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ABSTRACT

The Task Force on Women, Minorities, and the Handicapped in Science and Technology was established by the U.S. Congress in Public Law 99-383 with the purpose of developing a long-range plan for broadening participation in science and engineering. Public hearings were held in Albuquerque (New Mexico), Atlanta (Georgia), Baltimore (Maryland), Boston (Massachusetts), Chicago (Illinois), Kansas City (Missouri), and Los Angeles (California), between Fall 1987 and Spring 1988. The final report of the task force was produced in December, 1989. This document is the written verbatim transcript of the public hearing held in Atlanta, Georgia, on March 2, 1988. Co-Chairs Mr. Jaime Oaxaca and Dr. Ann Reynolds conducted the hearing. Speakers at this hearing included: (1) Dr. Thomas W. Cole; (2) Dr. Etta Falconer; (3) Dr. James O. Mason; (4) Ms. Karen Darling; (5) Mr. Jack Sabater; (6) Ms. Chandra French; (7) Ms. Carolyn Chestnutt; (8) Ms. Polly Anna Harris; (9) Ms. Iris M. Carl; (10) Mr. James G. Breene; (11) Ms. B. K. Krenzer; (12) Dr. Joe Johnson; (13) Mr. William Shackelford; (14) Mr. Bill Linder-Scholer; (15) Ms. Debbie Baldridge; (16) Dr. Charles Meredith; (17) Dr. Isabella Ann Finkelstein; and (18) Dr. Melvin R. Webb. A written statement by Congressman J. Roy Rowland (Georgia) is included. (CW)

TASK FORCE ON WOMEN, MINORITIES, AND THE HANDICAPPED IN SCIENCE AND TECHNOLOGY

PUBLIC HEARING

REPORT OF PROCEEDINGS of a public hearing of the Task Force on Women, Minorities and the Handicapped in Science and Technology held on the 2nd day of March, 1988, at the Atlanta University Center, Atlanta, Georgia, and presided over by MR. JAIME OAXACA and DR. ANN REYNOLDS, CO-CHAIRS.

PRESENT:

Co-Chairs

Mr. Jaime Oaxaca, Corporate Vice President
Northrop Corporation
Kansas City, MO

Dr. Ann Reynolds, Chancellor
California State University System
Long Beach, CA

Members Present

Mr. James A. Biaglow, Project Engineer
NASA Lewis Research Center
Cleveland, OH

Ms. Ferial Bishop, Chief
Registration Support and Emergency Response
Branch, Office of Pesticide Programs
Environmental Protection Agency
Washington, DC

Dr. Mary E. Carter, Associate Administrator
Agricultural Research Service, USDA
Washington, DC

Dr. Alan Clive, Equal Employment Manager
Office of Personnel and Equal Opportunity
Federal Emergency Management Agency
Washington, DC

Dr. Joseph Danek, Deputy Director for Research
and Improvement
National Science Foundation
Washington, DC

Mr. Herbert Fernandez
AFWL/NTS Kirtland AFB
Albuquerque, NM

Ms. Stella Guerra, Director of Equal Opportunity
Office of the Secretary of the Air Force
The Pentagon
Washington, DC

Dr. Ruth A. Haines, Deputy Director
Center for Chemical Physics
National Bureau of Standards
Gaithersburg, MD

Ms. Penelope M. Hanshaw, Deputy Chief Geologist
for Scientific Personnel
Department of the Interior
Reston, VA

Mr. Norbert Hill, Executive Director
American Indian Science & Engineering Society
Boulder, CO

Mr. James Jeffers, Chairman
Board of Trustees
Community College of Baltimore
Baltimore, MD

Dr. Harriett G. Jenkins, Assistant Administrator
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Ms. Brenda Kay, Staff Assistant to the
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Orion International Technologies, Inc.
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Mr. Nathaniel Scurry,Director of the Office
of Civil Rights, EPA
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Mr. Curtis J. Smith, Associate Director
for Career Entry
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MR. OAXACA: Good morning, ladies and gentlemen. Welcome to the public hearings in Atlanta, Georgia for the Task Force on Women, Minorities and Handicapped in Science and Technology.

A little bit about the ground rules. First of all, our very sincere thanks to the Atlanta University Center and all the folks that work with Dr. Thomas Cole, the President of Clark College, and later on we will be hearing from the very distinguished Dr. Cole.

On the ground rules, each witness that is on the schedule has 10 minutes. There will be a bell that will come on. Betty Vetter will have the timer--and the hook. After nine minutes, that will signal that to testify that you have one minutes.

Then questions will be asked by the Task Force members. It is not only in terms of the Task Force to get argumentative, and so we will be just asking questions with the intent to get further clarification as we go through our task of coming up with a sound report that addresses what has to be a national agenda.

I would ask the deaf interpreter to please identify themselves. Where is the deaf interpreter? Oh--and I would ask that she ask if there are any people in the audience that need that capability so that we can better serve your needs. Please raise your hands if you can't see or if you need some extra assistance. We appreciate that.

Anyone who would like to testify who is not on the program is welcome to do so--three minutes for each. We would ask that you fill out a card and turn it in to Mildred, and where is Mildred? Mildred is way in the back. She raised her hand over there, so if there are people who would like to testify, we would ask that she would submit for the record your testimony and you are allowed to speak three minutes.

We will be going this morning until 12:30 and we will try to keep it as much as we can on schedule. These are very full sessions. We would ask, once again, that you bear with us on the 10-minute rule, and so we will proceed.

My name is Jaime Oaxaca. I am the co-chair. This afternoon, Dr. Ann Reynolds will also be here, and once again, welcome. We all look forward to a very productive two days and thank you again so much for being here.

I would now like to call on Dr. Thomas Cole, Jr., who is President of Clark College, to kick off the first testimony, and once again, Dr. Cole, thank you so much for this wonderful reception and all the facilities and all the work that you have done, you and your staff. It is most appreciated in this very, very important [INAUDIBLE].

DR. COLE: Thank you, Mr. Chairman, and members of the Task Force. Good morning. I am especially pleased to welcome all of you to Atlanta and to the Atlanta University Center.

We are delighted you are here. You are engaged in a

topic of considerable interest to us, and we look forward to the testimonies presented at the hearing today.

You will be hearing several statements and recommendations on the role of the federal government in increasing the representation of women, minorities and handicapped persons in the nation's science and technology work force.

In the brief time available to me, I want to focus primarily on minorities, particularly black Americans and what the federal government can do to increase their participation in science and technology.

Now, I think this is really quite straightforward. Increased participation in education throughout the entire spectrum, but especially higher education including graduate school.

Not simply increase access. Access to higher education has been achieved more or less, but access is not enough. We simply must do a better job of training students through the baccalaureates and doctorate degrees.

You know the statistics. Black Americans represent over 11 percent of the U.S. population, but account for less than 2 percent of the science and engineering work force.

Persons of Spanish origin represent more than 6 percent of the population, but less than 1 percent of the science and engineering work force.

A major reason for this underrepresentation, in my

view is that racial and ethnic minorities are underrepresented generally in the nation's colleges and universities.

While minorities constitute about one-fifth of the current population of 18-24 year olds, they account for only one-sixth of the total undergraduate enrollment, 6 percent of the graduate enrollment, and just over one-tenth of all degrees conferred.

Of the approximately 33,000 Ph.D.s awarded annually, fewer than 1,700 are awarded to black and Hispanic Americans. The number has been consistent over the past decade, but it is declining now for blacks.

Only 8.8 percent of black Americans, 7.8 percent of Hispanic Americans, and less than 1.5 percent of Native Americans have a bachelor's degree.

The factors which contribute to these low participation rates have been widely discussed at numerous national meetings and workshops and reports over the past several years, and there is rather general consensus that there are at least four contributing factors:

Poor quality of elementary and secondary education that many of these students receive;

Low performance on standardized tests;

Lack of adequate financial aid and the increased dependence on loans rather than grants; and

Low retention rates in college and graduate schools in a mathematics-based curriculum.

The impact of each of these has been documented thoroughly, and I simply want to focus on the fourth factor--persistence in college through graduation in the science and engineering fields.

The differences in attrition rates between whites and the underrepresented minorities at various points along the educational ladder explain their relative representation in the science and engineering work force and the doctorate pool.

For every 100 whites, 83 complete high school, 23 complete college, and eight complete graduate or professional school.

The comparable numbers for black Americans are 72, 12 and four, respectively.

For every 100 Hispanic Americans, only 2 will ultimately finish graduate or professional school.

At every potential entry point into the science and engineering work force, minorities lag significantly behind whites.

In the first half of the 1970s, there was a large increase in black enrollment in the institutions of higher education. However, during the last half of the seventies, the number of blacks who enrolled in college remained essentially unchanged, even though the pool of black youth in the college age group increased by 20 percent.

More recent statistics show that the percentage of black Americans enrolled in higher education has declined by

more than four percent from the high of 1976.

And even of more serious concern is that students from the underrepresented minority groups tend to be disproportionately concentrated in two-year colleges. More than half of all Hispanic and Native Americans who are college students are enrolled in public community colleges.

Compare it with 44 percent of black students and 33 percent of white students.

Less than 20 percent of the black student enrollment is at historical black institutions, and one in four Hispanics are enrolled in less than 40 institutions.

What is significant about these statistics is that minority students are disproportionately concentrated in those institutions at the lower end of the educational hierarchical system with respect to financial and other resources.

The impact of the type of institution is even more dramatic when one looks at the degrees awarded. In 1981, for example, the majority of black degree recipients at each level, except doctorate, earned their degree in a state where historically black institutions are located, primarily because of the historical black institutions.

In that year, 83 historically black institutions that granted bachelor's degrees produced more black baccalaureates in the sciences and mathematics and engineering than the 673 non-historical black institutions in those same states.

While these institutions as a group enroll less than

20 percent of the blacks enrolled in colleges and universities, they produce almost 40 percent of the bachelor's degrees in math, science, and engineering fields.

The top 20 of historically black institutions granted 1,900 baccalaureates to blacks who eventually earned a Ph.D., while the top 20 non-historically black institutions granted just 900 in the same time period.

Historically, as you know, these institutions were established at a time when higher educational opportunities for the majority of black Americans were few. Yet under often adverse conditions they have provided the country with a wealth of talent among black Americans by offering them an educational opportunity in an environment conducive to their educational and personal development.

These institutions have been successful because they offer a reservoir of skill, sensitivity, and support for teaching and nurturing gifted as well as underprepared students, as evidenced by the proportion of their graduates who have proceeded to earn doctoral degrees at some of the most prestigious institutions in this country.

Majority institutions, while effective for some minority students, have become a revolving door for so many others, where they often are the only in the department without the necessary supportive environment.

Numerous national reports have identified the dire social and economic consequences to this country of not

providing minority youths with the technical skills needed for constructive and productive participation in our economy.

Such a forecast is based in part on the demographic changes already occurring within the nation's public school system.

According to Harold Hoskinson, quote, "Half of the states now have public school populations that are more than 25 percent nonwhite, and 25 of the largest school systems have minority majorities. By the year 2000, America will be a nation in which one in three will be nonwhite. Minority majorities are possible in the public school systems of 10 states," end quote.

By the year 1992, reports project that there will be a substantial drop in the number of all qualified students from entering engineering colleges unless special efforts are taken.

Such projections argue for improved educational preparation of minority youth so that quantitatively based careers are among their career options.

This was justified for reasons of the national interest. The involvemen of federal and private agencies in activities designed to attract more minority students into scientific and technical careers, and to push for systemic changes in the pre-college education received by minority students.

Also significant is the need for greater involvement of the federal government in programs targeted for minorities

is the lack of sufficient involvement in science decision and policy making roles.

Minority communities are the most rapidly growing segment of the U.S. population. Public policy decisions which affect these communities are becoming increasingly technologically based.

Minorities must assume a greater role in such decisions in a nation that will be 30 percent minority by the year 2000.

Meeting the higher educational needs of minority youth cannot be accomplished by a monolithic design for higher education. Similarly, no single type of institution can be expected to offer the diversity in environment conducive to the higher educational aspirations of large numbers of minority students.

Accordingly, any comprehensive strategy designed to increase minority access and retention in science and engineering fields should take into account the type of institution and the factors which have contributed to that historical track record in producing quality graduates at the undergraduate and graduate level.

Put simply, part of the solution means going to where the students are in large numbers and design programs to increase productivity.

But it also means holding majority institutions more accountable for their performance in producing minority

graduates. [BELL]

There have been initiatives at the National Institutes of Health, the National Science Foundation, and many of the mission agencies in the seventies which have been extremely helpful.

These targeted programs at historical black institutions have had a major impact, yielding enormous success stories at many institutions. These programs should be enlarged substantially to provide not only direct support for research and research training, but support to strengthen the infrastructure as well.

I leave you with just two recommendations:

One, we know what programs work and those that do not. Targeted programs to historically black institutions should be increased tenfold in funding.

Secondly, student financial aid programs should be revised, the guidelines should be revised, so that students will not have to rely as much on loans as is the case now.

That has been a dramatic change since the mid-seventies, and also one of the reasons minorities are opting not to go to college and graduate school.

Historically black colleges and universities have a documented track record in producing black graduates who are making significant contributions to the science and engineering enterprise in the United States.

These institutions should be strengthened and their

resources more fully tapped as one component to any solution to the problem of the underrepresentation of minorities in science and technology.

But it will take external support from the federal government, beyond the current budgets currently committed to these institutions. It will take commitment to supercede short-term considerations for long-term results, one which has implications for the long-term development of the nation's science and engineering work force.

Thank you.

MR. OAXACA: Thank you so much, Dr. Cole. Let me kick off one of the questions that, as we have gone through the different cities and somebody with your background and experience, we seem to find that the K through 12 in developing a product that is going to have the highest probability of making it through the BS and on to the higher-level degrees seems to be in short supply.

In other words, the pipeline is empty. We would sure like to hear your thoughts on what we might do to give you a higher quality and quantity of folks going into the university level, with the idea that they want to go on and get the advanced degrees.

DR. COLE: That goes somewhat away from my main emphasis, which is focusing on higher educational opportunities right now for those students once they come from K through 12.

My own sense, though, is that what we have seen

happen over the years is that in the public school systems students have been given too many options to opt out of taking the requisite math and English and courses that are essential if they want to pursue a mathematics-based curriculum.

I think that should be, the curriculum should be more prescribed. In other words, I think efforts initially to track students has hurt the pipeline, if you will, because it has given students the opportunity to pursue the path of least resistance and not allow them to make, and options, by taking as rigorous a curriculum as is needed, particularly in high schools, so that when they get to college that they still have the option of pursuing a degree in science and math.

MR. OAXACA: Yes, Mr. Scurry, Dr. Scurry.

MR. SCURRY: I don't really have a question. What I wanted to do is just acknowledge Dr. Cole. I happen to have graduated from Clark College in 1973, and am a product of the math and science department of that institution, and I wanted to say I am very, very proud that you would agree to run my school.

DR. COLE: Are you going to come back and help me? [Laughter]

MR. OAXACA: I think it's a grand opening for alumni donations. [Laughter]

MR. SCURRY: The check's in the mail.

MR. OAXACA: Shirley Malcom.

DR. MALCOM: Dr. Cole, I think that you would be one

of the first people to acknowledge the fact that the existing, that federal programs have been very effective in terms of their impact on the black colleges, programs such as MARC, MBRS, and the like.

I want your opinion, however, on the impact of the absence of programs in particular disciplinary areas. Now, the reason that I say this is that if one looks at the structure of certain of the departments, for example, in biology, they have become very biomedically oriented, basically because the funds have been available there.

But my question is what about those other areas within the biological sciences that have not been perhaps supported in the same kind of way, and also fixed areas such as physics and inorganic chemistry and the like, has there been a skewing because of the absence of funding in the other areas?

DR. COLE: Thank you. No question about it. I think that the--well, I think the National Institutes of Health did a marvelous thing when they started the MBRS program and subsequently the MARC program.

But--and it was such a successful program that many disciplines were skewed, were shifted toward being more responsive to the mission of the National Institutes of Health and somewhat away from the more traditional areas that you have indicated.

Particularly in the physical sciences, the absence of a companion kind of program from the National Science

Foundation to give the appropriate emphasis in physics and astronomy and engineering and other areas to complement the MBRS program from the National Institutes of Health has in fact, I think, resulted in many of the historical black institutions and minority institutions perhaps overemphasizing the biomedical sciences in order that their research and research training programs be eligible for funding by NIH, where the larger dollars and resources were.

MR. OAXACA: Yes, sir, Dr. Jeffers.

MR. JEFFERS: Dr. Cole, I have a twofold question and it relates to your comments concerning the clustering of minority students in predominantly black colleges and community colleges.

I represent some of the interests of community colleges, the latter. A twofold question:

Number one, do you consider this normatively bad that minorities are clustering in community colleges?

And secondly, there has been concern, I think, expressed in other settings and other hearings, among other members of the Task Force, that focused on technical degrees at the associate level and community colleges is really not what we ought to be striving for. We ought to be bringing, at higher goals.

Could you respond to both of those areas of concern?

DR. COLE: Yes, I will take the, if you don't mind, the last question first. I think the--if we are to make a

major impact on the representation of minorities in science and engineering, we have to be looking at progress of minorities through the entire educational spectrum, through the baccalaureate degree through graduate school.

What is happening at the community college--in fact, most of the increase in enrollment since the mid-sixties through the mid-seventies really has resulted with the major increase in the public community colleges, to which I think we owe appreciation to those in the community colleges for doing their jobs well.

What has happened, though, is that students are not transferring. Minorities are not transferring in significant enough numbers from two-year programs to baccalaureate programs.

I think for blacks, it's something like 15, 16 percent who are actually going on to baccalaureate degrees.

So what is happening, I think, is that career options have been truncated because students are receiving two-year technical degrees and that then, in most cases, results in a closed-end career that doesn't provide the flexibility to make the kind of contribution in science and engineering I think this country needs.

MR. OAXACA: Ms. Bishop.

MS. BISHOP: Dr. Cole, assuming that you have a fair number of students receiving BS degrees or MS, can you speak to the employment aspects of the students finishing this area, the

[INAUDIBLE], are we having problems, are students having problems being placed once they have got their BS degree or MS degree?

Can you speak to the success rate--or non-success rate?

DR. COLE: That's also part of the problem. They are so successful that too often they opt for the work force immediately rather than pursue graduate opportunities.

That is the least of our worries in terms of having career opportunities. Sometimes we find ourselves talking to recruiters, discouraging them from trying to attract our best students immediately into the work force, to give them an opportunity to go on and get an advanced degree.

MS. BISHOP: But should a student opt to go on after he has--there doesn't seem to be a problem in terms of employment?

DR. COLE: There is not a problem in terms of employment. We would just like to see more of the students...

MS. BISHOP: Stay longer.

DR. COLE: Stay longer and continue. I have no qualms, no quarrel, for example, with the aggressive recruiting of the armed services. One problem is that the financial package is so attractive that many students are opting to go to the armed services even before going to college, because in some packages it provides a guarantee that the college education will be fine.

Well, I can't be against that. The only problem is that I think that too often students may not opt to go back to college...

MS. BISHOP: Well, that's the question. Are the students tending to go more into private industry versus the federal government?

DR. COLE: I can't give you the statistics on that. My intuition would be that they would tend to go into private industry.

MR. OAXACA: One last question. Ms. Hanshaw.

MS. HANSHAW: My question, I think follows on this, and it has to do with opportunities for students from historically black colleges to work in federal government research labs. I once fell into a program of that sort, and it seems to me that by working with research scientists, with the encouragement to go on, can be very successful.

Did you have experience in such a program?

DR. COLE: Yes, yes, there are, there are a variety of programs that [INAUDIBLE], which are funded by various federal agencies that include a component, an internship component, a summer experience component, and all of those, all those tend to help.

By and large, though, you find that your best students are the ones who are engaged in those activities, and most of them were going to go on anyway. We kind of need to not only be responsive to their needs but I think to go with

those that are quite--who have not quite made up their mind yet about their futures and be able to encourage them to participate in those activities as well.

MR. OAXACA: Dr. Cole, thank you so much and thank you again for all the help you have given us in setting us up here so well.

DR. COLE: Thank you. It's my pleasure, it's good to have you here.

MR. OAXACA: Thank you. I would like to welcome now Dr. Etta Falconer, who is the Chairperson of the Division of Natural Sciences, who is going to tell us about an exemplary program that she has been working with.

Welcome to the Task Force hearings.

DR. FALCONER: Thank you. To the Chairman and the members of the Task Force on Women, Minorities and the Handicapped in Science and Technology, I am happy to have the opportunity to share a successful activity with you, and to make suggestions concerning the critical problem that we now face.

Minority women are poorly represented in the nation's science and engineering labor force, accounting for less than 2 percent of the total.

The improvement of the situation will require a variety of programs aimed at different levels, including those which decrease the attrition of college students in science and engineering majors.

A program which has had long-term success in increasing the number of women science majors at Spelman College is the Pre-Freshman Summer Science Program.

This program was initiated in 1972 as a part of a comprehensive plan to improve the science program through the development of faculty, curriculum, facilities, and special activities.

It represented a specific strategy designed to increase the number of students majoring in the sciences. It was both a recruitment and retention effort.

Spelman is a historically black institution for women. Prior to the first summer program, there was an abundance of evidence that Spelman students were not seriously encouraged to pursue the sciences.

The science building was dark and uninviting. Less than 9 percent of the degrees awarded were in the natural sciences and mathematics.

In 1971-72, only 10 percent of the students were seeking science majors. Major classes above the freshman level had few students.

It is clear that there would be little advancement for the science program until a critical mass of majors were enrolled. The summer program served as the major means of recruiting high ability students with an interest in science.

The program also was designed to alleviate the severe loss of students between entrance and the sophomore year.

High ability black women science majors are at high risk during the freshman year. They suffer from the usual college adjustment problems and may have several of the following:

Ineffective study skills and habits;

Serious background gaps in science and mathematics;

A job;

Low self esteem.

In addition, they must carry heavy academic schedules. The summer science activity is a brief program that improves the student's chance of success during the freshman year.

The program is an eight-week residential program for approximately 40 students. It has an academic component and a counseling component, and both are vital to a student's success.

The academic component consists of classes taught by regular Spelman faculty and faculty in the Atlanta University Center. Each student takes biology or chemistry, mathematics, reading, computer science, and problem solving.

Laboratory experiences are given in biology, chemistry, mathematics, and computer science. Study skills and test taking techniques are offered during the first week.

Instruction is intensive and classes are challenging. Classes run from nine until four.

The counseling and science awareness activities are

primarily extra class activities. Professional scientists and engineers are invited to give career talks such as opportunities in computer science, careers in engineering, careers in medicine.

Other talks focus on scientific content as a means of introducing students to different fields of study, such as atmospheric chemistry.

Students also participate in other activities such as giving a panel at a national conference on black women health issues, taking a trip to the Agnes Scott Observatory.

Students are given an opportunity to earn advanced placement in mathematics. They receive the certificate of award at the closing ceremony with special awards given to the top student in each area.

Parents are invited to attend the closing ceremony, which provides an opportunity for their recognition as vital forces in the future success of the students.

Now, in examining program success, I felt we would first look at the 1976 program, since this class graduated several years ago and the students are out.

Of the 47 participants, 42 returned to Spelman in the fall. The quality of the students is seen in the fact that 10 of the students earned advanced placement into pre-calculus and mathematics 2, and constituted 14 percent of the students enrolled in all sections of that class but earned 55 percent of the As and Bs.

This is more amazing for the students that went into calculus. Seventeen students placed there and they made up 17 percent of the enrollment, but they made 89 percent of all As and Bs given in that course.

Of the 42 students, 32 graduated from Spelman, with 23 earning degrees in the natural sciences and mathematics. two in engineering, five in the social sciences.

It is known that 11 of the students are now physicians, four are dentists, which speaks to the fact that there is an emphasis on health careers.

One holds a Ph.D. in mathematics and she is now doing a post-doc. Two are engineers and three are computer scientists.

If we look at the 1985 program, the students are still at the college. Forty-six of the 50 students returned as freshmen and 41 are still enrolled. We have had some loss from the science and engineering majors, but after three years and the students are juniors, we still have 34 of the students majoring in science and engineering, and we will not likely have much drop after that.

I would like to observe that the biggest drop has been in the students that are in engineering, and this points out that some additional activity is needed to save the students.

The success of the Pre-Freshman Summer Science Program can be seen not just in what happened to the students

that attended the program, but what happened to the college, because it was the strategy to get more students to major in science.

In 1973-74, 16 percent of the students were majoring in science at Spelman. That had grown to 33 percent in 1980-81. It is 35 percent now.

We are also graduating students. In 1973, we graduated 8 percent--18 students graduated with majors in the natural sciences and mathematics. In 1980, that number grew to 62, which represented 28 percent of the graduating class.

Last year, in 1987, we graduated 103 students--35 percent of all graduates at Spelman.

The pre-freshman summer experience enabled approximately 700 students to improve their science and mathematics background, but among the positive outcomes have been the contributions that the students have made as tutors to the regular program, and the fact that they have become role models for younger students and have provided a force within the college that has had an influence on the work of other students.

The problems addressed by the program are those that are experienced by many minority students, and the program should serve as an excellent model for addressing the shortage of minority scientists and engineers.

The college has moved from a lack of emphasis on science to being one of the largest producers of strong black

women science and engineering college graduates.

The Pre-Freshman Summer Science Program has been one of the most important links as we strive to increase the number of qualified black women entering science and engineering careers.

As a recommendation, I would like to note that the underrepresentation of minorities, women, and the handicapped is a problem of national significance, and the solution is crucial to our country's well being.

But it is a massive problem and the solution will require the efforts of all sectors. Clearly the federal government has to play the central and leadership role.

I would like to offer just three recommendations:

First, the National Science Foundation and other federal agencies should provide support for a variety of projects to encourage the participation of women, minorities, and the handicapped in science and technology, and should maintain this effort until some real progress has been made in all of the groups.

Second, support should be provided for bridge programs which give a successful [BELL] transition from high school to college science and engineering programs.

And finally, because this is now a problem for us, funds should be made available to colleges and universities for honors programs with scholarships and research experiences for students in the target groups, particularly minority women, who

are majoring in the mathematical, physical, and engineering sciences.

The goal would be to increase the pool of Ph.D.s in these fields.

MR. OAXACA: Thank you so much, Dr. Falconer. Any questions. Yes, Alan. Dr. Alan Clive.

DR. CLIVE: Yes, Doctor, when you gave us those statistics, did you--you used the word "natural science," did you mean to include all science or are you differentiating and do you have statistics on degrees in physical sciences if you were differentiating?

DR. FALCONER: I'm sorry. I was using the term that we use at our school. I mean the majors in physics, chemistry, biology, biochemistry, mathematics, computer science, and engineering.

At our college, we distinguish between that group of subjects and the social sciences.

DR. CLIVE: Thank you.

MR. OAXACA: Ms. Bishop.

MS. BISHOP: Dr. Falconer, I'm very--I'm interested and I'm curious really. What really draws the students into the program [INAUDIBLE]? Are they--they are coming out in high school? Is--are these students who are inclined [INAUDIBLE] by a counselor in high school as having some interest in science? Or just what gets the girls motivated to even apply to the bridge program?

DR. FALCONER: All right. It has changed. Originally when we did not have any science majors at the college, we used the program to recruit students, not only to the program, but to try to get them to stay at the college.

And that was a regular recruitment effort. We tried to identify high ability students and to send out an application and a brochure.

We no longer do that, and the reason that we don't is that we have an adequate pool of high ability students that are now applying for the program. It has some reputation.

MR. OAXACA: Ms. Walgreen, please.

MS. MEJIA-WALGREEN: I want to commend you, Dr. Falconer, on what I think is a terrific program, and your success rate is just outstanding.

If we wanted to duplicate this program at other institutions--first of all, do you think it is possible? And secondly, what do you think--what would you recommend? How would you recommend that we train for it? What should we do?

DR. FALCONER: Perhaps maybe a conference might be the appropriate means. Maybe a document dissemination through document. Maybe to get people to come to visit the program.

MR. OAXACA: Dr. Falconer, a similar question to the one I asked Dr. Cole. Do you find that you are getting enough raw material out of high school? Or do you have to go down [INAUDIBLE] and kind of pull on it, as opposed to just having people try to [INAUDIBLE] that wanted to come, folks that want

to go into science and technology?

DR. FALCONER: I think that we are, but I think that that is very special. I think the reason that we don't have to worry too much about the pool is because we did our homework back in the seventies at a time when it was not popular.

But there is a serious problem with the pool of minority students that are capable of doing science and engineering, not because of natural talent, but because of the educational background that they have received.

One of the major problems that I see is the tracking, the tracking of minority students, the heavy tracking of minority students into vocational sequences in the way that they cannot get out of it.

And also their parents don't recognize what is being done to the students. So the pool cannot improve.

MR. OAXACA: Well, what would you suggest to this Task Force might be done to address the problem of creating a larger, a significantly larger pool of people coming out of the [INAUDIBLE] into all these institutions that are by and large becoming more and more ready to receive them?

DR. FALCONER: I think that we must look at special programs that create scientific interests among children at elementary school age, and there must be some programs for teachers and some programs for counselors.

MR. OAXACA: Thank you very much. Mr. Scurry.

MR. SCURRY: We have a mechanism in place now

essentially that did [INAUDIBLE] to a lot of pre-recommendations in fact, and that is the President's Executive Order.

Now there are some people in some circles who believe that it is just a piece of paper and not effectively implement [INAUDIBLE] create both kinds of strategies not to drop out of the universities.

I am curious to learn if that opinion is not one shared by those of you in colleges and universities, and if not, has there been any direct benefit that you can associate, our implementations that would take, related to Spelman in general [INAUDIBLE]?

DR. FALCONER: Well, like Dr. Cole, I would have to say that the federal government has helped. That's why in the recommendation, I made the statement that the help should continue until progress is made, but certainly there have been programs that have benefitted Spelman College.

But in the summer science program, it has been very difficult to find money that will support students that were not health oriented.

I could get all of the money that I need from places that wanted to produce physicians and all medical scientists. But it was very hard to get money to produce physicists or chemists.

MR. OAXACA: Dr. Falconer, thank you so much for your testimony. We very much appreciate your time.

I would like to welcome Mr. James--Dr. James O. Mason, M.D., Director of the Centers for Disease Control. Welcome, Dr. Mason.

DR. MASON: Thank you, Mr. Chairman and members of the Task Force. I am delighted to have this opportunity to appear today, along with the other distinguished individuals that have and will participate.

I will submit written testimony, and if I might, I would like to just summarize it by making a few verbal comments.

First of all, the Centers for Disease Control is an agency of the United States Public Health Service, a part of the Department of Health and Human Services, and we work very closely with Ms. Lee-Miller, who is a member of your Task Force and appreciate that association with her.

I would like to say that since our responsibility at the Centers for Disease Control is principally prevention, to prevent unnecessary disease and disability and premature death, a lot of our work is directly targeted to women and minorities because they bear a disproportionate share of disease within the United States.

And it is absolutely imperative that if we are going to succeed in preventing diseases, whether it is diseases that can be prevented by immunization or by modifying behavior, if we are going to succeed, we have to have women and minorities represented on our work force, or we will just not meet our

goals and objectives.

Ard I think it is important for you to know that we are handicapped as a federal organization, as an employer of scientists and engineers, because we don't have adequate numbers of women, minorities, and disadvantaged, and handicapped represented among our scientists, engineers, and other researchers.

Looking at our statistics, a group of about 500 researchers, which includes M.D.s, Ph.D.s, veterinarians, dentists, and other categories, 32 percent of these are women, while as you know they constitute more than 50 percent, about 51 percent of our total population.

Of our minority researchers, only 8.6 percent are represented by that category, and as you know, that is way under representation in terms of representation in the population.

But with groups that we are primarily targeting, which may represent 60 to 80 percent, that they only have 8.6 percent minority researchers is far out of proportion to where we need to target our efforts.

When it comes to handicapped researchers, it's 5.2 percent.

So we are not able to achieve what we might achieve had we, had we achieved greater representation of women, minorities, and the handicapped among our work force.

I will say that as a federal employer of scientists

and engineers that we are not able to compete, salary-wise, with the private sector or with academia.

And so, when I set out to employ a scientist or an engineer, even though we beat the bushes, so to speak, it doesn't matter how we approach this, by going out into the universities, whatever, advertising it, we end up on our registers [INAUDIBLE]. And as a result of that we have too few employed with us.

And I will also take another step and say that we have many research positions that at this moment are unfilled because we can't find enough qualified scientists and engineers, whether they are white or black or Hispanic or Asian or women. We have more positions that are vacant than we have people that have been trained in this nation.

And I think we are facing a major tragedy as we go on into the future where we are going to have to look to Japan and Europe and other places for our scientists and engineers because it doesn't matter whether they are white or black or whatever, we don't train enough to meet the needs of this nation.

And since we don't compete salary-wise, I think the governmental agencies are going to be in even greater trouble than the private sector and academia.

And so that is rather a dismal picture that I am presenting for you, that I am concerned about it, deeply concerned.

Well, what is our problem? And I don't need to tell this Task Force what the problem is, because I think that you know it and understand it better than I do.

It seems to me that the problem is at all levels. It is a societal problem, it is a family problem. I am concerned that there seems to be much less family support for high academic expectations, and without high academic expectation, we are not going to have scientists and engineers.

I agree that there's decreasing levels of financial support, and I think this is at all levels, from the private sector, governmental, at all levels of government, and the result is a decreasing pool of candidates for high-level positions in science and technology.

In the long haul, we must attack these national frustrations and get right to the roots, if we are going to solve these problems.

There are not any quick fixes. There are not any glamorous fixes. It is just tough, hard, slugging it out to get at the root causes.

Well, I don't want to try to justify where CDC is, because, as I have said, we are not where we would like to be. But I will mention several programs that we have initiated to try to put ourselves in a better competitive position for scientists and engineers that are women, black, and handicapped.

We are spending over a half million dollars just at

targeted programs to encourage the training and recruitment of disadvantaged and those that are not in majority positions in the nation.

We have a Public Health Fellow Summer Program, which is cooperative with Emery University School of Medicine and the master of public health in Morehouse School of Medicine. It is supported by the Rockefeller Foundation, the Henry J. Kaiser Family Foundation.

It has--all of the students in the summer fellows program are black, seven males and five females, and we appreciate Morehouse's cooperation with this.

We have a summer intern program project, which is in cooperation with the Atlanta University Center, and there all of the summer interns are black and seven of the 12 are female.

We have a CDC-University of North Carolina graduate program in public health laboratory practice. This has been going on since 1961, and there have been to date 100 graduates of these. Of the 100, 23 have been females and only eight have been minority--seven Hispanics and one black.

And the problem, again, is recruiting students into the program that represent minorities as well as women.

We have a program with the Association of Schools of Public Health. This is an internship program, and it prepares people for a master's or doctoral degree in public health at predominantly minority schools.

Of those today that are all males, only two are

minority students.

In addition to these four programs, we operate a--with the School of Public Health at the University of Alabama at Birmingham, and in this program there are no minorities involved in it.

A post-doctoral residency program at CDC, there are three currently in that program. There are two black females and one black male.

We have a management leadership program at CDC. Three are currently involved in that, two white females and one black m[illegible].

An exciting program that we have recently become involved in, and that's--we've adopted Tillson Elementary School here in Atlanta. It's actually Dekalb School System. And I am excited about this because I see here [BELL] a relationship with an elementary school that is predominantly black.

We see the involvement of parents, of teachers, of students, and as I have said, I don't think there are any quick solutions to these problems. I think if we begin [INAUDIBLE] school, we are going to see some results of that in about 20 years as scientists and engineers join the work force.

And I believe that we can be involved at least with that one school and perhaps with others in what I would call growing our own, starting right at the beginning and through bringing them appropriately to CDC, and our scientists going

into Tillson, field trips, laboratory experiences, lectures.

I think working with parents and teachers and those incredible students that 20 years from now we can show some real dividends in terms of students that are excited about science and engineering.

We will probably lose out in the long run because we won't be able to attract them because of our salary structure, but it is still worth the effort and we are excited about it.

So, in closing, no quick fixes. We have to create the structure for the long-range solution. We have to start in elementary school and work out the--and it's a disgrace that all Americans in the United States who want a quality education, I don't believe they can get it today and that is one of the roots of our problem.

And I will stop there.

MR. OAXACA: Any questions for Dr. Mason? I have one, Dr. Mason. How long does it take to--in your opinion--to have somebody be, you know, actually effective as a researcher in the business that you are in, once they get out of the different [INAUDIBLE] BS and MS or a Ph.D.?

DR. MASON: Well, we're talking about kindergarten through 12th grade, that number of years that is common to any program. Then if we are going to take them at the bachelor's level, that's four more years, and most of our researchers, our scientists and engineers are not bachelor's-level people.

So they have got to commit another two to four years

to get a doctorate. Then there is post-doctoral training, which may go on for two to four more years. You can see this is a significant and substantial investment in a pretty tough field of mathematics, chemistry, physics, and things of that nature.

MR. OAXACA: You have a significant ability to get into the media these days because of the very severe problem that you folks are very much involved in trying to solve, vis a vis the AIDS epidemic.

Do you have any suggestions for the Task Force in getting that message across that we could use because we have not, in my opinion, been able to really whet the appetite of the American public?

In a lot of cases, the presidential candidates have not come forward and reviewed this as a national agenda.

What would you suggest to the Task Force that we might do to have people understand that it takes 28 to 30 years to grow a Ph.D. and that we had better get off the dime starting now or things will only get worse?

DR. MASON: Well, I think the thing that isn't generally understood is that there are a lot of jobs that require little training that seem to pay well in the beginning, and this attracts too many people who want to make money rapidly.

And they may have to make money rapidly. I think some of our best minds are attracted into work or to

experiences that look like they will have a quick payoff, and unless we can provide with either loans or grants or fellowships or scholarships, I don't think we are going to see a lot of minority students that are going to have the willingness or the resources to go through that 30-year training program.

And that's why if we want to have blacks and Hispanics and Asians and Indians and every other group adequately represented, we have got to find out what is it going to take to get them there?

And it's more than just the desire to be there. There has to be resources because they are coming from homes that too often don't have the resources to sustain them for that number of years.

And so this nation has to recognize that if we are going to be on the cutting edge of technology, if we are going to be in a competitive position in terms of our economic markets, or health care, or whatever it is, this is an investment that will pay off--this isn't just an expenditure, it's an investment that will pay back dividends.

And I'm not sure that that message has gotten across, that if we want to have a return on our investment, then we have got to invest in what I call quality education and sustained education, and that message isn't there.

But if we will invest in it, it will pay off in the long run. You know we spend too much of our time talking about

dollars and cents, but it makes sense from a dollars and cents standpoint to invest in the best minds we have and to make sure that we are on the cutting edge of science, rather than looking to other nations to do that.

From my own point of view, I can't get black and Hispanic kids immunized if I don't have black and Hispanic people out in the field.

I can't really stop this AIDS epidemic, which is a behavioral problem, if I don't have black and Hispanic, particulary scientists who can work in this field and get out where the people are to tell them how to change behavior. They won't listen to me. They shouldn't listen to me.

And so if we are going to win the battle against disease, it means we have got tc have women and minorities and handicapped people who are able to get out and be engaged in that war.

There aren't enough of them today.

MR. OAXACA: Dr. Shirley Malcom.

DR. MALCOM: Dr. Mason, you mentioned the efforts at the elementary school as this [INAUDIBLE] growing your own, while it is a long-term thing.

I was wondering if any consideration had ever been given to growing your own on a more short-term basis. For example, to take a student who shows tremendous potential at the sophomore level and say, we will foot the bill half the way and give you the kind of research, summer research experience

involvement, as it were, until you can get through the end of this pipeline, because it seems that--you're right--that students are being attracted into the work force for very good reasons.

One is the fact that they need the money, but also the fact that the options of going on are not presented to them early enough, along with the kind of experiences that they would need to understand what a commitment to this kind of a life might mean.

And I was wondering if any consideration or any discussions had taken place a little bit further up the pipeline in terms of growing your own.

DR. MASON: We invest in two groups further on down than the senior in high school. We take in what we call public health advisors and they are individuals that come to us directly out of college.

And we can move them into the public health advisor system by growing our own and providing the additional training, and they go into the management area.

In the epidemic intelligence service, we take physicians, dentists, Ph.D.s, usually at the point that they come out of the doctoral level, and then we grow our own from there in terms of additional training both on duty with the Centers for Disease Control, or we will sponsor them for a master of public health or even a doctorate in some field at that level.

And we can justify that kind of training, but I don't have a mechanism today--I would love to have it--that I could go clear down to the high school level and identify promising individuals and then take them right on through there.

In other words, I would have real problems with my appropriations if I were to deal--and in a way, I'm sort of bootlegging the training of the groups at a higher level, but I can get away with that.

But I couldn't go that far down, and I would love to have the mechanism to do it.

DR. MALCOM: You could use a training function.

DR. MASON: Pardon?

DR. MALCOM: That you could use a training function.

DR. MASON: That's right [INAUDIBLE].

MR. OAXACA: Thank you so much, Dr. Mason, and we wish you the best of success in all the things that you are trying to solve, because, boy, do we need you.

DR. MASON: Thank you.

MR. OAXACA: I would like to welcome Karen, Ms. Karen Darling, the Deputy Assistant Secretary for Marketing and Inspection Service, the United States Department of Agriculture. Welcome to the Task Force hearings and thank you so much for taking the time to be here.

MS. DARLING: Thank you, Mr. Chairman. It is nice to be here today. We, too, are in the business of public health at the Department of Agriculture. We probably employ about

125,000 people.

It breaks out and it's very difficult for us to pinpoint the percentages or the numbers that fall into these thr e categories. So I am not going to give you a lot of numbers today.

I represent the applied scientists and technologists by working with the Plant Inspection Service, the veterinary side of the Animal Plant Health Inspection Service. We protect the nation's food supply in meat and poultry.

Dr. Carter, who is on your Task Force, represents the basic sciences, and we work very closely together in that all regulatory and policy decisions, in my judgment, must be based on the best science available.

And we, too, are having difficulty in outreaching to these three areas to determine where we are going to find tomorrow's scientists, particularly with the rapidly changing technology.

We at the Department of Agriculture have been targeting our areas primarily in the recruitment and outreach programs. We fully recognize that we have a great deal to do to prepare for the year 2000 before then.

We have--we have been working as many, as the prior speakers have said, on trying to go where the students are. We work very closely with the 1890 schools and the historically black colleges.

Through our land grant-based system, as well as other

things, we are in every county of the United States. So, obviously, we have a chance to reach out to where those people are.

We are probably more involved in Native Americans than many other agencies within the federal sector. But then we are also concerned with water purity and such. We are not just food growers.

Some of the programs that I would highlight that we are doing within the department. For example, the Agriculture Marketing Service, they have targeted a particular school where they are helping support students to get on the technical side. We do a lot on commodity grading.

We want to make sure that the food that's in the system of our supply here is not only safe but that the consumer gets what they paid for, and that takes a technological training. It's not just off the street.

In the Animal Plant Health Inspection Service, we are working very closely with Tuskegee on many programs. We are also working with Grambling State University in Louisiana to increase the participation of minority students in wildlife biology.

Wildlife biology is a big thing with us, and we are doing our best to spend money for students that are involved and will go on. We will help support you to a certain degree and then assure you of employment after you get there.

At Fort Valley State College here in Georgia, the

Animal Plant Health Inspection Service is supporting the Veterinary Technician Program, which prepares students as veterinary technicians and assistants.

So we are helping with this university to help strengthen that curriculum, to coordinate faculty exchange, and so forth.

At Florida A&M in Tallahassee, and in North Carolina, A&T State University in Greensboro, the entomology and plant science departments are targeted for professional and technological development programs.

Many of our other agencies within the Department of Agriculture are using these cooperative education programs to enhance their targeted recruitment, including the Extension Service, the Soil Conservation Service, the Agricultural Research Service, and most of the others.

Another significant effort is based on the National Agricultural Research Extension and Teaching Policy Act of 1977. Funds are appropriated to support resident instruction programs at historically black institutions, and these funds provide a base to develop stronger teaching programs in the food and agricultural sciences at 1890 institutions, Tuskegee and the University of the District of Columbia.

We don't grow many crops in the District of Columbia, so we are trying to grow scientists. These grants cover such areas as faculty development and student internships and curriculum revitalization.

Two agencies support the research apprenticeship program in our department for high school students, the Cooperative State Research Service and the Agricultural Research Service, to participate--to try to expose science and technology to more minority, female, and handicapped students.

This budget is about $250,000 per year to support the program, and these students are selected from the upper third of their class with recommendation by their teachers.

In Louisiana, we have a bayou program in conjunction with Southern University, modeled after the Research Apprenticeship Program, and is jointly sponsored.

Through a combination of hands-on laboratory experience under faculty supervision, we do on-site visits to federal research facilities for students, orientation sessions, anything we can to try to enhance the curiosity of the student to want to enter into these fields of endeavor.

We have a summer youth program, cosponsored between the Delaware State College and the Agricultural Research Service. Technical support is also provided by the Food Safety and Inspection Service, the Forest Service, and the Economic Research Service.

These students participate in lectures, tours, career seminars to further stimulate an interest in science careers.

The Agriculture Research Service has been supporting a Teacher Research Fellowship Program in an effort to make a different approach to the same problem. High school science

teachers come on board in the Agriculture Research Service laboratories during the summer to learn more about research in the hope that they can better counsel their students on research career options.

Other more informal efforts are encouraged by the ARS among their scientists, and this agency does support scientists who are willing to judge school science fairs, exhibits, things like that.

Several of our agencies have developed innovative recruitment strategies designed to diversify their applicant pool. The Food Safety and Inspection Service uses a recruitment team approach, including a personnel specialist, a veterinary medical officer, and an EEO specialist.

The agency attempts to identify a VMO who is a graduate of that school that the recruitment team is visiting. Team members are trained in recruiting and interviewing techniques, and they use videotapes and so forth.

These tapes highlight minority and female veterinarians. Of the current 27 VMO recruiters in FSIS, seven are female, seven are minority.

The Food Safety and Inspection Service Coordinated Recruitment Initiative paid off in 1987. Of the 86 veterinarians hired, 19 were females, 16 were minority, and two were persons with targeted disabilities.

Of the 31 food technologists, 12 were women, six were minority. FSIS is also very resourceful in the use of paid

advertising and participation on career days.

In fact, most of our agencies have proven to be pretty good advertisers. We have some very slick publications that I understand have been submitted for the record.

The Agriculture Research Service uses a targeted recruitment strategy in its post-doctoral research associate program. Based on a need to attract minority post-doc employees, the administrator provided special funds to recruit, advertise vacancies, and supplement salaries in order to attract minority post-docs.

Areas with no minorities drew 13 out of 100 in one year, based on this focused recruitment.

We are like Dr. Mason, though. We don't have enough money to do what all we would like to do. The Animal Plant Health Inspection Service uses a coordinated recruitment strategy of role model recruiters.

We are developing more career brochures, slide programs and displays to try to enhance this curiosity to our work force.

We are glad to be here. The Secretary, Richard Ling, has a very strong, well-publicized commitment to equal opportunity at the United States Department of Agriculture.

Our agencies have taken this very seriously. We have ongoing efforts to see that this equality is available. We have--we participate in most of the White House forums on anything that has to do with equaling out the work force and to

look to tomorrow.

We don't have great recommendations to make to the Task Force, other than we have learned a lot about ourselves in that we haven't been totally coordinated within our own department, knowing what the numbers are, what the percentages are, what the--where to find things, and if there is anything I personally would suggest is that we continue among government, among private sector, and government within ourselves so that we have a better handle on not only what we have available, what we are looking toward tomorrow, and where the stress on those sciences is.

So we have ourselves here. I will commit to you that we will continue to do that, and to cooperate with the Task Force in any way we can.

MR. OAXACA: Thank you so much, Ms. Darling. Any questions? Yes, Dr. Scadden.

DR. SCADDEN: Yes. I would like to get a clarification on some comments you made, both regarding recruitment and training. You indicated that--I would believe it was in relationship to Grambling College, perhaps one of the other schools you mentioned, that you provide training programs and also job opportunities.

I would like to know, do you have required participation within the Department of Agriculture if people receive training money, similar to, say, the Reserve Officer Training Programs [BELL], or is this something that just a

voluntary job offer?

MS. DARLING: You mean if we help you learn how to do something, do you have to come to work for us?

DR. SCADDEN: Precisely.

MS. DARLING: No.

DR. SCADDEN: Well, do you think that that might be a reasonable thing to consider? We know that the military services have done that very successfully in providing educational programs and getting some young officers for a few years.

The public health services in many countries have done this. Do you think this is an option that Agriculture might want to consider?

MS. DARLING: Sure, sure. I think we like to hope that we are just so impressive and we are so committed to protect the food supply in this nation that everyone will want to come work for us.

Now obviously that isn't what occurs. It's certainly something we might try to look at. We are so service oriented, it's, I think it would be difficult in our department, but we could certainly look at it.

MR. OAKAR: Mr. Hill.

MR. HILL: You made a reference regarding American Indians and water, and you didn't...

MS. DARLING: Oh, I didn't--I forgot to read that part. We work a lot in the Western part of the country with

reservations, and through all of the various agencies within this vast department, from the Extension Service, on through those of us concerned with animal health--excuse me--and we have exchange programs, we have cooperative effort to the Agriculture Co-op Service, many things that we do to work where the people are, which has proven to be a pretty ood thing.

In fact, I went not too long ago to the tribal council when they were all in--gosh, I was impressed.

MR. OAXACA: Ms. Bishop.

MS. BISHOP: You seem to have a variety of programs throughout the USDA. How long--I have two questions--how long have these programs been in place, roughly? Are you talking a few years or one year or five years or?

MS. DARLING: I can't really answer that. I think programs continually change and we've been there since 1890 probably, but anytime there is a new focus or if we can look elsewhere and that seems to be working, like the outreach program [INAUDIBLE] program, we try it.

It makes some of that of trying to keep with all of the various guidelines is the difficult part.

MS. NESBIT: Can I have that?

MS. DARLING: Oh, I'm sorry...

MS. NESBIT: Probably our most successful program in USDA is with pre-college students has been the Research Apprenticeship Program. We initiated that program in USDA in 1980. At that time three agencies in the department--the

Forest Service, the Cooperative State Research Service, and the Agricultural Research Service--supported that program.

Forest Service has since dropped out. However, the funding level has increased in both of the remaining two agencies in USDA. CSRS operates it through [INAUDIBLE] cooperative agreement with land-grant universities, where they are paying students' salaries, and--go through the universities, they receive their paychecks through the universities and work on federal facilities.

In ARS, we hire the summer students now under federal appointment as GS-1s. We employ them throughout the summer, working with mentor scientists who submit proposals during the spring of the year. As a matter of fact, we just finished receiving the proposals from our students.

We select among our scientists because we require that the students have meaningful experiences in the research apprenticeship program for the summer. We don't want them coming into our laboratories and watching test tubes.

Rather, we try to have them work on a project that has a duration for the summer with the scientists. It has been very popular in our agency. A lot of our scientists have been--we found frustrated teachers themselves.

The last several years our research apprentices have placed every year in the Westinghouse Science Talent Search, and last year, not the current winner, but last year's winner of the national competition was an ARS research apprentice who

continued her work outside of our summer program.

Our scientists and the student came in on weekends and finished work on her project for the competition that winter, the scientist volunteering his time and the student hers.

The focus of the program has been, while not exclusively females and minorities, we have focused our attention and the majority of our participants have been both female and minority.

MS. BISHOP: The second question. Can you speak to retention? I assume that some of these people that you have been talking about cultivated somewhere along the line, I hope they have been hired by USDA, in terms of success through that [INAUDIBLE].

Can you speak to retention or moving up the career ladder?

MS. DARLING: I can from the veterinarian's side. We have employed many people that we've found on recruitment programs in the Animal Plant Health Inspection Service and the Food Safety Inspection Service.

We kind of feel that there is a core group of the new science that comes along for veterinary medicine. Many of these people are double degreed. Say a pharmacologist who really discovered he didn't like doing that, or she didn't like doing that, and become veterinarians as well.

We are very fortunate in that regard. They kind of

like to come there.

MR. OAXACA: Dr. Shirley Malcom.

DR. MALCOM: I was wondering how do you get students for your research apprentice programs. What are the recruitment mechanisms?

One of the concerns that I have is that disabled students are not necessarily going to come through regular kinds of [INAUDIBLE] kinds of mechanisms, and I was wondering what kinds of things are in place to ensure that you can have alternative mechanisms for tying into [INAUDIBLE] serving those populations?

MS. DARLING: Ms. Nesbit would like to answer this, but I have something to say first. I like things like this--job boosts self esteem of the disabled. One of our agencies of the Department of Agriculture is working with disabled children in Kansas City that are able to perform better than machines we have in place right now, examining wheat and so forth.

This is good stuff, when even the local press will say, gosh, isn't this fine. So I think we're doing, in those areas where we can, we're seeing the mentally disabled as best we can.

MS. NESBIT: On the research apprenticeship program question, because of the popularity of the program in our agency--and it has been--we evaluate the program annually through surveys of our scientist mentors as well as our

students and we have begun tracking our students now, trying to track them out of high school into cooperative education programs and summer intern programs, and they are [INAUDIBLE] with a very great success rate.

But we recruit through high school science teachers, and based on that popularity, a lot of our scientists who are in search of students for the summer contact the local high schools with the assistance of our administrative staff in the field.

We do a rather large mailing. We have brochures and so on that we send out in bulk to various points. In our agency, we have over 135 research locations.

And so the recruitment is done locally, with the stated purpose of what our target population is for the research apprenticeship program, and our scientists and administrative people understand that very clearly.

So we have had a great measure of success in that program. Since we require that they be in the top third of their class and have the recommendation from their science teacher, that has also helped us.

DR. MALCOM: Have you been able to get any disabled students...?

MS. NESBIT: Yes, we have.

MR. OAXACA: Mr. Herb Fernandez.

MR. FERNANDEZ: Ms. Darling. Let me ask you an iffy question, from a federal bureaucracy standpoint. Assuming that

money can help in getting more scientists and engineers out of the universities, where would you put the money if, say, all of a sudden they gave you 10 percent increase in your budget for research and recruitment, training of scientists and engineers.

MS. DARLING: I will give it directly to Dr. Carter. I think--I really, and I believe this very strongly as a regulator, that without the hard scientists--and we depend so much on the Agricultural Research Service--that certainly on universities and all the other vast range.

But when it comes down to a policy decision or a policy implementing decision, we have to be science driven--in house, in our own Department of Agriculture, that science drive is in the Agricultural Research Service.

Now, in the Animal Plant Health Inspection Service, Food Safety, and so forth, which are public health agencies, we also have scientists, but they are practicing more on the applied level.

We wipe out bugs. We wipe out animal diseases. We are pretty good at our task. But we rely, we rely absolutely on the science base of the Agriculture Research Service.

So I might split it with her.

MR. FERNANDEZ: But you are convinced that the programs you have in place now are going in the right direction as far as getting the universities to produce these scientists that you need?

MS. DARLING: I certainly do. I think they are a

good start. I agree with everything everyone said before about the difficulties where we are finding the quick fix on money, any quick jobs. That's all there.

But we are at the brink of another scientific, real revolution in biotechnology and food production, which is going to take a whole different look at the type of science we are seeking, I feel.

MR. FERNANDEZ: Thank you.

MR. OAXACA: Thank you so much, Ms. Darling.

MS. DARLING: Thank you.

MR. OAXACA: Thank you for taking the time, and thank you. I would now like to welcome Mr. Jack Sabater, Director of Community Programs for International Business Machines Corporation, to give us the private sector view, one that, of course, is going to have to be part and parcel of this whole national problem, and so think of some questions for this gentleman after he finishes his testimony because we are going to need a lot of help from the private sector.

MR. SABATER: Thank you, sir. Good morning. As you said, my name is Juan Sabater. I am Director of Community Programs for the IBM Corporation.

MR. OAXACA: Oh, I said Jack.

MR. SABATER: That's OK, that's my nickname, which is good.

MR. OAXACA: Juan.

MR. SABATER: Juan Miguel.

MR. OAXACA: Juan Miguel, my goodness.

MR. SABATER: I welcome this opportunity to tell the...

MR. OAXACA: Buenos dias.

MR. SABATER: [INAUDIBLE] I welcome this opportunity to tell the Task Force about IBM's programs for women, minorities, and the disabled.

As you notice in the front door of the library today, by the way, you will see that IBM is recruiting here on campus today. So you can see that is one phase of our involvement with minorities.

Let me tell you first some informative statistics for IBM. As of year 1987, IBM USA employed over 67,000 women and over 38,000 minorities. This represents more than 29 percent and more than 16 percent, respectively, of the total population.

Compared to 1962, when IBM joined the federal government's plans for progress, percentage of minorities has grown more than 10 times and the percentage of women has more than doubled.

In addition to the growth of employment over these years, IBM has focused on increasing the representation of minorities and women in management.

Currently, there are approximately 6,000 women and almost 4,000 minorities in management positions, and over 500 minorities and almost 700 women in senior management jobs.

The representation of women in the scientific and technical positions is 16 percent, while minority representation is 15 percent.

While we do not know the precise number of disabled employees, we estimate that there are about 7,000 disabled employees in IBM.

IBM personnel policies and practices are based on our basic belief and respect for the individual. IBM hires and promotes based on job-related requirements and the individual's qualifications with regard--without regard to race, color, religion, sex, national origin, handicap, or age.

All personnel-related programs are administered equitably, including training compensation, benefits, development, and transfers.

With regard to our future skill needs, we will continue to require engineering, programming, and marketing skill. For business in general, we see an increasing need for a literate, skilled work force.

We in business, education, and government must ensure that educational systems produce a skilled work force [INAUDIBLE], and that minorities, women, and disabled are well prepared to participate in these careers.

I would like to share with you some of the programs that have been successful in IBM in encouraging and promoting women and minorities and the disabled in the technical fields.

In the area of education, for example, IBM has long

been a contributor of dollars and equipment to colleges and universities to help retain faculty, conduct research, and initiate new and leading edge curricula in engineering, science, and management.

In addition, IBM matches on a two-for-one basis the contributions of its employees to educational institutions. IMB made the first corporate contribution to the United Negro College Fund in 1944, the year that UNCF was established, and has continued that relationship over the years.

Recently, IBM has concentrated support for UNCF on the IBM faculty fellowship program to encourage faculty members from UNCF colleges to pursue advanced degrees in business and technical areas.

Over 200 faculty members from UNCF colleges have benefitted from these awards. IBM obviously also supports separately the UNCF institutions with grants.

In the past few years, the company has also provided 78 [INAUDIBLE] for minorities and women students in science and engineering.

IBM's cash and equipment support has been supplemented by the IBM Faculty Loan Program, which is focused on minorities and women and the disabled.

Since 1971, more than 800 IBM employees have contributed their knowledge at 197 different schools. Employees serve at schools with high minorities, disadvantaged, and handicapped enrollment, will work on related projects,

teaching subjects such as math, computer science, engineering, and business administration.

There is no cost to the educational institution. By the way, of course, President Reagan presented an award to IBM in recognition for our support for science and engineering programs at historically black colleges and universities.

Recognizing the [INAUDIBLE] of qualified technical personnel to fill open faculty positions in engineering and science programs, IBM established the Technical Academic Career Program.

An eligible IBMer may accept teaching, research, or administrative positions with a post-secondary school in engineering, physical science, computer science, or information systems.

The IBMer then retires from IBM and in addition to his or her retirement benefits, IBM pays a percentage of their IBM salary for a two-year period. So we basically supplement their retirement payments while they go teach engineering.

More than 200 employees are currently taking advantage of this option, a number at minority schools.

IBM participates and supports such organizations as the National Consortium for Graduate Degrees for Minorities in Engineering (GEM), the National Action Council for Minorities in Engineering (NACME), the National Merit Scholarship National Achievement Awards for Outstanding Negro Students, the National Hispanic Scholarship Fund, and things like the New York City

Comprehensive Math and Science Program, and I understand you will hear from Gil Lopez this afternoon on that program, which by the way is an excellent one.

At the pre-college level, we contribute money and people to organizations associated with programs that encourage you to stay in school and continue their education [INAUDIBLE].

The Philadelphia Regional Introduction to Minorities in Engineering (PRIME), the Southeastern Consortium for Minorities in Engineering (SCME) which you will hear about this afternoon, [INAUDIBLE], Texas Alliance for Minorities in Engineering [INAUDIBLE].

Many of our employees are personally involved in these programs serving as role models and working one-to-one with young people.

As part of our computer literacy program, IBM donated thousands of personal computers and loaned trained staff to selected elementary and secondary schools. The program was designed to teach a teacher on the use of computers so that they in turn could teach the students this program, which a couple of years ago focused on schools with large numbers of economic disadvanteged children.

Since 1968, IBM has been working with local business and community organizations in cities with high unemployment to provide training for those who cannot afford commercially available classes, normally minorities and women and the disabled.

Currently, IBM is involved in 71 major centers teaching word processing, data entry, and computer-related operations, plus 31 small centers teaching basic typing skills.

Advisory committees made up of local business people determine the job skills to be taught at these centers. IBM loans the training equipment such as personal computers and type cards, provides student supplies such as [INAUDIBLE] and classroom materials.

In assisting the implementation of the program, including, if needed, lending IBM employees as instructors. Community-based organizations like OIC, [INAUDIBLE], Urban League, Russell Center.

More than 25,000 people have completed the training since the program began and over 80 percent of those have graduated and have found jobs.

Our Job Training Center Program earned IBM in 1987 the National Alliance of Business Award as Company of the Year.

Working with selected job training centers, we have instituted a Summer Youth Work-Study Program on behalf of disadvantaged urban youth.

There are two components to the program: a summer job in the community and academic reinforcement. The idea is to make sure that these kids don't drop out of school.

Over 2,000 students participated in 1987, with significant improvement in their grade level--reading, writing, math--as a result.

Of our community service assignment program, IBMers are loaned on a full-time basis and at no cost to the organization to work with community service organizations.

Approximately 50 such assignments are started every year. IBM also encourages and recognizes the participation of our employees, retirees, and their spouses in their volunteer efforts through the [INAUDIBLE] community service.

If they are actively involved in a community organization or high school, we will support specific projects with a grant through this fund. Last year, more than 200 grants through this fund were made to high schools, totaling over $400,000.

We also estimate that more than 10,000 of our employees are volunteering their time in school, doing such things as tutoring, career exploration, computer projects, math and science problems [INAUDIBLE] the school and business and economic education.

This is equivalent to IBM having 200 full-time people in the schools. A large portion of these people are working with minorities, women, and disabled students.

Now let me focus on the disabled community, and I will just address the U.S.A., as obviously we have programs in other countries.

We have been hiring--we hired our first disabled employee in 1914. We have a long tradition of support for people with disabilities. In the mid-forties, we assigned an

individual the responsibility to recruit more disabled people into IBM.

For our disabled employees, we make necessary accommodations to the workplace. These include caption and videotapes and providing sign language interpreters and note takers at meetings for people who are hearing-impaired.

Recording employee bulletin board notices on audiocassettes for the vision-impaired, providing adaptive devices or modifications to enable disabled persons to use computers, telephones, typewriters, and other work-related equipment.

Incidentally, our efforts in this area have earned .BM recognition in 1987 from the Department of Labor and the [INAUDIBLE] programs on behalf of disabled veterans, from the National Technical Institute for the Deaf, for employment of the deaf, as well as the American Foundation for the Blind's Corporation of the Year Award, and the Dole Foundation's Annual Leadership Award.

IBM has made a commitment to supporting the disabled persons in the community through a number of programs. In 1974, IBM developed a nationwide program to train and place severely disabled entry-level computer programmers.

Since then, the program has been expanded to include other training such as word processing and PC operation.

More than 2,500 individuals have graduated from these 36 centers, with over 80 percent of these graduates being

placed in jobs. The average starting salary of the [INAUDIBLE] graduates was $20,000.

As another example of our support, IBM provides equipment and funding to places like Gallaudet University. There we did it to [BELL], for the establishment of a unique [INAUDIBLE] speech training program for hearing-impaired students.

We purchased in 1987 more than $23 million in goods and services from 80 companies that predominantly employ disabled individuals.

And we have an organization to provide technology and products for the disabled. We announce products for the disabled. We recently did one called the screen reader. We've had a talking terminal, a talking typewriter.

And we do research to produce products for the disabled to make sure our products are accessible to the disabled.

In 1985, we established a National Support Center for Persons with Disabilities here in Atlanta. The center provides information on IBM and non-IBM equipment, along with services available for persons with a range of disabilities.

We get, through our hotline, more than 1,500 calls per month, and you will be hearing more about this [INAUDIBLE], IBM's activities in support of minorities, women, and disabled.

We believe that business has the technology and the experience to contribute and in partnership with government

agencies, educational institutions, and community-based organizations, we can be successful in ensuring that women, minorities, and the disabled are part of the pool of skilled resource needed now and in the future.

Thank you for this opportunity, and I will be glad to respond to any questions.

MR. OAXACA: Thank you very much, Juan Miguel.

MR. SABATER: Gracia.

MR. OAXACA: Ms. Bishop.

MS. BISHOP: I work for the federal government, as do a lot of my colleagues.

MR. OAXACA: Which is almost as big as IBM.

[Laughter]

MS. BISHOP: There is one difference, and I would just like to ask you if you have got any words of wisdom or suggestions to give to those who are in the federal government in terms of how to make it as successful as IBM.

I'm listening to the programs that you have which support across the spectrum in no uncertain terms, in terms of education and community support, recruitment and retention, because I am certainly well aware of minorities and women advancing through the ranks of IBM.

MR. SABATER: That's correct.

MS. BISHOP: And we don't have that in the government. It's sporadic at its best, and we don't have this emphasis, as you probably have at IBM.

You are one of our competitors. But in terms of trying to spread the wealth around, in fact, by the year 2000, do you have any words of wisdom for federal government?

And the question that I've wanted to ask before you was although money is certainly a much-needed aspect, I don't believe that money is the total answer, and I'm not sure that it's not an attitude concern as well that has to be part of the whole energy if the federal government is to do its best in terms of [illegible]itment and retention. Would you care to address?

SABATER: Yeah, I can just address it, why I think that IBM is so committed and so successful, and I think it's because, first of all, it's part of our culture.

As you can see from what I've said, we were concerned about the disabled from 1914. We were concerned about minorities way before many other people were concerned about minorities.

And it's part of our culture, engrained in our respect for the individual. We have seven principles at IBM and the seventh is that we want to be a leader in corporate social responsibility.

And every manager in IBM knows this. Every manager at IBM on his performance plan has equal opportunity is important. So it's engrained into our institution and our structure, and when something is engrained into your institution and structure, well, then it's engrained from the top of the company to the first-line manager.

And so I think that's how you make something happen. If something is clearly important and the organization knows it's important, well, then most people in the organization will work to acheive it.

MR. OAXACA: Mr. Hill.

MR. HILL: Certainly IBM has distinguished itself as a corporate leader. Give me thoughts on how to leverage other corporations to do similar things.

MR. SABATER: Yeah, well, a lot of corporations are doing a lot of good things, and actually we are involved in a lot of partnerships with other corporations and community-based organizations and government agencies in putting a lot of success in.

For example, every one of our [INAUDIBLE] training centers is where we loan equipment and people, and it also has support from other businesses and also usually from the federal government throught JTPA.

And so we get involved in this very cooperative process, and we learn from each other, and that's one way for one corporation to encourage another.

We are involved in many of the partnerships that are developing throughout the United States that deal with K through 12 education. The one that gets more attention is the Boston Compact.

But besides the Boston Compact, there is a lot of other cities and states that have partnerships going now where

the private sector and the public sector and community-based organizations get involved.

Well, the only way I know for IBM to leverage itself is to get involved in that way. Another way, we recently had an advertisement, which we put into some of the larger newspapers in the United States and magazines, where we talked about--it was about the problems, Workforce 2000, the need to have an educated labor force, the need for business to be concerned about this issue, and to make sure that everybody gets the appropriate education.

And we put this advertisement out with the National Alliance of Business. And we have other advertisements that deal with that subject.

The only way I think the federal government and IBM and other responsible companies can get this focus out there is by getting involved in cooperative efforts, talking about it, advertising about it, and that's about all--that's the only way I know how to do it.

And I think some companies are doing that, and hopefully it will work.

MR. OAXACA: Ernie Reyes.

MR. REYES: Juan Miguel, some of us have seen the--and we have heard the whole country tell us about it--the elementary school teachers are afraid of math and science. And you have been, apparently very successful in [INAUDIBLE] talking about [INAUDIBLE] retirees that go into education.

MR. SABATER: Yes.

MR. REYES: And one of these that Shirley and I have talked, and one of the things that I have commented was, we have people that have worked all their lives and we don't need role models, these lives models, if we can get women, minorities, handicapped that have spent their life in the science and engineering and math, whatever, to go back to the education process, I would like to get some literature from your company to the committees, because that might become an excellent role model, not only for the government retiree, but for other corporate companies, because we need a band-aid approach to this country.

We ain't going to generate [INAUDIBLE] enough teachers to get the science into the elementary pipeline, [INAUDIBLE] personnel of the various rs and shapes that we need to get these youngsters to underst...

This might be beneficial to part of our subcommittee report and part of our full report--to use a resource that is still available to influence the younger folks in the math and science. I would ask that we...

MR. SABATER: Sure.

MR. REYES: We have something from IBM so we can all share...

MR. SABATER: Fine. By the way, and I will have a written statement for you this afternoon, and I will get the brochures that we have on the different programs. I didn't

bring all those, but I will get them to your committee.

But I was going to mention that the Technical Academic Career Program, which I mentioned, 200 people out there, are in higher education. They are all in colleges and universities, at least a dozen of them in minority colleges and universities.

The people in our Faculty Loan Program, however, several of them are in high schools. And in some places they can't teach because that's not allowed, so they help in other ways.

We also are looking at, is there a way to bridge our retired people to teach in high schools after they retire? There is an effort going on by the National Executive Service Corps, putting some pilots, and we are looking at that--at how do you get your retirees to have the appropriate certification, so that when they retire they can teach.

And so we are looking at that.

MR. REYES: So this might be an incentive for the OPM to get innovative and clever on our retiree [INAUDIBLE] [Laughter].

MR. OAXACA: I will use the prerogative of the co-chair to ask for your help in this area. One of the things that appears to be coming out fairly clear, as we have gone through the different cities and as we have gotten this wealth of expertise and testimony, is that this whole problem is not going to be addressed just by the government or just by the

local levels or just by--it's got to be a whole, full-court press.

And one of the major elements in any endeavor that we have had in our nation historically has been harnessing corporate America.

If you look at the issue of the so-called different filters as you start right from birth of the child all the way through the formative years, all the way until they either have made a choice one way or the other, there has to be a molding of these young people, through the school boards, through parental concern, motivation at the state level, tied into this very complex federal-state relationship.

And the thing that appears to gel in the whole thing in a lot of cases is when corporate America, through their vast media forces, are able to highlight this to the American public, and then the American public goes forward and does what they feel is the right thing.

We are going to need that sort of thing, so I'm very interested in you drawing on that major pool of collaborative situations that you have going with your colleagues in business to see if you could supply something to this Task Force where we could make that a major element of our report, on how corporate America will play a role in this severe national agenda and crises that because it is such a long-term deal, as usual America waits until the last microsecond before they decide to react.

So maybe we could put the arm on you for your good services in that area.

MR. SABATER: OK.

MR. OAXACA: And we will be eternally grateful and will have an IOU for a taco down in South El Paso where Ernie came from.

MR. SABATER: OK--good taco, I hope.

MR. OAXACA: That's an oxymoron.

MR. SABATER: That's right, they're all good, aren't they? Fine, we will look at that.

MR. OAXACA: Thank you so much. Oh, Ms. Walgreen.

MS. MEJIA-WALGREEN: Mr. Chairman, I just didn't want to let him go by without my addressing him. See, I remember him when he was in high school and he wasn't Juan at that point [INAUDIBLE], and he was Jackie.

MR. SABATER: That's right.

MR. OAXACA: But he must have started with Watson or somebody, because he still wears the white button-down shirt. [Laughter] [INAUDIBLE].

MR. SABATER: I'm not going to make a comment on that.

MS. MEJIA-WALGREEN: And I would like just to follow up Mr. Reyes' and your request...

MR. SABATER: By the way, now I remember, and I loved the act. We used to be in the...

MR. OAXACA: You don't have to explain. This is a

public hearing. [Laughter] Sonia.

MS. MEJIA-WALGREEN: I would like to follow Mr. Reyes' and your request and ask Mr. Sabater to provide the Task Force, not just with the brochures and, you know, some of that information. We really want to know details of how IBM has the program set up, how they went about improving schools?

MR. SABATER: How we measure it.

MS. MEJIA-WALGREEN: Yeah.

MR. SABATER: How we measure success.

MS. MEJIA-WALGREEN: These details. We want to earn your pay at IBM.

MR. SABATER: If we are going to do that, we are all going to have to do it together, because this seems more like talking and things like that on an informal basis, in small groups, than for me to send reams of words someplace or something.

MR. OAXACA: We thank you so much, and thank you for taking the time and...

MR. SABATER: Thank you very much.

MR. OAXACA: Wish you well in the business world. I think the one thing that is behind the whole thing is that all of this makes business sense and that's what the world is all about, in making America a better place.

MR. SABATER: Thank you.

MR. OAXACA: Thank you. Now it is my distinct pleasure to welcome the next person who will testify. And it's

a young person, Chandra French, who is a junior, in her junior year as a math major at Clark College Courts.

And this young lady is going to give us her viewpoint and she has probably concluded that, the old statement that Art Buchwald made at one time when he talked to this graduating class, when he said, "We're leaving you a perfect world. Don't screw it up." It's probably not true.

Welcome to our Task Force, and thank you for taking the time from studying for your exams.

MS. FRENCH: OK. When I refer to students, I'll be basically referring to black students, since that's my area.

Black students have believed that they are incapable of being mathematicians or scientists. One of the reasons for this belief may lie in the fact that there are not enough role models to follow in that direction.

We have the people who do believe that we can be bankers, pilots, entrepreneurs, lawyers, and doctors. We are now even beginning to believe that we can be the president of the United States.

But we still hold onto the myth that we cannot perform mathematical and scientific problems. It is now clear that mathematics and scientists--sciences--originated from Africa and the Orient.

Since the number of role models is dwindling, we should stress our heritage in the field of mathematics and science to motivate our students.

The sense of accomplishment a researcher or engineer feels after proving a hypothesis or after a project has been completed should also be used to motivate students to pursue careers in the sciences.

There are several students who have a need to do something that has not been accomplished before, emphasizing that research careers are excellent outlets for their need, in addition to making them realize the significance their work may have on the scientific world, and eventually day-to-day life, should be a major inspirational truth.

I also believe that we should stop sending the message that science and mathematics are not extremely important to society by requiring math and science courses throughout the middle and high school years.

High school should be producing well-rounded individuals who are capable of pursuing any career they choose. It is almost impossible for most students to quit taking math and science courses and then two years later after graduation from high school decide confidently that they would like to pursue a career in the sciences.

My own personal motivation stems from my natural love of mathematics. This in conjunction with the challenges from high school and college instructors to develop my talent in mathematics has helped me to keep my intentions of pursuing a career in pure mathematics or some other mathematically related research area.

It was not until I became a sophomore in college, however, that I realized that research was one of my options for a career.

Before that, I had only considered education, statistics, and computer science as viable career moves.

So my participation in the UMARC program--that is the Undergraduate Minority Access to Research Careers Program--is partially responsible for my [INAUDIBLE].

Not only have I been introduced to many types of research, but I also have received financial support to help me continue my education. The program has also supplied me with some of the very necessary skills for research careers.

I was also the recipient of a MAS scholarship in honor of Joseph [INAUDIBLE]. This scholarship not only--it also gave me financial support and inspiration.

Both honors have demonstrated to me that my professors see potential in me to do well in the sciences, and I want to see that potential come to life.

I believe more programs like the UMARC program would increase the number of researchers in our areas. Although I knew very early that mathematics would be my career, some students are indecisive about what they would like to do.

Children begin to have some idea as to what career they may want to pursue by age 10 or 11. For this reason, I think that science and technology should be introduced by the age of seven or eight.

I don't profess to be an expert in the area of child education, but I believe that children should be introduced to computers at a very early age as tools for helping them improve mathematics and spelling.

I also believe that simple science projects, such as producing rainbows, could be used to get students fascinated in science.

After we have gotten students fascinated in science, I think motivation--continuing to motivate them is very important. Institutions can be of interest in the sciences by offering some programs to middle school and high school students. We supply these students with the necessary tools to enter college, confident in their ability to perform the work required in science disciplines.

These programs should indicate the variety of careers that can be pursued in the sciences.

At the middle school level, these programs shouldn't really be that--they should only be about one to two weeks long, so that the [INAUDIBLE] is attractive thought of going from school to summer school does not stop ested students from attending.

Ir their experience is beneficial as well as joyful but brief, students at that age will be willing to come back the following year.

Once these students have reached high school level, programs should be extended to at least six to eight weeks,

with courses in mathematics, science [INAUDIBLE] lab, and communication and writing.

Ideally, I would think a program that is funded by both public and private sectors would help--with cooperating [INAUDIBLE] different various colleges throughout the United States, students would be given the chance to decide where they would like to go during the summer, therefore making it even more of an incentive to attend a science program.

Students also have a very--students who are majoring in sciences now should become involved in recruiting other students in high school.

Science majors should go to some of the inner-city schools and help students with math and science projects, because a lot of them don't really--a lot of students in my school--and I went to a predominantly black school--did not really understand how to do a science project.

And I think they listen more--I know that we listened more to the students--and I think we could, by going back, especially since, like here the school, this isn't, the colleges here are right in the vicinity of many inner-city schools.

And if they could just go down and help them develop an interest in science, then I think we would get more students willing to pursue mathematical and scientific careers.

And after students graduate, I think, and then become successful in different careers, I think it is important that

we make ourselves visible to impressionable youth.

I realize that research can be very demanding, but we must make the effort to reach out to younger students. We have to let them know that we are capable of doing research. [INAUDIBLE] present them with the message that there are no barriers to--no barriers to what they cannot [INAUDIBLE].

Scientists, engineers, and mathematicians can offer high school students the opportunity to be in some way involved in research or engineering projects.

In conclusion, I believe that if we want to attract more students to science and technology, we have to educate them about the abundance of career choices in the sciences.

We must also make students feel that they are capable of pursuing such careers.

Programs which are funded by both public and private science should give students the necessary skills [BELL] to pursue these careers.

MR. OAXACA: Thank you, Ms. French. It is of paramount importance, and you have a grand opportunity to give us your thoughts in front of this Task Force.

Before we start on the questions, let me just ask one question, and I will, you know--there are two areas that are very key to the formulation to the reports by this Task Force.

One is in the formative years of the student--what motivates that student to go into the field of science and technology?

And number two, once they get a, given that they get a bachelor's degree, what are the factors that are taken into account by that student that either tell them to go out into the work force or proceed up that path with the advance degree, that gets the Ph.D., where we have a tremendous, tremendous shortage of minorities and women and handicapped that are going that path.

So maybe you could start off and give us your thoughts on the influence your parents had on you throughout your high school, from kindergarten through high school, or maybe before kindergarten, and then lead us into what your thoughts are now that you are getting close to that big diploma, getting your B.S., and all those American folks that are out there romancing you with all those big bucks.

And what is the thought process that you are going to go through to decide whether you are getting that Ph.D.?

MS. FRENCH: OK, when I was younger, my mother--basically my mother...

MR. OAXACA: I'd kill to be your age.

MS. FRENCH: When I was younger, basically my mother was--you were supposed to do well in school. So I just happened to love mathematics at an early age, and my teachers recognized this.

So they were always challenging me to go ahead, get ahead in math or science.

But what--one of the things that made me want to be a

researcher is basically the UMARC program. When I found out that I was eligible, it opened up a whole new area, because I had only thought--myself and other students had only thought that once you get a math degree. what do you do with it?

We didn't know, and we were majoring in mathematics, bachelor of science, and we had no idea what we could do with it, other than teach, and become statisticians or something of that nature.

And neither one of us wanted to do that. And when I was reading the--when I read the literature about the UMARC program and found I was eligible to apply, I started to find out about research areas that I could go into, and that's what, even research in pure mathematics had never been on my mind before I got into the UMARC program, and the UMARC program is a biomedical research program.

But now I have both areas open to me, and when I--I haven't really gone looking for corporate work because I knew I didn't want to do that.

Some students major in bachelor's, and that's--get a B.S. in mathematics and decide what they want to do is go work for a company.

I think that it's--they don't really know what they can do. I don't think they know what the opportunities are, and that's why they don't pursue research careers.

And I think it needs to be--I think they need to emphasize that early, so that they know what career choices

they have, and that there are a lot of career choices, because just as with the--most students are going to go on to what they think they can get a job in, because they don't even know what the jobs are, they don't think that they can get a job in the research area.

MR. OAXACA: Thank you. Ms. Winkler.

MS. WINKLER: I would like to hear a little bit more about your high school experience, what courses were available and what courses were required.

I know one of the things we have run into a lot in these hearings has been that many high schools simply don't offer very much in the way of math or science, or that, as you mentioned in your testimony, even if it is offered a lot of students are not required to take it.

Can you tell us what your experience was?

MS. FRENCH: When I was in high school, I was college prep, and we were encouraged to take all of the math courses, and the math courses ranged from basic math up to calculus I, or what is calculus I in college.

And there was also--we also had physics and chemistry, biology, one year of each of those, as well as if you started out early you could also take one year of chemophysiology.

But my science experience was--before I got to college, I had never even dissected an animal, which is something that most students have done.

And that was something that really bothered me, because when I came to Clark and I went to school down the street, it was--everyone had done it. So none of our students were given--our biology courses were basically instruction. There was no real lab in our science courses.

So I think the lack of labs is also hurting a lot of students who came out of inner-city schools.

MS. LEE-MILLER: Chandra, first of all, I would like to compliment you. You gave an excellent presentation, and surely I think we should get her to write the pre-college report for us--a really good job.

You mentioned the--and Dr. Cole earlier mentioned--a program that you found so helpful. And that program is an NIH program, right? [INAUDIBLE] the one you're talking about? The program that you refer to as UMAC.

MS. FRENCH: UMARC.

MS. LEE-MILLER: OK, well, I m sitting here representing Health and Human Services, which NIH as a part of, and I do not know much about the UMARC program. So I would appreciate your telling me what about that program--you said it kind of inspired you and exposed you to research as an option.

Could you talk to us a little bit more about the program?

MS. FRENCH: The UMARC program starts out the summer after your sophomore year.

MR. OAXACA: Excuse me, what does UMARC stand for?

MS. FRENCH: Undergraduate and Minority Access to Research Careers.

MR. OAXACA: Thank you.

MS. LEE-MILLER: I'm not the only person [INAUDIBLE].

MS. FRENCH: OK, after you--you apply during your sophomore year, in the second semester, and after you find out that you have been accepted, you are required to go to--you are required to attend summer school and take--well, we took a course called biomedical experiments--introduction to biomedical experimentation.

And basically, it is just introducing you to techniques and improving your scientific writing skills. So we were exposed to electron microscopy, which is something that a lot of people are not exposed to, even as an undergraduate student.

There were--we were exposed to techniques of gene splicing. It is such a--there are so many different techniques that [INAUDIBLE] give you in such a short time.

And there was writing skills. You are constantly writing scientific papers, and it is really, the experience that it gives you in developing your library skills, your communication skills are really worked on also.

MS. LEE-MILLER: Now is this at [INAUDIBLE] or did you go to summer school?

MS. FRENCH: This was at Atlanta University Center, and we took our courses at Clark, but it was the Atlanta

University Center.

After that you are given--after that we go through, the next two years we go through developing our own research project to eventually present a thesis on, a thesis on [INAUDIBLE].

And right now we are, our segment of juniors of the UMARC program are replicating a study that was done by King, Rudyard King, on the [INAUDIBLE] syndrome.

So we are constantly involved in some kind of research, or some writing of scientific information.

MS. LEE-MILLER: So you would recommend that that program be strengthened?

MS. FRENCH: I would recommend that more programs like that be offered to--because we are only 23 students, or 22 students in the UMARC program at the AU Center, and there are a ton of biology and chemistry and physics and math majors who are probably eligible but cannot get in the program because of the limited [INAUDIBLE].

MR. OAXACA: Mr. Scurry.

MR. SCURRY: Ms. French, you and your [INAUDIBLE] may be proud to be [INAUDIBLE] and also to be a math major [INAUDIBLE] [laughter]. Your presentation was [INAUDIBLE] shows a vision far beyond that which I had as a junior in math. I do like to do math, but I couldn't talk [INAUDIBLE] [laughter] talk too much.

MR. OAXACA: You are not going to get out of that

alumni presentation [laughter].

MR. SCURRY: [INAUDIBLE] member of the [INAUDIBLE] scholarship, where [INAUDIBLE]. One of the things that we have been concerned with among our subcommittees were the sort of social factors, and one of the premises that we were working on is that young folks, but especially young women, young girls before they become young women, are not encouraged in the main either at home or [INAUDIBLE] to pursue math and science [INAUDIBLE].

One was that your experience itself, how did you deal with the encouragement you experienced at home on the one hand, with teachers and with peer groups [INAUDIBLE].

MS. FRENCH: Well, one of the things, I attended one of the elementary schools in this area, so there was--most of the students, a lot of the students were children of faculty at the AU Center.

So my experience was a little different because we were constantly challenged where I go to school. So it was--my mother is not an instructor, because I was exposed around where it was very competitive at that--I was in the sixth and seventh grade.

So it was a little different, but once, when I got to high school, since there were so many females, it was, there were more females who were pursuing sciences than males. So it is really a different experience.

MR. SCURRY: Like in Viet Nam. The black man would

have to go there at 19 and didn't come out in large numbers.

MR. OAXACA: Thank you very much for your very eloquent presentation, your poise. We wish you the best and get your Ph.D., would you.

MS. FRENCH: Thank you. [Applause]

MR. OAXACA: At this time we are done with the morning testimony. Would Dr. Isabella Finklestein please identify yourself because we have to follow, the Task Force has to follow you to Kresge Hall for lunch, and I have a note here that says to take coats. I gather it's either cold or raining.

Others can dine in Cogman Dining Hall on the way to Kresge. You are Dr....

DR. FINKLESTEIN: I am, and I would like to say that I also direct the MARC program. Chandra's testimony I had not seen before she gave it.

So as we walk up, any of you that would like further information, I will present some testimony this afternoon, and I would be very glad to share it with you.

MR. OAXACA: Terrific. Thank you so much, and with that, let us conclude the morning session and once again, thank you very much for your attention. Thank the Task Force for their questions and the people that testified for taking the time.

We will meet here at 1:45 this afternoon, right on the dot and start the afternoon session.

[LUNCH]

MR. OAXACA: Profusely, all those people that had anything to do with that magnificent lunch.

VOICE: Thank you. [Applause]

MR. OAXACA: The peach cobbler was superb and the Southern fried chicken was right up there with the peach cobbler. And, boy, if I'd have gone to school when mom was cooking in the back room, like that lady that's putting all that stuff together, she really had shaped up those people back there--I don't know if you saw her--but she's got a real operation.

And we thank all the folks.

Let me welcome everybody to the afternoon session. It is going to be a very full session. We're starting about seven minutes late because of the walk back, and we have less time allocated per person, so let me go through the ground rules again.

The ground rules are that we will have 10 minutes. Dr. Betty Vetter will be the timekeeper. At nine minutes you will hear a bell and at 10 minutes you will get the hook. So please try to abide by the bell.

I would ask once again our deaf interpreter to maybe see if there is anyone in the audience that needs the services of the deaf interpreter. [Pause] And we will proceed.

I would like to welcome Ms. Carolyn Chestnutt, the Executive Director of the Southeastern Consortium for Minorities in Engineering, to be our first person testifying.

She is from the Georgia Institute of Technology here in Atlanta, Georgia. Welcome to the Task Force and thank you so much for taking the time to be with us.

MS. CHESTNUTT: Thank you, Mr. Chairman, and to you board members. I appreciate this opportunity. I have a great deal of confidence in this Task Force because so many of you have been supportive of our efforts and the kinds of things that we do at SECME.

I want to point out that one of your Task Force members--and it's to her credit that I am here today because I think I would not be sitting here if it were not for her. In 1980, NASA recognized the value of the teacher training that we were doing at that time, and we were at a point that we were making a transition from foundation funding, our sole source of funding, to getting corporations to support us, and it is a very difficult time.

NASA came in with substantial funds for that teacher institute and I have Dr. Jenkins to thank that we are still operating and that I am here today.

All right, the map that is on the view graph is the region in which we operate in secondary schools. We are a pre-college program. Our name is the Southeastern Consortium for Minorities in Engineering, and we go by the acronym SECME.

Now, I am based at Georgia Tech, as our Chairman pointed out to you, but actually we have 27 universities in the Southeast that are members of SECME, 45 corporate members,

three government agencies, 60 superintendents, 214 principals of middle, junior, and high schools, and over 15,606 minority students were in the program during the last school year.

Now, that seems like a very large program, and, believe you me, it is, but when you look at the Southeast and the potential in the Southeast, we estimate that there are easily 200,000 minority students in public schools in the Southeast that would--could and would benefit from a similar sort of program.

So what we are doing is just a drop in the bucket.

What makes SECME work? I could answer that in one word--the teacher. The teacher is the key. The teacher obviously is the key to academic preparation, for motivation of students and in terms of career guidance, the teacher is second only to the parent in terms of influence on young students.

Our work over the last 11 years in public schools in the South has taught us, though, that you must have, first of all, the endorsement and active support of the superintendent.

You must have the top-down approach for anything to be effective and for it to be sustained and ultimately institutionalized.

There must be a comprehensive plan developed internally by the school system personnel. The planning must be done locally by people who understand their own needs and what can work in a local situation.

THe plan, in terms of SECME, is implemented by the

SECME team--math teachers, science teachers, language arts teachers, counselors--headed up by the principal.

And here again the principal's support is crucial. It is a volunteer activity, and if this is not an important priority to the principal, it simply won't happen--for very long anyway.

We offer a summer institute, which is a three-semester-hour, graduate-level credit course every summer. We have had about 1,100 teachers attend thus far today.

Members of the SECME teams are who attend this summer institute, and I will say more about that in a few moments.

The partnership is another critical element that helps make SECME work. Our university members provide engineering faculty who work in all of the 214 schools. Let me rephrase that--they work in the schools in their area, but we have engineering faculty working in all 214 schools from our university members.

They provide liaison with the public schools and connect those schools to the university and they help the teachers develop applications that they can use in their science and math courses.

The community organizations are another important component of this partnership. Local businesses, industries, and government organizations have provided role models, plant tours, other in-kinds of services, and giving the teachers support in carrying out what they do.

We offer a student competition. We hold a student competition every year, which is done locally and then regionally and then at our summer institute.

This year it is mousetrap car competition. If you have never seen a mousetrap turned into a car and what students can do with that, it's fascinating. I won't speak to the benefits of that kind of competition.

We recognize our students by identifying SECME scholars in each state. We provide them scholarship information and when they get up to the 12th grade, there are many other scholarship programs that are available, especially to students entering engineering and sciences.

And of course, finally, I get back to the teacher again. The teacher networking has been a tremendous motivational device with our teachers, and it's invaluable to them. We have been able to enhance this through a NSF grant, called our Beacon School Program.

And this networking addresses the isolation of the teachers. It addresses issues of empowerment--and I could go on for the whole 10 minutes about working with teachers, but obviously I can't do that.

We do recognize a Teacher of the Year and runners-up every year at our summer institute.

Let's look for a minute at the school plan, because this comprehensive plan is very important. It's one thing to train a teacher and motivate them and they go back to their

classroom with new, exciting ideas.

But apart from this plan, apart from going back and fitting into the school system plan, that sort of training doesn't necessarily have a long-term effect.

But the school plan, which is written by the school system administrators and the teachers, includes identifying the SECME team, who those teachers and counselors will be who work with the program.

They have to come up with the criteria for the identification of students and how they will place them in the college preparatory courses.

They come up with a design for classroom enrichment, especially in mathematics, sciences, and in language arts, and particularly in those college preparatory courses.

They develop a career guidance component, wherein they provide opportunities for students to become aware of the career fields available to them in engineering and science and in related technical areas.

And then, finally, they develop strategies in their plan for utilizing the community--university, business resources.

Let me talk for a minute about our summer technological institute, which will be held this summer, this June. Our 12th annual institute will be held at the University of Virginia.

We rotated among our university members. It is a

two-week course. It is planned by the education and engineering colleges of the host institution, along with the SECME staff.

And since 1977, nearly 1,100 teachers--math, science, and language arts teachers--have attended SECME summer institutes around the Southeast.

And of course these are the people that make up our teams of teachers in the 214 schools in which we work.

Now, the focus of this institute is to help the student [INAUDIBLE]. That's for the SECME team members to develop an applications and a problem-solving approach for their instructional programs, for enriching their instructional programs.

We also offer them experience with a microcomputer and familiarize them with potential classroom applications of the microcomputer.

We try to give them an understanding of engineering as a career field, as well as other math-based fields and science areas.

The final product is an implementation plan, which they will go back and use in their classrooms. And the implementation plan fits right in to that comprehensive school system plan.

And of course all of these things that we dc are with the focus of assisting minority students to be successful in the college preparatory classes.

Now, let me take just a second to tell you about how we identify our students and how we track them internally. The criteria for selection as a SECME student is that someone has to believe you can succeed in algebra I.

Either your test scores indicate you can, a teacher believes you can, your parent believes you can, you believe you can. But that is the benchmark for identification, that you can succeed in algebra I.

Once identified, information is sent to us, which we keep in a data bank on each student, and each year the information on each student is updated. We know how their progress is being maintained, whether they continue in their math and science courses or not.

Once they reach their senior year in high school, we do a survey of all of those seniors and get information about their academic performance in high school · their performance on the SAT or ACT [BELL] and their plans.

And we also have plans underway for a major research project to determine our effectiveness in terms of how students do at the college level.

Well, let me take one minute and show you just a few of our results today. We have had 15,000, over 15,000 high school graduates between 1981 and 1987.

Eighty-five percent of these have continued their education at post-secondary institutions. Nearly half of them enter engineering, computer science, mathematics, or science

majors.

Their SAT scores--and if you will show the next view graph--of those entering the science and engineering majors have averaged over 200 points above the national average. This is in your handout. It won't all get on the screen up there.

I think this points to the effectiveness, the potential effectiveness of those teachers in the classroom when they focus on a minority student, on a minority student's success, and they are themselves encouraged by a team of teachers supported by an administration and a principal who believe that what they are doing is important.

On the way to making some recommendations, let me say I was in a very large school system a couple weeks ago. They consider themselves to be one of the premier school systems of the country and what they have done is very impressive.

They have a number of exemplary schools. They have some model programs. And yet, as I looked in the eighth grade algebra I classes, in one class I saw one black male, three black females.

I asked about the enrollment, they had no idea about the number of minority students in their eighth grade algebra classes. They did know that only 40 percent of their eighth grade algebra classes were female.

Now this points of impending disaster to me, and it also says that no matter how ideal your school system is, or how great your education programs are, without some

intervention effort, it is not, it is just not going to happen that you are going to have minority students and females in those math and science college preparatory courses.

And I guess I really don't have much time to spend on my recommendations. I think, first of all, you need to identify those effective programs, based on their past and present results.

You need to look at those that focus on systemic solutions, not just band-aid approaches. Obviously, you need to look for easy replicability and cost effectiveness, and the cost per student, I think, is a very critical thing, because the program that spends the most per student isn't necessarily the most effective.

I think something has got to be done to make public school people more aware and more concerned and perhaps the professional organizations is one way to go.

As I talk with people who belong to the principals' or superintendents' professional organizations or the dean of education college professional organizations, they seem interested and concerned, but don't know what to do or how to do it. I think that is one route to go.

I think within your own agencies--I have worked through the years with a number of people employed by government agencies who really wanted to do things, but outside their own personal investment could not find through their agencies a way to do those things.

And I know that most of you can find ways to free up--or at least perhaps you can--some of your operating constraints. Need to work for authorization and appropriation of government funds to support these kinds of efforts.

And I think that massive funding needs to be provided for SECME-type programs. And I say SECME-type, addressing the comprehensive plan, working through the public schools, all of these kinds of things that we do.

So, I will stop at that point.

MR. OAXACA: Thank you very much for your testimony. Any questions for Ms. Chestnutt? Mr. Hill.

MR. HILL: You suggested that students are taking algebra in eighth grade instead of the ninth grade. Is that [INAUDIBLE] point in the math sequence, or do you recommend that students start taking algebra in the eighth grade?

MS. CHESTNUTT: Well, in many schools, in many school systems, students have that option at the eighth grade if they show talent in the areas of mathematics. And I happen to be in a school that only had ninth grade, didn't have a ninth grade.

MR. HILL: One of the things that we're finding, one of the most important things to getting students to take at least algebra in the freshman year, ninth grade or earlier if possible, because if they do it in their junior or senior year, it's too late to be ready to...

MS. CHESTNUTT: The mid-grades are so critical. If you are even as late as ninth grade, it's too late for many

students. You should never say it's too late for any student, but unfortunately it is.

MR. OAXACA: Mr. Herb Fernandez.

MR. FERNANDEZ: Given that...

MR. OAXACA: Speak up.

MR. FERNANDEZ: Given that evidently we are not addressing the basic problems that the mid-schools and the elementary schools

MS. CHESTNUTT: [INAUDIBLE].

MR. FERNANDEZ: Gotta switch--here, take it back. Given the fact that we have a major problem in teaching math at the elementary school and mid-school level, do you have any suggestions as to how we could get the universities to get more involved in upping the quality of math teachers in the numbers?

MS. CHESTNUTT: At the elementary level.

MR. FERNANDEZ: Right.

MS. CHESTNUTT: Well, here again, I think you have got to start at the top. I do know that the deans of education, the one who was past president, is very interested in finding a way to address these kinds of issues. They have some ideas. They don't have any money.

And you can say, well, the education college ought to be doing it anyway. Sort of like the public school ought to be doing this anyway.

But sometimes we need the stress from outside, or maybe we need an intervention at the education college level.

MR. OAXACA: Have you found PTAs and school boards to really have any horsepower indeed?

MS. CHESTNUTT: The school board, absolutely. If you have the school board endorsing a program of this kind, it will work. You know it will work. The superintendent will see that it works and so will every principal and so will every teacher.

PTAs, parent groups, are vital in working with these kinds of programs. I don't know that we have worked in a school where the parents have lobbied, where our efforts have come about because parents have lobbied for it.

I think that could happen, but I haven't seen it happen. But the parents being behind this kind of effort is very critical, and this is why I have said on one of my pieces of paper, we have got to continue this focus on getting the public at large to understand that we have a national crisis, and it is not a women's problem or a minority problem or a problem of disabled people. It is a national crisis that we must address.

MR. OAXACA: Mr. Hill again.

MR. HILL: We talked this morning about IBM's institutional commitment to equity and whatever. Speak about the [INAUDIBLE]'s commitment. Is it re l? Or are they doing the rights things for the wrong reasons? Or are they just not doing anything to speak of? What's needed there in improving their commitment in this effort?

MS. CHESTNUTT: Well, you have all kinds of colleges,

obviously, and colleges are responsive to who is recruiting their graduates, especially engineering colleges, because they are driven by the corporations or the government agencies that hire their graduates.

And they want to be very responsive to those people because those are the people that support the college-level programs.

Now, many of the colleges have made contributions to the SECME program. [INAUDIBLE] that a consultant at Georgia Tech, for instance, spends one-third of his time visiting 45 schools in Georgia.

That's not something that SECME pays for. The engineering college pays for that. That's a large commitment, and we have this happening other places.

Tuskegee has a very active faculty coordinator that works in Southern Alabama, and we have got to have more of those colleges talking to schools.

It takes away the fear of college for students. That's just one of the little benefits, but it is a major impact.

MR. OAXACA: Thank you so much, Ms. Chestnutt, for testifying. That's an impressive record, but if you look at the total numbers as a nation, we have to have that across the board in all the places because you just can't afford not to have it in much larger numbers to solve the problem that is, that Ms. Chestnutt mentioned, a national priority.

I would like to welcome Polly Anna Harris, who is a Presidential Awardee, mathematics teacher, Bearden High School, Knoxville, Tennessee. And welcome to the afternoon session of the hearings on the Task Force.

And I am very interested in hearing what you have to say, because maybe you can tell us what you have done that's different and what you would suggest to this Task Force for us in providing the high schools with a better product, so that the high schools can in turn provide more of that product to the university.

MS. HARRIS: I appreciate the opportunity to come to testify. I feel that most of my efforts have been at the grass roots level and I will be glad to tell you what I have done.

When I talked to Ms. Orlando, she indicated that when I mentioned that I had received the Presidential Award for Excellence in Teaching Mathematics in Tennessee in 1984 because of my work encouraging young women in studying mathematics.

So that's the reason they put that in there.

I am glad to say that there are others who have focused on this problem.

I usually begin my talks--and most of my work has been done, besides what I have done in my high school, with presenting the community, my school community, the PTAs, women's groups, with the enormity of this problem.

I usually begin my talks on encouraging young women in mathematics by distributing cards to the people who are

present. Since I thought you were more knowledgeable, I will just tell you some of the questions.

What percent of the living members of the National Academy of Sciences are women?

What percent of engineers of the United States are women?

For a woman to make more than the median income of a man with eight years of elementary school, how much education must she have?

I will stop and mention on that one, it is a college degree.

What percent of practicing dentists are women?

What percent of high school principals are women?

What percent of middle management jobs are held by women?

And what percent of school superintendents are women?

Most of the time I will have the participants--they can be anonymous because they don't have to put their names on the cards--pass these in to me, and they are usually much too high.

They think we live in an enlightened age of Title IX and an awareness that just is not there.

I would like to tell you how I happened to come into this. Obviously I am a woman and I am a mathematics teacher. But I have been guilty of some of the things that I am trying to correct earlier.

We had a speaker at a faculty in-service meeting in my school who called attention to this problem, that women were not achieving their potential in our society.

Most people blame educators, from kindergarten to college. Other disciplines are important, but some researchers have called mathematics the critical filter, because without a good mathematics background, the practice of medicine, dentistry, engineering, architecture, and computer programming, to name a few, are impossible.

I had realized, of course, that in most of the mathematics classes in my high school that the percentage of girls electing mathematics beyond the basic courses was small. In fact, I have had some classes of mathematics, higher mathematics, in which there were no girls at all.

When we consider the average college-bound male student and compare him to the average college-bound female student, we find that the boy is much more likely to take four years of high school math--three years of algebra, a year of geometry, and one year of advanced mathematics, including trigonometry.

The comments that I obtained from my students when--female students--when I asked them what the problems were, why they didn't take math courses, answers were, "I have never understood math."

Or the one that really gets to me, "My mother says she wasn't good at math either." Or, "I plan to marry as soon

as I finish high school," as though these statements adequately explained that they needed to know very little mathematics.

Even some women math teachers--and this is what I have been guilty of, I think--who have the opportunity of being role models for young women, have told boys who were experiencing difficulty with math that they should try harder, while they are giving sympathy to girls under similar circumstances.

I see a related problem in my work as coordinator of non-credit mathematics at the University of Tennessee--this is my moonlighting job.

In recent years, we have seen an increase in the number of women returning to college. There are a variety of reasons. Some raise their children and want to return for a college education interrupted by marriage.

Some are divorced or widowed and now face the necessity of supporting themselves and their children. Some consider themselves in dead-end jobs and want to upgrade their skills.

Most plan to obtain a job in business or a science-related field, and before they can enroll in college-level mathematics, they must pass courses in algebra and geometry. Those going into engineering must study trigonometry as well.

Trigonometry is no longer considered a college-level course--those courses that are not included in their college fees. And many of these women lament that they were not

encouraged to take more mathematics in high school.

Some put the blame on themselves, but they are ambitious and they are anxious to make up for lost time and they are dedicated students.

What can mathematics teachers do to encourage young women in the study of mathematics?

Studies have shown that in the elementary grades mathematics achievements of girls and boys is not significantly different. It is only about the seventh grade the differentiation seems to occur.

Girls who mature earlier than boys, as a rule, become aware that mathematics appears to be a masculine subject, and some feel they will not be feminine, particularly boys, if they express a liking for the subject.

A study was made of women mathematics teachers to see when they made the decision to become a mathematics teacher. Most had chosen mathematics as a career before the age of 13. Few had decided during the high school years, though some did make the selection when they were in college.

These are some of the steps that we have taken to improve mathematics equity in our area.

The males who have the dominant roles in the school administration where I teach are aware of the discrepancy of male versus female achievement in mathematics.

They have been supportive, providing me with funds to attend equity conferences sponsored by the National Council of

Teachers of Mathematics, and they have encouraged me to share the results with middle and high school teachers in our workshops.

At my school, particularly, we address the problem this way. Our guidance counselors seem to be the key to encouraging girls to include more mathematics courses in their schedules.

It has been only a few years that we have had a two-year requirement for graduation for high schools in Tennessee, a two-year math requirement.

But now, the University of Tennessee and the Board of Regents schools have announced that three units of college preparatory mathematics will be required for entrance in 1989.

We have invited women professionals in science and math-related careers to address our mathematics classes. The Society of Women Engineers is a good resource. They have recognized some of our better students.

The girls in my calculus class will volunteer to tutor girls in our algebra classes and geometry classes who are experiencing difficulty.

As far as our feeder school is concerned, for several years I have met with each, with the eighth grade students at our feeder school. Some of these are already taking algebra, but we find that many of those who could perhaps have taken it in the eighth grade did not, and we want to encourage them and certainly we want to make sure that they are aware that

mathematics is for them.

This visit precedes an orientation night for parents in high school. I meet with parents of the eighth graders in the evening after the visitation in the day with their children to acquaint them with the opportunities.

And each May we have advisory sessions with each graduating student who plans to continue his formal education, so that we can review their background and make suggestions for further study.

We give special attention to achievement of our best mathematics students. We have a chapter of the National Mathematics Honor Society, Mu Alpha Theta.

Our Mu Alpha Theta sponsors a math bowl for students from seventh through 12th grades each year, and some of our own students attend math bowls in other schools. They take part in several mathematics--natonal mathematics competitions, as well as state contests.

Recognition is given at awards night to those students who have the best average in mathematics course.

And as an aside, I might mention that one of our awards in high school is the Pi Award. The Pi Award is given to the student whose average is closest to 3.14. [laughter] And it makes our students--they are all very interested in this. We don't give an E award because we think those students might not know what E is.

But as far as the Pi Award is concerned, there is

great competition among those who want to be sure their average comes out that close.

And even though these are, of course, not the students with the highest average, the prize is $3.14.

We want to be sure that mathematics is in the forefront. We encourage our students to visit the elementary schools and talk about our math program, so that it will have a positive image, and we do send some of the girls to that.

I would like to close with a personal story which is true. When I graduated from Agnes Scott College--I'm originally from this area--I had an interview with a well-known insurance company, and I was offered a job as an actuary with a beginning salary which was less than that was offered to men with the same education [BELL]. As you can tell, this was a few years ago.

The interviewer remarked that he wished I were a man so that he could offer me more. I thanked him, but perhaps because of him, I am a teacher and maybe I can do some good for my students. Thank you. [Applause]

MR. OAXACA: Don't go away. [INAUDIBLE] questions for you.

MS. HARRIS: All right.

MR. OAXACA: First of all, we appreciate your candidness. We felt you were beating around the bush [INAUDIBLE] [laughter]. I'm kidding, we're delighted and we're very proud of you.

Alan, do you have a question?

DR. CLIVE: Yes. I took two-and-a-half years of math, flunked out of algebra IV, but I wanted to ask you about the math teachers, because I was fascinated by what you had to say about where female math teachers make up their minds.

I had five teachers in those two-and-a-half years, five math teachers, four women and one man. Did I have an unusual experience?

MS. HARRIS: Is that unusual? Is that what you're saying?

DR. CLIVE: Yeah, to have that...

MS. HARRIS: No, not, because we have such a great attrition rate, so many of our young teachers stay a few years and because of the, usually they cite lack of pay as a reason why they will go on to some other occupation where mathematics is considered important.

But it is tragic when that happens, but I am afraid that it is true. Some school systems have better holding power than others.

DR. CLIVE: Yeah, as I recollected now, three of the four women were under 35.

MS. HARRIS: That's right, that's true.

MR. OAXACA: Ms. Winkler.

MS. WINKLER: I'm with the Department of Education. Being a Presidential Awardee, what effect has that had on your career, your visibility, or any other...?

MS. HARRIS: Well, I have been asked to speak a lot of times. In my area, they think that's really something. Of course, I was delighted. I was runner-up the year before, so that makes it even better when you get it.

But they want to know what we're doing, and it is the visibility, I think. The television stations made a great deal of my selection, and we have not had another one from East Tennessee since then, and--but this program, are you familiar with it? It is to encourage science and mathematics teachers.

And I think that it has, but mostly it is giving us an opportunity to reach a wider audience. We are now in the classroom all day and we may not meet with others there and other people may not know what we are doing.

And I think PTAs, you know, I have spoken to them and to other, to school groups. But the community ones--I am a member of an organization called Leadership Knoxville, made up of, they say, "present and emerging leaders," who are from various fields, and we work together on community problems, and they have been very supportive. Our Adopt-A-School groups have done this, too.

So the publicity, I think, probably has been the best thing to come out of that, as far as mathematics is concerned and encouraging people.

MR. OAXACA: Ms. Harris, if you had absolute authority to build from scratch an elementary school, K through the eighth, right before high school, so that they would arrive

in the best shape in the largest quantities, what would you ask--how would you form that elementary school?

MS. HARRIS: Well, I think that departmentalization is really very important in the early grades. It used to be thought perhaps that they did not need a teacher who was specially trained in mathematics, say, to teach in the early grades.

But I think that while in elementary school they certainly need to know how to teach, they do need to know what is going to be coming after what they teach.

And I am certainly in favor of increasing the mathematics requirement for those who plan to be elementary teachers. The University of Tennessee has now gone to a five-year plan, requiring a baccalaureate degree before a teacher's certification.

And I think this will help. The idea is that they will get more content.

MS. BISHOP: Question.

MR. OAXACA: Ms. Bishop.

MS. BISHOP: I'm sorry I didn't get to ask the last speaker this question, but I'll ask you.

MS. HARRIS: She was worth it.

MS. BISHOP: You are moving around and you are becoming visible with the community, and you're talking about lack of women in the--math area.

MS. HARRIS: Math area, right.

MS. BISHOP: Do you have any suggestions for us as to how we can stir the community? And everything that we do it seems as though it gets down to the bottom line--what's in it for me?

And it is almost like the way--as you mentioned earlier about the crisis. We have to be dead almost before somebody believes we are dying.

But you have been exposed to the community. Have you in your travels had a chance, or do you have any suggestion for us as to how we might stir up the public, and it seems as though the public will have to march on Washington almost to get them to recognize that we have a crisis stirring.

Do you find that difficult to get that point over in your community?

MS. HARRIS: Yes, I do. I mentioned that I was coming here to testify, and some people said, "What is that about?" And they were not aware of this Task Force, nor that the National Science Foundation was doing anything in this area.

I think more meetings of this type in more places is helpful for people to know, but comparisons in recent years of our achievement with those of other countries, I think, is beginning to make some people stir a little bit when we start comparing our education with that of other countries, such as Japan, that we are beginning to realize that we need to put more money into it.

MR. OAXACA: Thank you so much for your testimony and congratulations again on your award.

MS. HARRIS: Thank you.

MR. OAXACA: I would like to welcome Ms. Iris M. Carl, Elementary Math Supervisor of the Houston School District, and President of the National Council of Supervisors in Mathematics, and the home of the team that had Samson at one time playing basketball.

MS. CARL: We kept Elijah on.

MR. OAXACA: You kept the good one.

MS. CARL: Good afternoon. I wish to thank the members of this Task Force for this invitation to appear today and bring testimony on the current program, some reform projects, that seem to improve the quality of opportunity for minority students, described in this project, to learn math and science.

The testimony that I bring is based on my active participation in the work of one public school district and one federally assisted national effort.

I will submit a written report and documents to the Task Force.

I am a mathematics instructional supervisor in the Houston School District, which we refer to as HISD. My experience as a public school educator ranges from the kindergarten through senior high school, with the major emphasis in the area of mathematics.

I am a member of the Mathematical Sciences Education Board, MSEB, of the National Research Council. And the National Research Council is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering, creating to serve the United States government and other organizations.

The urban school district that I represent is the largest in the state of Texas and is presently the sixth largest in the nation.

It covers 312 square miles and has a population of 1.73 million people. It's divided into 14 districts. The Houston Independent School District has 232 schools, 12,000 teachers, and 191,831 students.

There are 17,000 special education students, 100,000 students receiving free or reduced lunch, 34,200 of them are limited English-proficient.

And the HISD has a mobility rate of 42 percent. Ethnically, the current enrollment is 42 percent black, 39 Hispanic, and 16 percent white.

The Mathematical Sciences Education Board is intended to provide a sustained attention over many years to the major issues affecting the quality of instruction and learning in the mathematical sciences.

The steering committee of MSEB is a unique coalition of mathematics teachers, supervisors, college and university mathematicians, educational administrators, and representatives

of government, business, and industry.

Its major tasks include studies, assessments, regional and national symposia. It seeks to provide leadership for the improvement and coordination of ongoing projects, service in determining the competencies of our students, and making recommendations on how to strengthen mathematics education.

The concern of the United States Congress on the work of this Task Force for equity of opportunity to study mathematics and science is shared by educators nationwide.

The HISD and MSEB are joined by the National Council of Teachers of Mathematics and the National Council of Supervisors of Mathematics in welcoming this opportunity to bring the current report and share some exemplary programs and make recommendations for action.

The HISD efforts to provide impro ed educational opportunities for students to learn is largely the result of the aggressive action of our new general superintendent, Dr. Joan Raymond, who is committed to the improvement of curriculum and instruction, and hence to the improvement of student achievement.

According to the demographics, it is less than 20 years out there that we will find that one in every three Americans will be non-white.

Today in HISD and in major urban school districts, the minority is already the majority. With careful regard for

race and equity, due to a federal court desegregation order, a new world of opportunity opened in the Houston School District for elementary and secondary students.

The programs were designed and structured to provide a variety of choices for students in the district. Special education programs are in all schools and the students who qualify are mainstreamed.

The new initiative was the magnet school. There are 32 elementary and 42 secondary magnet programs. The programs range from fundamental to the gifted and talented, from health professions to the international baccalaureate.

The majority of the programs stress mathematics and science. They emphasize higher order thinking skills and provide a small group instruction, individualized instruction.

Magnet schools are seen as an important vehicle for improving minority performance in science and mathematics. Most notable among the HISD elementary magnet schools is the Cadelius [PHONETIC] Mathematics and Science Academy.

It is located in a predominantly minority community. It is 29 percent black, 50 percent Hispanic, and 19 percent white. Fifty-three percent of the students qualify for free and reduced lunch.

A local amusement park annually provides access to its grounds and rides for a formal math-science problem solving examination that requires each student to be the spinning, falling, speeding object.

The fifth grade, April 1987, standardized mathematics achievement test score was 9.2.

The computer science magnet school, located in a predominantly Hispanic neighborhood, was the first elementary school program designed to implement the Computer's Can Project through Chapter I funding.

The parents of the students enrolled are instructed in the use of computers and the software and then permitted to check them out and use them at home with their students. It has continued to be a most effective intervention strategy.

One of the most successful secondary magnet programs in HISD is a school within a city school. The High School for the Engineering Professions that opened in the fall of 1975 for highly talented college-bound students who wished to consider majoring in engineering.

The 400-member student body was recognized for their efforts to create a scientific experiment that was taken into space by the space shuttle Columbia in 1986.

Each year graduates continue to receive college scholarships offered from the major schools of engineering and other leading universities.

The two magnet high schools for the teaching professions were established to encourage students who express an interest in majoring in education. The program provides the experiences and rewards of teaching in a variety of field experiences.

The HISD has established and maintained strong and lasting partnerships with business and industry that have provided real world experiences, positive role models, and funding to help minorities, females, and handicapped students become literate in mathematics, science, and technology.

The Gulf Coast Alliance for Minorities in Engineering is such a relationship. It creates a linkage with 15 HISD schools and three parochial schools. Each school has a corporate sponsor.

It provides hands-on experience, classroom demonstrations, industrial visits, and additional academic work that participating students who are required to complete science projects.

Harold Hodgkins reports that nearly one-fourth of the students under 17 live in poverty today. The continuing high birth among teenagers also contributes to the growing number of families living in poverty.

The students are in our schools. The four-year-olds who attend our prekindergarten program are the class of the year 2001.

Without early preventive action, these students will be ill-equipped to be productive adults. Unfortunately, too few of the students in the secondary schools, particularly, appear to realize the importance of mathematics and science and the ability to think.

Improved mathematics and science achievement for

minority students and better prepared minority science and mathematics will continue to depend on minority access to quality educational programs.

The National Action Council for Minority Engineering, a coalition of corporate leaders, university administrators, and local program directors, has been actively engaged in the secondary schools in Houston.

Say Yes to a Youngster's Future [BELL] represents a two-year commitment to black, Hispanic, and Native American students and females. YES represents the mobilization of educators, business, parents, and students with community, civic, and religious groups.

The successful programs have been implemented in Houston schools and represent some possible solutions to the problems that face the nation.

The fact that many of the programs are non-transportable, and therefore, do not represent solutions to other schools in the Houston School District is recognized.

Not every school district can have 425 connectives involving 209 businesses and business organizations, and 1,910 business people working with all of the schools, and specifically with 89 schools regularly.

The MSEB is actively engaged in the study of underrepresented groups and their access to higher education. One small facet of the problem was presented with the Symposium on the Second International Study.

The elementary schools, they pointed out, employ generalists, rather than mathematics specialists, to teach youngsters in the elementary school the most critical conceptual models.

The NATE [PHONETIC] Research on Effective Schools and the SIN [PHONETIC] studies all state that the expectation of teachers and of students themselves needs to be raised if there is to be a reversal to the trend.

There are chapter I teachers and supervisors who joined the National Council of Supervisors of Mathematics in calling attention to the regulation of a heavy concentration on teaching and testing, pencil and paper computational skills in these special programs, to the exclusion of higher order thinking skills.

The National Assessment for Educational Progress reports that the scores of minority students continue to increase in lower cognitive areas and rote knowledge.

Mathematics is a critical filter. A California study in 1983 identified 29 career choices that are closed to students who have not had three years or more of mathematics.

There are many efforts underway to reform mathematics curriculum that should have an impact on this problem. The NCTM Curriculum Standards is one. Another is the Mathematical Sciences Education Board's Curriculum Framework. And a third is the AAAS Project 20-61.

If it is imperative that a sustained effort to the

quality of instruction and curriculum be put in place, then the states and local levels will have to be involved in the formulated plan for implementation.

The Houston Independent School District and the Mathematical Sciences Education Board stand ready to offer any assistance that we can to this Task Force, and we thank you for the honor to present at this date.

MR. OAXACA: And we thank you for your testimony. Any questions? Yes, Ms. Winkler.

MS. WINKLER: I would like to thank you for a very comprehensive look at a lot of very good issues. One thing that you mentioned just in passing is a magnet high school for the teaching professions. Could you just say a word or two more about how that works? I had not heard of that.

MS. CARL: The magnet high school for the teaching professions is one of the newest magnets that we have in Houston, and was formulated and actually implemented as a plan to begin to look at getting more minority students in the pipeline for teaching.

And it was felt that, I guess, in one way, our proximity to so many of the colleges and universities--there are seven major colleges in the Houston area--gave us an advantage in that these youngsters work not only in our schools with younger children in the elementary schools, but they also work with the professors and advisors of the student teachers in the colleges that produce teachers in our area.

And they are given actual opportunities to walk in their path in many instances and experience some of the things that would be involved in becoming a teacher in the public schools.

MS. WINKLER: How long has that been open? Just this year?

MS. CARL: This is the third year.

MS. WINKLER: Third year.

MR. OAXACA: Mr. Herb Fernandez.

MR. FERNANDEZ: On the subject of teaching math at the elementary school level, are the universities not doing the job in educating or getting good quality math teachers for elementary schools?

MS. CARL: We're concerned on the elementary level with the university producing teachers who can teach basic concepts and model those concepts, and we are finding that the emphasis in teacher preparation is still that every elementary teacher will be a teacher of reading.

MR. FERNANDEZ: Now, let me follow on that question because I have asked university presidents the same question and the university faculty, and none of them can answer the question directly. They give you all kinds of answers why not.

Why aren't the universities taking the initiative if this is such a critical problem? Aren't we putting enough pressure on them? Are the teachers not doing their job or what?

MS. CARL: We're making every effort to put pressure on the universities. NCTM, as an example, is a member of MK, and originally MK did some of--well, provided that kind of service in looking at the programs in the colleges.

A lot of the approach to the MK visits has changed over the years.

I think that one of the things that will make a difference and have some impact on what happens in the universities will be the kinds of studies that I just identified by NCTM and AAAS and MSEB, and that is that once we get sufficient publicity of the kind of curriculum that is needed for the future, then it will be necessary that the universities prepare teachers to teach it.

At this point, there is no universal or national focus on what that curriculum needs to look like, and each of those groups at this point is identifying what the curriculum.

MR. OAXACA: Mr. Ernie Reyes.

MR. REYES: Very interesting testimony, but in an area where the minority is already the majority, and when you submit your written report, I would like to have some numbers, input versus output.

We are close to the year 2000 in your area, the Houston School District, where Hispanics and blacks are now the majority, but I didn't hear any numbers on how effective we are in the various programs.

And I am well aware that the magnet school

engineering [INAUDIBLE] on the shuttle, and we are all very proud of that, but I don't know [INAUDIBLE] on how successful we are, because this is a slice of the data the rest of the country is going to get in about 12, 10, eight years.

So I would be interested if you could get some of that data for me.

MS. CARL: We certainly will send that to you.

MR. REYES: I didn't hear any figures at all in your testimony.

MS. CARL: I tried not to because of the 10-minute limitation.

MR. OAXACA: Right, and could you explain, before we give you [INAUDIBLE], you mentioned 9.2 on a math test, what does that mean? Is that good or bad?

MS. CARL: That's excellent.

MR. OAXACA: Oh, OK.

MS. CARL: If a youngster is in fifth grade, then the normal score would be 5.7.

MR. OAXACA: Oh, OK. [INAUDIBLE].

MR. HILL: I'm just curious on the ethnic breakdown of teachers in the school system. You indicated the breakdown of students, but what is the teacher?

MS. CARL: I have it with me in a publication, I think.

MR. HILL: Does it represent the student breakdown?

MS. CARL: It's very close to it.

MR. OAXACA: Thank you so much for your time.

MS. CARL: And thank you.

MR. OAXACA: And thank you for the fine work that you are doing. I would like to welcome Mr. James G. Breene, Awareness Program Manager, the National Support Center for Persons with Disabilities, International Business Machines Corporation. Mr. Breene.

MR. BREENE: I would like to show a tape first, if you will.

MR. OAXACA: Does it have sound?

MR. BREENE: It has sound, yes, sir. It is 55 seconds, so it won't be long.

[TAPE]

MR. BREENE: Thank you. For the benefit of the blind friends that are here today, there were four individuals that were using adaptive technology in their jobs. Those four people all happen to be--three of them are IBM employees, and one of them is the daughter of an IBM employee.

So those are not actors. Those are real people doing real jobs, showing the technology that they are using. [INAUDIBLE]

I don't know that I have ever seen an IBM ad that didn't ask to sell you something, but that is strictly an awareness ad to make people aware of the technology that is available today.

And we have been very pleased. We have had over

1,500 responses to that advertisement. The first day it ran, the 16th of September, the day of salute to the Constitution, it only shows a Post Office Box there and we got 70 phone calls the next morning on it.

People had called their local IBM office and said we saw this advertisement. Where can we find the people?

So we think it has been a very effective program.

You do have notes, I believe, all of the members of the committee. Let me talk about the National Support Center first. We were formed in 1985, in December of 1985. The first thing we did was to establish a toll-free telephone number where people that are looking for technology and don't know where to find it can call that toll-free phone number.

I noticed after I got here that that is the 800 number which does not operate in Georgia. The number in Georgia for our attendees here is area 404 and the number is 988-2733, and I apologize for that omission from the notes.

But we have had something over 15,000 inquiries that have come in over that toll-free number. We are not a sales organization. We are strictly dispensing information.

The calls came from teachers, they come from parents, they come from employers, they come from universities, they come from voc-rehab, they come from everywhere, and the question is, where can I find something to accommodate my child, my employee, a member of my family?

And we are disseminating information on sources for

the technology that is available--switching devices, screen-reading programs for the blind, special education programs, all types of information.

We are conducting across the country what I would classify as "executive awareness programs." I was in Tulsa yesterday. We would invite in business officials, voc-rehab, educators, the media, and government officials, and we'll spend two hours with them, each one of those five groups, trying to acquaint them with the technology that's available and what's going on nationally, and why it would be in their interest to look at and hire people who do have disabilities.

The next area that we're in is the special offering with Easter Seal, and we have a cooperative program with Easter Seal where we make equipment available to people who are disabled, to individuals who are disabled, at between a 37 and 50 percent discount.

So we are trying to make it easier for people to gain access to the technology that is av.ilable. That is implemented in 10 cities across the country as a [INAUDIBLE] program. Atlanta happens to be one of those 10 cities.

In 1986, we did 24 disability conferences across the country. That would be the National Federation for the Blind, President's Committee on Employment of the Handicapped, the National Federation for the Blind, Closing the Gap, and a variety of other conferences, trying to make people aware of the technology that's available.

In 1987, we did 38 conferences and in 1988, we currently have 20 conferences on the schedule. So I'm sure, people seem to think that we can respond on two-weeks notice to conferences all across the country, but it does take a little longer on planning.

For your information, something that will happen in either March or April, we will do a mailing to approximately 50,000 companies, agencies, education institutions, and others that would have an interest in persons who are disabled and employment.

And it will be a return mail piece, asking them to join us in a commitment to hiring people who are disabled. I wish I had a print of that because it's a nice piece of mailing and it will go out to 50,000 people in this country.

I was asked to speak on national activities, what's going on nationally. I believe that Jack Sabater spoke this morning about the job training centers. There are 33 of those across the country.

There have been 2,451 graduates of that program since it was instituted in 1973, of which 2,044 of those have been placed in competitive employment. That's an 84 percent placement rate.

We were proud of the results of that. One of those centers is here in Georgia at the campus at Georgia Tech, supported by Goodwill Industries.

There is an alliance in Virginia of education, voc-

rehab, and business. In Virginia, they have a 75 percent unemployment rate of the graduates of the high school. This alliance is to address the improvement of the quality of the education and the training of the individuals, and to developing inroads into business, so that when their graduates come out of the program that they will have channels to be able to place them in competitive employment.

Florida State University has developed a training program using a touch-screen window approach to train graduates of high school to interview for job--how to go out to be an applicant f[illegible] a job.

It is extremely well done. They were developing this primarily for just a general graduate of the high school, and I think it has even greater applicability to our disabled students who are coming out of the high school program, who may not really have an understanding of how to go out and be prepared to take part in a job interview.

In New York State, in the University of New York at Albany, Dr. Bill Roth has put together an adaptive tailoring center where the students that are entering the program there, they will actually take them into a center where they have a variety of adaptive devices and aids, and they will tailor a solution for that student that will accommodate him during his studies at the university.

If you haven't seen it, I would suggest that the reading on Governor Cuomo's Task Force on Employing of the

Disabled is just an excellent document that has some very specific recommendations in it on employing of persons with disabilities.

In Minnesota, they have an issues team on technology, and the governor there commissioned this study. They found as a result of their study that for every dollar invested in voc rehabilitation, it increased the earnings power of the recipient of that training $11.44.

So we are investing in this country--the last numbers I saw were in 1984--$120 billion in disability support payments. That's through SSI, Medicaid, insurance companies, all the support systems--they totaled $120 billion in 1984.

In that same period of time, we invested $3 billion in vocational rehabilitation training, and if we could transfer some of that money from the support system into the voc-rehab area, and increase the earnings power by $11.44, it makes good business sense to be able to put a program in like that.

Manufacturers Hanover Trust in New York City developed a handbook, I would call it, for employers that talks about all areas of disabilities. The recruitment--the interviewing, recruitment, training, placement, job evaluation, all the considerations that a company would have to look at in employing a person who is handicapped.

I am not sure that they are still distributing that. I have a call in for them, that if they are discontinuing the distribution that they will allow me to make copies of it.

We will pick that up and begin distributing it as we get inquiries from employers on how do I go about finding and recruiting and training folks who are disabled.

Internal Revenue Service has a great program where they are using blind telephone operators in their Accounts Receivable Department. I don't know if that's where they call you if you owe them money--I suspect it may be.

But if it works for the federal Internal Revenue Service, how many states also have internal revenue departments on it where people are paying [BELL] income tax where we might be able to create job opportunities.

In Raleigh, North Carolina, I talked to a teacher there and they do a training in their school system, training their graduates to be medical record transcriptionists, blind students to be medical record transcriptionists. And they have been very successful.

I noted in talking with the lady there, she said that once a year she gets together with other similar--she is a facility supervisor--and they get together once a year, states from Virginia to Texas, and share ideas on what's working.

And if there are 15 or 16 states in that area, I wonder about the other 34 states--what is going on there, and the need for networking and exchanging of ideas.

I was asked to make some suggestions.

Number one is in the area of awareness, and I would call your attention to the 55-second TV. There are four groups

that I think we need to make aware of the technology that is available.

One is employers. We have to take the myth out of employers' ideas that there are no disabled candidates. We have to take the myth out that there are--the quality of their work would be less than their peers.

If you have read the Du Pont study that was done in the 1960s, updated in the seventies, again in the early eighties, they found that their managers all evaluated their disabled employees, and there was some 3,000 that were surveyed in that report, that 80 percent of the managers said that their work was equal to or superior to their peers.

The attendance record was better than their peers. The accident rate was better than their peers, or less, whichever way you want to look at it--they were not as prone to accidents.

And their loyalty to the employers was far superior. And as an employer, you make an investment in every employee that you bring in. You have to train them, and so if you have frequent turnover of your employees, then that means it's costing you money to be able to retrain people, and the loyalty and the stick-to-ittiveness that you would find from employees, I think that would be attractive to them.

If you have not seen the study, it was an ICD, International Center on the Disabled, and they confirmed those same statistics in here. They took 920 companies and they did

surveys of those companies, four different levels of management, four different sizes of companies.

It is an excellent book. It takes a lot of the myth out of some of the things that would be concerned to employers.

The number one thing that they found in the companies that had federal contracts--$2,500 annual income from federal contracts--73 percent of the companies that had federal contracts had in place an active program to recruit handicapped employees.

Only 21 percent of the companies that did not have government contracts were actively, had active programs to go out and recruit and hire the handicapped.

So I think that there may be a message there as far as federal interest in it, in looking for the candidates. Of the companies who had not had anybody in the last three years, one of the comments that they made was they did not know where to find qualified applicants.

One of the jobs of the Virginia Commission, the alliance there, is to provide through the voc education and the education process the qualified applicants.

We had a call in Atlanta one day this week--has the gong gone off, I haven't heard it?

MR. OAXACA: Yes, it went off two minutes ago.

MR. BREENE: Oh, I beg your pardon. All right, there are other suggestions that I have that I will just leave for

the commitee's.

MR. OAXACA: We didn't feel it would be good to push it because Jack's name was Juan Miguel, and I figure your name is Jaime, and I'm not going to mess around with that.

MR. BREENE: My whole thrust is in the area of awareness. We have to make people aware of where to find candidates and the technology that is available. We have to provide quality candidates for competitive employment. Thank you.

MR. OAXACA: Thank you so much. Any questions? Yes, Mr. Scurry.

MR. SCURRY: One of the things that I do know about IBM and that is it is set up to make money, and it probably makes investments in the main around them.

You did raise the question about attrition and people leaving and then having to repay them. Is it your experience, I think you recall the earlier citing, a fairly large number of people who were classified as handicapped. That may not necessarily mean severe handicap.

Well those employees who are classified as severely handicapped, who require extraordinarily special accommodations, what is your experience at IBM in terms of the cost to maintain them and the relative [INAUDIBLE] and the attrition as compared to employees not classified as being handicapped.

MR. BREENE: I have to beg off on that because I

don't have access to the personnel records of those people. We do have three disabled employees in our center here in Atlanta. One is totally blind. There is no cost to the added accommodation for that employee.

We have one employee who is deaf and there is no added cost for that employee, and we have one lady who has suffered a stroke and there is no added cost for that.

I would say that in many cases the technology--the studies have shown that the technology in 50 percent--50 percent of the disabled employees, it costs nothing for the accommodation for those employees.

It costs less than $100 for the next 18 percent. So 68 percent of the employees, and this came out of a federal study that was done with defense contractors. I think it cost less than $100 for 68 percent of the disabled employees that were hired by those defense contractors, and that involves something like 20,000 disabled employees.

MR. SCURRY: That is what I keep hearing and I have every reason to believe that, but that is one of the messages that I don't think gets out.

We look at the slick--and I don't mean to be derogatory--and we see big bucks associated with fine and sophisticated equipment, when in fact, in the main, even an employee who is disabled, on the job it's more and more [INAUDIBLE].

MR. BREENE: If you look at the report that was done

by the Hudson Institute, and they talk about the shift from manufacturing technology to service-related technology in this country on it, you're going to find computers on the desk of most people who are in the service-related business.

And that is not making an accommodation to a person's disability. For a person who has cerebral palsy, perhaps, and a key guard, a piece of plastic that fits over that has holes over the keys where they put their finger down through it--$50. I can make it in my shop with a drill for $20.

It's not that expensive to make those accommodations. Mr. Jeffers.

MR. JEFFERS: Mr. Breene, I appreciate your testimony very much. I have a question regarding the job training centers.

MR. BREENE: Yes, sir.

MR. JEFFERS: The training you have.

MR. BREENE: Yes.

MR. JEFFERS: What kind of training do you conduct at those centers?

MR. BREENE: Those job training centers--IBM is not really conducting the training. We are of assistance to those centers in being established. Those 33 centers are doing programmer--computer programmer training.

Some of those centers, though, that, for instance, the one at Georgia Tech, that everybody does not have the aptitude to be a computer programmer trainer--trainee--so they

are doing what I would call service-order entry, where somebody calls in and places an order for maintenance on equipment, and the disabled person will take that call and do the dispatching on it.

One of the centers in New York is also training people to do word processing, and one of the centers has gotten off into the area of doing computer-aided design, CAD-CAM type of applications.

So it is not--the 33 that were established initially with the objective of being, training people to be computer programmers, but they are finding out that in their communities, there are other job outlets for people that might not have that aptitude, so they are diversifying that.

MR. OAXACA: Thank you, Mr. Breene. And once again, our thanks to IBM, and you can expect to hear from a lot of us with this.

MR. BREENE: Very good, thank you.

MR. OAXACA: We know you're loaded.

MR. BREENE: Information.

MR. OAXACA: I would ask everyone. It's going to be a long afternoon. There's drinks back there. Why don't we all kind of stroll back there, get something to drink, and we will get right back and then we will start off by welcoming Ms. B.K. Krenzer right after the break.

[BREAK]

MR. OAXACA: Let me welcome a fellow Kansas City

person, Ms. B.K. Krenzer, Past President, Society of Women Engineers, from Kansas City, Missouri. Welcome to the Task Force hearings this afternoon, and we are delighted you took the time.

MS. KRENZER: Thank you very much. I am delighted to be here partly because of coming from Kansas City, where it is still kind of winter, and being here in Atlanta where it is definitely spring.

It is also great to have the opportunity to speak directly to you about the Society of Women Engineers.

Since the mid-century, this small but growing group of women has, through volunteer efforts largely, solicited financial support of the industrial community, increased the visibility of engineering as a field for women, and expanded women's participation in it.

I have provided some publications which outline our plans and programs, and I do regret that we haven't taken time in many cases to develop detailed evaluations of those programs which I know would be more helpful.

But we have been influenced by the observed result to continually adjust them for optimum effect and have strong evidence that they are, in fact, very effective.

Our efforts received added impetus, of course, from the women's movement, when non-traditional fields were identified as the most profitable for women who work.

The influx of women into engineering took a quantum

leap in the seventies, when talented women sought careers in areas that would be challenging and would provide significant financial return.

To some extent, it is because of that emphasis on the financial advantage of careers in technology that we are seeing a decrease in the numbers of women entering engineering.

Until quite recently, the "in" profitable career for most of this decade has been a financial one versus the science and technology one of 10 years ago.

There was also a perception that the demand for engineers and scientists is not great enough to command the high salaries our collegians have come to expect. We are working now on counters to those attitudes and perceptions.

SWE has always been an educational organization and our programs reflect that. We develop literature, publications, built a scholarship program, conducted a campaign to give recognition to the achievements of women engineers, forming our own small pool of role models.

And these are an important part of our efforts to alert parents, educators, and counselors to the idea that science and technology are suitable interests for the attention of any person that has aptitude in those subjects, particularly women were no exception.

Our literature focuses on all the possible obstacles to women in those careers and then aims at overcoming them.

Information is included in the reading material of

pediatricians' offices, comic books are designed to interest children. You have already heard testimony on previous occasions about programs we develop with the Girl Scouts, such as one called "Tinker Toys Technology."

And there are shadows, big sister programs, and career days. A major certificate of merit program, carried out by members around the country, recognizes achievements by young girls in high school math and science, and others are designed to interest and then to encourage young women who choose engineering careers.

These are good programs, but they are limited in their application by the interest and the resources of volunteers who are spread thin, both geographically and time-wise.

As the only woman dean of engineering in the U.S., Dr. Eleanor Baum of Pratt Institute points out, "Women engineers tend to be very competent and successful engineers who are therefore called upon to serve on every committee, represent women on every panel, and so forth.

It definitely dilutes their efforts as role models and it even gets hard sometimes for them to find time to be successful in their engineering careers.

To counter this, we are finding that our participation in joint programs is more effective than going it alone. The joint effort with the Girl Scouts I already mentioned is one such program, and in another area, a SWE

section works with the Girl Scout leadership to produce science and engineering merit badge kits.

Some others are the National Society of Professional Engineers Math Counts program and the NOW National Science Olympiad, and I think they have just had to change that name because the Olympic term is restricted usage.

It seems important to the success of these programs, though, in reaching women, minorities, and handicapped that role models of each of these categories participate in the conducting of the programs. And that is what we in SWE try to do.

Our current tact is to expand and improve the programs for the career development of our members. Unless there are incentives and benefits in the Society of Women Engineers, our membership will not grow, and therefore our capability to handle programs which interest more women in science and technology will diminish or cease to exist.

Without any decrease in our efforts in that latter respect, we are now focusing on expanded projects to enhance the professionalism and develop the careers of practicing engineers.

Some of these benefits accrue to women who are working in our programs for career guidance. They are building the skills which will have direct application in their work, particularly if they plan to move up into management.

But this is not easily recognized by those involved,

nor is it enough to encourage joining the society.

In these materialistic times, we must send a clear answer to the "What's in it for me?" question in order to attract members.

Now I have provided copies of a Society of Women Engineers' "Career Guidance Idea" book, which describes projects to be undertaken by sections in which will interest young women in engineering careers.

A similar publication is now in the works to describe career development projects which sections of the society can implement to benefit themselves and promote the achievement of their career goals.

In this case, we must move beyond the standard dress-for-success type programs to be effective, and SWE sections are doing that.

It is those that will be compiled into the new idea book. I'm afraid it will be completed too late to be included in your research phase, but we will forward copies to you if it is ready in time to be of any use.

In it will be program modules which can be used by a section, videos developed by the society and by others who support our goals, and other pertinent materials.

A typical program module is a panel on life styles with a single and a married careerist, a single and a dual parent family representatives. Panel members--all women engineers--model solutions for typical problems they encounter

in combining engineering careers with any of those life styles, and/or in the interchange, panelists often find new solutions for themselves.

Another example is a seminar on communications skills for women engineers in management-oriented positions. There are growing numbers of these programs, which seem to be answering the needs of practicing women engineers and aiding the expansion of our membership base.

Since 1975, the society membership has been open to all qualified applicants--versus women only before that--and we have noted some of the student sections have a number of young men members.

The reason in these cases turns out to be not that the young men go where the girls are, but rather where the action is. Thus, we have decided to take a lesson from the students and we are trying to make our member sections the place where the action is.

It is a reverse catch 22--with more action, attracting more members, making more activities possible, which attracts still more members.

Adding importance to our effort, and increasing the pressure to succeed, [illegible] continuing presence of discrimination against women in engineering. Some of our more senior members are giving up the fight and moving into other career fields.

The society continues the work of education to stop

such practices as preventing women from developing into managers because "men don't like to work for women." Or blaming incidences of sexual harrassment on women's lack of humor since, after all, "boys will be boys."

We also have programs designed to prepare the young women entering engineering from college for what they may have to face in this regard.

These are promulgated in our workshops at student meetings and conferences throughout the year, and they build confidence in the young women to cope with those situations.

Finally, we are finding a growing recognition and appreciation of the role of women in engineering by our engineering community. [BELL]

Our members are participating actively in our professional societies and rising through the leadership ranks. This participation is encouraged, not only as an opportunity to develop more useful skills, but it is found to improve the perception and acceptance of women by our male peers.

They are even beginning to welcome the challenge of competing on an equal basis.

Maintaining a high profile may not be easy with the other demands on society members' time, but it is essential, in our opinion, to do to hold and to continue the advances women have made.

Overall, then, the society seems to be doing most of the right things, just not enough of them. To increase our

ability to do more by increasing our resources, we are now developing some grant request programs to supplement our drive to build membership and expand our activities.

In any case, we feel very strongly that we have found a good solution to one-third of the problem you are addressing here, and we would be happy to participate in any activities to implement that solution, and offer whatever SWE can do to help.

Thank you.

MR. OAXACA: Thank you so much. Any questions? Yes, Mr. Jeffers.

MR. JEFFERS: I was wondering if the society has made any effort--let me ask a question first, two questions, if I may.

Are there severely disabled women in your society?

MS. KRENZER: I'm not sure about severely. One of the things we find is, as I mentioned--as I implied--women in engineering find that their time is very much in demand, if they are of any degree of success at all.

And frequently--I don't know how many handicapped people there are--not all women engineers are members of this society, and I suspect that--I know that there are a few who are handicapped. I would not say severely, because I can't at the moment think of anybody, any quite severe ones.

But I suspect that they find more ways to use their unique capabilities and resources and/or get support from other areas than the society and just don't have the time for that,

too. There may be more, and it may be that there just aren't any more, but I'm not sure.

MR. OAXACA: One of the things--to give you a short anecdote--one of the women in our company was severely handicapped. When she saw the problem, she left her husband. It actually haprened.

MS. KRENZER: He said that, I didn't.

MR. OAXACA: Ernie.

MR. REYES: Membership, you mentioned some figures in 1975, you opened it up [INAUDIBLE].

MS. KRENZER: Opened it up to males.

MR. REYES: Has the membership gone up, gone down, stayed about the same, or where with respect that there are so many other societies drawing people?

MS. KRENZER: Well, OK.

MR. REYES: Your own society, has it gone up, come down, or leveled out?

MS. KRENZER: Definitely, since the almost the mid-seventies, we have more than doubled in size. Unfortunately, that has not only tapered off but started down again. It exactly parallels the enrollments of women in engineering school practically, in terms of rising sharply and then decreasing again.

At the moment, as I say, we are slightly, we are decreasing rather than increasing membership.

MR. REYES: Basically, your society is a barometer of

enrollment?

MS. KRENZER: Well, it shouldn't be because--you know, the number of women in engineering has increased tremendously, and so the society was very small at the end of--well, in '75, I'm trying to think, the numbers that come to mind are under 1,000, and that includes students, and we are now--well, no, we're way more than doubled then. It must have been 1,000 members, because we are now around 3,500 members.

And that is not anywhere near the increase that was reflected by the number of women graduating from engineering schools.

MR. OAXACA: Dr. Shirley Malcom.

DR. MALCOM: I have, really three questions--this is going to be short. First is that, do you have any of your own--I mean I have my own opinions about why the numbers are headed down on women in engineering now. I was wondering how you felt about it and why you saw it was heading down now.

The second piece is that of college-based chapters and what there has been any kind of relationship between the numbers that haven't gone down and the presence or absence of a college-based chapter, and whether you have any advice to give to any other chapter-based voluntary, special-association efforts, because I know that there are other kinds of local groups of the American Chemical Society, [INAUDIBLE], and the like, who are trying to get started because they realize that we have a national problem here, and whether there is any kind

of advice that you can give on that.

MS. KRENZER: I'm trying to remember the questions. The reasons--OK, the reasons, well, one of the reasons I mentioned in my testimony was that, I feel, that we overemphasize the financial advantage of engineering as a career field at one point, and I don't think that is entirely appropriate, plus the fact that it is no longer quite as true as it was a few years ago.

So I think that is turning a few people off, because they go where the big money is, and that's why more people are going into business, financial management now than otherwise.

So, I don't say that's the total answer. Of course, part of it is the natural drop in population that we're coming at the end of the baby boom.

And beyond that, I really haven't had enough data to analyze yet.

The second part of the...

MR. OAXACA: Chapter [INAUDIBLE]

MS. KRENZER: Oh--it's a little hard for me to say how they might influence things because we have something like 235 chapters in engineering schools and colleges around the country, and that's an awful lot of them, I mean that's a pretty high percentage.

And yet women in engineering are dropping off. In general, the college--they are called sections there, too--the colleges, the sections in schools, the student sections are, as

with the society, do not represent all of the women engineering students--in fact, less than half, I would say in most cases.

So, those that are active do, in fact, obviously influence the participation of women, but by the time you are in college, it's too late if you haven't got the word to know to come.

MR. OAXACA: Mr. Norbert Hill.

MR. HILL: Would you comment on minority women participation in SWE.

MS. KRENZER: It's--I think it's far below what I think it should be. Technically, of women in fields like that, I find the minority women in engineering are outstanding uniformly, and usually tend to rise to the surface.

I think--I only know of two in the--of course, there are many younger ones now--but there are only two of any maturity in the society who have been--and they have both served on the National Board of Directors or its predecessor, the Executive Committee.

I don't know--I don't have a good feeling for why there aren't more because I certainly think the environment is right, but I think it may go back to the same thing that there are fewer minorities entering engineering, and you have to work on that--we have to work on that issue, too.

MR. OAXACA: Last question, Ms. Hanshaw.

MS. HANSHAW: I wonder if you have any feelings about the role of women in scientific and engineering societies

[INAUDIBLE] possibly doing harm. I am thinking of my own women's society, which is the Association for Women in Geoscience. Having gone into a program like this, trying to run scientific meetings and depleting the efforts of women in the regular professional societies.

And I feel that this is the wrong way to go.

MS. KRENZER: OK, I do have a couple things on that. In the Society of Women Engineers, of course, we don't have in-depth technical meetings because it is a generalists'--I mean it's across the board disciplines and it's not appropriate. In yours it would be different, in that case.

But we find that the professional activities, the support of things are there and are required and are very useful. So, in that respect, I think the societies continue to have a place.

I hope that ultimately, someday, when we have achieved all our goals, they will be dissolved, which is the point.

I had a last--a year ago in February I was at a symposium, or a conference in Berlin, which was addressing the question of the relative advantages of a special group in the regular professional society and/or a special society for women.

And the result of that I found very conclusive, although people were represented from around the world, but the basis was so different from each one, you really couldn't make

any comparison.

But my own feeling is that, within the societies, they may well have a place but they tend to seek a level that turns out to be an ideal one, and I think of SAE, which had a women's division--Society of Automotive Engineers--which at their annual meeting in Detroit in February held a workshop or a session, and one of the women was heard to complain last year that all the attendees are men, which of course was her original idea. They were putting on such good programs that all the men came.

So, and I think that's certainly reasonable--you know, it's very good, but I think the societies still have a place, the individual societies.

MR. OAXACA: Thank you so much for your testimony. We appreciate it.

A couple of announcements while Dr. Joe Johnson, the Vice Chancellor of Research and Development, has asked to come in a little bit ahead of time. He is feeling a little poorly with the flu, and we would like to welcome him and go in a little bit ahead of time. We appreciate the folks that are letting him jump in ahead.

Let me announce that Mr. Jim Green of IF welcomes any Task Force members to visit the National Support Center, and tomorrow Dr. Larry Scadden will be visiting and, please, talk to Larry or Jim Green if you want more details.

We would also like to welcome our co-chair, who just

fighting the airline system. Dr. Ann Reynolds is here from California and hosted a wonderful session last time in California.

And we will also have two speakers from the floor at the very end. Those are the three-minute speakers.

Welcome to the Task Force, Dr. Johnson, and thank you for coming in on a wing and a prayer.

DR. JOHNSON: Thank you for giving me the opportunity to speak earlier than I had anticipated. What I have been involved in recently is looking at a feasibility study from NASA, the National Aeronautics and Space Administration, to look at the underrepresentation of minorities in science and engineering and see what kind of program can be generated to increase, at least quadruple, the number of underrepresented minorities produced annually at the present time.

We have constructed such a program that hopefully we will have it finalized in about 15 days, but I give you an executive summary of the main content of the document and the main recommendation that we made to NASA, that indeed NASA participate as a partner in the development of such a program representing one-third of the total cost of $15-$20 million.

That in such a program that it is beneficial to the United States of America to increase the existing pool of underrepresentative minority scientists and engineers [INAUDIBLE] prospectively.

We wanted from the fact that already nations that

have strong scientifical and technological base are outproducing us each year, annually, in terms of the number of engineers and scientists.

By the year 2000, one out of every three Americans will be a member of an underrepresented minority group. And this is particular serious when you come to the problem of the 18 to 24 year old age group. Then minorities, underrepresentative minority researchers constitute a larger share of that pool.

What we have recommended to NASA, along with private enterprise and other federal agencies, developing a feeder system from grades K to 12 in such a way that you can track and identify minority students that have the potential to go into science and engineering, that we have a centralized clearinghouse so that we can provide resources, scholarships, whatever, other resources that are necessary, that there be a nationwide effort to track as many of these minority students as possible, and then by the year 2000, we will have been in a position to say that we can successfully produce 32 Ph.D. minority persons.

That NASA continue to work with its existing programs like SHSAP, which is an acronym for a Summer High School Apprenticeship Program, and that be expanded into the university base, called the SHSAP Plus Program, and that we create a National Scholars Program, such that we can support annually 1,000 junior and senior high school students in a pre-

prep course that will enable them to go to undergraduate school.

From a pool of 1,500, we should be able to produce, at the Ph.D. level, approximately 300 students.

In addition, we recommend several activities that could be initiated: that NASA, in fact, create a National Advisory Board to monitor the progress of the goal of achieving these 320 by the year 2000.

Then it also recommends that NASA supports the top institutions in the country who are already demonstrating that they are sensitivity and are indeed producing minority scientists. And they make special efforts to do such an effort.

In all, if a national clearinghouse and a monitoring system can be developed, then it should be possible to reach the goal. It's a worthwhile goal. It certainly makes sense at the present time.

Thank you very much.

MR. OAXACA: Thank you so much, Dr. Johnson. We understand that you have got to get home and get to bed and get well. We need you out there in the trenches, and thank you so much for your testimony. No questions--he's feeling poorly.

Thank you so much, Dr. Johnson. Get well.

DR. JOHNSON: Thank you.

MR. OAXACA: I would like to welcome Mr. William Shackelford of the Industry Education Connection, Enterprises,

Redan, Georgia.

MR. SHACKELFORD: Chairpersons, Task Force members, good afternoon. In the past, industry has viewed minority recruitment programs as efforts to assist those unrepresented minorities achieve parity, attempts to offset past discriminatory policies, or as efforts to improve the economic lot of minorities.

Today, minority recruitment programs are rightfully viewed as being critical to the future survival of companies. As stated by Mr. George Brewster, Manager of College Relations for Corning Glass Works, "Companies committed to minority recruitment are working from a point of enlightened self interest."

In 1980, minorities accounted for 28 percent of the births in the United States. By 1990, that percent will rise to 35.5 percent and to above 41 percent by the year 2000.

Between 1976 and 1983, the number of women in the work force increased 120 percent to 44 percent of the total. However, women only accounted for 13 percent of all working scientists and engineers.

It is clear from these statistics that the work force of the future will be more minority and more female. It is also clear that those companies with strong minority recruitment programs will be better prepared to meet the challenges of the nineties and beyond.

As industry begins to build or rebuild their minority

recruitment programs, they must realize that these programs must do more than simply identify college seniors.

They must address four distinct areas of concern:

Number one, increasing the size of the pool;

Number two, increasing the skills of the pool;

Number three, increasing the yield from the pool; and

Number four, increasing the retention of the hirees from the pool.

Two critical junctures for science and technology careers for minority students are early grade schools--third and fourth grade, where it has been suggested that minorities are turned off [INAUDIBLE] programs which are designed to reach the students at these critical points can have a tremendous impact on the number of students who will pursue science and technology careers.

One such program that worked and worked well was the National Science Foundation funded Resource Center Program for Science and Engineering.

The first NSF Resource Center was established in 1979 at Atlanta University. The research center program included several components, the most exciting of which may well have been the Saturday Science Academy.

The academy was designed for third through eighth grade students and provided activities and coursework designed to improve mathematics and science communications skills, and to lay aside any fears the students may have developed about

their ability to master mathematics.

Industry must play a more active role in motivating these students towards science and technology careers. There should be more speakers from industry visiting our grade schools and our junior high schools, informing students of the opportunities in the science and technology and the academic requirements necessary to pursue these careers.

To hear this message from someone who works in the field will give a high sense of credibility and serve as strong reinforcement for the same message being passed on by the teachers and the counselors.

If we have looked to minorities and females to constitute a larger percentage of our work force in science and technology in the future, we must begin now to increase their participation in science and technology undergraduate and graduate programs.

In 1985, only 7.5 percent of the bachelor's degrees in science and engineering were awarded to either blacks or Hispanics. About 13 percent were awarded to women.

To improve these statistics, we must significantly increase the number of minorities entering college in science and technology, and the retention of these students in these fields.

This is easier said than done. Consider the fact that in 1987, blacks averaged 727 on the SAT, while the freshman class at Georgia Tech, our local engineering school,

the average SAT for the entering class was 1200.

The problem is more than simply inspiring more minorities into science and technology careers. There is a tremendous need for more support of programs that assist these students early in the development of science and technology skills.

Industry, therefore, must be more receptive to requests for funding from these pre-college intervention programs.

Another area where industry can provide more support is in providing internships for high school students, college freshmen, and high school teachers.

When I speak to industry about providing internships for high school seniors and college freshmen, I invariably get the response, "What can we do with a freshman?" I respond that a better question is, "What can you do for a freshman?"

While they have not taken advanced science or engineering courses, they do possess analytical minds, drive, enthusiasm, and the desire to learn.

You can use the internship to give them additional tools they will need to survive and excel--to survive and excel in college.

The summer can be a skills-building experience, including test-taking, time management, study habits, goal setting, computer literacy, typing, and more.

These are all survival skills the students will need

for [INAUDIBLE] fully developed upon graduation from high school.

This may well be the greatest service industry can provide because the retention rate for minorities in science and technology is deplorably low.

In my work, I have identified 22 critical components of minority recruitment programs that will increase the yield from these programs.

Time will not permit me to discuss each. However, some of the most important aspects of the ideal minority recruitment program would include the following:

The early identification of talented students;

Year-round involvement with the students;

Early exposure of the students to industry;

The selection of a few key institutions providing institutional development assistance; and

Strong support from management.

Industry must be creative in the restructuring of its minority recruitment programs, the bottom line. In addition, industry must address the problem of the retention of minority employees.

The average minority engineer will spend two to three years with his first employer. There are many factors that affect this average, including the demand for experienced minority engineers, realities of the job not matching expectations, escalating salaries for engineers, delayed

decisions in favor of graduate studies, and unfamiliar or undesirable job locations.

To improve upon this average, industry must incorporate retention strategies into their recruitment programs. A strong internship or co-op program is one such strategy. It provides the students with exposure to the company, its style, its people, and its locations.

The internship, or co-op program, allows the students--that is, prospective employees--to develop a first-hand understanding of the company and opportunities available.

In addition, the company may use this early involvement with the student to conduct a first-hand evaluation of the candidates.

This early exposure to the company will allow both parties to make a more informed decision about whether they make a good match.

Another company effort that will have a positive effect on retention is a strong and thorough orientation program. This program should include components that provide orientation to industry, the company, the division, the plant, and to the local minority community.

The intent of this effort should be to set the minority employees at ease in their new environment.

Finally, industry should not ove-look the important impact a mentor can have on the retention of minorities. The mentor helps you interpret the corporate environment, serves as

a problem-solver when problems arise, and helps a new employee to see beyond the entry-level assignments.

All of these items are critical to the retention of minorities, females, and to all employees.

In conclusion, let me say that engineers are not born, engineers and scientists are not born. They are made, they are made from seeds that are planted early, seeds that are allowed to--seeds that are nurtured and cultivated and allowed to blossom and bear fruit.

We are past the days when industry could contently wait and pick the ripe fruit from the doorways of our colleges and universities. Industry must play a more active role in the development of engineers and scientists, especially minorities and females.

The following five recommendations are offered to assist industry in its effort:

Number one, industry must increase its visibility with grade school and junior high school minority and female students in order to inspire more of these students to pursue science and technology careers.

Number two, industry must increase its support to pre-college programs designed to increase the size of the pool of minorities and females entering science and technology fields.

Number three, industry must redesign its internship and co-op programs to provide opportunities for selected high

school students and college freshmen to acquire early exposure to industry and skills-building training.

Number four, industry must provide more opportunities [BELL] for high school mathematics and science teachers to acquire exposure to industry, new technology, and research.

And number five, to improve retention of minorities and female employees, industry must develop more effective corporate orientation and retention programs.

I thank you for allowing me to speak to you today.

MR. OAXACA: Thank you so much. Any questions? Yes.

MS. LEE-MILLER: When you talk about industry increasing their visibility [INAUDIBLE] lower levels of school, could you be more specific? And how would you suggest that they increase their visibility?

MR. SHACKELFORD: There is a need for people who have an ability to communicate scientific ideas and concepts to lay people, to do more of that to students who are in the third, fourth, fifth grade to let them know about the excitement of science and engineering careers.

What is missing is, [INAUDIBLE] at University of Virginia, Curry School of Education, talked about science--we're teaching science as a science as opposed to teaching sciencing. She said we could change the name to sciencing.

Science should be a doing kind of thing. The joy of science is not in the textbook or in the lecture. It's in doing science. We need to have more people, more role models

in the grade schools, doing science for the grade school students, so they can get an idea of what it's like to be a scientist, to get excited and turned on to the sciences, and therefore develop that interest along the way, as opposed as us trying to redevelop that interest when they get to high school after they have already lost it five, eight years earlier.

MR. OAXACA: Any other questions? Thank you so much for testifying. Thank you for taking the time.

I would like to invite Mr. Bill Linder-Scholer, Executive Director of the Cray Research Foundation. Welcome to the Task Force and thank you for taking the time to be with us.

MR. LINDER-SCHOLER: Thank you very much, Mr. Chairperson. Like a couple of the other speakers, I, too, am glad to be here in the warm weather, and more importantly, have a chance to represent Cray Research, which is a relatively small but growing computer company, in this process.

Your challenge is one that we all face together, and it seems to me that certainly we at Cray don't have any ready or easy answers for all of you, but we believe in the importance and the urgency of what you are all about.

It is not just important, in fact, but it is critical that we do something about diversity in the work force, and particularly in science and technology, and so I want to focus on that one theme.

You have already heard ample testimony, I take it, having heard part of a day, and knowing that you have been

through this before, about the crisis America faces in developing our human resources.

And for those of us in industry, part of this urgency comes from the fact that we sense that there is a small window of opportunity, a relatively narrow one, that coincides essentially with the decade of the nineties, during which we will have one last chance to prepare for the fundamental changes that are going on not only in our schools but in the workplace and in the international economy, a chance to respond to the fundamental changes in our economic and social systems.

So much of what we can do right now is really planning for the future, but there is relatively little time. So we have got to get on with the work.

If we at Cray have any special perspective on this national challenge, it is that our very su[illegible]al is dependent upon the ability to capture the creativity [illegible] flexibility that comes from a diverse work force.

There is no other way around it. We are a very small company in an industry--the computer industry--dominated by a few large multinationals.

We know very well--we know first-hand how technology is changing the nature, not only of the global marketplace, but the nature of jobs and the work force, and hence the educational experiences and life skills demanded of our employees.

In other words, building on the strength that comes

from diversity is the only way that a small high-tech company like Cray Research will succeed, and it seems to us that the United States is in something of the same sort of situation relative to other countries of the world and technological and economic competition.

Well, for those of you who are unfamiliar with Cray, let me tell you just a little bit more about the company, with emphasis on those aspects which reflect our perspective on technology, education, and a diverse work force.

Cray is a Fortune 500 manufacturer of supercomputers, those large-scale scientific processors used by governments and businesses around the world for national security, basic scientific research, and more recently, a wide range of commercial and industrial applications, including designing automobiles, looking for a cure for cancer, animating motion pictures, or modeling national economic or demographic systems.

Our primary competition at the moment is the Japanese, and as a matter of fact, since the Japanese companies that we compete with have strong and enforced ties with their national government, in a real sense we are competing with the Japanese government, the nation of Japan.

Now the fact that American school children consistently perform poorly on international tests of math and science skills, as compared to children of the other industrialized countries, and particularly against Japan, of course, is of obvious and great concern to a company like Cray.

We think it ought to be a concern to the whole country.

Why is that? Well, like most other businesses in the high-tech industry, our work force is highly trained. Think of it this way--in a normal manufacturing company, perhaps five percent of the work force would have the equivalent of a four-year degree.

In a high-tech company, something closer to 30 percent, and it's certainly true at Cray, would have four-year technical degrees, and if you count two-year technical degrees and the equivalent military experience, the percentage approaches 50 percent.

We're education-dependent, much more so than other companies in the manufacturing area. For that reason--of for no others--we value education and every part of it.

Perhaps as much to the point, though, is the fact that the half life of an engineer is increasingly shorter. The same is really true for our unskilled workers as well.

In fact, our manufacturing group is experimenting right now with an in-house retraining program that would save jobs by offering employees with no more than a high school education the chance to complete a two-year vocational degree, emphasis on calculus and robotics, in the period of one year at Clay expense on work time.

This isn't a luxury, it's an absolute necessity to really retrain our folks for jobs that will change fundamentally in five years or less.

This effort has been dubbed the Cinderella Program, because as it turns out, the employees in it are all female, and their jobs are very literally threatened by the technology.

Every five years, the fundamental technology of our business turns over. That means every five years essentially the skills of our employees have been updated and I would suspect that time frame will shorten as we approach the year 2000.

Well, like other companies in our industry, we've struggled to implement and maintain many affirmative action programs despite some serious hurdles, including the following:

One is the mismatch between our typical hiring needs. Normally we are looking for technically trained computer professionals or engineers with 10 to 12 years experience on large-scale systems. That's a pretty small pool nationally. So there is a mismatch between what we are looking for in the available talent pool.

Secondly, stiff competition from other companies in our industry, though there are relatively few qualified applicants and particularly the qualified female and minority applicants.

Third, the difficulties of recruiting nationally for jobs that are located in the Midwest snow belt. Our major operations are in Minnesota and Wisconsin.

And fourth, the actual learning curve that attends the development of those internal support systems that make a

diverse work force possible, and for the use of student interns and so forth.

What do we do about this? Well, we start with a commitment to diversity. Our corporate mission and values are recorded in a one-page statement called, "Cray Style."

It is centered around the following belief, and I will quote from the "Cray Style": "Belief in because the individual is at Cray, there is a real diversity in the view of what Cray Research really is. In fact, Cray Research is many things to many people. The consistency comes in providing those diverse people with the opportunity to fulfill themselves and experience achievement."

How does that translate into action? It means having a plan for diversity that everybody has to buy into, and frankly, that takes some time.

The chief component is internal education, and that is not something that is done overnight.

The other part of this is bringing to bear all the resources the company has, including its corporate philanthropic resources, and that's the perspective I represent. I manage the corporate giving program at Cray.

We started the philanthropic program not long after the company first became profitable, and that was about eight years ago, and decided that education was our key priority for a number of reasons.

So we set up three programs. One is a scholarship

program for children of our employees which reflects an internal priority.

The second is an employee matching gifts program. We want to encourage and empower our employees to get out in the communities where they live and work and be involved as active volunteers in local non-profits, education and otherwise.

And thirdly, we set up a direct grant program, and that's the part that the outside world looks at as our charitable giving program. It is focused exclusively on science and engineering education.

Unlike many of our fellow companies, we decided that we couldn't be all things to all people, and so we have, try to have a meaningful impact on a very narrow slice of the full range of national needs, and we chose science and engineering education.

We have been influenced in our thinking by, I think, at least four major concerns we have about science and technology education in the United States, and particularly as it relates to the role of women, minorities, and the handicapped.

Those four are the following:

First of all, in the most global sense, engineering--what we call engineering education. Like other companies in our industry, we are concerned about the dramatic shortfalls nationally of the number of individuals who are trained in the engineering disciplines that form the backbone of our

companies, and hence the country's technological competitiveness.

These talent shortfalls are particularly critical, as it turns out, in electrical engineering and computer science, a business we know fairly well [BELL]--now I'm in trouble with time.

These shortfalls are predicted to continue into the nineties. What can a company like Cray do about them?

Well, our number one priority is to fund undergraduate scholarships in those disciplines with an emphasis on women and minorities in particular.

We think responding to the talent pool problems that you heard described by the previous speaker is the single most important thing we can do.

In addition, we make other grants and get involved in other organizations that are working on the same issue from a national perspective, like ASIS and NACME, and we also complement the scholarship giving by a number of departmental grants at selected colleges that go to the minority engineering programs, and particularly the pre-college components.

The other three areas that I wanted to draw your attention to, very quickly, are:

Faculty shortages, one of the major problems of the talent shortfall nationally is the shortage of trained faculty members, and that's true very broadly. It's particularly true for women and minorities.

Part of the problem, of course, is that we in industry are creating the problem by offering such great attractions that our best candidates are not choosing education careers.

We are beginning to realize that we are eating our own seed corn by doing that. And so trying to address that problem by essentially funding individuals and offering incentives to encourage them to go on for graduate degrees, and then consider careers in teaching.

The speaker before me I think was terrific, and I laid down a terrific program for all of us in industry to follow, and I couldn't agree more with the four key points that he made: the talent pool, the skills, the yield, and the retention.

He singled out, in one of your questions, was about K-12 aspect. We couldn't agree more, and I think that all of business is beginning to realize that education is all one system and, in fact, we at Cray often argue among ourselves about whether our money, our charitable giving money, might well be best spent on early science and math education, say K-3.

By being here today, I am missing a conference that Cray is cosponsoring back in Minneapolis on "Work Force at Risk Because Our Children Are at Risk." That's really focusing on not only K-3, but preschool as well.

I think what we are seeing nationally is increasing

business interest in K-12.

Academic preparation and career orientation you have already heard a lot about today, and I would simply emphasize that and say that those of us in business need to be more creative, not only in helping fund and get involved in the kind of programs you have heard about, but I think also educate our employees and get them involved in the local schools.

That, in fact, may be the best single thing that we can do to support education at the local level and K-12 level.

So with that, Mr. Chairperson, I will stop and answer your questions.

MR. OAXACA: Thank you very much. Questions please. Ms. Winkler.

MS. WINKLER: About your point about your work force becoming obsolete every five years is very interesting. Do you have a sense of how widely held that thought is? It has all kinds of implications for people who are almost having second chances, too [INAUDIBLE] people becoming obsolete

MR. SHACKELFORD: I don't know how wi hat is. It is a reality for us. Cray is in an unusual bus s. We are in one small segment of the computer business. It happens to be the highest of the high-tech end of that business, and so we see a situation very dramatically.

I think, however, that that is true much more generally, and certainly in technology-intensive industry. So what is happening for Cray is probably going to happen for

other technology-based companies, maybe a little farther out.

MR. OAXACA: Mr. Ernie Reyes.

MR. REYES: A member of the Fortune 500 club, you as the chief executive [INAUDIBLE]. Are you willing to tell us how much you pass on in grants on science?

MR. SHACKELFORD: I sure am, yeah, and we're not [INAUDIBLE]. Yes, we distribute about a million and a half dollars last year through that program. That represents about one percent of our pretax net profits.

As a company, we have said that for all of our charitable giving, we will devote one and a half percent of our pretax profits, and we are on our way to being in the two percent club by 1990.

We happened to be headquartered in Minneapolis-St. Paul, which is a great area for corporate giving. There is a very positive peer pressure on companies there to get on the bandwagon, do corporate giving, and set an ambitious goal.

But nationally, of course, less than half of all U.S. companies do corporate giving, and the national average is something like one-half of one percent pretax.

MR. REYES: That's why I'm asking is whether you set a goal.

MR. OAXACA: Yeah, I know that my corporation is about one and a half percent of the same number.

MR. LINDER-SCHOLER: Which puts you out in front.

MR. OAXACA: Yeah. Any other questions? Dr. Shirley

Malcom.

DR. MALCOM: I just wanted to underscore your concern about pre-K. We are working with a number of community-based organizations, and one of the things that we're working on with one of these community-based organizations is to actually develop appropriate, age-appropriate curriculum for use in early childhood in mathematics, science, and technology education, and also appropriate kinds of training efforts.

And I really think that it really must be continuous pre-K through, because of these kinds of concerns.

MR. LINDER-SCHOLER: I would agree and hope that you're--those of us in the corporate world, our most natural interest, of course, is at the higher ed level. That's where we hire. But I think gradually companies are realizing that they need to look earlier and earlier in the system, and we'll get there.

MR. OAXACA: Herb Fernandez, please.

MR. FERNANDEZ: On the same subject of K through 3, what can the universities do to improve the quality of teachers at that level, that teach at that level?

MR. LINDER-SCHOLER: That's a terrific question. I think there are a number of challenges. I have been struck by the fact, and surprised by the fact, that there has historically been such a gap between higher ed and K-12, just for starters.

We found in Minnesota and Wisconsin, acting as a sort

of lever or convenor, that it is frankly difficult to get higher ed and K-12 educators together to talk in common about issues that any one of us wants to lay on the table.

So that is maybe step number one. Then secondly to deal with teacher training issues, the training of elementary teachers.

From our perspective, teacher training--or staff development, as it is called--is key, and so a number of the grants that we make are in that area. Beyond that, I guess I don't have any [INAUDIBLE]

MR. OAXACA: Norbert Hill.

MR. HILL: Could you comment on the climate in corporate giving in relation to the impact of Black Monday. Can we look for things to get better or worse or stay the same?

MR. LINDER-SCHOLER: That's an unfortunate phrase for starters--Blue Monday or whatever.

I don't know. My sense is that over the long haul it is not going to make that much difference. I suppose you could argue what is the asset base of the major foundations and was that significantly impacted, and frankly, I don't know what the answer is.

My sense in talking to colleagues is they are not changing their programs. They are not cutting budgets back. So I don't think there will be an impact.

I think one of the problems we do face in the corporate philanthropic community is the competition--I use

that word cautiously for causes, and frankly, right now science and technology education is not a faddy cause. There are other causes that are.

I think national trends in corporate grant making probably have a much larger impact on dollar allocations than one financial.

MR. OAXACA: I want to thank you for the presentation, and you have my deepest sympathies on that guy dropping the pass on the six-inch line.

MR. LINDER-SCHOLER: You win some, you lose some.

MR. OAXACA: Yeah, but you gotta dress for every game.

I would like to invite Ms. Debbie Baldridge, Discovery Learning, from Hilton Head, South Carolina, on the teaching of Native Americans at the intermediate and middle school levels.

Welcome to our Task Force. It has been a long afternoon and we thank you for your patience, and we thank you for your time.

MS. BALDRIDGE: Thank you very much. First, I would like to make one little correction. I was co-founder and director of an organization named Discovery Learning for 10 years, but I am no longer connected with that organization and haven't been for a year and a half.

MR. OAXACA: Well, we have the Executive Director right here and she will be properly chastised.

MS. KEMNITZER: What are you doing now?

MS. BALDRIDGE: I am an independent consultant, continuing the same sort of work in schools throughout the country.

My testimony is based on 12 years of working with minority students and their teachers in schools throughout the country, as I said.

My goals have been and continue to be to improve the logical and critical thinking and reasoning skills of students, to improve their communication skills, to motivate students to pursue an education sufficient to enable them to compete shoulder to shoulder with anyone in any sector of our society, and to generally prepare them to have equal access to employment opportunities, particularly in the science and engineering fields.

My vehicle for pursuing these goals is directed discovery instruction, and the setting is the mathematics and science classroom.

I have worked in inner-city schools in many cities and in isolated rural schools on Indian reservations in about 20 states.

My experience is mostly in the middle grades, fourth through ninth, but includes some work with preschool to undergraduate courses, and of course, graduate-level workshops for teachers.

The target segment of my comments today is the

thousands of American Indian students in the middle grades in schools and reservations across the country, from Maine to Alaska, Arizona to Florida, and lots of states in between.

And what have I learned in all this experience?

First, something about expectations. Students meet expectations--theirs, mine, yours, if they know them--whether it has to do with achievement, following directions, discipline, whatever. If you constantly expect high performance, you will get it.

Secondly, students are capable of much more than most teachers expect of them.

And third, students rarely achieve more than is expected of them.

An example which illustrates all three of these truths I observed as recently as last week on the Menominee reservation. Learning disabled students in special classes were told they were on a second grade reading level and struggled with those classes with a primer.

Yet in the regular sixth grade class, they made As in science and other subjects using sixth grade textbooks and sixth grade teacher instruction, because the sixth grade teacher said they could do it.

Virtually all students can learn to reason, but fewer and fewer are expected to before they graduate from high school. They have been required to remember and spew back on tests innumerable bits of information, but not to think beyond

the most rudimentary level.

Some teachers ask great questions, sometimes, but then they ruin the situation by answering themselves. They are depriving their students of the exercise of struggling to find the students--the solution--for themselves.

Students' curiosity, creativity, and brilliance are often squashed by teachers. Teachers are afraid to deviate from the prescribed curriculum.

This precludes the opportunity to seize serendipitous ideas brought forth by students.

Students quickly lose interest if work is too easy or too hard, but they enjoy grappling with increasingly challenging work. More often than not, students are bored because the work is not challenging enough, or it is too predictable.

The media has made getting and keeping students' attention harder. Everyone knows that since TV, videos, and movies are so flashy, splashy, eye-catching, and entertaining that teaching by the book and lectures doesn't compete anymore.

The challenge to teachers is greater than in the old days when they were the only show in town. But they have several distinct advantages over the media.

First, they have a captive audience over long and frequent periods of time. If they bomb today, they can try a different approach tomorrow.

Second, they have a live and interactive audience.

Teachers don't take advantage of this. They act like TV announcers with no opportunity for feedback.

It is a lot harder to hold attention when the only communication is one way, and when the only participation is listening or seeing or reading.

It is much easier to keep students interested and alert, awake and thinking, if they are doing something actively and interactively, and the students feel better about themselves.

The student who follows class discussions and receives positive reinforcement for his or her participation, whether it is guidance and a boost for being on the track, or a pat on the back for hitting the bull's eye, he feels good about himself for being at the right place at the right time, doing the right thing, and having a one on one relationship with the teacher.

Similarly, most students I have encountered would rather do a science experiment than watch a movie, a film strip, or a videotape.

Students continue to question why they have to learn mathematics. The typical answers continue to be unsatisfactory. If the teacher says they need it for college, then the students decide they don't want to go to college.

If they say it's needed for a list of professions, students discard those professions as options for them.

Mathematics has to be taught as an end in itself to

these students, not as a means to an end.

Most students are unaware of the myriad opportunities in the science and engineering fields. You all have heard that a lot. You probably hear a lot of this other stuff today, too. I didn't get here until a little while ago.

They don't even know the names of most positions in these fields, much less do they have any idea of what these people do.

One fifth grade student on the [INAUDIBLE] reservation a week or so ago in Wisconsin said she wanted to be a scientist because her teacher made her like science.

That's good. Then she asked, is an astronomer a scientist?

Most minority students have an "I can't," rather than an "I can" attitude, particularly the Indian students. This seems to be due to five things.

I have already mentioned low expectations--that's number one. Teachers don't think their students can, nor do parents think their children can. So naturally, the students don't think they can, whether they are referring to achievement in mathematics or in matriculation into college or a pursuit of a profession.

Number two, there are no role models in the community. Most reservations have few, if any, native members who are scientists or engineers working on or even visiting the reservation. Students seeing no role models think it can't be

done.

Number three, there is low or no exposure to even non-Indian scientists and engineers. Students with no exposure to something certainly can't have access to it.

Number four, there is little, if any, exposure to fellow tribal members who are successful in college in any area. Again, if none have gone before them, they think they can't go either.

And number five, they are ignorant of the achievements of their ancestors in the areas of science and engineering. By not identifying with the great achievements of ancient indigenous people, they think they can't. Rather than the truth that not only they can, but their relatives for centuries have been known as outstanding scientists and engineers.

Youngsters don't become mathematics, science, or engineering students in college without an appetite whetted early enough to prepare them in high school.

It is well known that elementary teachers rarely have more than one or two science courses in college and about the same in mathematics. They didn't like or avoided those classes as students and they avoid them as teachers.

Therefore, their students are neither turned on nor prepared for junior high math and science. These teachers and students must play catch up.

In small communities such as Indian reservations, the

schools--in the junior high schools, the teachers are generalists as well and no more eager or prepared to teach mathematics and science than elementary teachers.

Therefore, the students carry their lack of enthusiasm and lack of preparation to high school, where, for obvious reasons, they take a minimum requirements in math and science, and thereby obviate any opportunity to pursue these avenues in college.

These 10 items I have mentioned are those that came to mind as I prepared for this testimony and I'm sure there are hundreds more [BELL], but with the ring of the bell, I will go on to a few suggestions.

What is needed to approve the educational attainment of American Indians as they are--so they are prepared to pursue careers in science and technology?

Teachers and, if possible, parents must have higher expectations of their students, their children. Teachers must teach and require students to think, not just to listen, watch, read, and memorize. Logical reasoning skills can and should be taught through inquiry instruction.

Teachers must be flexible. They must be willing to postpone their preplanned lessons in order to acknowledge and encourage students' creative ideas.

Teachers must challenge students more, both in difficulty of material and variety of approaches.

Teachers should involve student more. That is,

instruction needs to be more interactive. Students should experience the frustration of having to try different methods or paths before the solution or accurate conclusion is found, just as they should experience the euphoria of finding the answer to a difficult question on their own.

Mathematics needs to be taught in a manner that is interesting enough for it to stand on its own. If it is taught in a directed discovery manner, students love it. If it is taught by lecture and text assignments, it is usually drudgery.

Much greater exposure to opportunities in the science and engineering fields is needed.

First, teachers need greater familiarity with what the options are, so they can weave career awareness into daily lessons.

Second, scientists and the engineers should visit schools--elementary and middle schools, not just high schools--to talk about their work.

The route to access to careers in science and engineering needs to be made clear from the fourth grade or earlier.

College and high school students and professional role models should visit middle and elementary schools to talk about their successes and failures and what they did to help them get where they are and what they would do differently.

Elementary teachers must be better trained in mathematics and science in order for them to instill enthusiasm

for these subjects in their students.

Both understanding of basic principles and the pedagogy needs upgrading. Furthermore, teachers must learn to allow and encourage students to explore and to discover for themselves areas in science and engineering which may be unfamiliar to the teachers.

Students need to be taught about their ancestors' science and engineering feats. When students learn about the astronomical accomplishments of the [INAUDIBLE] and the Mayans in the fields of astronomy and architecture, for example, and they realize that these are their people who have engineered these miracles, it instills a positive attitude about their own potential.

In conclusion, young students and their teachers must be reminded that brilliance and success in mathematics, science, and technology are in their genes and that they must be given the training and opportunities to roll up their sleeves and get on with it.

Thank you.

MR. OAXACA: Thank you. Ms. Winkler, question.

MS. WINKLER: An excellent presentation, some very interesting ideas.

MS. BALDRIDGE: Thank you.

MS. WINKLER: One thing I would like to pursue a little bit more. In the Department of Education, we are I think right now completing a study which did some testing of

Indian children and found that they had--that their ability tests and achievement tests, I mean abilities were above average and the achievement was below average and increasingly so, none of which is a surprise to anyone here.

The thing that wasn't coming clear to me in that study and you are getting at a little bit is what is going on in those schools on a day-to-day basis that's causing kids to achieve so far below their own natural abilities, and there is something, a lot of the things you are talking about to many, many disadvantaged children.

MS. BALDRIDGE: You're right.

MS. WINKLER: Not distinct things about Native American kids.

MS. BALDRIDGE: Well, the one thing that occurs to me immediately that I didn't mention was a little bit of history. And on many Indian reservations there was no respect for formal education as we know it, and I think that is a major difference.

The other things that are included in the testimony and in the written as well are all there and they are maybe magnified on the reservation schools.

And one other major difference, I suppose, is that probably the majority of the other minorities--pardon that little pun--are in cities. They are in areas of high population and there are a lot of, all of us, and a lot of things going on around.

There are engineers and scientists that they run into on the street. They can't help it.

But most of the Indian students are in schools that are very, very, very isolated, and not only there are not major industries nearby, but there are not even major college or university institutions nearby for somebody to run out and do a program for them or for them to be bused to a program. They are three hours from the nearest airport in many cases.

So the isolation and the historical lack of support for education probably are the two biggest factors.

MS. WINKLER: What about [INAUDIBLE] teachers in those schools? Are they like other teachers or different?

MS. BALDRIDGE: Yeah, they are like other teachers. It varies from school to school. Very few of them have all Indian teachers. Most of them are teachers like you would find in any school anywhere else, I suppose.

They are trying to have more Indian teachers, and some of them have been very successful and some have no Indian teachers at all.

MR. OAXACA: Dr. Alan Clive.

DR. CLIVE: Yes, my background is teaching history at the college level, and there we found the results of what the Education Department has found in some of the studies about the vast ignorance of the American school child generally about the history of our country.

Now, you are the expert and I don't mean to challenge

you, but frankly I find it mind-boggling that kids would identify with something that happened centuries, I mean centuries ago.

The average American school kid, according to these studies, thinks that Watergate happened in the 19th century and that, you know, the Great Depression was something that happened when somebody stepped too hard on something.

Can it really be true--and I assume you are talking about elementary school kids--really identify and draw meaning from things that happened to--I mean we are even talking about a different continent. People are, you know, at least a much different part of North America when we are talking about the Mayans. Do they really draw that much meaning from things that happened so long ago?

MS. BALDRIDGE: Your question is can they draw meaning from the Mayan achievements?

DR. CLIVE: From the Mayan, from the pueblo builders, from the mound builders and so on--does that really mean that much?

MS. BALDRIDGE: I think it can be instilled in them that it is their ancestors that--one of the examples that I use is much closer to home for many of these, the [INAUDIBLE] people are the ancestors to the pueblc people, and they live amongst these achievements, they see them, and they can imagine, have difficulty with [INAUDIBLE] accomplish what they really go out their doors and see.

And if they are, if it's brought home to them that these are their people and they have the capability of doing the same, I do think that that's possible. I don't think it is the capabilities of the students that is the problem that the tests are showing, I think it is the instruction.

I saw yesterday in the newspaper where 65 percent of second graders think the world is flat. I don't think that is through--that may have something to do with their perception, but I think most of it is the teachers assume they already know it, so they don't teach it.

MR. OAXACA: Any other questions? Mr. Norbert Hill.

MR. HILL: I would ask something--if you could change anything in the process of teacher education, you were the headmaster of all the teacher education, what are some of the suggestions you would try to--not only for Indians, but for all minorities?

[INAUDIBLE]

MS. BALDRIDGE: I think there need to be changes both at the pre-service and the in-service level, but there are so many teachers out there right now that need upgrading in those areas that I mentioned, that I think just a much greater, more massive effort to involve all teachers in better quality in-service training is what my desire to be.

In fact, I would like them all to use, be trained in interactive instruction. My main sorrow is that the teachers are not teaching the kids to think. It's just not there, and

it can't be taught by lecture. It can't be taught out of a book.

MR. OAXACA: Thank you, Ms. Baldridge, for your presentation, for your intensity, you're committed.

MS. BALDRIDGE: How could you tell? Thank you very much.

MR. OAXACA: How [INAUDIBLE] healthy?

MS. BALDRIDGE: I have to admit I was on a beach yesterday and a sailboat for four hours the day before--working, working, writing my testimony.

MR. OAXACA: [INAUDIBLE] Thank you so much for taking the time.

MS. BALDRIDGE: Thank you.

MR. OAXACA: Our final speaker that's programmed to speak is Dr. Charles Meredith, the Chancellor of the Atlanta University Center and Corporation, and then we will have two three-minute talks by people that were not listed before.

Dr. Meredith, a very warm welcome to you from the Task Force, and I gotta believe you had a lot to do with our wonderful hospitality here, and we thank you.

DR. MEREDITH: Thank you so much. Mr. Chairman and members of the Task Force. I am very pleased to have an opportunity to address you this afternoon and I think it is appropriate that I come at the end because I have before me the answers to all of the problems that have been [laughter].

I am very serious about that. I am here to talk to

you about the implementation of a program that is entitled, "Long-Term Activities for Minority Institutions in Science and Technology."

But first I want to make a few remarks about the general problem of the underrepresentation of minorities in science. It is a great problem, destined to become critical if definitive and effective measures are not immediately taken.

The effects of this underrepresentation with respect to the nation and the minority community are difficult to measure quantitatively. However, it is certain that the nation is denied the talents of million of Americans' minds, and they are in turn denied the opportunity to participate in the new technologies that are reshaping our lives and the world.

The social impact of technology is more evident now than ever. The decisions to be made in the environmental sciences and biochemistry and computer technology have as much impelling social effect as scientific significance.

The problems of chemical and radioactive waste disposal and their effects on the environment, exciting as well as frightening possibilities of gene manipulation, and the management of massive amounts of information as provided by new advances in computer technology will all impact the minority community.

The decisions made in this area will, in many cases, directly involve the minority community, and as such, the minority community must participate in both the solutions of

these problems as well as the final decisions.

The widening high-tech gap between the majority community and the minority community has the potential of seriously diminishing the accomplishments of the civil rights movements of the sixties.

We are faced with the possibility of the creation of a second-class citizenry who instead of being denying the right to vote will be denied the opportunity to participate in and to make decisions about and to profit from the advancements in science and technology.

With a little imagination, one can envision the already disastrous unemployment rates of blacks and other minorities increasing as more and more technical jobs replace non-technical jobs.

As Dr. Martin Luther King stated, who was an alumnus of this exciting AU Center, "The final solution to civil inequality is to be found in education and economics."

You have been given statistics on the disparity between the minority and majority populations in terms of holders of B.A.s, M.A.s, and Ph.D.s, I won't repeat that.

But what I would like to share with you is that about four years ago a task force under the sponsorship of the National Science Foundation was convened at the Lake Area Conference.

We brought together some of the nation's top scientists and science educators for a week and we developed

this document that is called, "Long-Term Activities for Minority Institutions in Science and Technology."

There are several members on your panel who participated in the development of this document.

Specifically, the document goal may be stated as, "The establishment of a nationally competitive effort by selected institutions that will make a significant contribution to maintaining the preeminence of the nation in science and technology."

The effort, as outlined in here, was divided into four components: pre-college programs, undergraduate programs, graduate programs, and cooperative programs.

And it was hoped that this effort will provide a totally integrative approach to increasing the pool of minority scientists, improving the quality of faculty at all levels, improving facilities, expanding resources, and providing strategies to secure, as well as sustain, funding for these programs.

The pre-college component and recommendations contained here relative to that include the development of national education research centers at the pre-college level.

Examples of this was the development of demonstration centers for minority education. Sample projects included local school improvement and implementation projects, teacher renewal projects, research and development in math and science at the pre-college level.

Also included here was faculty and program development at historical black colleges for undergraduate science education programs.

In addition, we wanted to--it is recommended that efforts be devoted to strengthening the magnet and special schools as well as developing comprehensive science achievement programs.

Most of this--I've been in and out today--and most of this I have heard as I have come in and out to hear what's going on, and that has been mentioned by several speakers.

The next component, the undergraduate component was designed to increase the quality of science instruction and research opportunities available to minority students, particularly those enrolled in predominantly minority colleges and universities.

To address this concern, we presented an important plan scanning two years, focusing on the creation of a first-rate undergraduate science program at selected institutions.

This program would involve identifying 15 minority institutions through a competitive process, each of which would recruit 50 outstanding minority students, for a total of 750 students to participate in the high-quality, academic science program.

It was projected that of the original 750 students, 375 would complete the undergraduate programs in the areas identified as the quantitative-based sciences--mathematics,

chemistry, physics, computer science, etc.

Two hundred of that 375 would be admitted to Ph.D. programs, and a conservative of 120 of those would complete the Ph.D. degree in a quantitative-based science field.

That's to be compared with less than 40 Ph.D.s that are now being produced from all sources.

The institutions that would be eligible to compete for one of these programs would have to currently offer a B.S. degree in at least four of the following areas: biology, chemistry, physics, mathematics, and computer science.

At least 50 percent of that faculty should have the Ph.D. degree. At least 30 percent of the faculty should be actively engaged in research and publishing in refereed journals.

After the end of the 10-year period, it is projected that each of these institutions would offer a degree in computer science, that 75 percent of the faculty would have the Ph.D. degree, and at least 60 percent of the faculty would be actively engaged in research and publishing in refereed journals.

The other two components was graduate research. We took the position that if we are going to impact the number of minority students receiving the terminal degree in the quantitative-based sciences, then we must provide resources to strengthen those minority institutions that are on the threshold of being qualified to offer terminal degrees.

If you check the record, you will find that most of the baccalaureates awarded to minority students in science--in the quantitative-based sciences come from these minority institutions.

We feel that given the proper support that we can identify at least four or five sites around the country where if sufficient resources are made available, these institutions would produce--could develop strong doctoral programs.

And it is our view that if we don't do that we are not really going to have a major impact on the output of terminal degrees in the quantitative-based sciences.

The other area involves what we call cooperative programs. There, the report recommends, "Relationships established the majority universities and minority universities, and some of that is already taking place.

For example, in Atlanta here, the Atlanta University Center is closely tied in with Georgia Tech in several research programs, joint faculty appointment, professors here directing research for our students at Georgia Tech and vice versa.

We also talked about relationships between the universities and colleges and the national laboratories. That is being done to some extent across the country, as well as relationships between the universities and colleges and private industry. [BELL]

So we think that this document speaks to a 10-year plan that is a totally integrated plan that deals with pre-

college, undergraduate, graduate, and cooperative programs.

And the cost of this 10-year program is also outlined. Also a mechanism for external evaluation of the program is also outlined.

So I will deposit this with the committee, as well as my written statement, and I am prepared now to respond to any questions that you might have.

MR. OAXACA: Thank you so much for your testimony. Ms. Lee-Miller.

MS. LEE-MILLER: If you were going to advise the President on what kind of executive order he should issue to respond to this crisis in kind of a, you know, one, two, three layout, what would you advise?

DR. MEREDITH: First of all, I would hopefully have in hand some program that would be specifically targeted to the problem that would have been cost out, and I would say that we have estimated that to solve this very serious problem is going to cost a lot of money.

And I am talking about $100 million is what we are talking about here, over a 10-year period of time.

And until we make that kind of commitment and that kind of investment, we are going to be here again year after year talking about ways to increase the production of the underrepresentatives in science and technology.

So my recommendation would be that there has to be some plan that is generally accepted among the educators and

scientists and that it has to be well thought out, it has to be one that will allow for external evaluation, and that it has to be financially supported.

MR. OAXACA: Is that 100 million or billion?

DR. MEREDITH: A hundred million.

MS. LEE-MILLER: How would you respond to it if the response was, well, what if we were to take the existing resources that are going into this area anyway and target them specifically for science and technology, not adding new money, but taking existing money but focusing it.

DR. MEREDITH: That is exactly what is called for in this program. This program--research that we did suggested that the monies already exist, that it would not require any new legislation to create new dollars, that this program could be implemented with existing dollars and we have worked that out as well in the document.

DR. JENKINS: Were you thinking about Title III monies when you made that assessment?

DR. MEREDITH: We were talking about Title III monies, as well as monies that are in existence in the agencies and their programs that they are doing, as well as the research dollars that have been set aside for these kinds of activities.

MR. OAXACA: Mr. Norbert Hill.

MR. HILL: Just curious--did you submit that to somebody and what happened?

DR. MEREDITH: Oh, yes. As I said, this was financed

by the National Science Foundation and I think that a lot of people shied away from it because of the dollar tags that were associated--that's associated with it.

But I am happy to say that the National Science Foundation did take one of the recommendations that we, that's contained in here and included that in their 1987 fiscal year budget, and that was the minority science centers in science and engineering.

That is one of the recommendations that came out of this document and we were very pleased to see that that was taken and was included in the budget, and it has been implemented and there have been at least three centers established with three more of them coming on stream this year.

MR. HILL: I find the cost projects you make very modest actually and [INAUDIBLE] I can't understand why...

DR. MEREDITH: Well, these are 1984 dollars. [laughter] But actually we were very careful at that time.

And we also made the observation that while we have to work at the pre-college level to increase the pool of applicants for the quantitative-based sciences, we identified from the existing high school graduates that there were enough students who had sufficient test scores and other evidence that they would be successful in science for us to begin the undergraduate implementation immediately.

And I do think that our estimates in terms of attrition were very modest. We talked about 750 students

starting out and only 120 on the other end, getting Ph.D.s, with 375 going into graduate school. And graduate school attrition is not really that high, but we made allowances for students electing to go to medical school, dental school, electing to go to work, etc., who would finish college but would not end up with a terminal degree in the quantitative-based sciences.

MR. OAXACA: Ms. Bishop.

MS. BISHOP: This may be an impromptu question, but given that you have spent a lot of time developing this report, and this being a presidential election year, do you have any thoughts or suggestions as to how something like this might be proposed to someone, someone in terms of how this crises might catch their eye.

Again, I go back to the statement that if we are not dying in the streets then no one will recognize you--they just step right over.

So I'm just wondering if you have any thoughts off your head in terms of how we might sell this idea--if not your idea, the whole concept of we need something in a hurry.

DR. MEREDITH: I don't have any ideas off the top of my head, but I do think that it's an important issue, that we should all try to get it included on the agenda of all those persons who are now offering themselves as candidates.

As I said, this was in 1984, and at that time, that was an election. We tried then to--and we did meet with some

of the candidates at that time and presented this to them.

I don't have anything off the top of my head, but we haven't done anything to date specifically, but you're correct. We should be doing that.

MR. OAXACA: Any other questions?

MS. LEE-MILLER: I've got one more. Our mandate deals with disabled, women and minorities other than just blacks. So what is your response to the concern that this particular proposal would only address the black population.

DR. MEREDITH: No, no. I didn't mean to imply that. We specifically used the word "minority," and we had both majority, minority, the whole spectrum represented in the committee that put this together.

And the 15 institutions that we talk about targeting at the undergraduate level would all not--they would not all have to be predominantly black institutions. We would--the 15 was used to generate the dollar, the cost, but what we wanted to do was to identify institutions who already have demonstrated the capability of producing competitive students, and not to have to reinvent the wheel.

We would get the ones who demonstrated--and to select 15 that would meet the criteria that we established, they must have some minimum criteria at the outset and then through faculty development, we would hope that after the 10-year period would not only produce more students, but would also increase the quality of the science program at the institution.

And we would hopefully be able to identify 15 new institutions.

MR. OAXACA: Thank you so much, Dr. Mered th, and thank you again for some of the hospitality, and don't forget to leave us those copies.

We are now on for the three-minute people. You will get a bell at two minutes, and I would like to call and welcome Dr. Isabella Ann Finklestein, who walked us over to the great lunch. She is the Chairperson of the Biology Department, Clark College and the Atlanta University Center, and the Program Director of UMARC.

Welcome to the Task Force.

DR. FINKLESTEIN: Thank you very much, and thank you for the opportunity to present a few comments.

The program that you heard described by Chandra French this morning is the Undergraduate Minority Access to Research Careers program. It is funded by the National Institutes of Health, the National Institute of General Medical Sciences Institute.

I might mention that you show two members on your Task Force from that institute at NIH, so you might pull on them for some information if you think it is worthwhile.

The Atlanta University Center was funded in 1977 with a grant from NIGMS. The UMARC honors program includes students from the four undergraduate schools--Clark, Morehouse, Morris Brown, and Spelman.

The goal of the MARC program is to increase the number of minority college students that pursue advanced degrees leading to careers in biomedical research.

Participants are honor students or higher, with a 3.0 GPA or higher, majoring in biology, biochemistry, chemistry, mathematics, physics, or psychology who desire a career in biomedical research.

The program includes academic enrichment in terms of courses that lead to research as well as research experience itself. Each student is required to be involved in research in their junior and senior year on campus and an external research site during the summer after their junior year.

To date, the students in the MARC program have had research experience at 23 universities throughout the country, four industries, and six national laboratories.

This past year we have had 30 requests from student--from institutions throughout the U.S. to bring MARC students on their campus for the summer to train them.

Obviously, these institutions view this as an excellent mechanism for recruiting superior graduate students.

The AU Center MARC program is in its 11th year. It has grown from eight trainees in 1977 to, currently, 24.

The impact of the MARC program is evidenced by the success of its graduates. Eighty students have graduated from the program; 85 percent have entered graduate or professional school; 50 percent, M.D.; 9 percent, D.D.S.; 29 percent, Ph.D.-

M.S.; 4 percent M.D.-Ph.D.; and 5 percent M.D.-M.S.

This past August our first graduate completed her training at M.I.T. and returned to Spelman College, Dr. Jan [INAUDIBLE], to teach the students there, and is providing a valuable resource for our current MARC students. [BELL]

We have graduates in the final stages of their dissertation at Princeton, New York University, University of Georgia, University of Southern Illinois, Stanford University, among others.

The MARC program, we feel, is a model program for training biomedical research scientists. It could be duplicated by other federal agencies to increase the number of minorities pursuing research careers.

These agencies could establish programs that correspond with their mission. NIH is biomedical research. The agency could correspond with the mission that they have.

It is significant to note that the number of doctorates awarded to blacks has dropped 27 percent between the years of 1977 and 1986--27 percent, 50 percent among black males.

Although other underrepresented minorities have not shown this drastic drop, the number of Ph.D.s awarded to minorities in all scientific areas is considerably below their representation in the population.

New programs must be implemented that will address this disparity. We propose the UMARC honors program to be used

as a model for other agencies. After 11 years, it is working. It has been evaluated by outside agencies--the National Academy of Science, the National Academy of Engineering--by evaluators external to the NIH.

It has proved highly successful and other agencies should tie into this model.

When NIH started the program, NIH did not have authorization to work with undergraduate students in this fashion. Legislation came about to make that possible. So the idea that your agency doesn't have authorization to work with undergraduate students is insufficient to those of us who feel that that program can be successful if people are committed at the agency and want to see it work.

The program does provide students with a $5,000 a year stipend plus all tuition fees, so it is a very beneficial program for the student, but look what it produces.

MR. OAXACA: Thank you. That's a wonderful program. Any questions for Dr. Finklestein? Thank you so much for your testimony.

DR. FINKLESTEIN: If any of you would like to see my 24 MARC students, I'm going to see them--we meet tonight.

MR. OAXACA: You're going to have to work on your marketing, you're not pushing enough. [laughter]

I would like to ask our last testifier today for the three minutes, Dr. Melvin R. Webb, Professor of Biology, Clark College, and a colleague of Dr. Finklestein's, I'm sure,

welcome to the Task Force and thank you for being here late and being patient, and thank you for your time.

DR. WEBB: Thank you very much for the opportunity and it is fitting that I be the last person to present testimony because I really think that I have something that you will be interested in.

I think that it's important for us to understand that central to maintaining a sufficient number of scientists and engineers is establishment of a substantial pool of pre-college students capable of and interested in pursuing studies leading to scientific and technical careers.

We know that these things will not happen automatically. What is needed is an approach that is both cost-effective, provides short-term solutions, while building for a solid future.

One such approach is to establish enrichment programs, or pre-college intervention programs starting as early as the third grade to expose students to academic programs in science and mathematics and computer science, communications skills, while at the same time establishing intervention programs at the high school level and at the pre-freshman college level.

Long-term results will come through the establishment of innovative pre-service teacher programs in science and mathematics that will provide a sufficient supply of teachers to ensure that all students in this country get a quality pre-

college education in science and math.

And I would like to devote the rest of my 15 minutes to talk about, especially a program that we have been doing at Clark College here at Atlanta University Center for 10 years.

That program is called the Saturday Science Academy. It is an enrichment program for students in grades three through eight. Since 1978, we have enrolled some 3,000 Atlanta area students, and the numbers could easily been doubled had we had sufficient funds to provide the program.

The program itself involves instruction in laboratory science and mathematics, computer science, and creative expression.

Now, one of the important things about the Saturday Science Academy is that nobody talks to the entire class more than three minutes. It is a hands-on activity-based approach to education and it works.

And it's very rewarding to me and to those people [BELL] who have seen it to find out that black kids on Saturday mornings jumping out of their seats to answer questions in mathematics while the rest of the world is going crazy watching cartoons.

I will just hold up very quickly a picture of a third grader raising her hand higher with the help of another hand to get the teacher's attention, and this is on Saturday morning in a mathematics class. It works.

Another program that we have had quite a bit of

success with is the Summer Science, Engineering, and Mathematics Institute for High School Students. That is an eight-week residential program where we bring in students from all over the country.

These students are in grades 10, 11, and 12. The student is enrolled in an academic program that includes a laboratory science, mathematics, computer science, and scientific communications.

Since 1979, we have had 350 students participating in this program; 100 percent of those participants went to college; 94 percent of those students majored in a math-based curriculum, which includes engineering, mathematics, computer science, biology, and chemistry.

Of the remaining 6 percent, some of them at the last check were undecided about their majors, and we found out that a couple were interested in art. We pushed them into medical arts, illustration, so we are going to count them in our statistics, too.

We have for you a program, I think, that has been as successful as any program in the country, and I think it addresses the problem at a point where it is very critical if this country is going to solve the long-term solution about providing adequate numbers of scientists and technologists.

Thank you very much.

MR. OAXACA: Thank you very much, Dr. Webb. Ernie Reyes, question.

MR. REYES: The summer science program--how is that funded? How is the selection process?

DR. WEBB: Well, it was funded originally as a part of a comprehensive program called the Resource Center for Science and Engineering. It was the first program established in the country, funded by the National Science Foundation.

As a matter of the fact, the illustrious President of Clark College, Dr. Thomas W. Cole, was the first Director. I inherited the job after he was kicked upstairs as Vice President of Academic Affairs at Atlanta University.

The nice thing about the Resource Center for Science and Engineering as a program was it provided a source of support over a short period of time--five years, four years originally, which is a lot better than the traditional one-year funding program.

But it allowed us to address the issue on a broad-based approach. We had programs at Atlanta University that address teachers, counselors, parents, and students in 1978. The things that people are talking about here today, we could show you how to do that.

We have the history. We have the track record, and we have the documentation to support it. So that one of the things that I would recommend as a part of your deliberations is to consider very strongly comprehensive programs with extended funded periods, with the opportunities to reapply for additional cycles.

We cannot solve the problem in five years. We can discover some avenues leading to those solutions, but it's going to take 10 to 15 years, and as successful as the program was here at Atlanta University, the funding ran out in five years, and there have been no programs to replace those since 1982.

So here we are representing, I think, a national resource of sorts, with solutions and programs that we can demonstrate anywhere to anybody that will work, and we cannot get the wherewithal to implement those, and it's sort of disconcerting, as a matter of fact.

MR. OAXACA: Norbert Hill, please.

MR. HILL: One question. You have been a success with the Saturday program, and I wish they could make every day a Saturday in the public schools.

That's not the case. I have been involved in pre-college enrichment programs for 15 years, and it seems to be we are still in the position to create those kinds of programs and recommend more funding for those programs to replace what the public school system does not deliver.

DR. WEBB: Yes.

MR. HILL: Like we are creating an education system around one that doesn't work, instead of making the one we have work, and we've done a zillion dollars in taxes each year.

I would just like to explore your thoughts on that because I'm not sure where we are going as a nation in

education.

DR. WEBB: See, I'm not ready to give up on public schools. I am committed to the idea that they can work. I think that one of the things that we have to do is to step back and take a hard look at what we have been doing and see where we made some errors, and then apply the new knowledge that we've gained over the past 10 or 15 years into an educational program that will produce teachers that can do the job.

I have a Ph.D. and I would be afraid to teach half of the subjects that elementary teachers are charged with teaching with four years of training.

I think we are reaping--actually are getting what we pay for, and I think it's time for us to rethink that whole situation. We have in America one-room schoolhouses under one roof, because the teacher goes into that classroom and locks the door and she's with or he's with 30 to 40 kids all day long. It really doesn't make sense.

So I think that what we get out of public schools is precisely what we put into public schools. And I'm suggesting that we put something new and different into public schools to get something new and different out of public schools.

MR. OAXACA: Ms. Winkler, and then, yeah, illustrious alumni.

MS. WINKLER: One of the options that has been kicked around among the members of the Task Force is funding of programs that work on a declining percentage basis, at least

from the federal level, on the assumption that it is very hard to start things up, but if they work and go out to other sources, state sources, local sources, industry and so forth.

Something you just said at least hints that you think that might not work. Can you comment on it?

DR. WEBB: Well, I didn't say that--I didn't mean to say that that would not work. What I meant to say is you have to extend the period of time that you want to start declining the dollars, and it's not after five years.

That will not work. That is insufficient time for you to get a program up and operating and then do the necessary things to build in the connections for getting funding to run those programs.

You see, we are still, in a lot of segments in this country, an unknown and untrusted commodity, and it is not easy for me to approach foundations and corporations to get money for successful programs that are written up in the leading journals and organs in the country.

I still represent an entity that is not to be trusted completely, you see. And that is a reality. I can live with that, and I have found ways to deal with that. I'm not bitter about it. In fact, it's challenging to deal with it in the real world.

What I am saying, though, is that you have to take--we're talking about a period of 10 to 15 years before we get to that point.

MS. WINKLER: What are the--at some point, you sort of know that that's the time when you are viable enough to make that switch. Do you have a sense of what are the conditions tha need to exist for a program?

DR. WEBB: No.

MS. WINKLER: I mean ii you don't go--it's not very realistic, federal programs, to fund something for 10 years. It just almost never happens.

I mean, but you can use other kinds of variables rather than time. What are the kinds of variables that you need to look for to know that something is at that point?

DR. WEBB: Unfortunately, in my entire career, I have never realized that point, so I can't tell you about that from first-hand experience.

I can tell you a lot about the struggle from year to year, but I have never been at a point with any program that I have ever been associated with that was at a point where it was--where we could think about self sufficiency. I have never had that experience.

I would love to do that. [laughter]

MR. OAXACA: Mr. Scurry.

MR. SCURRY: Dr. Webb, one of the committees that--one of the subject areas that we've established deals with social factors, and I mentioned earlier this morning [INAUDIBLE] about peer pressure and things of that nature.

You are a lot closer and have been over the past 10

years that you have been associated with this program to be in a position to make some judgments about some of the social factors that might inhibit, prohibit encouraging, discourage kids at the age of three on up, grade three on up, to participate and continue to pursue science and technology type courses.

Could you share with us some of your experiences there. You might help us dispell some of the myths that some of us may have that kids are being steered out of those fields and peer pressure is so great that the boys move forward and girls don't.

DR. WEBB: Let me see if I can approach that quickly. We started at the third grade with our Saturday Science Academy program simply because that was the last time in the public school experience of the students that we were looking at would score on grade level on standardized examinations.

They score above grade level in first grade and second grade. They break even in the third grade, and the best schools are in some leading school systems in this country produce graduates who score--the best schools--at 10.5 grade equivalency when they leave 12 years of school.

So that the reason we started at third grade is not because of peer pressure, but because it's the point at which we think we can give students a boost and try to help them over the hump, so to speak, to get into the fourth grade at or above grade level and I hope that that will carry over into the upper

years.

One of the reasons that I think we have so much success with the residential summer program is that we put 50 to 75 students in an environment where achievement was the name of the game and was the order of the day, and the only peer pressure that you felt was to do better than your teammate on the next examination.

I would submit that peer pressure is a tremendous factor in the pursuit of academic excellence in America today. Even at the college level, students don't like to be singled out very often for doing exceptionally well on an examination. It's embarrassing to them.

So there is something that seems, on the one hand, counter to excellence, but I think it goes a bit deeper than that, and I'm not sure I understand what all of those factors are. I do know that when you put good, competitive students together for any period of time, something wonderful and magic happens and it carries over into the next year and the next and on through into careers as scientists and technologists.

MR. OAXACA: Last question, Dr. Jenkins.

DR. JENKINS: Yes, Dr. Webb, you indicated that you had funding for about four or five years. During that period of time, were any of your ideas picked up by the Atlanta school system, the public school system.

Was any thought given to coalescing or cooperating or talking about how the program could be changed in the regular

system.

DR. WEBB: Well, the Atlanta public school system was fairly generous, as a matter of fact, in their support of our efforts. We were offered--the Saturday Science Academy, for an example, is held in a school building two blocks down the street, offered to us free of charge by the Atlanta public school system.

They would prefer for us to have it as [INAUDIBLE] Academy, which is a science and math magnet school. But you see, that school is located in affluent Atlanta, and I wouldn't want kids in depressed areas to have to worry about getting to the program.

If anybody's got to worry, let's let rich kids worry and so they come over from the other side. Kids over here can walk to the program.

So we have that support from the Atlanta public school system--free use of the building.

The school system supported our efforts to work with in-service teachers by giving them increment credit, which would help them to advance on--one step on the salary scale, or two steps on the salary scale. That benefit is still being derived by participants in the teacher education program. That was a long-lasting contribution.

They also emulated the Saturday Science Academy by creating academies in art and social science throughout the city.

Now they didn't give us any money to run the academy, but they created some of their own, and I guess they took the position that we were self sufficient or we had the wherewithal to get what we needed, you see, and it didn't come through, but we are still working with that. We have not given up.

And Dr. Cram, the superintendent of the school system, is one of our big supporters, and we have an excellent relationship with the public schools here in Atlanta.

In fact, I think most of the principals think I really work for them on their staff because I am in and out of the schools so much. That helps a lot, too. That helps.

MR. OAXACA: Dr. Webb, thank you so much for your time and thank you for taking the time to be with us.

DR. WEBB: Thank you for the opportunity, and I have some written testimony that I would like to leave for the record, if that's permissible.

MR. OAXACA: Yea, they're right here. At this time, let me make some announcements for the Task Force. There is a reception that is being hosted by Clark College to meet the Center community, and that is between now and 6:30 p.m.

At 6:30 p.m., the bus will transport us back to the Hotel Radisson.

Before we go to the reception, though, our very able writer who is over there on the flat top computer has kind of put together a [INAUDIBLE] at several meetings we have had and all the inputs that we have gotten from the subcommittees--the

first cut of the report draft, and I would ask that people look at that report as a first cut draft.

It needs a lot of work to toughen it up, to have a cogent set of implementable recommendations that have teeth behind them, and a very important factor that we are putting together in a way that it does not become a political football to be used by those folks that like to do that sort of thing.

So that it is something that is really addressing the needs of the country, and Deborah wanted to talk a little bit about the format, and Deborah, you have a mike at your convenience, or from there, however you want to do it.

DEBORAH: I just wanted to make a brief announcement, and I should have the wit to--I should have the wits to just attach a little note on the cover of the document, but since I didn't I just wanted to say verbally, Mr. Oaxaca and others have stressed, and I think the staff of the Task Force is in total agreement, that in the end we want to release a document that is as readable and accessible as possible to not only those who have been in the trenches of this issue and are experts and reflect, too, people in the political world and the corporate world, and those who may not yet be familiar with the importance of the problem and the brilliant--solutions, which we have yet to decide what they are.

So the final document we visualize at the moment to be very accessible. We want to make it very readable, very free of bureaucratese in its language, but also visually very

accessible.

And the text that you have will--I see as being just a very preliminary cut, and a text that would run along the right hand side of the pages in an easy-to-read type with occasional stresses or italics.

What you don't have, because it hasn't yet been produced, would be the material that would go on the left-hand side of the pages. The pages might be tinted or have photographs or some way of identifying them as being separate from the main text.

On the left-hand sides of the pages, of many of the pages, I am going to propose inserting what in the news business we call "boxes," and a box would be a short piece addressing the problems, for example, if the American Indian community vis-a-vis this issue, or highlighting the way certain disabled individuals have been able to become high-quality scientists, through which programs have helped them.

Or addressing specific problems of women. In other words, the Task Force's charter requires, as you well know, to cover a wide range of subjects with very individual problems.

The different groups we have to deal with face very different circumstances.

And I am proposing to deal with that by having these little boxes along the side that enable the reader to focus on certain specific aspects of the problem.

The other kind of material that would appear on these

left-hand pages would be charts or graphs that may visually [INAUDIBLE] is the captions.

In other words, the graphic material is complete enough and careful enough so that the story can be gotten quickly from that.

Now I threw in a few graphs just to give you the flavor of what's available in a pipeline chart or a chart showing the patterns of majors in different fields by our different minority groups.

But this is really intended to give the flavor, and I welcome suggestions for either material for boxes or for better graphics to go on the left-hand side.

The reason I wanted to make this little announcement was only so that people reading it would not get frustrated that there wasn't a focused discussion on women in one place, or a focused discussion of the blacks issue in one place.

That is because I visualize trying to treat all groups in as balanced a way as possible in a main text, and then focus on the specifics of specific issues in these other items, which would also be very brief.

Thank you.

MR. OAXACA: I would ask that all of the members of the Task Force at least read it through one time before we convene for breakfast at 8 in the morning. It is now called out at the Radisson Hotel in the ballroom.

If there is more than one ballroom, we're dead, but

they've told us it's the ballroom.

And it is fror 8 a.m. until noon, and Sue is going to give us an exam at 11.

We will be discussing the whole thing. We really need the ideas because we are now in the first part of the implementation stage for the interim report, which is the report that we want to get in to the system and try to get this to be part of the agenda for all the people that are running for president and get that to be something that then can have a starting off point as you do the second half of this Task Force.

After the primaries, you get a new president, and then you have set the ground work for an implementation of all this sometime after the new president gets in. Deborah.

DEBORAH: I'm sorry, I left off my announcement one item I should have mentioned. We thank--the subcommittees did a lot of work and we got all their material. We got a lot of it somewhat late in the game, and it should be no secret that, in fact, in one case it has not arrived, although I know they are doing very good things.

And so we have the reports and we do have copies of the subcommittee documents here with us in Atlanta, in case anybody who is not on one subcommittee wants to see what the other did.

But chapter 10 in the document you are receiving is--what I did was I tried to take what I understood to be the main

recommendations of each of the subcommittee reports and we organized them on the word processor under different headings.

So subcommittee members should find familiar things in here, and I tried to be very careful and not leave out anything major.

Some of them are very imaginative ideas.

So, in some cases, I had to simplify the language, and I had to use a little--it wasn't totally clear exactly what was meant, but I hope you will appreciate that that chapter 10 is the amalgam--whatever that word is--of the subcommittee report recommendations.

And there is lots of overlap, but I thought it useful for the group to see what the overlap was, because there is interesting consensus developing around certain kinds of suggestions. Thank you.

MR. OAXACA: Before we adjourn, Dr. Ann Reynolds, anything?

DR. REYNOLDS: No.

MR. OAXACA: I guess we are going to get pointed towards the reception, and once again, thank all of you for being here and for being patient.

Statement submitted to the Task Force, in writing, by Congressman J. Roy Rowland of Georgia

I am pleased to have this opportunity to commend the Task Force on its efforts to increase the number of women, minorities, and handicapped individuals who enter the fields of science and technology. I am also delighted that my home state of Georgia has been selected as one of the sites for its hearings.

Scientific and technological advances are changing the world in which we live. Historically, women, Blacks, Hispanics, Native Americans, and the handicapped have been underrepresented in these fields. Although we had made some advances in attracting these groups to majors in scientific and technological fields, there has been a steady decline in minority enrollment in these areas over the last few years. For example, a 1986 New York Times article reported that the proportion of Black college freshmen who choose to major in science decreased from 10 percent to 5 percent in the past 10 years.

Employment statistics indicated that in 1984, women represented 25 percent of the scientists in the country. However, only one in twenty engineers was female. Further, according to a National Science Foundation Report, approximately 77 percent of employed women scientists and engineers were working in science and engineering jobs. By

contrast, 88 percent of employed men were working as scientists or engineers.

The NSF Report also indicated that in 1984, only two percent of all scientists and engineers were physically handicapped. Although the employment rate for the physically disabled in their chosen fields was relatively high (87%), women and minorities who happen to be handicapped face even greater obstacles to access opportunities for careers in science and technology.

The downturn in the progress of women, minorities and the handicapped may be traced to policies initiated during the past seven years. Under this administration, federal programs that have enabled many who otherwise may not be able to attend college have been severely reduced or completely eliminated. For example, in the present FY 89 budget proposal, federal funding has been eliminated for the State Student Incentive Grants program and the federal capital contribution to the low-interest Perkins Loan programs. The lack of adequate financial assistance is a major obstruction to advanced training in science and technology fields.

We can encourage more participation in these type of careers by starting very early in the educational process to familiarize these groups with the rewards that such careers may offer. We must make them feel confident that their investment in careers in science and technology will pay off for them as with other segments of society. The challenge to the federal,

state and local governments is to continue to recognize and fund innovative programs designed to improve career access to the fields of science and technology for women, minorities and the handicapped. The challenge to the educational system is to equip our students with basic skills so that such careers are not prohibitive due to lack of a learning foundation.

The underrepresentation of women, minorities and the handicapped in science and technology is a matter of national concern. This loss of talent and potential expertise cannot continue if we are to remain competitive throughout the world. The Task Force's cc bution toward increasing the nation's pool of scientists is a service that should be acknowledged and applauded by all who are concerned with the future of this country.