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Women's and Girls' Participation in Science and Technology in North Africa

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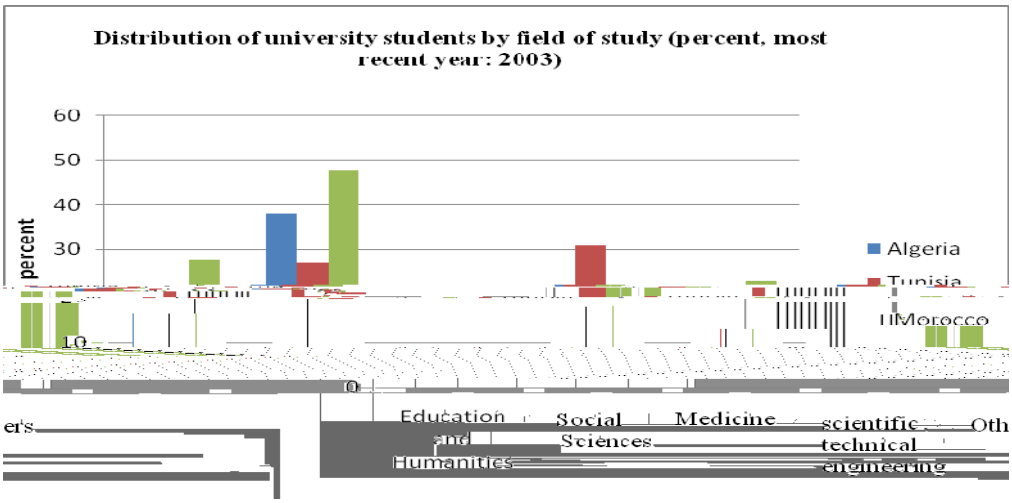
Introduction

The Arab Human Development Report for 2002 has shown that the Arab world faces three key deficits; these are the gaps



Source: UNESCO Institute for statistics, Data centre (accessed in June 2006).

Situation in Tunisia

In the last decade, Tunisia has made strong efforts to change its educational system to increase the student ratio in science and technology fields at secondary and tertiary levels. A remarkable progress has been achieved for both boys and girls. Statistics published by the Tunisian ministry of education in 2008 shows that 62 per cent of students at the upper secondary level pursue science, technical and computing studies. In Tunisia, secondary level students have to choose between four fields: human science, science, computing technologies, economy and services. The percentage of students by field of study is summarized in Table 4.

Table 4: Percentage of students by field of study by sex

	Total	Male	Female
Human science,	18.8	27.2	72.8
Science (total): * Experimental science * Mathematics * Technical science	46	44	56 71.3 51.3 23.2
Computing technologies	16.3	59.3	40.7
Economy and services	18	40.7	59.3

Source: The Tunisian Ministry of Higher Education and Scientific Research (2008)

Data for higher education (Table 5) show an important increase, in the last decade, in the number of students in science, computing, engineering, manufacturing, and business and administration, with a high participation rate for girls.

Table 5: Number of tertiary students by field

	1998-1999	2008-2009	% girls in 2008
Science	24886	37657	58.4
Computing	7498	50491	48
Engineering	8418	37078	32
Manufacturing	647	2068	40
Business and administration	12542	64935	60

The percentage for master's degrees includes all higher education graduates (technical degrees, two year professional degrees, bachelor, master and engineer diploma), except PhD degrees. Women outnumber men significantly among master's degree graduates but the pattern does not persist at the Ph.D. level.

In research structures of institutes and universities, the percentage of female researchers is 30-45 per cent. As this percentage covers all research fields, there is a need for more detailed data on women's participation in particular subfields of science and technology.

II) Employment

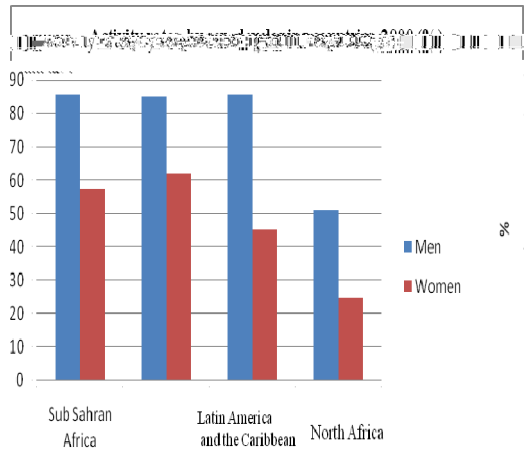
1) Economic growth and employment growth

"The rapid growth in the population and labour-force participation in the MENA region was not associated with sufficient job-creating growth to absorb the increase in the supply of labour. Thus, a combination of high population growth and increased participation of women in the wage-labour force, together with insufficient job creation, resulted in higher unemployment, especially in Algeria, Morocco, Syrian Arab Republic, Jordan, and Tunisia."

A World Bank report, entitled "The Road Not Traveled" (published February 2008), highlights what must be done to overcome the present macro-problems: low adult literacy, high dropout rates, relatively low scores on international tests, and a disconnect between the region's education system and labour markets. As a consequence of the last deficit, the high drb

Table 9: Activity rates, by sex, developing countries, 2000 (%)

Regions	Men	Women
Sub Saharan Africa	85.5	57.4
Asia	85.	62.0
Latin America and the Caribbean	85.5	45.2
North Africa	51.0	24.7



Source: CAWTAR (2001)

The data for 1980 and 2000 show that women's activity has changed, also in terms of age

The distribution by sector of economically active women is also beginning to change, showing greater diversification[10]. Upon leaving the agricultural sector, women went mainly towards the service sector. In 1990, a little less than one third of women's labour force was found in this sector. In the industrial sector, the rise in the proportion of active women has also been general; in 1990 the highest concentration of women active in industry was found in Tunisia (31.55 per cent) and in Morocco (19 per cent). Detailed data on the industrial sector reveal the place occupied by manufacturing activities (mainly textiles, clothing and leather) for the female labour force in Tunisia, and Morocco. Given the low levels of technology and qualification required for this work, this sector uses a high proportion of unqualified labour. Women with little or no education have provided the major source of labour for this sector. They are preferred to men because there is a tradition of women working in these sectors, and because women are considered more flexible, more docile and cheaper than male workers are. Thousands of women with no qualifications may lose their jobs during the process of technological transformation. In these countries, increased competition has driven unqualified women out of the labour market.

a) Women's jobs

In North Africa, the public sector has been the main employer of the female workforce. In contrast, more men are found in the private sector.[11].The highest concentrations of women employed in the public sector are found in Algeria[12] man0005 Tc 0c1i26jEMC 9 in theipl[e 0 Td(ce1.0.0

- 40 per cent of university professors
- 16.7 per cent in the sector of agriculture and fisheries
- 26.4 per cent in the die sector of manufacturing industries
- 46.9 per cent in the sector of commerce and services

Data on the share of women in S&T research and their representation by field in scientific and technological careers is not available. The total proportion of women researchers is 30.1-45 per cent in Tunisia (30.1-45 per cent in Algeria, 0-30 per cent in Morocco).They mainly work at university research structures. In academic careers (teaching and research), the percentage of women academic staff varies by field, grade, and university

Table 11: Percentage of women academic staff by grade

Position	%
Assistant professor (grade C)	70
Assistant professor (grade B)	50
Professor (grade A)	10

Women are underrepresented in positions of S&T leadership – in senior professorships, research projects, and institutional management. As of 2004, approximately 92 per cent of research team leaders in research structures (research laboratories) were men. As a result of women's absence among scientific and technical staff in government research and development institutions, women have been completely absent in decision-making and priority setting in scientific research.

b) Entrepreneurship

Entering the formal economy as workers or businesswomen allows women to provide for themselves and their families, and to play th

Industry	42%
Commerce	14%
Craft	10%
Total	100%

Women's activities were mainly in textiles, clothing and leather (25.1 per cent), cultural and social services (25.2 per cent), and trade (18 per cent).

In Morocco, the number of businesswomen managing and/or owning a business involving several sectors of activity and employing qualified labour is around 5000, which represents about 0.5 per cent of the total of working women. Most of these female-run businesses are small and medium-size businesses, operating in the organized sector, mainly in clothing and services sectors (50 per cent and 47 per cent respectively). Of these businesses, 70 per cent have recently been created and are concentrated in the country's capital. 75 per cent of the women are aged between 30 and 39; and almost half of them employ fewer than ten workers (40 per cent).[17] A survey of the manufacturing sector identified 39 businesses managed by women (representing 5 per cent).[18]

The emergence of the services sector has also played an important role. We can in fact observe a predominance of businesswomen in the tertiary sector, and their concentration in activities that constitute an extension of their traditional role in society, such as dressmaking, weaving, confectionery and food processing. This trend can be explained by the following facts, in particular:

- In taking up these types of activity, women are apparently more easily accepted in the business milieu, and by suppliers and customers.
- Since women generally have limited financial resources, they choose activities which are more accessible and which can often be practiced from home.
- They are able to combine family and professional responsibilities, particularly in the case of young women.
- They opt for activities where they have an absolute advantage, having an insight into what women and families need today and therefore being better placed to respond to these needs.

Women also invest in activities with a high value added. In fact, we are seeing the emergence of a new generation of women with high education who are turning to modern sectors such as import-export operations, consultancies, training, tourism, etc. They are also present, although a minority, in other domains such as industrial food processing, fishing, construction, mechanical and electrical industries, chemistry, rubber and construction materials.

4) Youth unemployment

Despite all the efforts to promote growth and significant investments in education, North Africa exhibited the highest youth unemployment rate in the world (25.7 per cent in 2006) as well as a large gender gap in unemployment. Recent estimates predict that as a result of the economic crisis, youth unemployment could increase up to 4 per cent in North Africa over 2008-2009, and particularly impact young women. Despite relatively high and sustained economic growth since 2004, employment creation has been insufficient to significantly

[17] ILO (2002c)
[18] Morocco (2002)

reduce unemployment, or to abso

In Tunisia where the labour market is more competitive, people with higher educational attainment may compete with less educated candidates for the same jobs. This has generated a situation in which young people with basic or intermediate education find it difficult to enter the labour market. In order to address this significant increase in unemployed graduates, the Tunisian Ministry of Employment and Professional Integration of Youth, in collaboration with the World Bank, conducted a survey at the end of 2005 on young graduates to attempt to identify some mechanisms to integrate them in the labour market.

Some results of the study of 4763 young graduates (Statistics 2005)

- 46 per cent of young graduates did not have a job 18 months after graduation.
- Graduates with master's and advanced technician diplomas represent 90 per cent of graduates.
- Nearly 50 per cent of graduates with master's and advanced technician diplomas are unemployed.
- Ten per cent of engineers are unemployed, the lowest percentage of unemployment among all diplomas and specialties.
- The unemployment rate for technicians from higher institutes of technology (Instituts supérieurs des études technologiques (ISETs)) is 45 per cent, compared to 53 per cent for the non-ISET technicians.
- Young women represent 57 per cent of graduates compared to 43 per cent of young men.
- 51 per cent of men are employed compared to 38 per cent of women.

Two principal recommendations of the study

Better align graduates' skills with the needs of the economy.
Overall, the results of the survey show a serious imbalance between the actual skills of graduates and the demand for skills in Tunisia. The diploma and the field of specialty remain the principal factors that dictate entry into the workforce.

Identify mechanisms to adjust the flow of students that pursue different diploma specialties and better align the graduates' skills with the needs of the economy.
In the short-term and medium-term, the analysis also suggests the need to strengthen the employment assistance programs, however, it is important to structure these programs in a manner that will maximize their impact and minimize their costs. In sum, education systems in MENA will have to change to adapt to new demands of the labour market and the increasing number of youth.

5) The region needs to reshape its education systems to face up to economic, demographic and financial challenges[19]

The objective of a basic level of instruction for all has been reached but the path taken in the future will need to address three realities:

The knowledge economy: Competitiveness today depends on firms that employ a well-educated, technically-skilled workforce, and that are capable of adopting new technologies and selling sophisticated goods and services.

[19] World Bank (2008). The Road Not Travelled: Education Reform in the Middle East and North Africa., Washington D.C.