

Male vs Female IT Student Numbers: What do the Stats Say

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Abstract

Worldwide the participation of females in the field of information technology is low and the attrition rate high. This paper reports on the student enrolment figures for IT courses according to gender at a university in Johannesburg, South Africa and determines what the main reasons are that influence females to enrol for an IT course. Data was collected from a database of 5859 students enrolled for an IT course for the years 2013 to 2017 at a university in Johannesburg. Statistics showed that the percentage of female students enrolled in either an IT degree or diploma for 2013 to 2017 was 21%. It was determined that the main reasons that females choose to pursue an IT field is their interest in the course, the number of job opportunities available and the support that they received from their families. This is the first phase in an ongoing research study to understand why females are underrepresented in IT courses. Future studies will explore what interventions can be put in to place to attract females to study IT courses.

1. Introduction

The 21st century is an era of great technological advances. This is largely due to the level of innovation in the fields of artificial intelligence, robotics and automation. However, for a variety of reasons, Higher Education (HE) students are often reluctant to enrol for Science, Technology, Mathematics and Engineering (STEM) degrees. This is more so apparent for female students as research indicates that these students often doubt their ability, lack confidence and feel that it is a male-dominated sector [1].

Within the STEM classroom at Higher Educational Institutions (HEI's) as well as within the workplace, there are often fewer females than males. Although there are many reasons for this, the notion of the male scientist still dominates society [2] [1]. Within the South African context other factors, such as gender inequality, cultural aspects and social norms influence the career choice of many females [3].

Research indicates that most emerging economies lack qualified individuals to fill vacancies within the STEM sectors. The shortage is exacerbated by a low representation of females. Although developed countries have started to focus on closing the gender

gap, less attention has been given in emerging economies [4]. Furthermore, data on the participation of females in STEM sectors is very limited for emerging economies [4].

Since the worldwide assumption is that there are more males than females studying IT related courses at universities, it was important to determine if this was true for the university where this study was conducted. Therefore, this research aims to investigate the percentage of females studying Information Technology (IT) at a University in Johannesburg. The research question being - What are the enrolment figures regarding gender and IT degrees/diplomas at a university in Johannesburg in South Africa? The researcher also wanted to determine the main reasons that influenced females to enrol for an IT course.

Two research questions were formulated for this study:

- 1) What are the enrolment figures, according to gender, in IT diplomas/degrees at a university in Johannesburg?
- 2) What are the main reasons that influence females to enrol for an IT course?

The first section of this paper highlights the underrepresentation of females studying IT courses and the second section of this paper highlights what influences female students to enrol for IT courses. This paper is the researcher's first paper, in a series of papers, in understanding the status of women in information technology (SWIFT) and more research is needed to be done in this area. The main purpose of this ongoing research is to change females' perceptions of the IT industry and to ultimately implement interventions to attract more females to study IT courses.

2. Literature Review

It is well known that there is a worldwide shortage of applicants available to fill the vast amount of IT based vacancies [5]. This is in spite of universities increasing their student intake in computer science degrees. According to [5], "colleges can't seem to keep up with computers" (page 1). Even though colleges and universities are enrolling more students in IT courses, very few students are female [6]. Statistics from the Department of Higher Education and Training in South Africa find that males are more likely to study STEM programs, whereas females are

more likely to study programs in the humanities [7]. The question is – how can we change this trend?

Unfortunately, the perception of the IT field is a negative one. [8] states that the IT sector is seen as strongly prejudiced against females. The stereotype of males being better at technology than females does not help matters, as females inherently tend to lack confidence in themselves and thus stay clear of IT altogether [9]. Another prevalent stereotype is that the IT industry is for “nerds” [10]. BCS President Liz Bacon states that there needs to be a shift in the way society perceives IT careers if more females are to be encouraged to pursue the field [10].

A study by Google [11] indicated that a deciding factor in females choosing IT courses at university is whether they were encouraged to do so, or had previous exposure to IT. Google found that the main factors influencing females to pursue an IT career were: (1) encouragement from family and peers; (2) being interested in puzzles and problem solving; (3) academic exposure at school or after-school programs; (4) the perception of IT being a career with potential. However, even if females do choose to study IT at HEIs, they are faced with the added problem of computer programming modules being characterised by low success rates (see for example [12] [13] [14]).

Part of the problem of females being underrepresented in IT could be due to them not being encouraged to choose the subject IT offered in high school. The programming component of the subject IT has the largest weighting in the South African curriculum. [15] from the North West University (NWU) in South Africa, express several concerns about the Grade 12 subject IT. Their main concern is that the exit level expectations of the subject (National Qualifications Forum Level 4) are too high when compared to first and even second year expectations at university level (National Qualifications Forum level 5 and 6) making it extremely difficult for school learners to succeed. [16] agree that there is a disconnect between the way IT subjects are presented at high school compared to higher education. High achievers at school do not want poor performance in IT to affect their overall average and so they do not choose IT as a subject. Females who doubt their abilities and lack confidence especially stay away from the programming subject IT. It seems that universities need to do more collaborating with high schools to impart knowledge to learners on the different IT fields and careers that they can pursue as well as the skills they would need to pursue them.

3. Methodology

In order to determine what the enrolment figures regarding gender and IT degrees/diplomas are at the

institution where the study was conducted, data was collected from the university’s database for the years 2013 to 2017 of all students studying an IT degree or diploma. These included: BSc in Information Technology, BSc Computer Science and Informatics, National Diploma Business Information Technology, and National Diploma in Information Technology. Data was collected from a database of 5859 students.

In order to determine what influences females to choose an IT career, a questionnaire was given to one sample group of students. Annually, the university where the study was conducted has an intake of 120 students for the National Diploma Business Information Technology. The total sample size for the questionnaire consisted of 113 students. Sampling for this study was based on convenience sampling as the researcher included student’s that were accessible to her and formed part of her lecturing classes.

4. Analysis

The data was analysed descriptively. The total number of students registered for an IT degree or diploma at the university where the study was conducted totalled 5859 students for the years 2013 to 2017. Figure 1 indicates the average percentage of male students enrolled in either an IT degree or diploma for 2013 to 2017 was 79% and the average percentage of female students enrolled in either an IT degree or diploma for 2013 to 2017 was 21%.

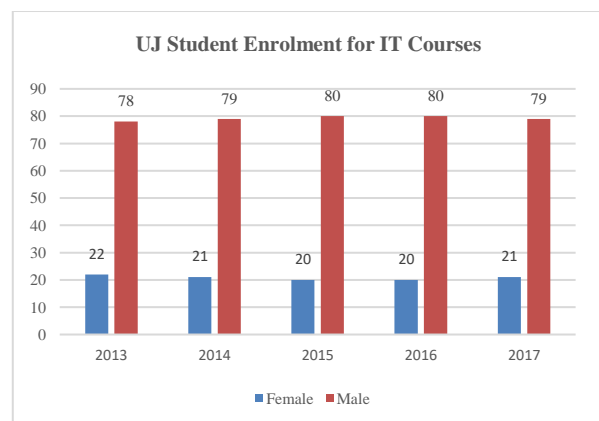


Figure 1: Student enrolment figures for IT courses according to gender

A questionnaire was given to one sample group of students studying the National Diploma Business Information Technology at a university in Johannesburg. 71% of the students were male and 29% female. In order to find out more information from the female students, the male students’ questionnaires were discarded. 42% of the female students indicated that IT was not their first choice of study, these questionnaires were further removed. Only the remaining questionnaires are reported on.

The data collected from the questionnaire was transcribed verbatim. Keeping the research questions in mind, the data was manually analysed sentence-by-sentence in order to determine whether there were similarities or patterns to help interpret the data. A total of 19 female students responded.

To understand what the main reasons were that influenced females to enrol for an IT course, students were asked why they chose to study a diploma/degree in IT.

The responses included the following comments:

- (1) "I was studying marketing at College last year and one of my subjects was computer practise, that's when I realised I had a love for computers and wanted to know more."
- (2) "I wanted to further my interest in the subject as I did CAT in High School."
- (3) "I love working with computers and everything about IT fascinates me."
- (4) "I chose IT because I love computers and based in the world we are living in today, technology literacy is very important."
- (5) "I love new challenges, so technology brings me new challenges because it is not static, there is always something new to learn."
- (6) "I researched IT before choosing it as a career choice. I found it to be very challenging but at the same time interesting. IT also has many job opportunities."
- (7) "I was always passionate about computers and wanted to learn how they worked. I started using them from a young age and was always fascinated by the different components and how they all work together as a whole."
- (8) "When my mom bought a new phone she would give it to me to teach her how to use it. At that stage I didn't know anything but I found it easy to learn."
- (9) "I am a very inquisitive person. I am interested in finding out how things work. I am a gadget fanatic. I figured that because of this IT is the field for me."
- (10) "IT seemed like it had a lot of job opportunities."

In summary, the researcher concludes that the majority (74%) of students were enamoured with IT (some of them were exposed to computers at school) and a few (26%) felt that there were more job opportunities in IT than other professions.

Female students were also asked what the reactions were of their family and friends when they first became interested in information technology.

The responses included the following comments:

- (1) "My family was excited because I had finally found something that I wanted to pursue. My friends however, said that I didn't know what I was getting myself into since they had heard stories about how IT is difficult and a lot of work."
- (2) My family supported my decisions regarding my interest in IT. They know that IT is a very large field, so there are many job opportunities available."
- (3) "My family said that if I love something I should just go for it, so they were happy that I finally found something that interested me."
- (4) "Most of my family do not know what IT is. My friends told me that IT is hard and that I am going to fail. I told my friends that I believe in myself."
- (5) "They were happy for me because they knew that I loved gadgets and that I had a fascination for technology."
- (6) "My sister studied a BSc in Computer Science, so my family was happy because they knew what the course was about."
- (7) "They were very supportive."
- (8) "My family was impressed because they knew of my interest in IT."
- (9) "My parents and friends were not really surprised that I was opting for IT because they know my love for gadgets."
- (10) "They were fine with my choice."

In summary, the researcher concludes that the majority (73%) of students' families were supportive of their study choice, however, 11% of students families did not support them and 16% indicated that their friends weren't supportive.

Finally students were asked what kind of jobs they would one day like to do with their IT Diploma/Degree?

Students' responses were:

- (1) Security (12%)
- (2) Software developer (16%)
- (3) IT technician (6%)
- (4) Programmer (32%)
- (5) Web developer (6%)
- (6) IT analyst (6%)
- (7) Technical support (6%)
- (8) Business analyst (16%)

In summary, the researcher concludes that the students' career choices were varied, which shows that as technology progresses, the need for information technology professionals will only increase.

5. Findings and Conclusions

This research aimed to investigate the current state of females studying Information Technology (IT) at a University in Johannesburg. It was found that the average percentage of male students enrolled in either an IT degree or diploma for 2013 to 2017 was 79% and the average percentage of female students enrolled in either an IT degree or diploma for 2013 to 2017 was 21%. This is consistent with statistics presented around the world, where female numbers linger around the 20% mark [17]. These numbers are, however, low and future studies need to explore what interventions can be put in to place to attract females to study IT courses.

The second aim of this study was to determine what factors influence females to choose an IT career. In accordance with the study by Google [11] this study found the main reasons females choose to pursue an IT career is their interest in the course, the number of IT job opportunities that are available and the support that they received from their families. A few students mentioned prior exposure to computer courses being what peaked their interest.

This is the first phase in an ongoing research study to understand why females are underrepresented in IT courses. Further research will track students who participated in the study to determine how many of them drop out, fail or stay the course. The researcher also plans on collecting information further afield, both nationally and internationally to fully understand the underrepresentation of women in IT.

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