

# APPENDIX D

## CEOSE Findings and Recommendations 1980-2002

Appendix D summarizes CEOSE findings and recommendations as reported in minutes and each of its biennial reports to Congress. Each biennial summary is presented in a table that states the findings; indicates whether they apply “inside NSF,” or “outside” in the broader scientific community, or both; and provides the recommendations made by CEOSE at the time. The title of each table states the year the biennial report was published and identifies the Congress to which it was delivered. Since CEOSE biennial reports were issued in various years and in various formats, and since CEOSE has had periods of greater or lesser activity during its existence, the tables in Appendix D are uneven in length, content, and year of issue.

The CEOSE membership list included in each report period is also provided, both to acknowledge those whose work on the Committee resulted in the cited findings and recommendations, and to underscore the rich scientific, institutional, geographic, and demographic diversity that has characterized CEOSE membership throughout its history.

The CEOSE membership of 2003-2004 thanks Dr. Walter V. Collier and his colleagues at C&A Technologies, Inc., for extracting these summaries from CEOSE minutes and biennial reports and for preparing Appendix D.

**Summary of CEOSE (CEOST) Findings and Recommendations  
Broadening Participation Overall  
Year: 1981 Congress: 96th**

CEOSE Findings	Setting	CEOSE Recommendations
A major problem for women and minority scientists is underutilization (i.e., higher unemployment, slower career advancement and lower salaries than their majority male counterparts). <sup>1</sup>	Inside/ outside NSF	National Science Foundation (NSF) should (1) leverage its influence on universities and research institutes to promote more equitable employment opportunities for women and minorities; (2) have the Division of Personnel and Management assess performance plans and include statement of equal opportunity for women and minorities; (3) staff should visit grantee sites to encourage women and minorities to enter S&E; (4) train Program Officers on women's and minority issues, and expand mailing list for announcements to women and minorities; (5) keep Executive and Management Council informed about women and minority initiatives; (6) target women and minority programs for FY 1983 funding; (7) establish National Science Board (NSB) pre-college commission; and (8) begin collecting data on women and minorities. <sup>2</sup>
Due to Federal budget cuts, the NSF submitted no new programs or legislative recommendations to the Office of Management and Budget (OMB) and to the Congress to promote equal S&E employment opportunities for women and minorities in FY 1981. Instead, NSF focused on current programs, policies and activities, and collaborated with others to achieve greater participation of women and minorities in science and engineering. <sup>3</sup>	Inside NSF	Funding for career facilitation and re-entry programs should be included in NSF budget for FY 1982 and future years. Funds for National Research Opportunity Grants should be restored to these budgets. A study of personnel policies in connection with NSF grants should be conducted. Appropriate sex/race distributions should be considered in awarding grants. NSF should place a priority on gathering statistics on women and minorities. Affirmative action policies of grantees should be considered. Minority women should be specifically included in all programs. <sup>4</sup>
Implementing proposals throughout the research directorates requires an effective management structure. <sup>5</sup>	Inside NSF	NSF's management structure is not optimized to facilitate participation of minorities and other underrepresented groups. <sup>6</sup>

<sup>1</sup> Minutes of CEOSE Subcommittee on Women, September 16-17, 1981, p. 7.

<sup>2</sup> Ibid., pp. 2-3 and 8.

<sup>3</sup> Proposals of the National Science Foundation to Promote the Full Participation of Minorities and Women in Science and Engineering, December 15, 1981, pp. 3-4.

<sup>4</sup> Ibid., p. 5.

<sup>5</sup> Ibid., p. 14.

<sup>6</sup> Ibid.

**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Year: 1981 Congress: 96th**  
**Target Group: Women**

CEOSE Findings	Setting	CEOSE Recommendations
Women in S&E are under-represented within the NSF organization. <sup>7</sup>	Inside NSF	CEOSE proposed strategies for the Foundation's division directors and program officers to involve women in science and technology on many fronts: (1) staff awareness orientation; (2) announcements for funding and technical assistance; and (3) involvement on proposal review, advisory panels and committees. <sup>8</sup>
The number of students enrolled in science and mathematics drops markedly in the senior year of high school. Even fewer girls than boys pursue science curricula. <sup>9</sup>	Outside NSF	Programs should be undertaken to reduce differences in science and engineering education between boys and girls. <sup>10</sup> Funds in grants should be made available for women and minority high school and college students to participate in research and/or research related activities at organizations with established programs to promote women in S&E. <sup>11</sup>
Historically, women face barriers that restrict their professional options in S&E. <sup>12</sup>	Inside/ outside NSF	Proposals for improving the status of women and minorities in the Foundation's programs concerned with research in the academic community should be considered by NSF. <sup>13</sup>

<sup>7</sup> Minutes of CEOSE Subcommittee on Women, September 16-17, 1981, p. 7.

<sup>8</sup> Ibid., pp. 4-9.

<sup>9</sup> Ibid., p. 10.

<sup>10</sup> Minutes of Subcommittee on Women, May 28, 1981, p. 3.

<sup>11</sup> Minutes of Subcommittee on Women, September 16-17, 1981, p. 10.

<sup>12</sup> Ibid., pp. 2 and 16-17.

<sup>13</sup> Ibid., p. 15.

**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Year: 1981 Congress: 96th**  
**Target Group: Minorities**

CEOSE Findings	Setting	CEOSE Recommendations
There's evidence that participation of minorities in S&E is low. <sup>14</sup>	Inside/ outside NSF	Increase awareness and sensitivity of NSF staff to problems blocking minority entry to S&E professions. Improve representation of minorities on NSF professional staff and panels. Ensure NSF announcements go to minority institutions. Offer supplemental funding support and technical assistance for minority research grant applicants. Continue support for <i>Minority Research Initiation</i> program. <sup>15</sup>
Minority scientists need to be acquainted with NSF programs. <sup>16</sup>	Inside NSF	Minority scientists and key administrators might spend several months in residence at the NSF. <sup>16,17</sup>
Minority students and girls have higher drop-out rates from science programs at the junior high and high school levels than other students. <sup>14</sup>	Out- side NSF	Maintaining student interest and continuing study in secondary school science and mathematics is all the more important. <sup>15</sup>
NSF has demographic data on participants in NSF fellowship programs. <sup>16</sup>	Inside NSF	Data collection on minority groups and women needs to be improved for better tracking and summary of NSF policies. <sup>17</sup>
While the number and proportion of doctorates in S&E fields have increased over the last decade, the overall proportion of those awarded to minorities remains relatively low. <sup>18</sup>	Out- side NSF	NSF should consider the implementation of a set goal for doctoral degrees for minorities. <sup>19</sup>
It is imperative that the Foundation coordinates its efforts, experience and resources with those of other sectors to improve the participation of minorities in S&E. <sup>20</sup>	Inside/ outside NSF	(1) Develop ways for the Federal and private sectors to work together to increase contributions by minorities to science and technology, and (2) monitor progress. <sup>21</sup>

<sup>14</sup> Ibid., p. 9.

<sup>15</sup> Ibid.

<sup>16</sup> Ibid., p. 13.

<sup>17</sup> CEOSE Meeting Minutes, May 27-28, 1981, p. 5.

<sup>18</sup> Ibid., p. 7.

<sup>19</sup> Ibid.

<sup>20</sup> Ibid., p. 16.

<sup>21</sup> Ibid.

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**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Broadening Participation Overall**  
**Year: 1981-1982 Congress: 97<sup>th</sup>**

CEOSE Findings	Setting	CEOSE Recommendations
The apparent retreat from the enforcement of equal opportunity legislation, affirmative action policies and programs threatens to reverse the gains made by underrepresented groups. <sup>1</sup>	Inside/ outside NSF	NSF should (1) bolster and protect affirmative action policies and other equal opportunity legislation to remove barriers against underrepresented persons which results in disproportionate or unequal opportunities for them; and (2) build “equality assurance” in all Foundation programs and steadfastly enforce equal opportunity and affirmative action legislation throughout the Federal Government. <sup>2</sup>
The data on women, minority and persons with disabilities sub-groups of scientists and engineers are far from adequate. <sup>3</sup>	Inside/ outside NSF	If programs appropriate to the needs and experiences of various groups are to be devised, we must have better understanding of these groups. <sup>4</sup>
The current shortage of S&E personnel will persist unless there is greater recruitment of women from all backgrounds, including the physically disabled. <sup>5</sup>	Inside/ outside NSF	To help overcome barriers faced by women scientists and engineers, NSF should (1) initiate greater recruitment efforts; (2) inform women about NSF grant opportunities; (3) increase mentoring and research support on the undergraduate level; (4) continue funding for NSF re-entry programs; and (5) support research to assess demand for skilled S&E personnel. <sup>6</sup>
Minority and physically handicapped women are neither entering nor advancing in scientific and technical careers at rates commensurate with their numbers in the population. <sup>7</sup>	Inside/ outside NSF	NSF should (1) continue financial support of targeted women’s programs; (2) reinstate funds for programs modeled after the career workshops and the educational project for the handicapped; and (3) enlist public and private organizations to lend their support to proven performance-enhancing educational models. <sup>8</sup>

<sup>1</sup> Annual Report of the National Science Foundation Committee on Equal Opportunities in Science and Technology, October 1982, p. 14.

<sup>2</sup> Ibid., Executive Summary, p. 4 and pp. 10 and 19-20.

<sup>3</sup> Ibid., p. 13.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid., Executive Summary, p. 1.

<sup>6</sup> Ibid, pp. 27-28.

<sup>7</sup> Ibid., Executive Summary, p. 1.

<sup>8</sup> Ibid., pp. 6-9.

**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Year: 1981-1982 Congress: 97<sup>th</sup>**  
**Target Group: Women**

CEOSE Findings	Setting	CEOSE Recommendations
A matched sample study found that women scientists earn less than their male counterparts, especially in chemistry; and that women are less likely to get promoted. <sup>9</sup>	Outside NSF	NSF should contact universities to hold student discussion groups; and the NSB should incorporate criteria within the research project selection process that draw attention to this issue of wage and advancement disparities. <sup>10</sup>
The untapped pool of potential S&E women prospects now pre-dominate in student populations. <sup>11</sup>	Outside NSF	NSF should (1) continue funding targeted science and education programs at all levels; and (2) emulate successful educational S&E models in and outside of the Foundation. <sup>12</sup>
Equality of access and advancement is needed to assure equal opportunity throughout the careers of women to attract large numbers of them in scientific research. <sup>13</sup>	Inside/ outside NSF	NSF should (1) develop programs targeted to women scientists who are involved in research projects, review panels and all other phases of the research process; and (2) fund programs facilitating the entry and re-entry of women scientists and engineers. <sup>14</sup>
Significant gaps exist in the data currently available on women, minority women and women with physical handicaps. <sup>15</sup>	Inside NSF	NSF should (1) gather data that are detailed enough to describe the unique problems as well as the successes of women, minority women and women with handicaps—and the subgroups among them; and (2) conduct comparison studies to assess the demand and market value of skilled S&E personnel versus the potential economic loss for the underutilization of women in these target groups. <sup>16</sup>
Minority women comprise 12 percent of the population and 1 percent of the doctoral scientists and engineers. <sup>17</sup>	Inside/ outside NSF	CEOST recommended improvements: (1) more accurate data, demographic classifications of minority subgroups; (2) greater minority representation in Federal programs; (3) special-interest programs that address needs not met by other programs for women and/or minorities; (4) collaborations with minority outreach and professional organizations; and (5) mentoring programs. <sup>18</sup>

**(continued)**

<sup>9</sup> Summary Minutes of Subcommittee on Women Meeting, CEOSE, February 4-5, 1982, p. 1.

<sup>10</sup> Ibid.

<sup>11</sup> Ibid., p. 8.

<sup>12</sup> Ibid., pp. 9 and 10.

<sup>13</sup> Annual Report of the National Science Foundation Committee on Equal Opportunities in Science and Technology, October 1982, Executive Summary, p. 2.

<sup>14</sup> Ibid, p. 10.

<sup>15</sup> Ibid., Executive Summary, p. 2.

<sup>16</sup> Ibid., p. 3 and pp. 6 and 28.

<sup>17</sup> Ibid., p. 33.

<sup>18</sup> Ibid., pp. 10 and 35.

NSF staff reported that the agency's data collection system on sex and race was deficient, in that cross-tabulated data are not available. <sup>19</sup>	Inside NSF	Strongly urged NSF to revise its system to make sex/race cross-tabulations possible. <sup>20</sup>
A number of changes were proposed in the "1981 Proposals of the NSF to Promote The Full Participation of Minorities and Women In S&E". <sup>21</sup>	Inside/ outside NSF	<p>Proposals included the following:</p> <ul style="list-style-type: none"> <li>• Division of Personnel and Management is to assess performance plans that include statements on equal opportunities for minorities and women.</li> <li>• NSF staff to visit grantee sites to encourage women to enter S&amp;E and submit proposals.</li> <li>• Program Officers are to be trained on issues of equal opportunities.</li> <li>• Mailing lists are to be expanded to ensure more women and minorities receive NSF announcements.</li> <li>• NSF Executive and Management Councils to be informed about women and minority equal opportunity initiatives.</li> <li>• Targeted women and minority programs to be funded in FY 1983.</li> <li>• Support for resource centers to be continued.</li> <li>• NSB Commission on Pre-college Education in Mathematics, Science and Technology to be established.</li> <li>• NSF to begin collecting data on women and minorities who submit proposals to NSF.<sup>22</sup></li> </ul>

<sup>19</sup> CEOSE Subcommittee Meeting Minutes, July 13-14, 1982, p. 7.

<sup>20</sup> Annual Report of the National Science Foundation Committee on Equal Opportunities in Science and Technology, October 1982, Executive Summary, p. 34.

<sup>21</sup> CEOSE Meeting Minutes, April 6-7, 1982, p. 2.

<sup>22</sup> Ibid., pp. 2 and 3.



**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Year: 1981-1982 Congress: 97<sup>th</sup>**  
**Target Group: Minorities**

<b>CEOSE Findings</b>	<b>Setting</b>	<b>CEOSE Recommendations</b>
For minority scientists and engineers, few apply for research funds from the Foundation or serve on the panels that review grant applications. <sup>23</sup>	Inside/ outside NSF	The Foundation should develop identifiable programs for increasing the number of minorities, who participate in research projects, review panels, and all other phases of the research process. <sup>24</sup>
African American, Hispanic, and Native Americans are more than 22% of the population, yet account for less than 3% of the Ph.D.s in science and technology awarded annually. <sup>25</sup>	Inside/ outside NSF	Development of any future minority or women-focused programs at the NSF should involve input from the National Network of Minority Women in Science (MWIS) using CEOST Subcommittee on Minorities as the liaison contact. <sup>26</sup>
Exemplary programs exist to increase the pool of minority scientists. <sup>27</sup>	Inside/ outside NSF	The Foundation should review and replicate exemplary programs, so that increasing numbers of minorities can benefit from these programs. <sup>28</sup>
Hispanics were less than 1% of science and engineering workforce in 1979; 3% of B.A.s in S&E, 2% of masters and 1.4% of doctorates. <sup>29</sup>	Inside/ outside NSF	Much stronger links should be established between CEOST and organizations concerned with Hispanic education and involvement in science and technology. <sup>30</sup> Also, it was recommended that the Foundation's data collection seek to disaggregate the Hispanic subgroups. <sup>31</sup>
Native American participation rates leading to careers in S&E are low. In 1980 there were 194 Native Americans or 0.24% of the total S&E graduate students in the country. <sup>32</sup>	Outside NSF	Pre-college programs for Native American students should focus on academic remediation, and development of a substantive and definitive database for Native Americans. <sup>33</sup>

<sup>23</sup> Annual Report of the National Science Foundation Committee on Equal Opportunities in Science and Technology, October 1982, p. 10.

<sup>24</sup> Ibid.

<sup>25</sup> Ibid., p. 32.

<sup>26</sup> Ibid.

<sup>27</sup> Ibid., p. 33.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid., p. 36.

<sup>30</sup> Ibid., p. 37.

<sup>31</sup> Ibid., p. 38.

<sup>32</sup> Ibid.

<sup>33</sup> Ibid., p. 39.

**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Year: 1981-1982 Congress: 97<sup>th</sup>**  
**Target Group: Persons with Disabilities**

<b>CEOSE Findings</b>	<b>Setting</b>	<b>CEOSE Recommendations</b>
The physically handicapped are neither entering nor advancing in S&E careers. <sup>34</sup>	Inside/ outside NSF	Undertake efforts to eliminate discriminatory barriers to career advancement. <sup>35</sup>
Major investments in academically oriented science education programs at all levels can expand the pool of disabled individuals to enter S&E careers. <sup>36</sup>	Outside NSF	Give high priority in policy decisions and budget allocations to science education programs at every level for disabled students prepared to complete post high school programs in S&E. <sup>37</sup>
Significant gaps exist in the data currently available on disabled scientists and engineers. <sup>38</sup>	Inside/ outside NSF	Gather data that are detailed enough to describe the unique problems as well as the successes of subgroups, such as the disabled, in S&E. <sup>39</sup>
The NSF formerly operated several programs for the education of disabled persons through the project on the Handicapped in Science. <sup>40</sup>	Inside NSF	NSF should reinstate funding for these programs. <sup>41</sup>

<sup>34</sup> Ibid., Executive Summary, p. 2.

<sup>35</sup> Ibid., p. 4.

<sup>36</sup> Ibid., p. 2.

<sup>37</sup> Ibid., p. 3.

<sup>38</sup> Ibid., p. 2.

<sup>39</sup> Ibid., p. 3.

<sup>40</sup> Ibid., p. 7.

<sup>41</sup> Ibid.

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**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Broadening Participation Overall**  
**Year: 1983-1984 Congress: 98<sup>th</sup>**

CEOSE Findings	Setting	CEOSE Recommendations
The basic issues of equal access for all to science education, employment and advancement, once education is completed remain the same. <sup>1</sup>	Inside/ outside NSF	NSF and educational agencies should support research that would identify clearly the specific educational needs of women and other underutilized groups and the conditions affecting their performance in science and mathematics. In addition, to regain women who dropped out of S&E, re-entry programs should be reinstated. The Career Facilitation programs were eliminated in the Federal budget decision of 1981. <sup>2</sup>
The indiscriminate use of Scholastic Aptitude Test in mathematics (SAT-M) may well be at the root of sex and race discrimination in science. <sup>3</sup>	Outside NSF	NSF should: (1) support research to clarify this issue and should help to educate the public and scientific community in the proper interpretation of such tests; and (2) science education provided through Federal legislation should specifically mandate consideration of the educational needs of girls and women. <sup>4</sup>
Half of all future scientists and engineers are educated at major research universities where more than 90% of the Federal support for research is spent. <sup>5</sup>	Inside/ outside NSF	CEOSE recommended that these institutions bring their enrollments of women and other underrepresented groups into better alignment with the population distributions. <sup>6</sup>
Science and engineering graduate training play a unique and critical role in career preparation. <sup>7</sup>	Inside/ outside NSF	The Graduate Education Subcommittee of the Committee recommended that there should be substantial increases in stipends, fellowships, and research assistantships for women and other underrepresented groups. In addition, NSF should continue to support all existing programs that aid women. <sup>8</sup>
Adequate data must be collected if the Committee and the Foundation are to measure progress towards equal opportunity. <sup>9</sup>	Inside/ outside NSF	CEOSE recommended that NSF develop a database on women scientists and engineers, by sex and race/ethnicity. <sup>10</sup>

**(continued)**

<sup>1</sup> The Continued Quest for Equal Opportunity, CEOST Second Annual Report to Congress, p. 1.

<sup>2</sup> Ibid., pp. 1, 14 and 19.

<sup>3</sup> Ibid., p. 6.

<sup>4</sup> Ibid., pp. 6 and 14.

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

<sup>7</sup> Ibid., p. 8.

<sup>8</sup> Ibid.

<sup>9</sup> Ibid., p. 11.

<sup>10</sup> Ibid., p. 9.

Better quality data on participation of target groups in S&E fields are needed to facilitate progress of programs. <sup>11</sup>	Inside/ outside NSF	The Foundation should develop a database and set of procedures for monitoring the involvement of disabled persons on grants and contracts funded by the Foundation. <sup>12</sup>
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<sup>11</sup> Ibid, p. 3.

<sup>12</sup> Ibid.

## Summary of CEOSE (CEOST) Findings and Recommendations

Year: 1983-1984 Congress: 98<sup>th</sup>

Target Group: Women

CEOSE Findings	Setting	CEOSE Recommendations
Barriers to education and career advancement prevent too many women from contributing their talents to the nation's scientific and technological enterprise. <sup>13</sup>	Inside/ outside NSF	Congress should enlist all Federal agencies in the quest for equal opportunity; and it should incorporate explicit language during the reauthorization process to assure that programs in science and technology address the needs of women and other underrepresented groups in S&E. <sup>14</sup>
Unless STEM programs provide appropriate access for women students, the pool of scientists and engineers will fall short of the nation's needs. <sup>15</sup>	Inside/ outside NSF	NSF should accumulate and disseminate information on pre-college program models that have successfully attracted and educated women in science and engineering. <sup>16</sup>
Deficiencies caused by lack of qualified teachers, inadequate equipment, crowded facilities, sexism and poverty inhibit the education in science for many students. <sup>17</sup>	Outside NSF	CEOSE recommended the continuation of former Foundation-sponsored activities: The <i>Resource Centers for Science and Engineering (RCSE)</i> program, and the Women in Science program. <sup>18</sup>
Women in engineering chose that career later in life than did their male counterparts. <sup>19</sup>	Inside/ outside NSF	CEOSE recommended that new program initiatives specifically should avoid the creation of unnecessary lockstep sequences and aim for flexibility in access and timing. <sup>20</sup>
Women's colleges have traditionally had far better records in preparing their students for science and technology careers than have the majority of co-educational institutions. <sup>21</sup>	Outside NSF	CEOSE recommended that NSF undertake programs similar to the <i>Research Improvement in Minority Institutions (RIMI)</i> program in women's colleges. <sup>22</sup>

**(continued)**

<sup>13</sup> Ibid, p. 1.

<sup>14</sup> Ibid.

<sup>15</sup> Ibid., p. 5.

<sup>16</sup> Ibid., p. 1.

<sup>17</sup> Ibid., p. 7.

<sup>18</sup> Ibid.

<sup>19</sup> Ibid.

<sup>20</sup> Ibid.

<sup>21</sup> Ibid.

<sup>22</sup> Ibid.

The presence of women faculty evidently plays a considerable part in making science and engineering studies seem more feasible. <sup>23</sup>	Inside/ outside NSF	NSF should encourage more hiring of women, especially in the tenured ranks. In addition, Congressional action should be taken to make Title IX applicable to all programs within institutions which receive Federal funds. This will enable NSF to establish voluntary cooperative programs to foster equal access to S&E. <sup>24</sup>
The shift from student aid to loan programs has had especially discouraging effects on the participation of the most talented women. <sup>25</sup>	Inside/ outside NSF	CEOSE recommended collaboration between the Federal government and academic institutions to disseminate information to women about opportunities for graduate financial assistance. <sup>26</sup>
Women scientists are twice as likely as identically prepared men to hold “revolving door” appointments while the men hold tenure-track positions. <sup>27</sup>	Inside/ outside NSF	CEOSE noted that the proposed <i>Research Opportunities for Women Scientists and Engineers (ROW)</i> program was a much-needed effort to deal with the difficulties many women have encountered in obtaining independent research funding. About half of all major research universities do not allow non-tenure-track staff to serve as principal investigators. <sup>28</sup>
There is a need for broadening the base of supported international activity to include education in the sciences, both formal and informal, including efforts to increase women’s participation in such programs. <sup>29</sup>	Inside/ outside NSF	CEOSE supported programs of cooperative research and related activities between American and foreign scientists and institutions for the purpose of strengthening the endeavor of the U.S. S&E community. NSF should encourage women scientists and engineers to participate in these programs and to become members of international scientific teams. <sup>30</sup>
A successful program supporting research, mathematics and scientific education for women scientists was targeted for elimination. <sup>31</sup>	Inside NSF	Congress should review this agency’s activities and channel funds for science education in the interim through the NSF until questions about this setback can be resolved. <sup>32</sup>

<sup>23</sup> Ibid.

<sup>24</sup> Ibid., pp. 8 and 14.

<sup>25</sup> Ibid., p. 8.

<sup>26</sup> Ibid., p. 8.

<sup>27</sup> Ibid., p. 9.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid., p. 20.

<sup>30</sup> Ibid., pp. 20 and 21.

<sup>31</sup> Ibid., p. 22.

<sup>32</sup> Ibid.

**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Year: 1983-1984 Congress: 98<sup>th</sup>**  
**Target Group: Minorities**

CEOSE Findings	Setting	CEOSE Recommendations
Alaskan Natives, Native Americans, African Americans, Mexicans, and Puerto Rican Americans are severely under-represented in S&E; and data on these subgroups are insufficient. <sup>33</sup>	Inside/ outside NSF	NSF should encourage the other data collection agencies to obtain more detailed information on subgroups within the larger minority category. <sup>34</sup> NSF should collect data and monitor race/gender of personnel supported by NSF research contracts and grants. <sup>35</sup>
National attention to the state of pre-college education overall has not served to focus discussions on the particular needs of minority populations in science and mathematics. <sup>36</sup>	Outside NSF	NSF should respond to the National Science Board (NSB) Commission report and Congressional interest in serving all the pre-college population, and seek input from CEOSE in ways to reach those represented by the Committee. <sup>37</sup> Support pre-college education, with specific attention given to increasing the pool of minority, women, and disabled students. <sup>38</sup>
Since minority students are “at risk” in the educational system, intervention programs in science and engineering are needed at all levels. <sup>39</sup>	Outside NSF	Effective programs are needed at all levels to address the serious underrepresentation of minority students in S&E career preparation. <sup>40</sup>
Already, 23 of the Country’s 25 largest school districts have mostly minority school populations. <sup>41</sup>	Outside NSF	Proposals designed to reach all minority groups should demonstrate an understanding of the differences among the various target groups and the strategies needed to reach these students. <sup>42</sup>
Retention programs are needed for minority students in undergraduate science and engineering programs. <sup>43</sup>	Outside NSF	Efforts similar to the National Institute of Health’s (NIH’s) Minority Biomedical Research Support and Minority Access to Research Careers programs should be adopted at NSF as well as re-establishment of NSF’s Resource Center programs that help to maintain retention in science curriculums. <sup>44</sup>

**(continued)**

<sup>33</sup> Ibid., p. 23.

<sup>34</sup> Ibid.

<sup>35</sup> CEOST Minority Subcommittee Meeting Minutes, May 3, 1983, p. 3.

<sup>36</sup> The Continued Quest for Equal Opportunity. Second Annual Report of The CEOST, April 1984, p. 23.

<sup>37</sup> Ibid., p. 29.

<sup>38</sup> Ibid., p. 30.

<sup>39</sup> Ibid., p. 23.

<sup>40</sup> Ibid., p. 24.

<sup>41</sup> Ibid., p. 25.

<sup>42</sup> Ibid., p. 29.

<sup>43</sup> Ibid., p. 31.

<sup>44</sup> Ibid.



<p>The aggregating of all data on Asian Americans makes it impossible to determine if various Asian populations have differential access problems.<sup>45</sup></p>	<p>Inside/ outside NSF</p>	<p>The Committee urged that Congress support CEOST in addressing the concerns of Asian Americans in science and engineering.<sup>46</sup></p>
<p>Most African American, Mexican, Native American and mainland Puerto Rican students attend majority institutions as their primary source of B.A. training.<sup>47</sup></p>	<p>Outside NSF</p>	<p>CEOST urged the establishment of programs to support undergraduate research experience for minorities, women, and disabled students.<sup>48</sup> The Foundation should focus on issues that will increase minority applicants and participants in the NSF fellowship programs and the budget for the <i>Minority Resource Institute (MRI)</i> should be increased \$500,000 per year.<sup>49</sup></p>

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<sup>45</sup> Ibid., p. 27.

<sup>46</sup> Ibid., p.31.

<sup>47</sup> Ibid.

<sup>48</sup> Ibid.

<sup>49</sup> CEOST Meeting Minutes, April 19, 1984, p. 1.

**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Year: 1983-1984 Congress: 98<sup>th</sup>**  
**Target Group: Persons with Disabilities**

CEOSE Findings	Setting	CEOSE Recommendations
National attention is needed on the state of pre-college education for disabled students. <sup>50</sup>	Inside/ outside NSF	As research directorates seek to establish goals, they should include support of pre-college education, with efforts to increase the pool of disabled students. <sup>51</sup>
The NSF has made some attempts to address CEOST concerns over provision of data on disabled scientists and engineers. <sup>52</sup>	Inside NSF	More data are needed to determine the extent and nature of participation in Foundation programs by disabled persons in S&E. <sup>53</sup> The Foundation should adopt methods used by NIH. <sup>54</sup>
NSF must seek better accommodations between the legitimate claims to equal access and opportunity of disabled persons, and the equally legitimate deficiencies caused by lack of qualified teachers, inadequate equipment, and crowded facilities. <sup>55</sup>	Inside/ outside NSF	The <i>Resource Centers for S&amp;E</i> program should be supported, given their success in overcoming barriers. <sup>56</sup>

<sup>50</sup> The Continued Quest for Equal Opportunity. Second Annual Report of the CEOST, 1984, p. 23.

<sup>51</sup> Ibid., p. 30.

<sup>52</sup> Ibid., p. 27.

<sup>53</sup> Ibid., p. 23.

<sup>54</sup> CEOST Meeting Minutes, January 6, 1984, p. 1.

<sup>55</sup> Ibid., p. 7.

<sup>56</sup> Ibid.

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**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Broadening Participation Overall**  
**Year: 1985-1986 Congress: 99<sup>th</sup>**

CEOSE Findings	Setting	CEOSE Recommendations
The numbers and patterns of participation in science and engineering by underrepresented U.S. citizens do not bode well for our economic and national security needs. <sup>1</sup>	Inside/ outside NSF	To further understanding and to achieve significant progress in this area, CEOST recommended that there be a sizeable investment in staff to assist the Committee, as well as support for research and studies as warranted. <sup>2</sup>
Industry, academia, government, and professional and honorific organizations clearly have practices that deny leadership positions to women and other underrepresented groups. <sup>3</sup>	Inside/ outside NSF	CEOST urged Congress to either create a committee with Federal government-wide responsibility for equal opportunity activities in science and engineering, or that the mission of CEOST be expanded to encompass this broader scope--in order to address this inter-institutional problem of discriminatory practices. <sup>4</sup>
Quality education in science, mathematics and technology is a key to access careers in science and engineering. <sup>5</sup>	Outside NSF	NSF and Congress should look to successful educational models and replicate them nationally. <sup>6</sup>
The levels of literacy that are needed by citizens in a pluralistic society are increasingly based in science and technology. <sup>7</sup>	Inside/ outside NSF	NSF should develop technologies that increase the depth, breath and scope of science and mathematics teaching; and to conduct research that will reveal ways to effectively teach women and other students. <sup>8</sup>
Groups presently underutilized in S&E will comprise close to 65% of the available new entrant population. <sup>9</sup>	Inside/ outside NSF	NSF must be sensitive to the inclusion within the talent pool of those who have traditionally been underutilized--specifically women, minorities, and persons with disabilities. <sup>10</sup>

**(continued)**

<sup>1</sup> The Third Report of the National Science Foundation CEOST, p. 4.

<sup>2</sup> Ibid., p. 7.

<sup>3</sup> Ibid., p. 10.

<sup>4</sup> Ibid., p. 13.

<sup>5</sup> Ibid., p. 15.

<sup>6</sup> Ibid., p. 14.

<sup>7</sup> Ibid., p. 15.

<sup>8</sup> Ibid.

<sup>9</sup> Ibid., p. 2.

<sup>10</sup> Ibid., p. 4.

The NSF should not be expected to shoulder the entire responsibility for Federal government programs to promote access and advancement for these groups. <sup>11</sup>	Inside/ outside NSF	NSF should call for broader agency involvement in developing and supporting focused programs in institutionalizing concerns for underrepresented groups in regular programs, and in increasing their numbers among staffs, advisors and reviewers. <sup>12</sup>
Access remains the most formidable barrier to minorities and other underrepresented groups. <sup>13</sup>	Inside/ outside NSF	CEOST urged the NSF to identify barriers to educational access by minorities, women and persons with disabilities, and to work with organizations, industry, government, universities, and schools in supporting intervention programs. <sup>14</sup>
More contact is needed among agency and department heads in addressing human resource needs in S&E. <sup>15</sup>	Inside NSF	CEOST urged that strong efforts be devoted to dissemination and replication of successful models and approaches to the problems relating to disabled scientists and engineers. <sup>16</sup>
Women, minorities and persons with disabilities are absent from tenured full professor faculty positions, and at high management levels in science-focused agencies such as the NSF. <sup>17</sup>	Inside/ outside NSF	CEOST recommended that NSF provide employment opportunities for underrepresented groups within NSF staff positions. <sup>18</sup>
CEOST has found great merit in ongoing programs such as <i>Minority Research Initiation</i> , and <i>Visiting Professorships for Women and Research Opportunities for Women</i> . <sup>19</sup>	Inside NSF	Congress/NSF must reassess the value of these programs. <sup>20</sup>

<sup>11</sup> Ibid., p. 5.

<sup>12</sup> Ibid., p. 5.

<sup>13</sup> Ibid., p. 10.

<sup>14</sup> Ibid., p. 16.

<sup>15</sup> Ibid., p. 6.

<sup>16</sup> Ibid., p. 14.

<sup>17</sup> Ibid., p. 10.

<sup>18</sup> Ibid., p. 5.

<sup>19</sup> Ibid., p. 13.

<sup>20</sup> Ibid.

**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Year: 1985-1986 Congress: 99<sup>th</sup>**  
**Target Group: Women**

CEOSE Findings	Setting	CEOSE Recommendations
Women comprised an average of 21.8% of scientists and engineers employed in academic institutions that received more than 40% of NSF research grants. <sup>21</sup>	Outside NSF	CEOST urged Congress to support specific NSF attention to access by women and other underrepresented groups in its authorization and funding of science and engineering educational programs. <sup>22</sup>

**Summary of CEOSE (CEOST) Findings and Recommendations**  
**Year: 1985-1986 Congress: 99<sup>th</sup>**  
**Target Group: Persons with Disabilities**

CEOSE Findings	Setting	CEOSE Recommendations
More interchange is needed among those persons charged with developing, monitoring and implementing programs for persons with disabilities in S&E. <sup>23</sup>	Inside NSF	Congress should carefully reassess the need for programs that were discontinued in 1981 for their potential contribution to promoting access to and advancement in science and engineering by persons with disabilities. <sup>24</sup>
Access remains the most formidable barrier to persons with disabilities. <sup>25</sup>	Inside/ outside NSF	CEOST urged the NSF to identify general and scientific discipline specific barriers to educational access by persons with disabilities and to work with organizations in developing intervention programs. <sup>26</sup>

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<sup>21</sup> Ibid., p. 7.

<sup>22</sup> Ibid., p. 15.

<sup>23</sup> Ibid., p. 6.

<sup>24</sup> Ibid., p. 13.

<sup>25</sup> Ibid., p. 10.

<sup>26</sup> Ibid., p. 16.

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**Summary of CEOSE Findings and Recommendations**  
**Broadening Participation Overall**  
**Year: 1987-1988 Congress: 100<sup>th</sup>**

CEOSE Findings	Setting	CEOSE Recommendations
Many of the key factors in choosing S&E fields as majors impede participation of underrepresented groups in S&E. <sup>1</sup>	Inside/ outside NSF	NSF must eliminate the inequities in S&E salaries to attract more women, minorities and persons with disabilities. <sup>2</sup> NSF should provide for these groups more stable financial support at the graduate level, increase opportunities for research assistantships and provide greater clarity about the benefits to be derived from an advanced degree. <sup>3</sup>
A <i>Resource Center</i> program for S&E near largest school districts is an effective approach for recruiting, motivating and supporting students to pursue S&E careers. <sup>4</sup>	Inside NSF	More funds are needed to support projects, like the <i>Resource Centers</i> , that take a comprehensive approach in increasing the participation of minorities in S&E. Funds should be used to establish at least 5 new centers per year. <sup>5</sup>
There is growing resentment about affirmative action, which can impact the goals of CEOSE. <sup>6</sup>	Inside/ outside NSF	Issue of affirmative action backlash and impact on promoting opportunities for women, minorities and disabled persons should be researched. <sup>7</sup>

<sup>1</sup> Fourth Report to The Congress of the CEOSE, April 1988, p. 19.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

<sup>6</sup> CEOSE Meeting Minutes, October 27, 1988, p. 1.

<sup>7</sup> Ibid., p. 3.



**Summary of CEOSE Findings and Recommendations**  
**Year: 1987-1988 Congress: 100<sup>th</sup>**  
**Target Group: Women**

CEOSE Findings	Setting	CEOSE Recommendations
Girls need early intervention in mathematics and science preparation to increase college enrollments. <sup>8</sup> In high school, females take fewer years of mathematics and science classes than males, and are less likely to enroll in advanced courses for these subjects. <sup>9</sup>	Outside NSF	For girls as early as age 9, CEOSE recommended that NSF develop programs and research to increase their interest in mathematics and science at the elementary and middle school levels. Funding to support these efforts was also strongly advised. <sup>10</sup>
Fewer college-bound women show an interest in studying S&E. Their interest tends to be less in quantitatively-based fields such as physics, chemistry and engineering and more in the life sciences and health areas. <sup>11</sup>	Outside NSF	NSF should provide targeted programs to motivate and support women undergraduates to pursue science and engineering. <sup>12</sup>
Women are less visible in decision-making roles in industry and government. <sup>13</sup> And, in academe, women are less likely to be tenured than men. <sup>14</sup>	Inside/ outside NSF	NSF should launch a major effort to make experienced women more visible to women entering the S&E workforce. <sup>15</sup>

<sup>8</sup> Fourth Report to The Congress of the CEOSE, April 1988, pp. 9 and 10.

<sup>9</sup> Ibid., p. 17.

<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

<sup>12</sup> Ibid., p. 18.

<sup>13</sup> Ibid.

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

**Summary of CEOSE Findings and Recommendations**  
**Year: 1987-1988 Congress: 100<sup>th</sup>**  
**Target Group: Minorities**

CEOSE Findings	Setting	CEOSE Recommendations
There is low representation of minorities among the senior staff at the NSF and an absence of minorities on the National Science Board. <sup>16</sup>	Inside NSF	CEOSE urged the Director of the Foundation and the National Science Board Chair to signal to the President that minority representation on the Board is critical. <sup>17</sup> Foundation needs to increase diversity among its staff by more intensified efforts. <sup>18</sup>
There is a severe shortage of minority mathematics and science teachers. Only 3% of mathematics and 5% of science teachers in grades 10 through 12 are African-American. <sup>19</sup>	Outside NSF	NSF should support school collaborations that focus on the production of pre-college science and mathematics teachers and address the dearth of minority S&E faculty. <sup>20</sup> NSF needs to also support initiatives to increase the number of minority faculty at the university level. <sup>21</sup>
Minority seniors with SAT-Math scores of 550 and above and interested in S&E represent a special target for increasing participation of minorities. <sup>22</sup>	Outside NSF	These high-ability students should be singled out for special nurturing beginning with the pre-freshman summer and continuing through to the post-doctorate level. <sup>23</sup>
There are exemplary programs to advance minorities in S&E. <sup>24</sup>	Outside NSF	Exemplary minority-focused intervention projects, such as the Johns Hopkins Center for the Advancement of Academically Talented Youth (CTY), need to be replicated on a national level. <sup>25</sup>
In 1975, African Americans received 1.8% of 11,800 postdoctoral appointments. <sup>26</sup>	Inside/ outside NSF	A modest minority postdoctoral program should be created. <sup>27</sup>

**(continued)**

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<sup>16</sup> Ibid, p. 2.  
<sup>17</sup> Ibid.  
<sup>18</sup> Ibid., p. 14.  
<sup>19</sup> Ibid., p. 2.  
<sup>20</sup> Ibid., p. 3.  
<sup>21</sup> Ibid., pp. 2-3.  
<sup>22</sup> Ibid., p. 3.  
<sup>23</sup> Ibid.  
<sup>24</sup> Ibid.  
<sup>25</sup> Ibid.  
<sup>26</sup> Ibid., p. 4.  
<sup>27</sup> Ibid.

Most of the public school districts are comprised mainly of minority students, whose dropout rates exceed 50%. <sup>28</sup>	Outside NSF	University/school and industry collaborations should be formed to encourage and support inner city and rural school retention in mathematics and science curriculums. <sup>29</sup>
Native Americans are less than 1% of the population and their representation among S&E in the labor force is less than 1%. <sup>30</sup>	Inside/ outside NSF	CEOSE should establish a Native American task force within the Committee; and NSF should hire a Native American to work out of Office of the Director. <sup>31</sup>
Hispanics constitute 7% of the population, 6% of labor force, but only 2% of S&E. <sup>32</sup>	Inside/ outside NSF	Programs that help minority students bridge the gap between high school and college, continuing through the postdoctoral level, must be in place to increase minority participation. <sup>33</sup>
A comprehensive approach to the participation of minorities in mathematics, science and engineering is needed from pre-college to postdoctoral levels. <sup>34</sup>	Inside/ outside NSF	Programs that help minority students bridge the gap between high school and college, continuing through the postdoctoral level, must be in place to increase minority participation. <sup>35</sup>

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<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

<sup>30</sup> Ibid., p. 9.

<sup>31</sup> Ibid., p. 14.

<sup>32</sup> Ibid., p. 9.

<sup>33</sup> Ibid., p. 15.

<sup>34</sup> Ibid., p. 12.

<sup>35</sup> Ibid., p. 15.

**Summary of CEOSE Findings and Recommendations**  
**Year: 1987-1988 Congress: 100<sup>th</sup>**  
**Target Group: Persons with Disabilities**

<b>CEOSE Findings</b>	<b>Setting</b>	<b>CEOSE Recommendations</b>
CEOSE remains concerned about the low representation of persons with disabilities among senior staff at the Foundation. <sup>36</sup>	Inside/ outside NSF	A scientist or engineer with a disability should be hired to work out of the Office of the Director of the NSF. <sup>37</sup>
The Foundation does not have specific programs for persons with disabilities beyond the Facilitation Awards to the Handicapped Program, which supports persons with disabilities within the NSF. <sup>38</sup>	Inside NSF	Existing programs to promote and sustain participation of minorities and women in S&E careers should be expanded to include persons with disabilities. <sup>39</sup>
Major concerns for persons with disabilities within the past two years have included accessibility to facilities, scientific meetings, materials, use of lab equipment, and physical safety. <sup>40</sup>	Inside NSF	NSF should make scientific meetings more accessible to persons with disabilities, visually, or hearing impaired. <sup>41</sup>
Scientists and engineers with disabilities represent only 0.26% of workers with disabilities. <sup>42</sup>	Inside/ outside NSF	NSF should help to remove barriers that prevent persons with disabilities from contributing to our nation's scientific and engineering effort. <sup>43</sup>
To make scientists and engineers with disabilities more visible, the NSF supported the publication by the American Association for the Advancement of Science (AAAS), listing 950 such individuals. <sup>44</sup>	Inside NSF	Program officers should consider doing a special mailing of program guidelines to scientists and engineers with disabilities who were identified in the recent AAAS publication. <sup>45</sup>

**(continued)**

<sup>36</sup> Ibid., p. 2.

<sup>37</sup> Ibid., p. 24.

<sup>38</sup> Ibid., p. 10.

<sup>39</sup> Ibid., p. 23.

<sup>40</sup> Ibid., p. 21.

<sup>41</sup> Ibid., p. 5.

<sup>42</sup> Ibid., p. 21.

<sup>43</sup> Ibid., p. 22.

<sup>44</sup> Ibid., p. 21.

<sup>45</sup> Ibid., p. 6.

The most serious problem for disabled scientists, engineers and students is accessibility all along the educational pipeline and workplace. <sup>46</sup>	Inside/ outside NSF	Large employers, in particular Federal agencies and their contractors, should set aside adequate funds in their annual budgets for improving accessibility for the persons with disabilities. <sup>47</sup>
Recipients of NSF funds need clear information on how to conduct a barrier-free meeting for scientists and engineers with disabilities. <sup>48</sup>	Inside NSF	NSF should play a leadership role in the removal of barriers that prevent many individuals with disabilities from contributing. <sup>49</sup>
Students with disabilities often have special expenses over and above those of other university students. <sup>50</sup>	Outside NSF	The NSF should develop a program like the <i>Minority Fellowships Program (MFP)</i> for students with disabilities that would provide additional support for their special needs. <sup>51</sup>
In 1987, among 14,000 principal investigators, only 78 or about 0.55% had a disability. <sup>52</sup>	Inside/ outside NSF	The NSF should initiate a targeted grant program for scientists and engineers with disabilities. <sup>53</sup>
To promote access of scientists and engineers with disabilities, an increase in visibility is needed of professors and research scientists who have disabilities and are active in their careers. <sup>54</sup>	Inside NSF	A scientist or engineer should be hired to work out of the Director's office of the NSF or out of the STIA Directorate where several targeted programs are located. A scientist or engineer with disabilities should also be appointed to the National Science Board. <sup>55</sup>
Scientists and engineers with disabilities are less likely to be supported for travel because adequate facilities may not be available. <sup>56</sup>	Inside/ outside NSF	A program should be initiated to support travel to meetings and conferences for scientists and engineers with disabilities, and provide funds to cover travel. <sup>57</sup>

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<sup>46</sup> Ibid., p. 22.

<sup>47</sup> Ibid.

<sup>48</sup> Ibid.

<sup>49</sup> Ibid.

<sup>50</sup> Ibid., p. 23.

<sup>51</sup> Ibid.

<sup>52</sup> Ibid., p. 24.

<sup>53</sup> Ibid.

<sup>54</sup> Ibid.

<sup>55</sup> Ibid.

<sup>56</sup> Ibid.

<sup>57</sup> Ibid.

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**Summary of CEOSE Findings and Recommendations  
Broadening Participation Overall  
Year: 1989-1990 Congress: 101<sup>th</sup>**

Complete information for findings and recommendations were not available for the 1989-1990 period.

**Summary of CEOSE Findings and Recommendations**  
**Broadening Participation Overall**  
**Year: 1991-1992 Congress: 102<sup>nd</sup>**

CEOSE Findings	Setting	CEOSE Recommendations
On the whole, under-represented groups in STEM have even less access than others to educational opportunities that allow them to develop expertise or literacy in science, mathematics and technology. <sup>1</sup>	Inside/ outside NSF	CEOSE recommended the following goals to NSF (1) design new and comprehensive programs; and (2) integrate plans across Directorates and for foundation-wide initiatives for underrepresented persons in STEM. <sup>2</sup>
Economically, our national destiny depends on having a world-class scientific and technical workforce. <sup>3</sup>	Inside/ outside NSF	CEOSE recommended that the NSF use its expertise to develop and plan diversity programs to necessitate change with results that can be evaluated. <sup>4</sup>
Neither women nor minorities can be even partially excluded from S&E enterprises without squandering talent needed to solve pressing scientific, technological and economic problems. <sup>5</sup>	Inside/ outside NSF	NSF must help (1) triple the number of women in scientific, engineering and mathematical professions, and (2) quadruple the number of minorities who enter two-year institutions and move on to earn bachelor degrees in science, mathematics and engineering. <sup>6</sup>
Education in science and mathematics presents serious challenges, at all levels, which are exaggerated for underutilized groups. <sup>7</sup>	Inside/ outside NSF	NSF initiatives must achieve parity in participation rates for female and all other students in elementary, middle and high school science and mathematics. <sup>8</sup>

<sup>1</sup> Goals for The Coming Years. Committee on Equal Opportunities in Science and Engineering, December 1992, p. 9.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid., p. 4.

<sup>4</sup> Ibid., p. 3.

<sup>5</sup> Ibid., p. 4.

<sup>6</sup> Ibid., pp. 2 and 7.

<sup>7</sup> Ibid., p. 3.

<sup>8</sup> Ibid., p. 6.



**Summary of CEOSE Findings and Recommendations**  
**Year: 1991-1992 Congress: 102<sup>nd</sup>**  
**Target Group: Women**

CEOSE Findings	Setting	CEOSE Recommendations
The gap between men and women along the S&E educational pipeline originates in elementary grades. <sup>9</sup>	Outside NSF	NSF should reduce by one-half and eliminate by the year 2010 gender as well as race/ethnic gaps in student achievement in pre-college science and mathematics. <sup>10</sup> CEOSE recommended that NSF educational strategies double the undergraduate degrees awarded annually to women. <sup>11</sup>
Although earning nearly 25% of Bachelor's Degrees, women earn only 13% of the Ph.D. degrees in S&E. <sup>12</sup>	Inside/ outside NSF	NSF should work to triple the number of doctorate degrees awarded to women. <sup>13</sup>
Among doctorate level scientists and engineers employed in 4-year colleges and universities, women are less likely than men to be tenured. <sup>14</sup>	Outside NSF	NSF should set goals to double the number of women faculty and college majors in the physical sciences, engineering and mathematics. <sup>15</sup>

**Summary of CEOSE Findings and Recommendations**  
**Year 1991-1992 Congress: 102<sup>nd</sup>**  
**Target Group: Minorities**

CEOSE Findings	Setting	CEOSE Recommendations
Minority students have far less access to well-prepared teachers and other educational resources. <sup>16</sup>	Outside NSF	A highly coordinated strategy needs to be established to address the entire science, engineering and mathematics education continuum for minority groups, from K-12. <sup>17</sup>
Disadvantaged minorities are underrepresented in the S&E workforce. <sup>18</sup>	Inside/ outside NSF	NSF should adopt a strategy to triple the number of professional S&E positions occupied by minorities by the year 2000. <sup>19</sup>

<sup>9</sup> Ibid., p. 5.

<sup>10</sup> Ibid., p. 6.

<sup>11</sup> Ibid., p. 7.

<sup>12</sup> Ibid.

<sup>13</sup> Ibid., p. 2.

<sup>14</sup> Ibid., p. 6.

<sup>15</sup> Ibid.

<sup>16</sup> Ibid., p. 5.

<sup>17</sup> Ibid., p. 7.

<sup>18</sup> Ibid., p. 3.

<sup>19</sup> Ibid., p. 7.

**Summary of CEOSE Findings and Recommendations**  
**Year: 1991-1992 Congress: 102<sup>nd</sup>**  
**Target Group: Persons with Disabilities**

CEOSE Findings	Setting	CEOSE Recommendations
Little is known about the achievements of students with disabilities in the S&E pipeline. <sup>20</sup>	Outside NSF	A strategy should be established that addresses the entire STEM education continuum for disabled students, including measurable competencies for all students K-12. <sup>21</sup>
Despite the growing population, only about 100,000 scientists and engineers with disabilities are employed. <sup>22</sup>	Inside/ outside NSF	NSF should develop programs and initiatives to double by the year 2000 the number of professional S&E jobs for disabled persons. <sup>23</sup>
Students with disabilities have less access to scientific, mathematical and technical materials than their non-disabled peers. <sup>24</sup>	Inside/ outside NSF	NSF should develop programs and initiatives to reduce or eliminate by the year 2000 barriers to access in S&E education for disabled persons. <sup>25</sup>
Students with disabilities have less access to S&E teachers who are disabled. <sup>26</sup>	Outside NSF	NSF should develop programs and initiatives to double by the year 2000 the number of disabled S&E teachers. <sup>27</sup>

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<sup>20</sup> Ibid., p. 5.

<sup>21</sup> Ibid., p. 7.

<sup>22</sup> Ibid., p. 5.

<sup>23</sup> Ibid., p. 2.

<sup>24</sup> Ibid., p. 5.

<sup>25</sup> Ibid., p. 2.

<sup>26</sup> Ibid., p. 5.

<sup>27</sup> Ibid., p. 2.

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**Summary of CEOSE Findings and Recommendations**  
**Broadening Participation Overall**  
**Year: 1993-1994 Congress: 103<sup>rd</sup>**

CEOSE Findings	Setting	CEOSE Recommendations
NSF has made some progress in executing the goals related to women, minorities and persons with disabilities, as recommended in the 1992 CEOSE Report to Congress. <sup>1</sup>	Inside NSF	In addition to continued work on those goals, CEOSE recommended that NSF (1) continue to encourage more partnerships between two-and four-year colleges to increase interest and participation of underrepresented groups in STEM; (2) continue to hire within NSF more female, minority and disabled professional staff; (3) ensure that NSF's pool of reviewers and panelists are inclusive of the total population of scientists and engineers. <sup>2</sup>
NSF's initiatives in reaching data-collection goals need to be assessed and made accountable. <sup>3</sup>	Inside NSF	NSF should (1) continue to support efforts for data collection; (2) actively support cooperation among Federal agencies that collect relevant data; (3) ensure quality of data on gender and race; and (4) continue the publication of NSF's document " <i>Women, Minorities and Persons with Disabilities in Science and Engineering</i> ". <sup>4</sup>

<sup>1</sup> Biennial Report to Congress of the Committee on Equal Opportunities in Science and Engineering, June 1995, p. 9.

<sup>2</sup> Ibid., pp. 9-10.

<sup>3</sup> Ibid., p. 9.

<sup>4</sup> Ibid.

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**Summary of CEOSE Findings and Recommendations**  
**Broadening Participation Overall**  
**Year: 1995-1996 Congress: 104<sup>th</sup>**

CEOSE Findings	Setting	CEOSE Recommendations
Significant portions of the American people are not full participants in science and technology (S&E) either as professionals or with acceptable standards of scientific literacy. <sup>1</sup>	Inside/ outside NSF	The NSF should continue to work to remove barriers that limit the number of underrepresented individuals in the pool of successful principal investigators, possibly using strategies such as increasing the diversity of reviewers and panelists for grants that NSF awards. <sup>2</sup>
Trends in average mathematics test scores of students, aggregated by sex, race and ethnicity have shown limited improvement over the past 21 years. The same is true for science, over the past 24 years. <sup>3</sup>	Outside NSF	NSF should continue the goal of reducing gender, race and ethnicity-based differentials in science and mathematics by one-half by year 2000. <sup>4</sup>
Effective programs require effective leadership and such leadership includes achieving diverse representation of opinions and ideas. <sup>5</sup>	Inside NSF	NSF should achieve representation of women and the other underrepresented groups at all management and staff levels throughout the Foundation. Specifically: (1) place underrepresented persons in STEM on NSF grant review panels; (2) increase opportunities for faculty at less well-known institutions to collaborate with and be mentored by well-known members of the S&E community; and (3) encourage more partnerships between two-year and four-year higher education institutions. <sup>6</sup>
The levels of participation still fall far below the proportional representation of the total U.S. population. <sup>7</sup>	Inside/ outside NSF	CEOSE recommended: (1) goals should be monitored using metrics and timetables that are appropriate; (2) NSF leadership must determine the best path to achieve a fully engaged science and engineering (S&E) enterprise; (3) continue review of demographic trends in participation, with ongoing analysis for accuracy and completeness; and (4) collaborate with other Federal agencies that participate in S&E to share S&E population data and strategies on achieving full participation. <sup>8</sup>

<sup>1</sup> CEOSE, 1996 Biennial Report to Congress, p. 1.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid., p. 4, Figure 1.

<sup>4</sup> Goals for The Coming Years. CEOSE, December 1992, p. 6.

<sup>5</sup> CEOSE, 1996 Biennial Report to Congress, p. 13.

<sup>6</sup> Ibid.

<sup>7</sup> Ibid., p. 1.

<sup>8</sup> Ibid., p. 2.

**Summary of CEOSE Findings and Recommendations**  
**Year: 1995-1996 Congress: 104<sup>th</sup>**  
**Target Group: Women**

CEOSE Findings	Setting	CEOSE Recommendations
Participation in mathematics and science classes by female students has generally increased, which has helped to reduce the gap with male students. <sup>9</sup>	Outside NSF	NSF should continue the goal of increasing participation of females in science and mathematics education. <sup>10</sup>
Women earned 31% of the total doctoral degrees in S&E issued in 1995—a 17% increase from 1992. <sup>11</sup>	Inside/ outside NSF	NSF should continue the goal to double the number of women who attain doctorates in S&E. <sup>12</sup>
The ratio of men to women in S&E college faculty positions is 5 to 1. At the secondary-school level, women represented 51% of the science and mathematics teachers in 1991. <sup>13</sup>	Outside NSF	NSF should continue work on goal to double the number of women S&E teachers by 2000. <sup>14</sup>
Women, who are 51% of the total population, represent only 22.4% of the S&E labor force. <sup>15</sup>	Inside/ outside NSF	NSF should continue the goal to increase the number of women in the S&E labor force. <sup>16</sup>

<sup>9</sup> CEOSE, 1996 Biennial Report to Congress, p. 5, Figure 2.

<sup>10</sup> Goals for The Coming Years. CEOSE, December 1992, p. 6.

<sup>11</sup> CEOSE, 1996 Biennial Report to Congress, p. 7.

<sup>12</sup> Goals for The Coming Years. CEOSE, December 1992, p. 2.

<sup>13</sup> Ibid., p. 9.

<sup>14</sup> Ibid., p. 6.

<sup>15</sup> CEOSE, 1996 Biennial Report to Congress, p. 8, Figure 4.

<sup>16</sup> Goals for The Coming Years. CEOSE, December 1992, pp. 2 and 7.

**Summary of CEOSE Findings and Recommendations**  
**Year: 1995-1996 Congress: 104<sup>th</sup>**  
**Target Group: Minorities**

CEOSE Findings	Setting	CEOSE Recommendations
African Americans constitute 12% of the population but are only 3.5% of the S&E labor force. Hispanics are 10% of the population and 2.8% of S&E labor force. Native Americans are 0.7% of the population and 0.2% of S&E labor force. <sup>17</sup>	Inside/ outside NSF	NSF should review demographic trends in participation to identify and track those population sectors under-participating in S&E relative to their size in the U.S. population. Also, NSF should meet with other Federal agencies that participate in S&E to share data on S&E population and strategies for achieving full participation. <sup>18</sup>
Underrepresented minority students who have attended a two-year college are a significant part of the total group of students who receive bachelors and doctorates in S&E. <sup>19</sup>	Outside NSF	CEOSE recommended that NSF continue to support partnerships between two- and four-year colleges in encouraging and supporting students to remain in S&E tracks. <sup>20</sup>
The number of minorities receiving S&E doctoral degrees remains low: 3% for African Americans and Hispanic Americans, and 0.3% for Native Americans. <sup>21</sup>	Inside/ outside NSF	NSF should continue the goal to double the number of minorities who attain doctorates in S&E. <sup>22</sup>
African Americans comprised only 4% of full-time S&E faculty in higher education in 1992. <sup>23</sup> Among secondary-school teachers of S&E, African Americans comprise 7% and Hispanic Americans comprise 3%. <sup>24</sup>	Outside NSF	NSF should continue work on the goal to increase the number of minorities in the S&E labor force. <sup>25</sup>
Minorities remain underrepresented in the pool of principal investigators. <sup>26</sup>	Inside/ outside NSF	NSF should remove barriers that limit minorities in the pool of successful principal investigators. <sup>27</sup>

<sup>17</sup> CEOSE, 1996 Biennial Report to Congress, p. 3.

<sup>18</sup> Ibid., p. 14.

<sup>19</sup> Ibid., p. 6.

<sup>20</sup> Ibid., p. 13.

<sup>21</sup> Ibid., p. 7.

<sup>22</sup> Goals for The Coming Years. CEOSE, December 1992, p. 2.

<sup>23</sup> CEOSE, 1996 Biennial Report to Congress, p. 9.

<sup>24</sup> Ibid.

<sup>25</sup> Goals for The Coming Years. CEOSE, December 1992, pp. 2 and 7.

<sup>26</sup> CEOSE Meeting Minutes, October 25-27, 1995, p. 20.

<sup>27</sup> CEOSE, 1996 Biennial Report to Congress , p. 1.



**Summary of CEOSE Findings and Recommendations**  
**Year: 1995-1996 Congress: 104<sup>th</sup>**  
**Target Group: Persons with Disabilities**

CEOSE Findings	Setting	CEOSE Recommendations
Persons with disabilities constitute approximately 20% of the population but only 5.4% of the S&E work force. <sup>28</sup>	Inside/ outside NSF	NSF should continue work to remove barriers that limit the number of principal investigators with physical disabilities. <sup>29</sup> NSF should achieve representation of persons with disabilities in all management and staff levels throughout the Foundation. <sup>30</sup>
The collection of data on students with disabilities is severely limited, in part by its dependence on self-identification by subjects. <sup>31</sup> The national data on persons with disabilities is woefully deficient, and without these data it is impossible to establish effective plans. <sup>32</sup>	Inside/ outside NSF	Analyze the accuracy and thoroughness of internally and nationally collected data on persons with disabilities, and on degree achievement from associate through doctorate degree levels. <sup>33</sup> Improve the extent and coverage of data on persons with disabilities, including data on science and mathematics achievements in grades K-12, and employment data. <sup>34</sup>
Negative attitudes by teachers, counselors and parents continue to be a major barrier to participation of students with disabilities in STEM education. <sup>35</sup>	Outside NSF	CEOSE applauded the eight funded projects with training programs aimed at overcoming negative attitudinal barriers and recommended that these programs be continued. <sup>36</sup>
Scientists with disabilities have needs that require special encouragement and support. <sup>37</sup>	Inside NSF	NSF should promote the use of (1) facilitation awards for students, scientists and engineers with disabilities across all directorates; and (2) descriptive videos, in addition to closed-captioning for all video materials, should be required. <sup>38</sup>

<sup>28</sup> Ibid., p. 3.

<sup>29</sup> Ibid., p. 13.

<sup>30</sup> Ibid., pp. 1 and 13.

<sup>31</sup> Ibid., p. 5.

<sup>32</sup> Ibid., p. 13.

<sup>33</sup> Ibid., p. 14.

<sup>34</sup> Ibid.

<sup>35</sup> Ibid., p. 12.

<sup>36</sup> Ibid.

<sup>37</sup> Ibid., p. 14.

<sup>38</sup> Ibid.

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**Summary of CEOSE Findings and Recommendations**  
**Broadening Participation Overall**  
**Year: 1997-1998 Congress: 105<sup>th</sup>**

CEOSE Findings	Setting	CEOSE Recommendations
America needs well-trained educators at all levels to build a strong technical foundation, replenish and enhance tomorrow's technological workforce. <sup>1</sup>	Inside/ outside NSF	NSF should continue to work in, and expand dissemination of, advanced curriculum and pedagogical development in conjunction with expanded programming in systemic reform initiatives. <sup>2</sup>
NSF non-focused programs are conducive to achieving the full participation of under-represented groups by partnering in research with Minority-Serving Institutions (MSIs). <sup>3</sup>	Inside/ outside NSF	CEOSE views such connective capabilities as critical to helping reduce the disparity between information-rich and information-poor communities. <sup>4</sup>
Compared with the total population in the STEM professoriate, NSF has disparate participation rates of Principal Investigators (PIs) from underrepresented groups. <sup>5</sup>	Inside NSF	Review panels and ad hoc reviewers should include persons from underrepresented groups to provide a fair appraisal of NSF proposals, especially those concerning the education of all students. <sup>6</sup>
America's increasingly diverse society is challenging the adequacy of current STEM education, research and workforce support structure. <sup>7</sup>	Inside/ outside NSF	The Committee recommended that NSF assert its leadership position to develop quality standards and practices to be used by organizations that will assure equitable access to information technology by all individuals and institutions. <sup>8</sup>
As technology becomes more ubiquitous within educational processes, it will become more critical for NSF to attend to issues of access and capacity for women and other under-represented groups. <sup>9</sup>	Inside/ outside NSF	NSF technological initiatives, such as <i>Fast Lane</i> , require careful planning to ensure that they do not have a disparate impact on these underrepresented populations. <sup>10</sup>

<sup>1</sup> CEOSE, 1998 Biennial Report to Congress, p. 4.

<sup>2</sup> *Ibid.*, pp. 1 and 16.

<sup>3</sup> *Ibid.*, p. 13.

<sup>4</sup> *Ibid.*

<sup>5</sup> *Ibid.*, p. 15.

<sup>6</sup> *Ibid.*

<sup>7</sup> *Ibid.*, p. 1.

<sup>8</sup> *Ibid.*, p. 16.

<sup>9</sup> *Ibid.*, pp. 15-16.

<sup>10</sup> *Ibid.*, p. 16.

**Summary of CEOSE Findings and Recommendations**  
**Year: 1997-1998 Congress: 105<sup>th</sup>**  
**Target Group: Women**

CEOSE Findings	Setting	CEOSE Recommendations
The high-school gender gap in mathematics and science achievement continues to close. <sup>11</sup>	Outside NSF	NSF should develop initiatives to assist women and other underrepresented groups to reach parity in science, mathematics and engineering achievement and participation. <sup>12</sup> Also, current programmatic trends in service to education should be continued. <sup>13</sup>
Women S&E faculty amount to 21% of total faculty, a much lower representation than the percent of women in the labor force. <sup>14</sup>	Inside/ outside NSF	Programs supporting women and other under-represented groups should be increased to achieve parity within the nation's universities as well as to provide mentors and role models. <sup>15</sup>
Women doctoral scientists and engineers increased at a faster rate than that of minorities and disabled persons. <sup>16</sup>	Inside/ outside NSF	Consistent with the goal of increasing the diversity of doctoral graduates, NSF should have role models and mentors in the professoriate who are themselves members of groups underrepresented in the academy. <sup>17</sup>
Women have not yet achieved parity in the S&E labor force. <sup>18</sup>	Inside/ outside NSF	The Foundation's efforts should be joined and supported by policy and programming support from all government agencies, as well as corporate and private sectors. <sup>19</sup>
Focused NSF programs broaden the S&E opportunities for women not ordinarily available through established channels. <sup>20</sup>	Inside/ outside NSF	NSF should continue its focused programs, such as <i>Professional Opportunities for Women In Research and Education (POWRE)</i> . Recently, many of these programs have been curtailed or eliminated. <sup>21</sup>

**(continued)**

<sup>11</sup> Ibid., p. 5, Figure 2.

<sup>12</sup> Ibid., p. 6.

<sup>13</sup> Ibid., p. 16.

<sup>14</sup> Ibid., p. 8, Figure 7.

<sup>15</sup> Ibid., p. 16.

<sup>16</sup> Ibid., p. 10, Figures 10 and 11.

<sup>17</sup> Ibid., p. 14.

<sup>18</sup> Ibid., p. 9, Figure 9.

<sup>19</sup> Ibid., p. 11.

<sup>20</sup> Ibid., p. 13.

<sup>21</sup> Ibid.

<p>In step with the Government Performance and Results Act (GPRA), all NSF new program announcements and proposed solicitations include a statement indicating that proposers must address improving the participation of women/ other members of underrepresented groups.<sup>22</sup></p>	<p>Inside NSF</p>	<p>The Committee recommended that NSF should (1) take appropriate steps to ensure that all applicants as well as NSF staff adhere to this requirement and (2) enforce policies and implement management mechanisms concerning cost-sharing that reduce barriers for women and other underrepresented groups to compete for NSF awards.<sup>23</sup></p>
<p>Women were under-represented (31%) among NSF's program directors and division directors compared to their representation in the national workforce population (51%).<sup>24</sup></p>	<p>Inside NSF</p>	<p>NSF should seek to achieve better representation of underrepresented women, minorities and disabled persons at the scientific and engineering staff levels throughout the Foundation.<sup>25</sup></p>
<p>The involvement of students in cutting-edge research will encourage our nation's female and minority youth to choose science and engineering careers which will help America maintain its global scientific and leadership role.<sup>26</sup></p>	<p>Outside NSF</p>	<p>NSF should improve the infrastructures (i.e., human capital and resources) of MSIs that target women.<sup>27</sup> NSF should enhance the collaborations developed among major research centers at research institutions and minority institutions and design activities that mutually benefit each party.<sup>28</sup></p>

<sup>22</sup> Ibid., p. 14.

<sup>23</sup> Ibid., pp. 2 and 14.

<sup>24</sup> Ibid., p. 14.

<sup>25</sup> Ibid., p. 16.

<sup>26</sup> Ibid., p. 14.

<sup>27</sup> Ibid., p. 1.

<sup>28</sup> Ibid., p. 16.

**Summary of CEOSE Findings and Recommendations**  
**Year: 1997-1998 Congress: 105<sup>th</sup>**  
**Target Group: Minorities**

CEOSE Findings	Setting	CEOSE Recommendations
Minorities continue to be underrepresented among professional scientists and engineers within the Foundation. <sup>29</sup>	Inside NSF	NSF should seek to achieve better representation of minorities at the scientific and engineering staff levels throughout the Foundation. <sup>30</sup>
Minorities continue to be underrepresented among NSF proposal reviewers. <sup>31</sup>	Inside NSF	NSF should expand the diversity of review panels and ad hoc reviewers to include underrepresented groups across Directorates. <sup>32</sup>
It appears that the majority staff at NSF needs to be educated about the actual talents and benefits of having educators and researchers from diverse populations. <sup>33</sup>	Inside NSF	The Committee recommended the initiation of activities that contribute to the positive education of NSF staff on the benefits of a diverse population. <sup>34</sup>
In 1996, out of 2.66 million high school graduates, only 18,600 will receive a Ph.D. in S&E—of which 1,300 will be underrepresented minorities. <sup>35</sup>	Outside NSF	CEOSE commended NSF's support for the newly established <i>Minority Graduate Education</i> program, designed to increase the number of minorities awarded doctorates in S&E. <sup>36</sup>
For minorities, the differences in mathematics and science achievement on the NAEP assessment have narrowed in the past ten years. <sup>37</sup>	Outside NSF	NSF should continue its curriculum and pedagogical development, its data collection and analysis, and as a partner in policy development. <sup>38</sup>

**(continued)**

<sup>29</sup> CEOSE Meeting Minutes, June 9-11, 1998, p. 10.

<sup>30</sup> CEOSE, 1998 Biennial Report to Congress, p. 16.

<sup>31</sup> CEOSE Meeting Minutes, February 1997, p. 4.

<sup>32</sup> CEOSE, 1998 Biennial Report to Congress, p. 17.

<sup>33</sup> *Ibid.*, p. 2.

<sup>34</sup> *Ibid.*, p. 17.

<sup>35</sup> *Ibid.*, p. 3.

<sup>36</sup> *Ibid.*, p. 12.

<sup>37</sup> *Ibid.*, p. 5.

<sup>38</sup> *Ibid.*, p. 16.

<p>The minority pre-college population will increase to 42% by 2030. This shift in the composition of K-12 enrollment means that minority students who have the lowest grades in mathematics and science will comprise an ever-increasing population.<sup>39</sup> And students in high-minority-enrollment schools are much more likely to be taught mathematics and science by teachers who are not certified.<sup>40</sup></p>	<p>Outside NSF</p>	<p>Activities must be continued to educate teachers so they will have proper competencies to teach science and mathematics concepts with K-12.<sup>41</sup></p>
<p>The aim of the <i>CREST</i> program has been to increase diversity in S&amp;E by supporting minority institutions, by encouraging and supporting students financially, and by increasing institutions effectiveness.<sup>42</sup></p>	<p>Outside NSF</p>	<p>NSF should increase its efforts in creating and implementing initiatives to improve faculty capacity of minority-serving institutions.<sup>43</sup> Also, NSF should continue to support focused programs for minorities. Recently, many of these programs (e.g., <i>Minority Graduate Fellowship Program</i>) have been curtailed or eliminated due to so-called “race blind” policies of the Foundation---which may actually limit the ability to provide national programs aimed at minorities.<sup>44</sup></p>

<sup>39</sup> Ibid., p. 5.

<sup>40</sup> Ibid., p. 8.

<sup>41</sup> Ibid., p. 16.

<sup>42</sup> Ibid., p. 11.

<sup>43</sup> Ibid.

<sup>44</sup> Ibid., p. 13.

**Summary of CEOSE Findings and Recommendations**  
**Year: 1997-1998 Congress: 105<sup>th</sup>**  
**Target Group: Persons with Disabilities**

<b>CEOSE Findings</b>	<b>Setting</b>	<b>CEOSE Recommendations</b>
Despite the assets that the disabled can bring to the STEM workforce, there are few efforts to improve workforce data, identify successful strategies, and support school-to-work programs for the disabled. <sup>45</sup>	Inside/ outside NSF	NSF should expand and support the development of a national data infrastructure concerning persons with disabilities in STEM. <sup>46</sup>
The percentage of persons with disabilities in the S&E faculty pool is 6%. <sup>47</sup>	Inside/ outside NSF	Programs supporting persons with disabilities in faculty positions should be increased to achieve parity within our universities as well as to provide mentors and role models. <sup>48</sup>
The Program for Persons with Disabilities (PPD) has committed to bring about needed change in academic and professional climates. <sup>49</sup>	Inside/ outside NSF	NSF should seek to achieve better representation of persons with disabilities at the S&E staff levels throughout the Foundation; and to further promote education and employment in STEM for persons with disabilities. <sup>50</sup>
In 1997, the NSF made a total of 9,864 competitive awards, of which 102 were given to persons with disabilities. <sup>51</sup>	Inside NSF	To increase sensitivity to proposals from disabled scientists, NSF should expand the diversity of review panels and ad hoc reviewers to include disabled persons as well as other underrepresented groups in all areas of the Foundation. <sup>52</sup>
Facilities and technologies not user-friendly for disabled persons can prevent them from participating in NSF functions and activities. <sup>53</sup>	Inside NSF	NSF should address emergent issues and the capacity to employ new technologies for persons with disabilities. <sup>54</sup>
Data are sorely needed on the demographics and needs of persons with disabilities in STEM. <sup>55</sup>	Inside NSF	NSF should expand and support the development of a national data infrastructure concerning persons with disabilities in STEM, so as to better inform public policy and programming. <sup>56</sup>

<sup>45</sup> Ibid., p. 6.

<sup>46</sup> Ibid., p. 16.

<sup>47</sup> Ibid., p. 8.

<sup>48</sup> Ibid., p. 16.

<sup>49</sup> Ibid., p. 11.

<sup>50</sup> Ibid., p. 16.

<sup>51</sup> Ibid., p. 15.

<sup>52</sup> Ibid., p. 17.

<sup>53</sup> Ibid., pp. 15-16.

<sup>54</sup> Ibid., p. 1.

<sup>55</sup> CEOSE Meeting Minutes, October 14-15, 1997, p. 4.

<sup>56</sup> CEOSE, 1998 Biennial Report to Congress, p. 16.



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**Summary of CEOSE Findings and Recommendations**  
**Broadening Participation Overall**  
**Year: 1999-2000 Congress: 106<sup>th</sup>**

<b>CEOSE Findings</b>	<b>Setting</b>	<b>CEOSE Recommendations</b>
A reform of K-12 education is needed to increase the flow of skilled U.S. workers. <sup>1</sup>	Inside/ outside NSF	CEOSE recommended that NSF collaborate extensively with the Department of Education and other Federal agencies in further developing national mathematics and science education enrichment programs. <sup>2</sup> CEOSE recommended that NSF increase funding and support to programs that improve the skills and teaching capabilities of K-12 science and mathematics teachers across the nation. <sup>3</sup>
There is serious concern about the quality of teachers in science and mathematics for the K-12 grades. <sup>4</sup>	Outside NSF	NSF should encourage and participate in the adoption and implementation at the state level of: (1) comprehensive school standards for mathematics and science curricula; (2) mathematics and science teacher qualifications; (3) physical infrastructure; and (4) technological assets, built environments and assistive technologies. <sup>5</sup>
Just when the U.S. economy requires more STEM workers, the largest pool of potential workers continues to be isolated from STEM careers. <sup>6</sup>	Inside/ outside NSF	CEOSE strongly advised NSF to replicate the “center model” for its upcoming <i>Workforce Initiative</i> . Characteristic programmatic attributes have a long history of success. <sup>7</sup>
Among employed non-Ph.D. scientists and engineers, women (54%) were less likely than men (73%) to be employed in business or industry. <sup>8</sup>	Inside/ outside NSF	CEOSE recommended that NSF institute an award to recognize exemplary achievement of STEM workplace diversity by employers. <sup>9</sup>
There is limited demographic information on the scientists and engineers who act as reviewers for and advisors to NSF. <sup>10</sup>	Inside NSF	CEOSE recommended that NSF collect demographic data on review panelists and Committees of Visitors (COVs), in an effort to maintain diversity. <sup>11</sup>

**(continued)**

<sup>1</sup> CEOSE 2000 Biennial Report to the United States Congress, p. 5.

<sup>2</sup> *Ibid.*, p. 41.

<sup>3</sup> *Ibid.*

<sup>4</sup> CEOSE Meeting Minutes, June 1-2, 2000, p. 7 and October 12-13, 2000, p. 5.

<sup>5</sup> CEOSE 2000 Biennial Report to the United States Congress, p. 42.

<sup>6</sup> *Ibid.*, p. 3.

<sup>7</sup> *Ibid.*, p. 42.

<sup>8</sup> *Ibid.*, p. 26.

<sup>9</sup> *Ibid.*, p. 42.

<sup>10</sup> *Ibid.*, p. 37.

<sup>11</sup> *Ibid.*, p. 42.

NSF's merit-based review process includes evaluation of proposed grants that broaden opportunities and enable participation of underrepresented groups. <sup>12</sup> But, according to a COV assessment, some improvements are needed in regard to the broader-impacts criterion. <sup>13</sup>	Inside NSF	CEOSE recommended that NSF leadership take a position of demanding rather than simply encouraging greater use of broader impact criterion. <sup>14</sup> CEOSE also recommended that an annual NSF-wide quantitative assessment be implemented of the effects of the broader-impacts criterion on STEM participation. <sup>15</sup>
In FY 1999, 95% of funds allocated to projects were subjected to diversity- embedded merit review process. <sup>16</sup>	Inside NSF	CEOSE recommended that NSF require written comments on the intellectual merit and broader-impacts criteria on proposal submission. <sup>17</sup>
The Census Bureau projects that by 2010, 68% of entrants to the workforce will be minorities and women. <sup>18</sup>	Inside/ outside NSF	CEOSE recommended that NSF strongly consider its "center" model for its upcoming <i>Workforce Initiative</i> . Also, NSF should initiate an award program to recognize exemplary achievement in increasing diversity in STEM within government, industry and academia. <sup>19</sup>
Participation of women, minorities and persons with disabilities in the engineering fields is low. <sup>20</sup>	Inside/ outside NSF	NSF should fund aggressive focused intervention efforts targeting minorities at the high school level, at the transition into postsecondary education, and the transition from community college into four-year programs. <sup>21</sup>
Companies cannot successfully compete in the marketplace if they fail to recruit 85% of the newly available talent—minorities, women and persons with disabilities. <sup>22</sup>	Inside/ outside NSF	CEOSE recommended that NSF institute an award to recognize exemplary achievement of STEM workplace diversity by employers in business, government and academia. <sup>23</sup>

<sup>12</sup> Ibid., p. 37.

<sup>13</sup> CEOSE Meeting Minutes, February 17-18, 2000, p. 8.

<sup>14</sup> Ibid. and CEOSE Meeting Minutes, June 10-11, 1999, p. 4.

<sup>15</sup> CEOSE 2000 Biennial Report to the United States Congress, p. 42.

<sup>16</sup> Ibid., p. 37.

<sup>17</sup> Ibid., pp. 35 and 42.

<sup>18</sup> Ibid., p. 2.

<sup>19</sup> Ibid., p. 44.

<sup>20</sup> Ibid., p. 22.

<sup>21</sup> Ibid., p. 41.

<sup>22</sup> Ibid., p. 1.

<sup>23</sup> Ibid., p. 42.

**Summary of CEOSE Findings and Recommendations**  
**Year: 1999-2000 Congress: 106<sup>th</sup>**  
**Target Group: Women**

CEOSE Findings	Setting	CEOSE Recommendations
The United States risks losing its economic and intellectual pre-eminence, if the failure to prepare all its citizens for STEM careers persists. <sup>24</sup>	Inside/ outside NSF	CEOSE continued its warnings to the NSF on the critical need to support greater participation by women. <sup>25</sup>
In 1997, white women comprised 37.9% of U.S. population and only made up 15.4% of the STEM workforce. <sup>26</sup>	Inside/ outside NSF	CEOSE recommended that NSF institute an award to recognize exemplary achievement of STEM workplace diversity by employers in business, government and academia. <sup>27</sup>
Females complete advanced level high school mathematics and science courses at the same rate as males. However, females tend to hold more negative attitudes about mathematics than do their male peers. <sup>28</sup> Girl's rejection of mathematics and science may be influenced by societal attitudes and media images that steer women away from STEM vocations. <sup>29</sup>	Outside NSF	CEOSE recommended NSF: (1) conduct research on pre-college and undergraduate barriers and enablers; (2) conduct demonstration projects at the pre-college and undergraduate levels; and (3) provide direct support for graduate students and faculty. <sup>30</sup>
In the 1990s, women continued an established trend of increased enrollment in graduate STEM programs. <sup>31</sup>	Outside NSF	CEOSE advised NSF to take the leadership role in advancing STEM participation by women in government and business. <sup>32</sup>
Women in college are under-represented in engineering and physics. They also drop out at higher rates than men do but not because of poor academic performance. <sup>33</sup>	Outside NSF	CEOSE recommended that NSF increase funding for intervention programs for women at the undergraduate and graduate levels. <sup>34</sup>

**(continued)**

<sup>24</sup> Ibid., p. 3.

<sup>25</sup> Ibid.

<sup>26</sup> Ibid., p. 3, Figure 1-2.

<sup>27</sup> Ibid., p. 42.

<sup>28</sup> Ibid., pp. 6-7.

<sup>29</sup> Ibid., pp. 7 and 15 sidebar.

<sup>30</sup> Ibid., p. 39.

<sup>31</sup> Ibid., p. 20.

<sup>32</sup> Ibid., p. 42.

<sup>33</sup> Ibid., p. 14.

<sup>34</sup> Ibid., p. 41.

In 1997, women attained 58% of graduate degrees in the social and behavior sciences, but only 17% of the engineering graduate degrees. <sup>35</sup>	Outside NSF	NSF should more actively target women in promoting occupational opportunities in science. <sup>36</sup>
Women with doctorates receive lower salaries than men and are more likely to be in the non-fulltime workforce. <sup>37</sup>	Inside/ outside NSF	A partnership between NSF and other leaders in business, government and education is vital to overcome obstacles to meet the current critical need for STEM workers. <sup>38</sup>
A substantial percentage of women with doctorates do not hold tenure-track positions, and if tenured, they are consistently more likely to be found in the junior rather than senior ranks. <sup>39</sup>	Outside NSF	CEOSE recommended that NSF institute an award to recognize exemplary achievement of STEM workplace diversity by employers in academia and other sectors. <sup>40</sup>
Female representation in decision-making positions at NSF Directorates parallels the ranking of women in the doctoral population. <sup>41</sup>	Inside NSF	NSF should continue its policy of embedding diversity at all levels and in all programs throughout the Foundation. NSF should also delineate strategies for implementing this policy and establish measures of accountability. <sup>42</sup>
While NSF total science and engineering staff grew from 38% in 1990 to 45% in 1999, women were largely in clerical positions. <sup>43</sup>	Inside NSF	CEOSE suggested NSF consider using numeric targets for GPRA Goal 3 and incentives for increased diversity among NSF workforce of scientists, engineers and executives. <sup>44</sup>

<sup>35</sup> Ibid., p. 20.

<sup>36</sup> Ibid., p. 41.

<sup>37</sup> Ibid., p. 29.

<sup>38</sup> Ibid., p. 42.

<sup>39</sup> Ibid., p. 28.

<sup>40</sup> Ibid., p. 42.

<sup>41</sup> Ibid., p. 36.

<sup>42</sup> Ibid., p. 42.

<sup>43</sup> CEOSE Meeting Minutes, February 17-18, 2000, p. 5.

<sup>44</sup> CEOSE 2000 Biennial Report to the United States Congress, p. 6.

**Summary of CEOSE Findings and Recommendations**  
**Year: 1999-2000 Congress: 106<sup>th</sup>**  
**Target Group: Minorities**

CEOSE Findings	Setting	CEOSE Recommendations
While the percentage of underrepresented minorities enrolling in and completing graduate degrees in STEM has risen in the past decade, the numbers are still disproportionate to their size in the U.S. population. <sup>45</sup>	Inside/ outside NSF	The NSF should fund research on barriers to minority graduate degree attainment and design programs to address the identified barriers. <sup>46</sup>
The low numbers of Hispanics and African Americans in STEM tenure-track faculty positions can be increased only by increasing the flow from these groups into the doctoral-trained workforce. <sup>47</sup>	Inside/ outside NSF	NSF should take a leadership role in more effectively bringing minorities into the STEM workforce, ensuring that America will retain a global competitive edge. <sup>48</sup>
<i>CREST</i> , formerly known as <i>Minority Research Centers of Excellence</i> , has upgraded the research capabilities of the most productive minority institutions, and increasing the number of minorities with degrees in STEM. <sup>49</sup>	Inside NSF	NSF should increase funding to build institutional infrastructure to support education of minorities and other underrepresented groups. <sup>50</sup>
African American and Hispanic students have lower enrollment rates than white students completing the two most rigorous levels of mathematics coursework—pre-calculus through calculus. <sup>51</sup>	Outside NSF	NSF should encourage and participate in the adoption and implementation at the state level of comprehensive school standards concerning mathematics, and science curricula. <sup>52</sup>

(continued)

<sup>45</sup> Ibid., pp. 20-21.

<sup>46</sup> Ibid., p. 42.

<sup>47</sup> Ibid., pp. 29-30.

<sup>48</sup> Ibid., p. 42.

<sup>49</sup> Ibid., p. 19.

<sup>50</sup> Ibid., p. 41.

<sup>51</sup> Ibid., p. 10, Table 2.2.

<sup>52</sup> Ibid., p. 41.

In 1998, HBCU-UP initiatives enrolled nearly 20,000 minority students in STEM disciplines and awarded over 2,500 B.A. degrees. <sup>53</sup>	Outside NSF	NSF should continue programs to enhance collaborations between major research institutions and institutions that serve minorities. <sup>54</sup>
The majority of African American and Hispanic American students are isolated in schools that typically suffer from a grievous lack of resources. <sup>55</sup>	Outside NSF	NSF should adopt comprehensive state-level school standards concerning mathematics and science teacher qualifications, physical infrastructure, technological assets, built environments, and technologies. <sup>56</sup>
Funding rates for proposals from minority PIs were below the NSF average in FY 1999. <sup>57</sup>	Inside NSF	NSF should collect demographic data on review panelists and Committees of Visitors in an effort to maintain the diversity of review panels and ad hoc reviewers. <sup>58</sup>

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<sup>53</sup> Ibid., p. 19.

<sup>54</sup> Ibid., p. 41.

<sup>55</sup> Ibid., p. 8.

<sup>56</sup> Ibid., p. 41.

<sup>57</sup> Ibid., p. 39.

<sup>58</sup> Ibid., p. 42.

**Summary of CEOSE Findings and Recommendations**  
**Year: 1999-2000 Congress: 106<sup>th</sup>**  
**Target Group: Persons with Disabilities**

CEOSE Findings	Setting	CEOSE Recommendations
Data on persons with disabilities in STEM are seriously limited, which is due to several factors, including: varying definitions of disability; poor institutional record keeping on disability status, and issues of confidentiality. <sup>59</sup>	Inside/ outside NSF	CEOSE emphasized the need to get better data on persons with disabilities, in order to inform and assess interventions targeted to this group. <sup>60</sup>
The disabled make up 20% of the population, 14% of the U.S. workforce, and 6% of the STEM workforce. <sup>61</sup>	Inside/ outside NSF	Efforts to increase the flow of skilled U.S. workers must begin with the reform of K-12 education, which has failed to prepare persons with disabilities as well as other underrepresented groups. <sup>62</sup>
There have been budget constraints over the past few years for support of persons with disabilities activities—especially for accessibility to advances in information technology that would assist the disabled. <sup>63</sup>	Inside NSF	NSF should fund aggressive focused intervention efforts targeting persons with disabilities. <sup>64</sup>
The <i>Program for Persons with Disabilities (PPD)</i> has shown that 70% of high school students who participated in <i>PPD</i> go on to higher education, and a majority continued to study STEM. <sup>65</sup>	Inside NSF	To broaden access for those with disabilities, NSF should (1) increase funding and support for programs that improve the skills and teaching capabilities of K-12 science and mathematics teachers across the nation; (2) build the institutional infrastructure, including policy and procedural framework for relevant programs and technological advances; and (3) evaluate targeted programs for the disabled to determine outcomes for stated objectives. <sup>66</sup>

**(continued)**

<sup>59</sup> CEOSE 2000 Biennial Report to the United States Congress, p. 11.

<sup>60</sup> CEOSE Meeting Minutes, June 1-2, 2000, pp. 10-11.

<sup>61</sup> CEOSE 2000 Biennial Report to the United States Congress, p. 2.

<sup>62</sup> *Ibid.*, p. 5.

<sup>63</sup> CEOSE Meeting Minutes, February 25-26, 1999, p. 10.

<sup>64</sup> CEOSE 2000 Biennial Report to the United States Congress, p. 41.

<sup>65</sup> *Ibid.*, p. 12.

<sup>66</sup> *Ibid.*, p. 41.



The disabled are less likely to graduate high school, enroll in a four-year college, or graduate than those without disabilities. <sup>67</sup>	Inside/ outside NSF	NSF should encourage and participate in the adoption of comprehensive school standards concerning mathematics and science curricula for students with disabilities. <sup>68</sup>
Persons with disabilities are not disproportionately leaving STEM, but are simply not choosing or receiving full-time employment. <sup>69</sup>	Outside NSF	A wide array of needs, accommodations, and technologies will be necessary to address the requirements of the diverse disabled population. <sup>70</sup>
Little data are available for staffing with respect to persons with disabilities. <sup>71</sup>	Inside/ outside NSF	Educating institutions with regard to the contribution by the disabled in STEM, and making advances in assistive technology should be incorporated into facilitating more individuals with disabilities. <sup>72</sup>
The Division of Human Resource Development (HRD) conducted research on pre-college and undergraduate barriers and enablers, demonstration projects, facilitation aids, and research on assistive technologies for persons with disabilities. <sup>73</sup>	Inside NSF	NSF should continue to seek distribution of persons with disabilities at all staff levels in the Foundation to inform on the needs of persons with disabilities. <sup>74</sup>
College-bound students with disabilities lag far behind their peers without disabilities on the SAT. <sup>75</sup>	Inside/ outside NSF	CEOSE recommended that NSF participate actively in promoting and selling STEM professions to all American youth by defining and highlighting occupations, developing economic data on availability of positions and professional tracks and developing salary structure information and comparisons. <sup>76</sup>

<sup>67</sup> Ibid., p. 16.

<sup>68</sup> Ibid., p. 41.

<sup>69</sup> Ibid., p. 32.

<sup>70</sup> Ibid., p. 17.

<sup>71</sup> Ibid., p. 36.

<sup>72</sup> Ibid.

<sup>73</sup> Ibid., p. 39.

<sup>74</sup> Ibid., p. 42.

<sup>75</sup> Ibid., p. 12.

<sup>76</sup> Ibid., p. 41.

## COMMITTEE ON EQUAL OPPORTUNITIES IN SCIENCE AND ENGINEERING MEMBERSHIP LIST 2000

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**Summary of CEOSE Findings and Recommendations**  
**Broadening Participation Overall**  
**Year: 2001-2002 Congress: 107<sup>th</sup>**

CEOSE Findings	Setting	CEOSE Recommendations
Research experience is often recognized as one of the key factors in retaining students in STEM pathways. <sup>1</sup>	Inside/ outside NSF	CEOSE recommended that NSF: (1) strengthen the <i>Research Experience for Undergraduates (REU)</i> program to allow students to participate for multiple years; (2) extend research programs to high school students; (3) involve counselors and teachers who play a key role in course selection during the K-12 years; and (4) find funding for the most promising programs. <sup>2</sup>
The enforcement of the broader-impact s criterion in the grant application process has not always been uniform across Directorates. <sup>3</sup>	Inside NSF	NSF needs to better enforce the broader-impacts criterion requirement, by providing proposers and reviewers with specific examples of what is expected of principal investigators. <sup>4</sup>
A diversity-embedded proposal-review process makes it easier for minority researchers to obtain NSF government-funded grants. <sup>5</sup>	Inside NSF	NSF should place a high priority on promoting diversity awareness within the organization and in the Foundation’s proposal review process. <sup>6</sup>
The spirit of cooperation is a critical factor in increasing awareness of diversity and diversity issues within NSF. <sup>7</sup>	Inside NSF	NSF should promote diversity awareness internally, to every Directorate and office within the Foundation. <sup>8</sup>
Students from underrepresented groups with the potential to pursue careers in science, technology and engineering often make the decision to enter—or not enter—the STEM pathway during the middle and high school years. <sup>9</sup>	Inside/ outside NSF	NSF should identify, fund, replicate and adapt successful programs and best practices at the K-12 level; (2) enhance relationships with the Federal and state departments of education to upgrade the skill levels of mathematics and science teachers; (3) create continuous pathways from K-12 and beyond, and develop methods to track students throughout the educational process; and (4) create accountability systems to measure progress and accomplishments of projects designed to improve science and mathematics skills. <sup>10</sup>
Unavailability of disaggregated data on underrepresented groups in STEM persists as a major problem. <sup>11</sup>	Inside NSF	CEOSE recommended that disaggregated data be collected on underrepresented groups to assist in evaluating and formulating policy aimed at increasing their presence in STEM. <sup>12</sup>

**(continued)**

<sup>1</sup> CEOSE, Biennial Report to Congress 2002, p. 11.  
<sup>2</sup> Ibid., p. 9.  
<sup>3</sup> CEOSE Meeting Minutes, October 16-17, 2001, p. 5.  
<sup>4</sup> Ibid.  
<sup>5</sup> Ibid., p. 5.  
<sup>6</sup> Ibid.  
<sup>7</sup> Ibid., p. 9.  
<sup>8</sup> Ibid.  
<sup>9</sup> Ibid., p. 13.  
<sup>10</sup> Ibid., pp. 2 and 13.  
<sup>11</sup> CEOSE Meeting Minutes, February 7-8, 2002, pp. 6-9.  
<sup>12</sup> Ibid.

<p>Industry supported programs that provide research experience and mentoring are proving successful (e.g., Lucent Technologies' Project GRAD, Bell Labs Science Program).<sup>13</sup></p>	<p>Outside NSF</p>	<p>NSF should consider best practices from industry that can help inform and improve the efforts of NSF and educational institutions in promoting greater participation in STEM.<sup>14</sup></p>
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<sup>13</sup> CEOSE Meeting Minutes, October 16-17, 2001, pp. 8-9.

<sup>14</sup> CEOSE, Biennial Report to Congress 2002, p. 7.

**Summary of CEOSE Findings and Recommendations**  
**Year: 2001-2002 Congress: 107<sup>th</sup>**  
**Target Group: Women**

CEOSE Findings	Setting	CEOSE Recommendations
The proportion of women earning a Bachelor's Degree in S&E doubled between 1966 and 2000. But, there still remains a paucity of women earning a doctorate in the S&E fields. <sup>15</sup>	Inside/ outside NSF	NSF should: (1) conduct research studies on the educational outcomes of underrepresented groups to develop effective strategies to retain women at risk of leaving the pathway to advanced degrees in STEM, and (2) identify and replicate successful mentoring programs. <sup>16</sup>
Women who obtain Doctoral Degrees in S&E, except for the most recent recipients, are far less likely to be tenured than their male colleagues. <sup>17</sup>	Inside/ outside NSF	NSF should: (1) examine promotion and tenure policies at all institutions to uncover those with innovative and proven practices that result in women achieving tenure and promotional opportunities in higher numbers and (2) identify industry best practices that may inform and improve the efforts of both NSF and educational institutions to promote the inclusion of women. <sup>18</sup>
While progress has been made, America has failed to cultivate the vast pool of untapped talent among women in science and engineering (S&E). <sup>19</sup>	Inside/ outside NSF	NSF should adapt and continue to support model programs. An example is NSF's <i>ADVANCE</i> Program, which supports approaches to improve the climate for women in academic institutions and facilitates their advancement to the highest ranks of leadership. <sup>20</sup>

<sup>15</sup> CEOSE, Biennial Report to Congress 2002, p. 4, Figures 1 and 2.

<sup>16</sup> *Ibid.*, p. 7.

<sup>17</sup> *Ibid.*, p. 4, Figure 3.

<sup>18</sup> *Ibid.* p. 7.

<sup>19</sup> *Ibid.*, p. 1.

<sup>20</sup> *Ibid.*

**Summary of CEOSE Findings and Recommendations**  
**Year: 2001-2002 Congress: 107<sup>th</sup>**  
**Target Group: Minorities**

<b>CEOSE Findings</b>	<b>Setting</b>	<b>CEOSE Recommendations</b>
In recent years, minorities have been as likely as whites to major in S&E at the undergraduate level; but less likely to pursue graduate degrees. <sup>21</sup>	Outside NSF	Additional programs and policies need to be put into place to provide linkages and bridge programs between academic tiers. <sup>22</sup> NSF should consider implementation of a set goal for doctoral degrees awarded to minorities. <sup>23</sup> NSF Directorates should create fellowships and scholarships for minorities on existing grants in NSF programs. <sup>24</sup>
In 1999, minorities made up 21.4% of the total workforce in the U.S., but only 7.2% of the S&E workforce. <sup>25</sup>	Inside/ outside NSF	Pathways to STEM careers should be examined and considered for ways to increase the participation of minorities and other underrepresented groups. <sup>26</sup>
There is a cadre of well-trained minority students coming out of top universities, but they are not eligible for faculty positions because they lack publications. Factors contributing to this include lack of mentoring. <sup>27</sup>	Inside/ outside NSF	Successful mentoring programs at all levels should be identified and closely examined in order to replicate their success. <sup>28</sup>
The lack of NSF participation with Tribal Colleges seems to remain a cultural problem. <sup>29</sup>	Inside/ outside NSF	NSF should seek to increase Native American representation on CEOSE to provide greater input. <sup>30</sup>
Minority women are less likely to be tenured. <sup>31</sup>	Outside NSF	Promotion and tenure policies should be examined at all institutions to uncover those with innovative and proven practices that result in higher numbers of minorities and women in tenured positions. <sup>32</sup>

<sup>21</sup> CEOSE Biennial Report to Congress 2002, p. 5.

<sup>22</sup> Ibid., p. 7.

<sup>23</sup> Ibid.

<sup>24</sup> CEOSE Meeting Minutes, February 7-8, 2002, p. 13.

<sup>25</sup> CEOSE Biennial Report to Congress 2002, p. 5.

<sup>26</sup> Ibid., p. 7.

<sup>27</sup> CEOSE Meeting Minutes, October 16-17, 2001, p. 4-5.

<sup>28</sup> CEOSE Biennial Report to Congress 2002, p. 7.

<sup>29</sup> CEOSE Meeting Minutes, October 16-17, 2001, p. 6.

<sup>30</sup> Ibid.

<sup>31</sup> CEOSE Meeting Minutes, February 7-8, 2002, p. 10.

<sup>32</sup> CEOSE Biennial Report to Congress 2002, p. 7.

**Summary of CEOSE Findings and Recommendations**  
**Year: 2001-2002 Congress: 107<sup>th</sup>**  
**Target Group: Persons with Disabilities**

<b>CEOSE Findings</b>	<b>Setting</b>	<b>CEOSE Recommendations</b>
Persons with disabilities make up 1% of the total of all those earning S&E doctorates. <sup>33</sup>	Inside/ outside NSF	NSF should (1) consider the implementation of a set of goals for doctoral degrees awarded to members of underrepresented groups; and (2) develop additional initiatives and policies to provide linkages and bridge programs between academic tiers. <sup>34</sup>
Disabled persons make up 7.5% of the college-educated U.S. workforce, but constitute a lower portion in S&E occupations. <sup>35</sup>	Inside/ outside NSF	Alternative pathways to STEM careers should be examined and considered as a way to increase the participation of persons with disabilities as well as other underrepresented groups. <sup>36</sup>
Among employed scientists and engineers, approximately 64% with disabilities are over age 50 while just 33% of those without disabilities are over age 50. <sup>37</sup>	Inside/ outside NSF	NSF should pay attention to the development of accommodations for scientists and engineers who become disabled during the course of their careers. <sup>38</sup>
SRS experiences continued difficulty in obtaining data on persons with disabilities. <sup>39</sup>	Inside NSF	NSF needs to improve data collection resources for CEOSE, in order for CEOSE to better advise NSF. <sup>40</sup>
Using disaggregated data will help increase awareness of untapped STEM talent among persons with disabilities. <sup>41</sup>	Inside/ outside NSF	To help policymakers broaden access and increase STEM participation, CEOSE requested comprehensive data on persons with disabilities and other underrepresented groups, regardless of the size of individual cells. <sup>42</sup>
Financial incentives help to ease the burden of student loan debt. <sup>43</sup>	Inside/ outside NSF	Recognizing the financial burden many persons with disabilities carry, NSF should increase stipends for graduate students to \$25,000 per year in 2003. <sup>44</sup>

<sup>33</sup> CEOSE Biennial Report to Congress 2002, p. 6.

<sup>34</sup> Ibid., p. 7.

<sup>35</sup> Ibid., p. 6.

<sup>36</sup> Ibid., p. 7.

<sup>37</sup> Ibid., p. 6.

<sup>38</sup> Ibid.

<sup>39</sup> Ibid., p. 10.

<sup>40</sup> CEOSE Meeting Minutes, October 16-17, 2001, p. 22.

<sup>41</sup> CEOSE Biennial Report to Congress 2002, p. 10.

<sup>42</sup> Ibid.

<sup>43</sup> Ibid., p. 11.

<sup>44</sup> Ibid.

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