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# Women in computing in Saudi Arabia

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## ABSTRACT

Women are generally under-represented in tertiary computer science education in most countries around the world, especially in the West. The most recent report of the National Science Foundation in 2014 shows that only 14% of woman study CS in USA, and that the country the holds lowest proportion of women receiving Bachelor degrees of all the fields of Science, Technology, Engineering, and Mathematics (STEM) [1].

At UK universities, in 2014, 16% of CS students were female, despite initiatives to get more women into (STEM) subjects. Also a significant proportion of students in (STEM) are international students some of whom are from Arab countries.

The percentage of women in CS in Europe and the US is significantly lower than in other countries such as India, Malaysia and the Arab region. In India, CS has been perceived as a woman-friendly field. Women in India believe that CS provides good opportunities for future employment [3]. In Malaysia, there is a large number of women in CS, which is considered also a woman-friendly space and a safer environment. The cultural setting of the eastern peoples however, is considered one of the primary factors [4].

In 2014, 59% of students enrolled in CS-studies in government universities in Saudi Arabia were women [8]. Women have been encouraged to study CS through various factors such as the distribution of CS colleges across the kingdom, gender separation, and culture.

**Fayiq Alghamdi** is a member of the Uppsala Computing Education Research Group (UpCERG) that conducts research in learning and teaching computing in higher education. Among the group's interests is to study globalization and cultural aspects in CS learning. Alghamdi originates from Saudi Arabia and has worked at Albaha University and is therefore familiar with the Saudi Arabian culture and educational system. His current position at Uppsala University has allowed him to experience another culture and educational system.

## INTRODUCTION

Computing Science is a discipline that changes rapidly. Information technology in the Arab region generally needs more investigation to minimize the gap between the developed and the

developing Arab countries. The major problems negatively affecting the flourishing of ICT in most Arab region are mostly

problems related to basic infrastructure and economy and others related to governments' policies and regulations [4].

In fact, there are signs of the beginning of the development of the CS field in SA. In 2015, 62% of the applicants to the Bachelor's Program in CS at the University of Albaha in Saudi Arabia were women. In the last tow years Saudi Arabia organized several conferences in CS as follows:

In 2015:

- 1- The first ABU3QCE, [http://www.it.uu.se/research/group/upcerg\\_new/ABU3QCE](http://www.it.uu.se/research/group/upcerg_new/ABU3QCE)
- 2- The international conference on Cloud Computing ICC15, <http://www.pnu.edu.sa/ICCC/Pages/Home.aspx>
- 3-Social networks and intellectual security conference, <http://computer.org.sa/?lang=en>

In 2016:

The 1st National Computing Colleges Conference (NC32016), [http://nccc.kau.edu.sa/Default.aspx?Site\\_ID=6110001&lng=EN](http://nccc.kau.edu.sa/Default.aspx?Site_ID=6110001&lng=EN)

Currently the country is preparing for laTICE 2017 conference.

Additionally, the Saudi Computing Colleges Committee-SCCC has been established in 2014. It is composed of 32 members who are the deans of the Computer faculties in public universities. The aim of the SCCC is to improve CS in SA by achieving the following goals:

1. Promote the Exchange of experiences, expertise and successful practices among the CS and Information faculties in the Kingdom;
2. Unify efforts and cooperation in joint academic and administrative issues;
3. Seek to improve the performance of participating colleges and enhance the scientific and administrative level;
4. Develop curricula and study plans in line with the international standards, labor market, and requirements of local and international academic accreditation;
5. Adopt and support faculty development programs;
6. Encourage and support joint scientific research;

7. Facilitate the exchange of scientific production in the research and academic fields as well as graduate studies;
8. Ensure continuous improvement of the specification and outputs of computer and information colleges in compliance with the requirements of time and labor market;
9. Support the emergence of new colleges by overcoming the obstacles that might encounter them;
10. Define the most prominent problems facing the member schools and propose appropriate solutions.

Total			Programs			Branches			Regions			Field of study
Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	
7,444	4,363	3,081	140	71	70	4,918	2,863	2,055	2,363	1,411	952	Governmental universities
681	367	314	0	0	0	674	367	307	0	0	0	Information technology
0	0	0	0	0	0	0	0	0	0	0	0	Information technology
0	0	0	0	0	0	0	0	0	0	0	0	Information technology
0	0	0	0	0	0	0	0	0	0	0	0	Information technology
13,115	7,260	5,855	140	71	69	5,662	3,264	2,398	7,136	4,084	3,052	Information technology

Furthermore, the Arab Women In Computing Association (ArabWIC) is another phenomenon that worth mentioning. Its mission is to “support, inspire, retain, encourage collaboration among, increase visibility of and help elevate the status of Arab women in computing from the various computing/technology sectors (academia, industry and entrepreneurship), and allow them to achieve their career goals. Also, to create linkage with international women-in-CS organizations”.

ArabWIC was founded during 2012 New York University Abu Dhabi (NYUAD) regional collaborative Workshop on Women in Computing in the Arab World, where participants unanimously agreed to create an international organization for Arab women in computing. Thanks to the NYUAD Institute and their support of ArabWIC, there is a listing of ongoing projects:

- 1) Conduct research about Arab women in computing;
- 2) Convene an annual conference on Arab women in computing;
- 3) Develop a mentoring program to support Arab women in computing (academics, entrepreneurs, and women in industry);
- 4) Publish a newsletter and other research publications;
- 5) Fund-raise for scholarships for graduate study and conferences, awards to promote and support Arab women in computing at all levels;
- 6) Develop a comprehensive database to support networking and visibility for ArabWIC.

In searching the subject I came across an article in Arabic “The trend toward computer - A comparative study by sex and other variables” published in Egypt in 2002. The article concludes that males and females alike accept CS as a field of study, and that there are no significant differences between the sexes in terms of preferential direction towards CS, except for a high degree of concern from CS among females. There is also no difference associated with age. The rising level of CS anxiety among females is due to the lack of training and practice. The level of positive trend also rises towards the CS with both sexes [3].

## METHODS AND MATERIALS

This study uses data from the observatory on education in SA which is “a specialized system” of monitoring, research, studies, evaluation. And correction, that has as members the partners in development and is affiliated to the council of Higher Education. It collects and analyzes data, statistics, and information, and it undertakes fields surveys in all areas that relate to the higher education sector. It processes all these in a manner compatible with the requirements of measurement, comparison, publication, archiving, and retrieval in the fields of development of this vital sector, with the aim of improving its performance.

## RESULTS

There are 30 colleges offering computer programs in Saudi Arabia. The proportion of total government spending on higher education is 9.4% as of 2014, while the proportion of female graduates was 45,8%. and the number of students studying IT in SA was 13,155 in the same year[9].

The 30 colleges are spread all over the kingdom which is important for people who seek enrollment nearby. There is also a special university dedicated to woman called Princess Nourah bint Abdulrahman University established in 2006, making it the largest female university around the world.

In addition, an improvement in the field of CS is noticed recently as the number of graduates climbed to 28 820 as of 2015 compared to the 41.6% percentage of 2010 representing 20,355 graduates. In terms of gender comparison however, the field records a higher female ratio of 55.5 as of 2010. [9]

## DISCUSSION

Three pushing factors used to encourage women to study CS in SA are subject to discussion. These are: the geographical distribution of CS colleges, gender separation, and the culture issue.

First, today in SA there are 39 universities hosting 1,496,668 students as of 2015. There are 769,758 male students and 726,920 female enrolled in higher education [9].

There is a wide range of specialties for students to study, with no fees at all for admission. However, college students must be Saudi citizens or residents of the Kingdom of Saudi Arabia holders of valid Iqamas (residency). Student also should be aged less than 17 years old, and a holder of a high School Certificate (Class 12) issued in or out of the Kingdom of Saudi Arabia. The student must also successfully pass the Aptitude Test offered by the National Center for Assessment in Higher Education. In 2015 the total number of students who completed the high school was 405,941 while the number of seats in universities was 424,484.[12]

Second, the separation of gender is a rooted principle in Saudi Arabia. In fact, the female education model in a traditional Muslim country like SA is u unique of its kind. Its strategies for the reproduction of gender divisions are among others: (1) a dual system of male and female education; (2) a gender-specific educational policy that emphasizes women's domestic function; (3) gender-segregated schools and colleges; and (4) curriculum differentiation at the various educational levels. [12]

It is a unique system where women and men contribute to build their own country in their respective parameters. I expect however, that women will achieve more in the information field.

Third, the cultural issue is related to the Islamic religion. SA is a 100% Muslim country which means Islam is an important aspect

of the Saudi society. One characteristic that distinguishes believers of Islam from the believers of other faiths is that Muslims are abiding by the Qur'an even in their lifestyles [13].

Islam urges to read and learn and contribute to science and regulates the handling of men and women not only in learning environment but also in all aspects of life.

## CONCLUSIONS

This paper focused on the study of CS in SA with a special focus on women. It also helped explain why the percentage of women is higher than that of men in CS field. It pointed out that the distribution of CS colleges across the kingdom allowed women to remain in their home cities and study CS, in compliance with the culture that obligates women to stay with the family until they are married. Another fact is that women prefer to work and stay in safe and quiet places. The universities and the system in SA in general support this by establishing female sections in public places. The article also highlighted the role of gender separation in encouraging women to study CS; an example of this is the largest female university in the world.

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