest is the most-pinning factor responsible for gender interest in programming.

4.1.3. Opinion on Programming as a difficult career

Table 3: Is programming as a career difficult

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	23	23.0	23.0	23.0
No	41	41.0	41.0	64.0
Undecided	36	36.0	36.0	100.0
Total	100	100.0	100.0	

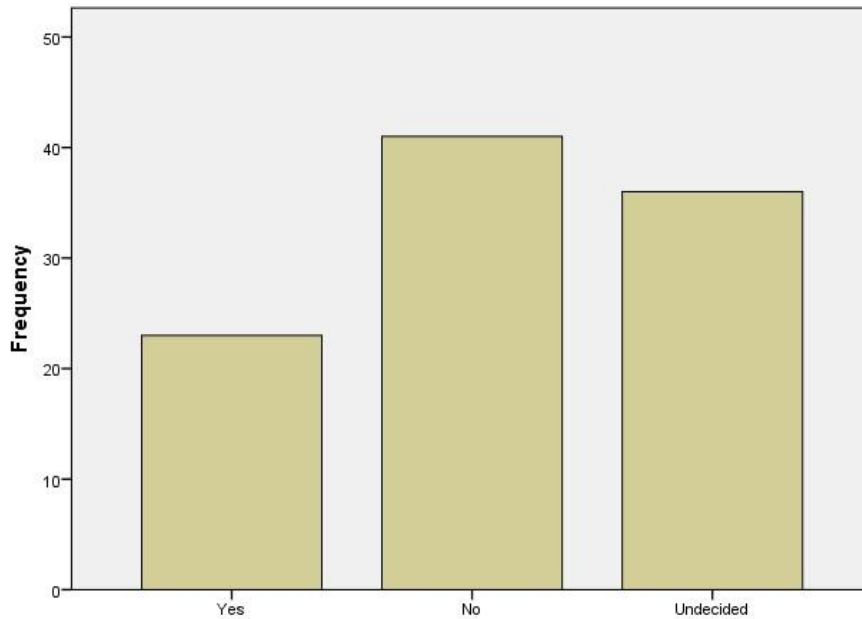


Figure 3: A chart comparing respondent statistics on programming as career

DISCUSSION

This outcome of the analysis of the data gathered suggests that programming is not a difficult career, 41% believed that programming is not a difficult career, 23% of the respondent believe it to be a difficult career. While the other 36% picks none of the two options above.

4.1.4 Evaluation of student's performance in programming courses

Table 4: level of performance In Programming

	Frequency	Percent	Valid Percent	Cumulative Percent
High	13	13.0	13.0	13.0
Low	30	30.0	30.0	43.0
Average	57	57.0	57.0	100.0
Total	100	100.0	100.0	

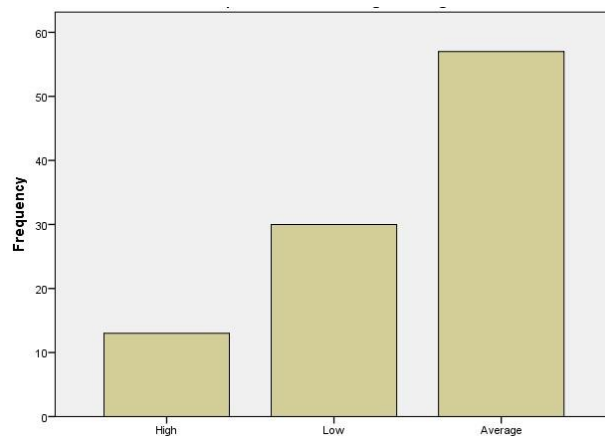


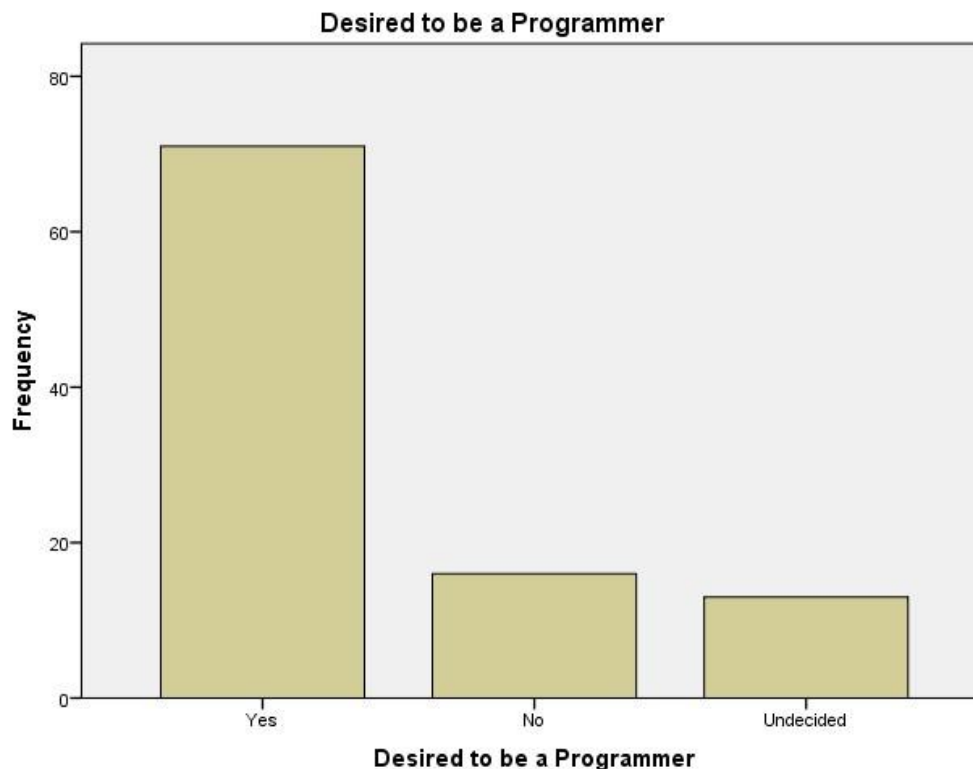
Figure 4: A chart showing level of Performance in Programming

The level of performance of respondents was also considered. Most of the respondents' performance in programming is average with 57%, those with low performance with 30%, while those with high performance in their programming course are just 13%. This analysis suggests that most of the students are average in their programming courses.

4.1.5 opinion of students studying computer science to be a programmer

Table 5: Desired to be a Programmer

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	71	71.0	71.0	71.0
No	16	16.0	16.0	87.0
Undecided	13	13.0	13.0	100.0
Total	100	100.0	100.0	

**Figure 5: A Chart showing Respondent ambition**

From the above analysis using percentage ratio, 71% of the considered respondent would like to take a career in Computer Programming, 16% considered No, 13% are still undecided.

4.2 Summary of the discussion

Summarily, Most of the students are average in their performance in programming, programming should be meant of both genders, the most responsible factor for gender difference is interest, most of the respondents are interested taking a career in programming, most of the respondent believe programming as a career is not difficult.

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

An empirical research was carried out in this study to analyse the factors responsible for gender difference in programming. From this study it could be deduced that the gender of a prospecting programming student have little or no impact on the career of being a software developer, furthermore, it has been observed that the marital status of individual has little or no influence of this programming career. Hence, the eminent factor from this study is the interest of the individual.

5.2 Recommendation

This study hereby recommends that the interest and passion of the female gender should be aroused by concerned stakeholders to increase the participation of females in software development.

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