*Women in Computing around the World:
The ACM-W Ambassador Program*

Grace Hopper Celebration of Women in Computing 2002 Panel

Ambassadors around the World

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ACM-W Mission

The mission of ACM-W is to engage in activities and projects that aim to improve the working and learning environments for women in computer science (CS). This includes promoting activities that result in more equal representation of women in CS such as mentoring or role modeling, monitoring the status of women in industrial and academic computing, providing historical information about women's accomplishments and roles in CS, and serving as a repository of information about programs, documents and policies of concern to women in CS. ACM-W is interested in encouraging women to pursue CS as a career all along the pipeline from K-12 to professional.

http://www.acm.org/women/

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Panelists

- **Denise Gürer -- United States, Panel Moderator**
- **Anne Condon -- Canada**
- **Reyyan Ayfer -- Turkey**
- **Annemieke Craig -- Australia**
- **M. Suriya -- India**
- **Veronika Oechtering -- Germany**
- **Jehan Ara -- Pakistan**
- **Ursula Martin -- United Kingdom**
- **Vashti Galpin -- South Africa, Panel Organizer**

Ambassadors around the World

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ACM-W Ambassador Program

- **Currently 8 Ambassadors**
- **Websites - programs, statistics, references, resources, other information**
- **Indian ambassador (M. Suriya) helped organize the first Women in IT Conference in India (WIT 2002)**

How can ACM-W help improve the status of women in computing worldwide?

Ambassadors around the World

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ACM-W
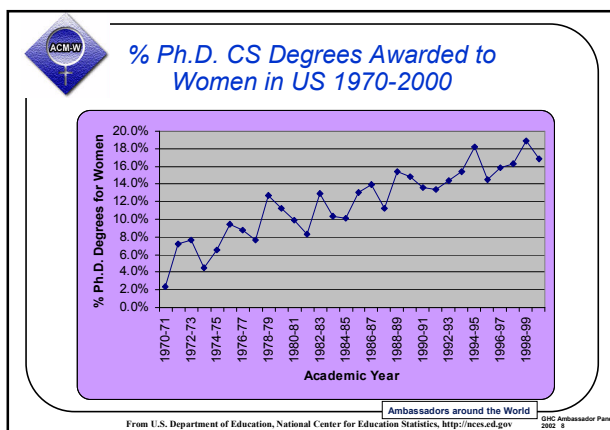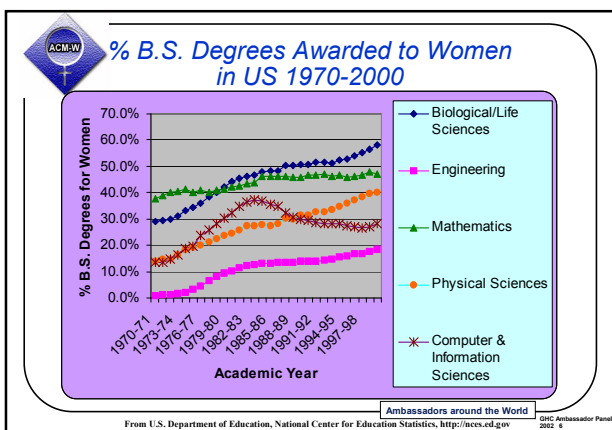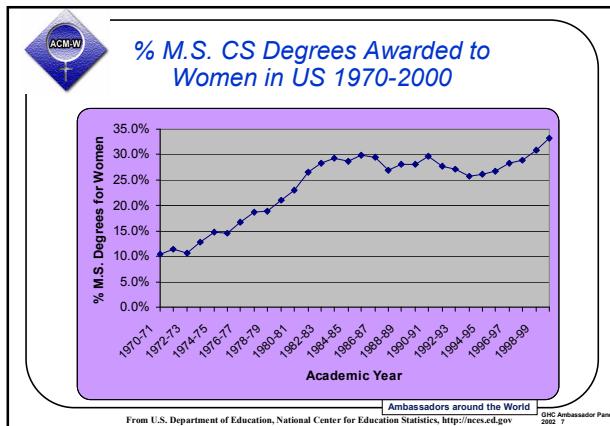
Women Faculty in US -- for Ph.D. Granting Institutions

- **Teaching**   **26%**
- **Assistant Professor**   **14%**
- **Associate Professor**   **13%**
- **Full Professor**   **8%**

Distribution Among Female vs. Male Faculty

Teaching	**32% F**	**14% M**
Assistant	**23% F**	**23% M**
Associate	**25% F**	**25% M**
Full	**20% F**	**38% M**

From 1999-2000 Taulbee Survey
http://www.cra.org

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Canadian Women in Computing

Anne Condon, U. British Columbia

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Workforce in US

- **45% of US workforce are women**

- **12% of science and engineering jobs are held by women**

From Balancing the Equation: Where Are Women and Girls in Science, Engineering, and Technology?, 2001, The National Council for Research on Women

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Online Courses Per 100,000 Population, March 2002

Canada – Statistics

percentage of undergraduate women in Canadian CS programs (CRA Taulbee survey)

Canada – Statistics

percentage of female graduates by field of study

Canada – Statistics
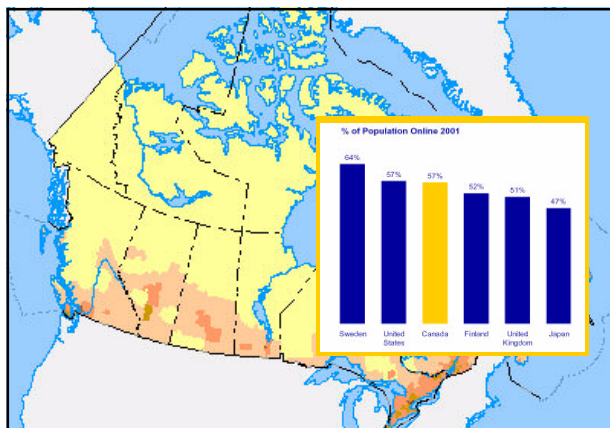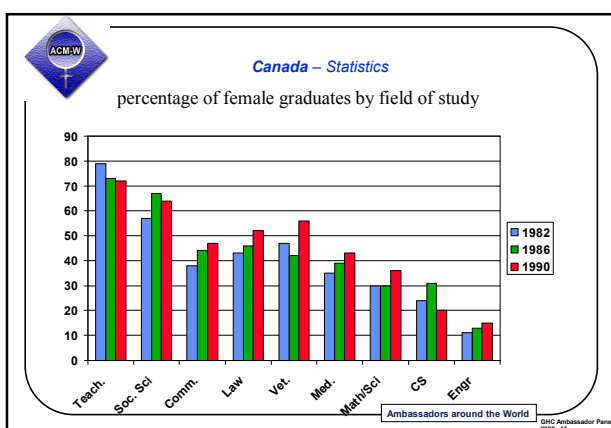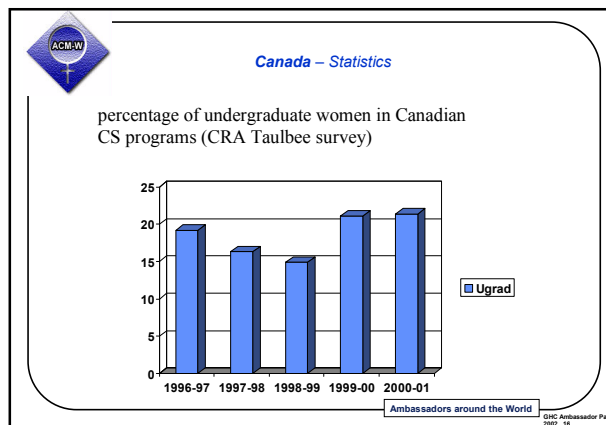
- girls consistently obtain higher marks in high school than do boys
- women in CS earn less than men
- women in CS reported lower job satisfaction than women in teaching, law, engr. medicine, and all 7 other reported fields of comparison (1995)

Canada – Research

- **NSERC-Industry Chairs**
  - five regional chairs conduct research as well as action plans on gender and science
  - Maria Klawe is Chair for BC and the Yukon
    » gender differences in students' attitudes towards computing careers
    » E-GEMS: research on children's interactions with computers and design issues for educational games
- **CCWEST** (Canadian Council for Women in Engineering, Science and Technology)
  - biannual conferences report on gender related research across Canada and beyond

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Canadian Women in Computing Web Site

http://taz.cs.ubc.ca/swift/cwic/index.html

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Canada – Organizations

- **SCWIST** (Society for Canadian Women in Science and Engineering)
  - organizes events, mentoring programs
- **Wired Woman Society**
  - encourages women to explore opportunities in technology and to build successful careers
- **SWIFT** (Supporting Women in InFormation Technology)
  - research and outreach activities to increase the participation of women in information technology, part of NSERC Chairs
  - 20% of UBC CS faculty are women!
- **ACM-W, CRA-W**
  - CWIC web page
  - Canadian distributed mentor program
- **NSERC** programs for new women faculty
- **University programs** at several institutions nationwide

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Turkish Women in Computing

Reyyan Ayfer, Bilkent University

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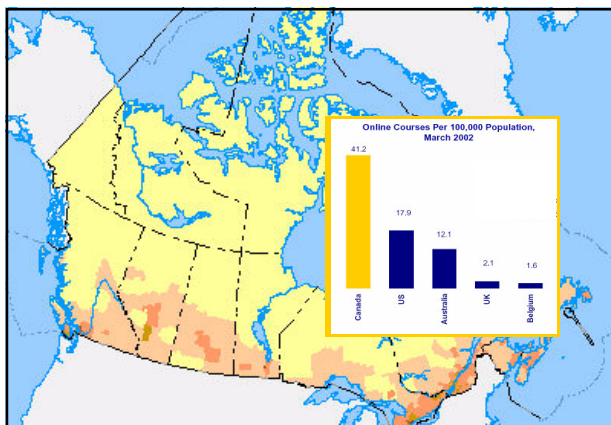## Merhaba!

Turkey,
where the East meets the West…

Population:
~ 67 million

Land:
814 578 sq km

www.turkey.org

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Education System

Elementary: 8 years (mandatory)
...choosing field of study

High School: 3 years
…national university entrance exam
Strong math and science background

Higher Education: 2 year vocational school
4 year university/college

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Women Status

1923: Turkish Republic founded

1926: Civil Code accepted

1934: Women gain rights to vote and to be elected

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Choosing a Career

- **a decision is typically made around age 14**
- **central placement with a national university entrance exam, student preferences considered**
- **students are required to have a high school degree relevant to the higher education field**

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Turkish Women in Computing

- undergraduate education for computing started in 1980 with almost equal number of male and female students
- no gender discrimination
- however, recently only 20% computing students are females

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Students in Higher Education
(Numbers)

	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002
F	509809	557151	580596	605308	656005	694372
M	793379	852476	884144	898673	951383	983564

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Students in Higher Education
(Percentages)

	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002
F %	39.12	39.52	39.64	40.25	40.81	41.38
M %	60.88	60.48	60.36	59.75	59.19	58.62

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Undergraduate Students in Computer Science
(Percentages)

	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002
F %	18.31	19.60	20.04	20.42	20.44	20.69
M %	81.69	80.40	79.96	79.58	79.56	79.31

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Undergraduate Students in Computer Science
(Numbers)

	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002
F	759	992	1219	1458	1753	2068
M	3386	4070	4864	5681	6824	7926

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Graduate Students in Computer Science
(Numbers)

	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002
F	160	178	177	182	262	278
M	691	703	780	950	1289	1456

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Graduate Students in Computer Science
(Percentages)

	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002
F %	18.80	20.20	18.50	16.08	16.89	16.03
M %	81.20	79.80	81.50	83.92	83.11	83.97

Ambassadors around the World

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Vocational Students in Computer Systems
(Percentages)

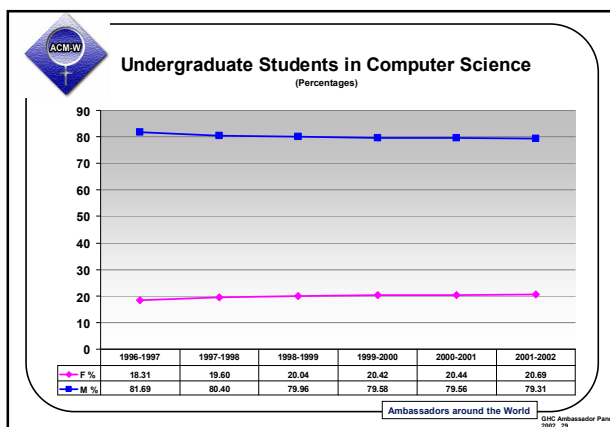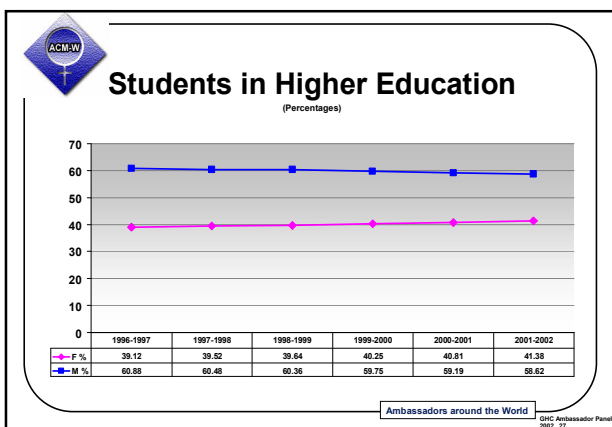|	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002
F %	17.91	22.88	25.41	27.42	29.36	30.51
M %	82.09	77.12	74.59	72.58	70.64	69.49

Ambassadors around the World

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Vocational Students in Computer Systems
(Numbers)

	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002
F	1132	1888	2561	3205	4129	5316
M	5187	6363	7516	8485	9936	12110

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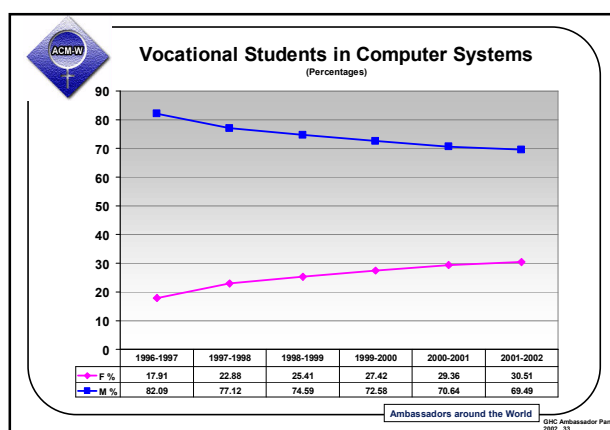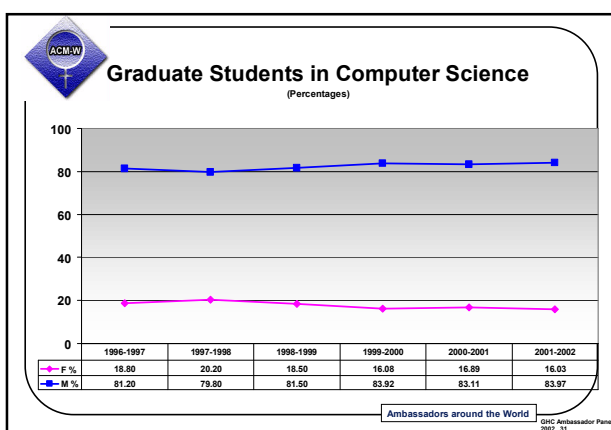**Bilkent Computer Engineering Graduates**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
M	7	18	33	37	35	41	37	43	47	53	43	45	43
F	2	10	13	6	11	8	8	8	6	7	8	3	15

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Bilkent Graduates

%M
%F

PhD Computer Engineering
MS Computer Engineering
BS Computer Engineering
BS Computer Tech and Inf Systems
AS Computer Tech and Programming
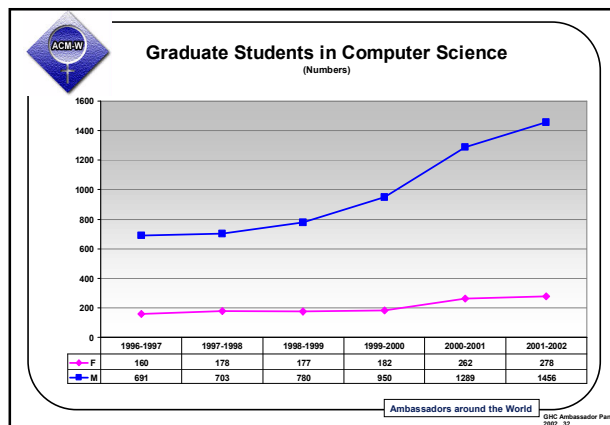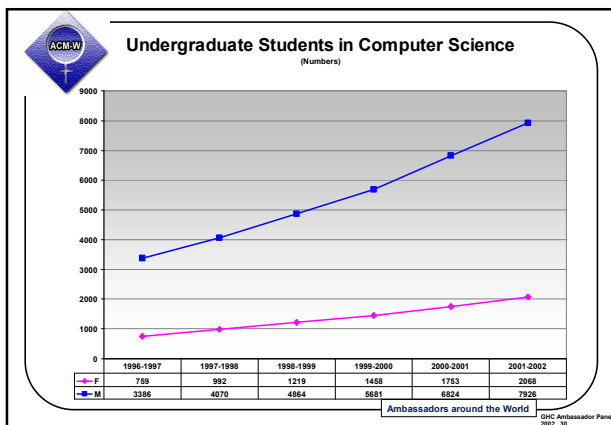
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Bilkent Computer Programming Graduates

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
F	4	2	6	9	16	20	12	14	13	17	16	10	9	18	16
M	5	9	14	32	19	17	13	16	8	19	17	8	12	20	21

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Why?

- **Women's role and responsibilities**
- **Jobs require working overtime and traveling**
- **Girls not particularly interested in mathematical subjects**

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However...

WIC should make a difference!

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Although...

- **no discrimination**
- **salaries are assigned to jobs**
- **women are preferred (no military obligations)**
- **promotion possible**
- **women are well represented in IT and many role models exist**

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The Australian Story

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Work Force

- **In 2000; 43.6% of the total Australian workforce are women**

Participation Rates

From Australian Bureau of Statistics 1995, The Labour Force Australia,
Catalogue 6203 and Australian Bureau of Statistics 2001,
Australian Social Trends 4102.0, Page 118

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Education

- **High School Retention Rates**
  - **All students 72%**

	1990	2000
Women	69.9 %	78.7 %
Men	58.3 %	66.1 %

- **Student Population in Higher Education**
  1981 - 45% were women
  2000 - 56% were women

From Australian Bureau of Statistics 2001,
Australian Social Trends 4102.0, Page 92

Ambassadors around the World

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Access to Technology

In 2000;
- **54 % of all households had a computer**
- **33 % of all households had access to the Internet**

In 2001;
- **An estimated 9.2 million adults (66% of Australia's adult population) access the Internet regularly**
- **10 % of Australian adults (1.3 million) used the Internet to purchase or order goods or services for their own private use**

From Australian Bureau of Statistics 1999,
Australian Housing Survey

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Computer Science

What is it?   Computer Science: Information Systems

- High School level

Female Students	1999	2000	2001
Information Systems	11.3%	11.6%	13.2%

From Australian Standard Classification of Occupations
Cat 1220.0, DETYA Selected Higher Education
Student Statistics 1998 , and VCAA

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Computer Science

What is it?   Computer Science: Information Systems

• High School level

Female Students	1999	2000	2001
Information Systems	11.3%	11.6%	13.2%
Info Processing & Management	46.2%	45.0%	41.7%

From Australian Standard Classification of Occupations
Cat 1220.0, DETYA Selected Higher Education
Student Statistics 1998 , and VCAA

Australia
Ambassadors around the World
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IT Industry figures for 2001

	Male	Female
Bachelor	77.9%	22.1%
Salary (Aus$)	$40,000	$40,000
Graduate Cert/Dip	66.2%	33.2%
Salary	$50,000	$45,000
Master Coursework	69.9%	29.9%
Salary	$60,000	$48,000
Master Research	82.5%	17.5%
Salary	$61,200	$56,000

From http://www.gradlink.edu.au/ accessed Sep 2002

Australia
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Computer Science

What is it?   Computer Science: Information Systems

• High School level

Female Students	1999	2000	2001
Information Systems	11.3%	11.6%	13.2%
Info Processing & Management	46.2%	45.0%	41.7%
Any IT subject	41.1%	39.4%	35.9%

• Tertiary level
  36 Universities; Total number of students 24,283
                      Females 21.3%

From Australian Standard Classification of Occupations
Cat 1220.0, DETYA Selected Higher Education
Student Statistics 1998 , and VCAA

Australia
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Employment

• **20 % of Computer Professionals are women.**

• **Male staff accounted for 67% and women for 33% of
  the persons employed in the ICT(Information and
  Communication Technology industries) sector.**

From ABS, Information Technology Australia,
Nov 2000,Cat. No. 8126.0.

Australia
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Australian Women in Computing

The aim of this web page is to provide information about women in computing in Australia and to present the programs and individuals that are involved in addressing issues relating to women in computing.

Australian Women in Computing was developed as part of the **ACM's Committee on Women in Computing (ACM-W)** *Ambassador Project*. Funding for the development and maintenance of this page was provided by the ACM-W.

This site includes statistics from studies that show the number of women in computing over the years and provides resources on gender issues in general.

If you have information about programs or references not on this page, please **contact** us so we can add them.

- **Home**
- **Programs**
- **Statistics**
- **Resources** Updated!
- **Conferences**
- **Contact Details**

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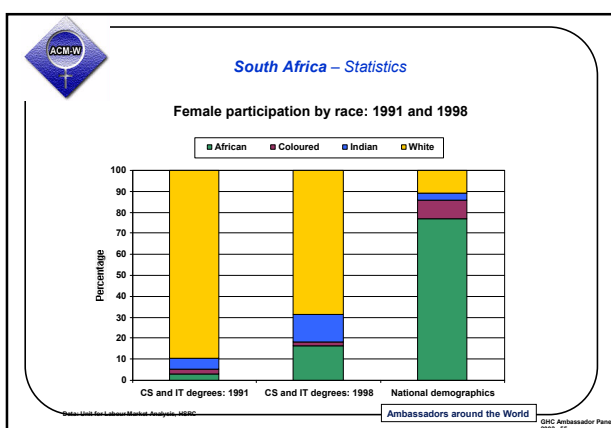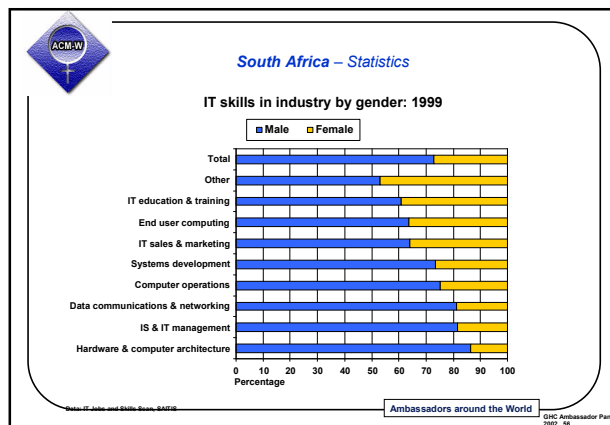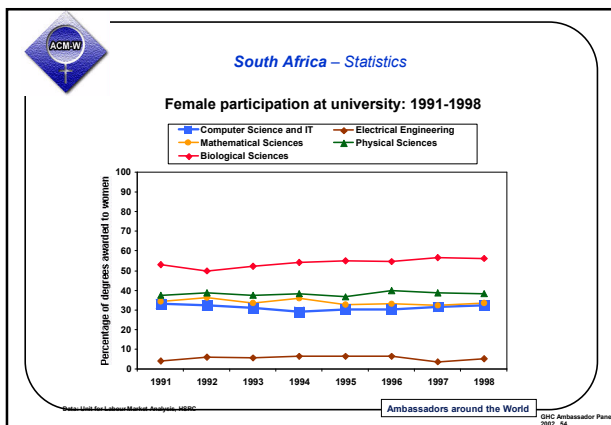

United Kingdom

- **Organisations**
  - Women into computing www.wic.org.uk
  - BCS women www.bcs.org.uk/women

- **Government programs**
  - Athena encourage women in science
  - Equalitec web resources

- **Obstacles**
  - Equal Opportunities legislation
  - poor funding and reliance on passionate volunteers

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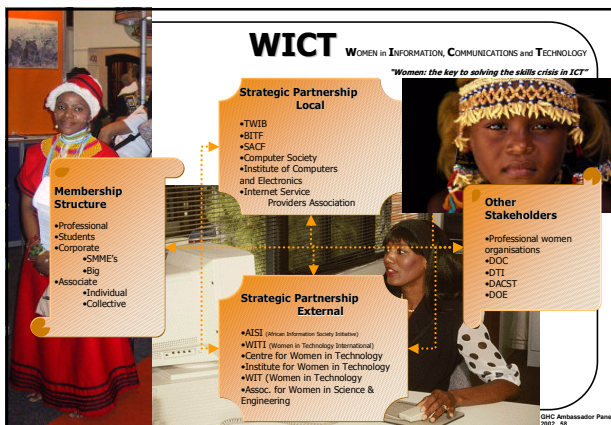GHC Ambassador Panel 2002 52

United Kingdom

- **Women in computing in the UK**

- **Undergraduate numbers**
  - constant at around 18%

- **Pipeline issues**
  - PhD 17%
  - Assistant prof 21%
  - Associate prof 12%
  - Full prof 4%

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United Kingdom

- **Successes**
  - women entrepreneurs and increasing number of small women owned businesses
  - Masters courses for those converting for other subjects attract high numbers of women
  - women increasingly succesful in related disciplines like math
  - women students increasing confidence and expectations

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South Africa – *Statistics*

Female participation at university: 1991-1998

South Africa – *Statistics*

IT skills in industry by gender: 1999

South Africa – *Statistics*

Female participation by race: 1991 and 1998

South Africa – *Programs*

- **SAWISE** (South African Women into Science and Engineering)
  - focusses on issues affecting women scientists and engineers
  - aims to raise profile and provide role models
- **GenderNet**
  - aims to empower South African women in the use of ICT
- **NRF Women-in-Research** (National Research Foundation)
  - aims to increase female participation in research
  - offers online database of female researchers
- **Third World Organisation for Women in Science** (TWOWS)
- **African Gender Institute** (University of Cape Town)
- **WICT** (Women in Information, Communications and Technology)
  - new national organisation

WICT WOMEN in INFORMATION, COMMUNICATIONS and TECHNOLOGY

"Women: the key to solving the skills crisis in ICT"

Strategic Partnership Local
- TWIB
- BITF
- SACF
- Computer Society
- Institute of Computers and Electronics
- Internet Service Providers Association

Other Stakeholders
- Professional women organisations
- DOC
- DTI
- DACST
- DOE

Membership Structure
- Professional
- Students
- Corporate
  - SMME's
  - Big
- Associate
  - Individual
  - Collective

Strategic Partnership External
- AISI (African Information Society Initiative)
- WITI (Women in Technology International)
- Centre for Women in Technology
- Institute for Women in Technology
- WIT (Women in Technology)
- Assoc. for Women in Science & Engineering

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Impact of Technology on Women's Life in the Developing World: Fact or Fiction

Dr. M. Suriya

Professor and Chair

Department of Library and Information Science

Annamalai University, India

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South Africa – Research

- **gender-related research**
  - statistics: universities, industry, Human Sciences Research Council
  - attitudes to computers and computer science
  - computer self-efficacy and ability
  - role models
- **reasons for lower participation by women**
  - stereotypes, discrimination, lack of role models, incorrect perceptions
  - low number of Maths (SG and HG) passes in school-leaving exams, particularly among African women
  - limited access to computers at schools (?)
- **suggestions for increasing participation**
  - approach for CS at Wits: demonstrate CS is more than programming
  - computing in general: education and access

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India's Contribution to IT Manpower Development

- **India is one of the top 10 countries in the world in the production and supply of high skilled IT manpower.**
- **34% of the Microsoft employees and 17% of Intel scientists in the USA are Indians. The co-founder of Sun Microsystems, the founder and creator of Hotmail, the GM of HP, the president of AT&T are Indians (to name a few).**
- **No wonder India has made a record in the production of high-quality manpower in IT!**

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What Change IT Education Brought on Women's Lives in India

- Until the last decade, the percentage of women engineers were very low; currently their numbers are overwhelming; thanks to the IT invasion in the Indian scenario.
- There is a boost in the number of women entering the primary and the tertiary level of IT education.
- The proliferation of IT institutions and the growing IT labor demand attributed to women's advancement in IT.
- Young males and females gain equal access to computing technology, which serves to bridge the gap between the gender groups in IT education and IT employment.

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Women's Growing Power in the Work Place

- In the work place, women CEO's, women IT leaders, and women entrepreneurs are hitting the headlines. In the IT field, women seemed to have gained equal opportunities for upward movement, and they are no longer side-lined by male dominance.
- Women possessing professional skills and motivation are able to move to top positions without much resistance. On the whole, one can notice a kind of positive trend in women's life after the IT invasion.

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Transformation in women's perception and outlook

- IT education has changed the outlook of the female students regarding their careers. Many female students prefer to move to cities or to foreign countries for higher education and for jobs. This is made possible by loans from national banks, fellowships and/or overseas assignments from multinational companies.
- The IT profession has changed the outlook of parents and society. The same parents and society which forbade women to move out of their homes now permit them freedom of travel.
- Women's bargaining power in the matrimonial part of their lives also has improved and women are no longer taken as mere 'house wives' but an 'equal partner' in the family enterprise.

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Women's Growing Power in the Work Place (con'd)

- Is the situation true in all cases? It is said that the beneficiaries of these technological changes are only those who have access to IT education. The larger beneficiaries are the urban youth. A larger section of women community in the rural areas are yet to reap the benefits of this technology in India.

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What is the concern of the IT educators

- Women form 50% of the population in India, but their presence in higher education is only 6% and even lower in IT.
- How do we draw more women into computing?
- What kind of educational programs would be more suitable for women from different social statuses and cultures?

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Conference Themes

- Status of women in IT education in formal and informal educational sector
- Role of women in computing academia
- Factors favoring women to pursue IT education and profession
- Barriers deterring women in their academic pursuits in IT
- Strategies for attracting more women into computing

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First Annual Conference on Women in IT (WIT2002)

- The Annamalai University, India, organized a conference on ' Current Status of Women in IT Education and IT Profession' (www.auwit.org) during August 29-30, 2002, as a part of ACM-W activities.
- More than 350 delegates from all over the country representing academia, corporations and the Ministry of Information and Technology attended the conference.

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Recommendations

- Subject based IT education to meet employment requirements in various environments (e.g. finance, hospital administration, etc.)
- Gender focused IT education
- IT education from primary school
- Technology integrated education for young female students

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Recommendations (con'd)

- **Financial Support (government/industries)**
- **Institutional support (mentoring/advising)**
- **Personal support (child care, transport,health care etc)**
- **Admission policies should attract women from rural areas**

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Solutions: Need and Skill Based Training

- **Evaluation of the types of IT jobs that are in demand and the skill requirements for each kind of jobs.**
- **Then decide for which jobs men and women are being trained.**

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