
Maria M. Larrondo Petrie, Florida Atlantic University

Dr. Maria Larrondo Petrie is a Professor of Computer Engineering and Associate Dean of Engineering and Computer Science at Florida Atlantic University. She is on the Executive Committee of the International Federation of Engineering Education Societies (IFEES), is Vice Chair of the Organization of American States’ (OAS) Engineering for the Americas (EftA) initiative, and is Executive Director of the Latin American and Caribbean Consortium of Engineering Institutions (LACCEI). She has served or currently served on the ASEE Boards of the International Division, Women in Engineering Division and Minorities in Engineering Division. Her email is admin@laccei.org or petrie@fau.edu

Martha Elicia Beltran-Martinez, Office of Science, Technology and Innovation of the Organization of American states

Martha Beltran Martinez is a Specialist at the Office of Science, Technology and Innovation of the Department of Economic Development of the Organization of American States (OAS), where she works on issues related to gender and science, technology, metrology, biotechnology and energy. Previously, she worked at the Inter-American Commission of Women (CIM) of the OAS, on women’s human rights and gender equity and equality. In her country, Venezuela, she worked in the private sector as Social Development Manager at Owens-Illinois de Venezuela, and in the public sector, as Director of International Cooperation of the National Library and Director of Planning and Programming of the Ministry of Youth. She also worked in the Social Planning area at Corporacion Venezolana de Guayana, a regional development agency. She holds a Graduate Degree in Human Resources Planning from the University of Paris-Sorbonne in Paris, France, and M.A. Degrees in French and Spanish from Middlebury College in Vermont, USA. She obtained her B.A. at George Mason University in Virginia, USA. She can be contacted at: mbeltranmartinez@oas.org

©American Society for Engineering Education, 2011
Gender and Engineering in the Americas

ABSTRACT

The Organization of American States proclaimed the year 2010 as “The Inter-American Year of Women” 1 to commemorate the 10th anniversary of the adoption of the Inter-American Program on the Promotion of Women’s Human Rights and Gender Equity and Equality, as well as the 35th anniversary of the first United Nations’ World Conference on Women during the International Women’s Year, and the 15th anniversary of the last United Nations’ World Conference on Women celebrated in Beijing in 1995. The intent of the proclamation was to broadly mobilize throughout the Americas an evaluation of successes and challenges in women’s human rights and gender equity and equality, and to strengthen public sensitivity to gender issues. The Latin American and Caribbean Consortium of Engineering Institution (LACCEI) sponsored an Inter-American Year of Women event in 2010. During the event, a review of hemispheric data was presented, additional resources were identified, and the challenges to attain gender equity and equality in this engineering in the Americas were discussed. The session yielded a spirited discussion on differences in engineering education gender data available for comparison and differences in progress across the nations of the Americas. This paper provides an expanded literature review of pertinent data and shows that U.S. percentage of women studying engineering decreased 0.98% from 1998 to 2008, and although data is not comparable, data from Latin America and the Caribbean shows equity or near equity has been achieved in Argentina, Cuba, Brazil, Paraguay and Venezuela. LACCEI is collaborating with the OAS to launch an initiative to conduct a hemispheric study on gender in engineering to identify effective practices and understand how progress can be improved. As a result, collaborators are sought to create a taskforce to design and implement the hemispheric study.

Keywords: women, gender equity, advancement for women, engineering education

1. INTRODUCTION

In 2007, the Executive Committee of the Inter-American Commission of Women (CIM, for its acronym in Spanish: Comisión Interamericana de Mujeres) of the Organization of Americas States (OAS), proposed that the OAS proclaimed 2010 as the Inter-American Year of Women 1. Their goal was to catalyze throughout the Americas an evaluation of successes and challenges in the defense of women’s human rights and gender equity and equality, and to strengthen public sensitivity to gender issues. This celebration commemorates the 10th anniversary of the adoption by the OAS of the Inter-American Program on the Promotion of Women’s Human Rights and Gender Equity and Equality, as well as the 35th anniversary of the first United Nations’ World Conference on Women during International Women’s Year, held in 1975, and the 15th anniversary of the Fourth United Nations World Conference on Women: Action for Equality, Development and Peace † celebrated in Beijing in 1995 1.

† There have been four United Nations’ World Conferences on Women: Mexico City, 1975; Copenhagen, 1980 (UN, 1980); Nairobi, 1985, and Beijing, 1995.
The 1995 United Nations World Conference on Women was attended by delegates of 189 Governments and 5000 representatives from 2,100 non-governmental organizations approved the Beijing Declaration and the Beijing Platform for Action aimed at achieving greater equality and opportunity for women. The Conference signaled a clear commitment to international norms and standards of equality between men and women. It found that the issues were global and universal, and that inequality and discrimination against women both in public and private life throughout the world are perpetuated by deeply entrenched attitudes and practices, and that changes in values, attitudes and priorities were required at all levels. To this end, governments, the international community and civil society, including non-governmental organizations and the private sector, were called upon to take strategic action in 12 critical areas of concern, shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1. Critical Areas designated by the United Nations Beijing Declaration and Platform for Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The persistent and increasing burden of poverty on women</td>
</tr>
<tr>
<td>2. Inequalities and inadequacies in and unequal access to education and training</td>
</tr>
<tr>
<td>3. Inequalities and inadequacies in and unequal access to health care and related services</td>
</tr>
<tr>
<td>4. Violence against women</td>
</tr>
<tr>
<td>5. The effects of armed or other kinds of conflict on women, including those living under foreign occupation</td>
</tr>
<tr>
<td>6. Inequality in economic structures and policies, in all forms of productive activities and in access to resources</td>
</tr>
<tr>
<td>7. Inequality between men and women in the sharing of power and decision making at all levels</td>
</tr>
<tr>
<td>8. Insufficient mechanisms at all levels to promote the advancement of women</td>
</tr>
<tr>
<td>9. Lack of respect for and inadequate promotion and protection of the human rights of women</td>
</tr>
<tr>
<td>10. Stereotyping of women and inequality in women’s access to and participation in all communication systems, especially in the media</td>
</tr>
<tr>
<td>11. Gender inequalities in the management of natural resources and in the safeguarding of the environment</td>
</tr>
<tr>
<td>12. Persistent discrimination against and violation of the rights of the girl child</td>
</tr>
</tbody>
</table>

In the Beijing Platform for Action, one of the goals pertinent to engineering education was:

“Diversify vocational and technical training and improve access for and retention of girls and women in education and vocational training in such fields as science, mathematics, engineering, environmental sciences, and technology, information technology and high technology, as well as management training. Actions to be taken: Strategic objective L.4: Eliminate discrimination against girls in education, skills development and training. Action 279 by Governments: Ensure universal and equal access to and completion of primary education by all children and eliminate the existing gap between girls and boys, as stipulated in article 28 of the Convention on the Rights of the Child; similarly, ensure equal access to secondary education by the year 2005 and equal access to higher education, including vocational and technical education, for all girls and boys, including the disadvantaged and gifted.”

In our Hemisphere, the issue of women’s equality has been on part of the Regional agenda since 1928, when the then Pan-American Union, now OAS, created the Inter-American Commission of Women (CIM) to secure the recognition of women’s civil and political rights. CIM was the first official intergovernmental agency in the world established expressly to promote the advancement of women. It played a crucial role in advocating women’s suffrage in the Americas and in the adoption by the OAS Member States of important Inter-American Conventions on the topics of the Nationality of Women (1934), the Granting of Civil and Political Rights to Women (1948), and the Prevention, Punishment and Eradication of Violence against Women ‘Convention of Belém do Pará (1994). Since its inception, CIM has served as an international forum where the concerns of women are brought into the foreground of public discourse by the member states. The existence of CIM with its influential role within the OAS has been a catalyst for women’s full and equal participation and leadership in all spheres of political social and economic life within the Hemisphere.

In solidarity with the OAS proclamation of 2010 as the Inter-American Year of Women, and in an effort to advance the issues that fall within its mission, the Latin American and Caribbean Consortium of Engineering Institution (LACCEI) at its 2010 conference celebrated the accomplishments of women engineering educators in
the Hemisphere by recognizing distinguished female engineering educators, identifying resources available to recruit and retain women in engineering, and discussing the challenges faced in the Americas to attain gender equity and equality in this field. The spirited discussions that developed during the special Inter-American Year of Women session and subsequent LACCEI Board meeting have resulted in a LACCEI taskforce, led by a representative of the OAS Office of Science, Technology and Innovation, to establish partnerships to develop and implement a hemispheric study on gender and engineering education.

2. **U.S. STATISTICS ON WOMEN IN STEM**

Since LACCEI focuses on Engineering Education, this paper will concentrate on the data regarding women in Science, Technology, Engineering and Mathematics (STEM). The United States National Academy of Sciences, National Academy of Engineering and Institute of Medicine published *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Sciences and Engineering*. The importance of attaining equality for women in the STEM disciplines is emphasized by this study:

> “The U.S. economy relies on the productivity, entrepreneurship, and creativity of its people. To maintain its scientific and engineering leadership amid increasing economic and educational globalization, the United States must aggressively pursue the innovative capacity of all of its people—women and men. Women make up an increasing proportion of science and engineering majors at all institutions, including top programs such as those at the Massachusetts Institute of Technology (MIT) where women make up 51% of its science undergraduates and 35% of its engineering undergraduates. For women to participate to their full potential across all science and engineering fields, they must see a career path that allows them to reach their full intellectual potential. Much remains to be done to achieve that goal.”

In 2004, the Board of the InterAcademy Council formed an Advisory Panel on Women for Science. In 2007, the study *Women for Science: An Advisory Report*, funded by L’Oreal Paris, the Netherlands Ministry of Education, the Alfred P. Sloan Foundation and an anonymous donor, was prepared by the InterAcademy Council.

It shows the concern is global, stating: “The low representation of women in science and engineering is a major hindrance to global capacity building in science and technology”. The report urges all national academies throughout the world to making changes within the academies and proposed a sample statement of commitment for adoption by the academies:

> “The president and council of the academy commit to full inclusion of women in science and technology. The academy will:
> 1. Adopt good management practice—tools for inclusiveness—in its institutions and advocate such practice across the S&T community.
> 2. Establish a committee that addresses gender issues and ensures follow-up.
> 3. Promote women members to decision-making levels and include them in panels and committees.
> 4. Increase the number of women scientists in the nomination pool for membership, prizes, and awards.
> 5. Give visibility to women scientists and represent women in the academy’s portrayal of science.
> 6. Pay attention to gender implications of research sponsored or evaluated by the academy.
> 7. Ensure that the criteria for evaluation of research institutes include organizational culture.”

The study identifies global sociological research noting that culture-based norms and prejudices create barriers that negatively impact inclusion of women, and cite national reports from the UK, the U.S.A, the Republic of South Africa. Several countries and international entities, such as India, China, Japan and European Union have launched initiatives addressing the shortages by expanding women’s membership in the Science and Technology (S&T) community and the United Nations’s “Education for All” core program incorporates girls’ education and regional chairs for women in science. Judith Glover notes 4 aspects that need to be distinguished when comparing data of gender in scientific education and employment:

1. qualifying
2. translating scientific qualifications to scientific employment
3. persistence
4. advancement

Inequities in gender and ethnic representation in the STEM fields must be addressed not only because women and men must have the same opportunity to contribute to science and technology, but also to promote global competitiveness and to deal with the growing shortages of S&T skills. A more diverse workforce with a wider variety of experiences and views enriches scientific enterprise and provides better solutions.

Studies have shown that women are underrepresented in many S&T disciplines due to factors such as:

- Cultural biases and prejudices
- Lack of support and provisions for combining professional work and family duties
- Discrimination in appointment, retention and advancement of women
- Lack of mentors and role models
- Lack of leadership training
- Hostile work environment
- Lack of information about S&T careers

In the United States the U.S. National Academies constructed the summary shown in Figure 2, using data from the National Science 2006 Survey of Earned Doctorates 1974-2004, on the percentage of science and engineering PhDs awarded to women in the twenty year period 1974-2004. Note that women in 2004 have attained equality in representation in the Social Sciences and Life Sciences but are still lagging in Physical Science and Engineering. In the top 50 engineering departments in the U.S., women earn one-fourth of the PhD’s granted in Chemical Engineering and 15% in engineering overall (Handelsman et al, 2005). Although women constitute about half of the total workforce in the U.S. and receive half of the degrees in certain scientific fields, they number only one-fifth of the nation’s scientific and technical workers.

![Figure 2. Percentage of science and engineering PhDs awarded to women, 1974-2004. Source: National Science Foundation (2006). Survey of Earned Doctorates, 1974-2004, Arlington, VA.](image)

The Engineering Workforce Commission of the American Association of Engineering Societies publishes for 60 years enrollment in engineering and technology (AAES-EWC, 2009). The authors compared enrollments in Fall 2008 (the latest available at the time of this article was written) to Fall 1998 to see the gender trend differences in enrollment, shown in Table 2 (AAES-EWC, 2009; AAES-EWC, 1999). In Figure 3 and Table 2 comparing 1998 to 2008 shows that the total number of women enrolled in engineering disciplines in higher education increased in number from 93,608 to 111,042, showing an 18.6% increase in total women studying engineering; however the number of students in engineering increased from 477,346 to 596,058 so the net change in...
percentage of women in engineering programs decreased by almost 1 per cent. A ten year comparison shows that the percentage of women in BS engineering programs decreased by 2.2% to 17.5%, in MS engineering programs increased very slightly by 1.5% to 21.6%, and in PhD engineering programs increased by 4.6% to 22.1%. These numbers do not follow the trend of 35% enrollment of women reported by MIT programs. It is clear that engineering still has far to go to reach equality in representations in the higher education programs.

Table 2. Ten year comparison of women enrolled in engineering disciplines in the U.S.\textsuperscript{15,16}

<table>
<thead>
<tr>
<th>U.S. Engineering Enrollment 1998 vs. 2008 BS, MS, and PhD</th>
<th>Fall 1998 Undergraduate</th>
<th>Fall 2008 Undergraduate</th>
<th>Percent Change Ten Yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree</td>
<td>Women</td>
<td>All</td>
<td>% of Total</td>
</tr>
<tr>
<td>BS - Full Time</td>
<td>66,276</td>
<td>329657</td>
<td>20.10%</td>
</tr>
<tr>
<td>BS - Part Time</td>
<td>6,117</td>
<td>37334</td>
<td>16.38%</td>
</tr>
<tr>
<td>BS - All</td>
<td>72,393</td>
<td>366991</td>
<td>19.73%</td>
</tr>
<tr>
<td>MS - Full Time</td>
<td>8004</td>
<td>38976</td>
<td>20.54%</td>
</tr>
<tr>
<td>MS - Part time</td>
<td>6657</td>
<td>33927</td>
<td>19.62%</td>
</tr>
<tr>
<td>MS - All</td>
<td>14661</td>
<td>72903</td>
<td>20.11%</td>
</tr>
<tr>
<td>PhD - Full Time</td>
<td>5486</td>
<td>30543</td>
<td>17.96%</td>
</tr>
<tr>
<td>PhD - Part time</td>
<td>1068</td>
<td>6909</td>
<td>15.46%</td>
</tr>
<tr>
<td>PhD - All</td>
<td>6554</td>
<td>37452</td>
<td>17.50%</td>
</tr>
<tr>
<td>Total</td>
<td>93,608</td>
<td>477,346</td>
<td>19.61%</td>
</tr>
</tbody>
</table>

Figure 3. Ten-year U.S. Comparison of Undergraduate Women Enrolled in Engineering U.S 1998 - 2008

Another concern reported by many women in choosing a career is the effect of marriage and the presence of young children on their career. Unfortunately studies have found that marriage and children “spur the career advancement of men but slow the advantage of women” (Xie and Shauman, 2003)\textsuperscript{19}. The U.S. National Academies study also summarized a National Science Foundation 2003 survey of women and men doctoral scientists and engineers in tenured or tenure-track positions, where they were asked their gender, marital status and presence of children (US National Academies, 2007). Figure 4 provides the comparison by discipline. On average, 64.4% of women doctoral scientists and engineers in tenure and tenure-track careers are married; compared to 83.4% of men; 42.2% of women have children compared to 50% of men. Although these figures
differ by field they have not substantially changed from 1993 to 2003. Figure 5(a) shows in of those women who are married, more women scientists and engineers are married to full-time working spouses (US National Academies, 2007). Figure 5(b) shows that 64% to 81% of women scientists and engineers marry fellow scientists and engineers (US National Academies, 2007).

3. STATISTICS OF WOMEN IN STEM IN OTHER PARTS OF THE WORLD

In Latina America and the Caribbean (LAC), women’s participation in STEM (Science, Technology, Engineering and Mathematics) varies greatly by country. Data has not been compiled systematically and cannot be compared. Nevertheless, some statistics are available as reference, especially in the bigger and more advanced countries.

Some regional statistics regarding the LAC are quite compelling, and speak to the need to have better data available to study the current situation of women engineers in the region. The UNESCO 2007 Report: *Science, Technology and Gender: An International Report* shows the variance and availability of data on women researchers (Figure 6 below). This study, which surprisingly contains data for most of the countries in the Region, states that Latin America and the Caribbean have the highest regional average of women researchers of all the Regions that were included in the study. The regional averages based on available data for 2007 are:

- 45.0% for Latin American and the Caribbean
- 33.9% for Europe
- 32.7% for Africa
- 18% for Asia
- 39.2% for Oceania
- There is no regional average available for North America due to a lack of data

Figure 6. Women as a share of total number (headcount) of researchers. Note: Data in this map are based on Head Count, except for Congo and India (based on Full Time Equivalency FTE). Source: UNESCO Institute for Statistics, August 2010

Figures 7 and 8 show a comparison between the Americas and Europe of data regarding the participation of women in research. In LAC, at least two of the largest countries, Argentina and Brazil, as well as Venezuela, Uruguay, Cuba, and Paraguay have reached parity as of 2009. In Europe, the most powerful countries seem to be trailing behind in this area.

Figure 7. Female researchers in Latin America and the Caribbean as a percentage of total researchers, 2007 or latest available year. Source: UNESCO Institute for Statistics, August 2010
Taking Brazil as an example, the study *Strategies and Successes in Getting Women and Gender Considerations included in Brazil Scientific Institutions and Policies* states that the majority of researchers in Arts and Linguistics; Health Sciences and Human Sciences are women. Table 3 shows there is gender parity (around 50%), in Applied Social Sciences and Biological Sciences and that women’s participation decreases for Exact and Earth Sciences; and that it is lowest for Engineering. Women group leaders represent 44% in total, but once again this varies from around 60% of leaders in the areas they have substantial majority, to almost parity in Applied Social Sciences and Biological Sciences. In Exact and Earth Sciences and Applied Social Sciences, women’s leadership is around 30%, approximately the same as their participation in those areas; however, in Engineering and Computer Sciences, female leadership is well below the other fields of endeavor, reaching the low figures of 22%.

**Table 3. 2008 Brazil Census Study of Research Groups: % of Women Researchers and Group Leaders**

<table>
<thead>
<tr>
<th>Scientific Areas</th>
<th>% of Women Researchers</th>
<th>% of Women Group Leaders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering and Computer Sciences</td>
<td>27.31</td>
<td>21.90</td>
</tr>
<tr>
<td>Exact Sciences and Earth Sciences</td>
<td>33.73</td>
<td>28.21</td>
</tr>
<tr>
<td>Agrarian Sciences</td>
<td>37.86</td>
<td>32.29</td>
</tr>
<tr>
<td>Applied Social Sciences</td>
<td>47.69</td>
<td>44.20</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>53.29</td>
<td>51.26</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>59.27</td>
<td>55.44</td>
</tr>
<tr>
<td>Human Sciences</td>
<td>60.40</td>
<td>56.37</td>
</tr>
<tr>
<td>Arts and Linguistics</td>
<td>66.46</td>
<td>66.49</td>
</tr>
<tr>
<td>TOTAL</td>
<td>48.89</td>
<td>44.52</td>
</tr>
</tbody>
</table>
Table 4, taken from the same Brazilian census study\textsuperscript{20}, shows that among the students who are part of the research groups, women are the majority at all levels, making up almost 60\% at the undergraduate level, 57\% of MSc, and 55\% of students at PhD level.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD</td>
<td>49.1</td>
<td>51.8</td>
<td>52.8</td>
<td>54.4</td>
<td>55.1</td>
</tr>
<tr>
<td>MSc</td>
<td>52.2</td>
<td>55.1</td>
<td>55.7</td>
<td>56.7</td>
<td>57.7</td>
</tr>
<tr>
<td>Undergraduates</td>
<td>58.2</td>
<td>58.1</td>
<td>57.4</td>
<td>58.5</td>
<td>59.5</td>
</tr>
<tr>
<td>Total</td>
<td>54.1</td>
<td>55.7</td>
<td>56.0</td>
<td>57.3</td>
<td>58.2</td>
</tr>
</tbody>
</table>

Figure 8. Brazil- CNPq Census of Research Groups: Researchers by Sex (\%) – 1995-2008
Source: Strategies and Successes in Getting Women and Gender Considerations included in Brazil Scientific Institutions and Policies\textsuperscript{20}

In spite of the undeniable progress shown by these general statistics about researchers the 2009 UN study, Women and Girls in Science and Technology: Increasing opportunities in Education, Research and Employment\textsuperscript{21}, points out that they have identified “three different types of segregation often faced by women in science and technology. Vertical segregation relates to the concentration of women at lower levels in S&T, such as the B.Sc. for students or lower level professional positions for women in the workplace. Horizontal segregation relates to the tendency for women to cluster in certain areas of science, such as the biological and medical sciences. Contractual segregation relates to the tendency for women to be given short term or part time contracts (UNU 2005). All of these types of segregation are heavily influenced by the overwhelmingly male culture of science and technology”. According to the 2009 UN study, in the Latin American and Caribbean region, 46\% of researchers are female, and Argentina, Cuba, Brazil, Paraguay and Venezuela have achieved gender parity.
4. RESOURCES TO ATTRACT AND RETAIN WOMEN IN ENGINEERING

It is clear from the data compiled in this section that there are differences in progress made in gender inclusion in science vs. engineering, and there are differences in progress made by different countries in the hemisphere. Data is not available for all countries, and much of the data available through different studies cannot be compared.

In this section we examine resources targeting improving Minority and Women participation in STEM fields. It is clear that Science has improved and reached near equity in some fields for Women but the same interventions have not worked for engineering. As a first step to understand this phenomenon we list resources available, particularly in the U.S.

4.1 RESOURCES TARGETING MINORITIES AND WOMEN

The GE Faculty for the Future program (see http://www.facultyforthefuture.org) is a ten year, $20 million initiative of the GE Foundation and WEPAN to increase the number of women and under-represented minorities faculty in engineering, related sciences and business. It has assisted nearly 200 students, who have earned PhD degrees and accepted faculty positions with over 900 students in the pipeline. The website links a diverse pool of women and under-represented minority candidates from engineering, science, and business with faculty and research positions at universities across the country.

The U.S. National Science Foundation created the ADVANCE program in 2001 to focus on developing centers to increase the participation and advancement of Women in academic Science and Engineering (see http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5383). The ADVANCE program has 3 funding areas:

1. Institutional Transformation (IT) – support systemic organizational approaches in higher education that will result in increasing the participation and advancement of women in STEM academic careers,
2. Institutional Transformation Catalyst (IT-Catalyst) – support organizational self-assessment activities that will result in issue identification and resolution of barriers in the recruitment, retention and promotion of women faculty in STEM academics, and
3. Partnerships for Adaptation, Implementation, and Dissemination (PAID) – support the extensibility of materials, tools, research and practices that have been demonstrated as effective in increasing the participation and advancement of women in stem careers.

WEPAN, the Women in Engineering ProActive Network, received an ADVANCE award from the NSF, called ENGAGE (Engaging Students in engineering through Instruction and Mentoring). This is the first year of this 3 year project, which will fund teams and minigrants from 10 universities each year. The grants will focus on training teams on best practices and disseminating them to their institutions: this include 1. improving visual 3D manipulation skills, 2. providing effective mentorship experiences, and 3. providing real world problems in the engineering classes. The first application deadline was October 28, 2009, more information and contact information can be found in the website: http://www.wepanknowledgecenter.org/c/journal_articles/view_article_content?groupId=1007&articleId=1243&version=1.0&p_1_id=PUB.1.81
4.2 RESEARCH ON WOMEN IN SCIENCE AND ENGINEERING


The *Journal of Women and Minorities in Science and Engineering* is published by Begell House, Inc., 145 Madison Ave., NY, NY 10016-7892. Phone: 212 725-1999; Fax: 212 213-8368. See http://www.begellhouse.com. This journal publishes original, peer-reviewed papers on innovative ideas and programs, scientific studies, and formulation of concepts related to education, recruitment, and retention of underrepresented groups in science and engineering.

The NAE has also developed a web site for girls: http://www.engineergirl.org/ that contains sections on Why Be An Engineer, Fun Facts, Cool Links, Cool Readings, Great Achievements, and an EngineerGirl Essay Contest http://www.engineergirl.org/?id=3821. It also has a site for Women Engineer

WEPAN has developed a web portal for their WEPAN Knowledge Center as an online resource for research, best practices, and professional communities dedicated to advancing all women in engineering. The resources are organized by Research & Reports, Assessment & Practice, Data & Statistics, Policy & Law, Profiles (Organizations, Programs, Projects, Initiatives and Tools), Cohorts, Resource Type (article, blog, book, etc.), and STEM Disciplines. (see http://www.wepanknowledgecenter.org/home).

4. CONCLUSIONS

The Gender Advisory Board of the United Nations Commission on Science & Technology for Development developed in 1995 a list of 7 Transformative Action Areas22. On top of the list was: Gender equity in science and technology education. The Organization of American States (OAS) declared 2010 the Inter-American Year of Women1. The OAS proclamation and the top transformative action area in the UN 1995 and other reports23, 24 motivated the LACCEI to form a taskforce to look at progress made by women in Engineering in the past decade in the Americas25. The literature search found that enrollment data was not available across the Americas. A comparison of 1998 to 2008 data from the U.S.A. showed the number of women studied engineering increased from 477,346 to 596,058 but that since the number of students studying engineering had increased, the percentage of female students decreased by 0.98%25. There are some existing studies published containing data from Latin America and the Caribbean20, 21, 22, 26, 27 but the data cannot be compared. UNESCO data on women as share of total headcount of researchers by country was missing data from U.S.A. and Canada. Latin America and Caribbean data in several studies concluded that gender equity or near equity in engineering has been attained in Argentina, Cuba, Brazil, Paraguay and Venezuela. Because of the variation in progress between the U.S. and some countries in Latin America and the Caribbean, the LACCEI taskforce concluded that there is a need to conduct a study to gather comparable data on gender and engineering across the Americas, and examine the practices and environment that yield best results. This initiative is being led by the Executive Director of LACCEI and a Specialist from the OAS Office of Science, Technology and Innovation. Individuals and organizations wishing to collaborate in this initiative are asked to contact the authors. In the first phase of the initiative at least 5 countries in the Americas will be solicited to take part in the study, and experts will be gathered to design the study so that the data gathered can be compared and analyzed across countries. The next meeting of the taskforce will be at the LACCEI Conference in Medellin, Colombia on 2-5 August 2011.
REFERENCES


