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ABSTRACT

Measurement needs of our nation's educational systems include the areas of student self-esteem and qualities of effective teachers. Student self-esteem is crucial in fostering academic achievement; in fact, some outstanding scientists and engineers have reported initially low self-esteem, but stressed the influence of a role model who provided encouragement. Ways to develop self-esteem and creativity in the classroom should be studied, including the effects of teachers' affective attributes and teaching behaviors. Further study of teacher qualities should consider the following areas: (1) desirable teacher characteristics and their impact on student achievement; (2) which of these qualities are essential for measurable academic achievement; (3) evaluation methods in nontraditional teaching situations; (4) measurement of teachers' affective attributes; (5) teachers' ability to define classroom objectives; (6) teachers' ability to facilitate excitement and motivation; and (7) the role of teachers who foster excellence with some students or some subjects but do not perform everything desired of the average teacher. (GDC)

THE QUEST FOR EXCELLENCE/PUPIL SELF-ESTEEM

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A B S T R A C T

This paper examines concerns about the educational process in relationship to policy issues and administrative needs and measurement of our Nation's education systems.

This paper identifies specific data elements that can provide necessary information in support of present and future government, business, and academic decisionmaking, and that can help inform the American public.

Specific issues addressed in this paper include the following:

- Opening statement of self-worth and its importance in the search for excellence
- A discussion centered around the problem of how self esteem can be developed in the classroom
- Areas for new data bases which include:
  Desirable qualities of teachers and their impact on student achievement;

  Which of these qualities are essential for measurable academic achievement;

  Teacher qualities essential for the development and enhancement of pupil self-esteem and pupil creativity;

  Methods of evaluation for non-traditional teaching methods;

  Weighing out affective attributes of teachers;

  Improving "state of the art" by correlating effective student outcomes with well-defined successful teacher behaviors and competencies.
- Description of "Teachers I Have Known"
- Teacher ability to define classroom objectives and to facilitate excitement/motivation in the classroom

THE QUEST FOR EXCELLENCE/PUPIL SELF-ESTEEM

Introduction

Probably the most important reason for striving for excellence is because it creates opportunity. ....It goes without saying, that it is the students who have achieved excellence who will have the best opportunities for challenging work, top pay, and access to graduate school.....Another reason to strive for excellence is because it is basic to your self esteem.....We all have a considerable investment in our education and we spend one third of our working lives on the job. WE HAVE A NEED FOR SELF-WORTH AND THAT COMES FROM DOING A JOB AS BEST WE CAN.

R. B. Powell

The above quote(s), taken from an address at the annual conference of the Mexican-American Engineering Society (MAES) can and do apply to students or teachers of any race, and to all age groups. Powell stresses the idea that although we are usually rewarded for excellence in schools or on the job, there is also a feeling of self-satisfaction that comes from doing a job well. This sense of pride cannot be taken away and it cannot be diminished by the fact that there may be no specific monetary reward attached to a given assignment. "Self-esteem", he continues, "is important, and fortunately, it is a by-product in the search for excellence".

For the past six years, while developing a science curriculum program which emphasizes successful scientist role models who have overcome numerous obstacles, I have been extremely impressed by the healthy self-esteem of over one hundred of the SOUNDS OF SCIENCE role models.

Since these materials are designed primarily for use in the upper elementary and middle school grades, great efforts have been made to relate to pre-adolescents the lifestyles, likes and dislikes, hobbies, favorite school subjects, personality traits, and other useful data about these scientist role models when they were pre-adolescents. The majority of these role models did not have extremely high self-esteem as youngsters. Some of their self-described traits as youngsters are loneliness, self-appraisals of being physically unattractive, experiencing aversion to certain academic subjects, having little knowledge of what they would become as adults, etc. The great majority of these persons, however, can still remember a significant adult who encouraged them to be the best of whatever they pursued, and at least fifty percent of these scientists were encouraged to study mathematics and science in high school. Few respondents can remember being encouraged by their junior high or high school teachers to pursue careers in science. Noting

the difficulties of generalizing and thus diminishing the results of two years of gathering data on over 350 successful scientists, the following characteristics are reported only because they accurately describe 90% of the scientists: They loved pets and spent a great deal of time with their individual pets; they had specific tasks to perform around the house or had after-school jobs for which they received earnings; and most significantly, they belonged to several extra-curricular clubs, sports organizations, music organizations, (band, choir,) and they were always busy. How much did these activities contribute to their eventual success as scientists?

> *A final reason why striving for excellence is so important to minority engineers is because it serves as an example to fellow students, co-workers, and to the community, which others can follow. This is especially important to various Minority groups where there is a shortage of role models in many fields, including science and engineering. And by having more role models who are striving for excellence in school or on the job, the young students will also respond and follow that lead because they will know that striving for excellence is desirable and achievable.*

The question to be addressed in this paper is centered around the problem of how self-esteem can be enhanced in the classroom. The aforementioned scientists did not have high self-esteem as youngsters, according to their own individual assessments. How did they achieve the high level of success which they now enjoy and at what point did self-esteem develop or evolve, and more importantly, what set of conditions must be present in the classroom to facilitate or bring about a student's sense of great self-worth?

I have chosen to not dwell on the all important areas of cultural pluralism, SES of pupils, parental involvement with student learning, etc., because the data on these topics has been more than adequately documented. Instead I have chosen to limit this discussion to the qualities of teachers and the quality of the day-by-day experiences in the classroom. There have been numerous papers written and countless workshops and seminars and or conferences devoted to the causes of student failures, and all too often, the blame has been placed on the lack of student readiness to learn, to parental apathy, cultural and economic plights, etc. It seems to me that only in education do we place so much emphasis on what happened yesterday, last year, and other historical events as we absolve our own inability to solve the problem of what we, the professional educators can do to help millions of students to achieve academic success. Does the mechanic ask the owner of the automobile how it happened that the brake lining were thin? When approached to change a flat tire, does the service station attendant ask "Where were you when you ran over this nail?" Is there one set of instructions for changing the oil if the car owner has just returned from a 5,000 mile trip as opposed to the negligent driver who drove the car around town for a year and forgot to have the oil changed? If a car window is broken by a burglar, is there a different method of installing a new window than if the car were involved in a collision? Does the dentist use a different method to remove a tooth if the patient broke the tooth in a fight, as opposed to breaking the tooth while accidently biting down on an unknown object?

The acknowledgment of cause of breakdown may indeed impact on the method of repair, but the quality of the finished product remains unaffected. The point is that teachers, educators, administrators,..our education profession in its totality; must cease and desist the practice of concentrating on the various causes for our pupils' failure to achieve and move to affectuate quality classroom experiences which will insure student excitement, inquisitiveness, and a genuine desire for knowledge. Instead of shaking our heads in disgust and occasionally with contempt for those students who have difficulty making their way through the educational maze, we must set into motion a set of conditions which will result in a well-ordered, self-disciplined, orderly school environment without which learning cannot take place.

In many disciplines, research reports are based on experimental data. The mere nature of education of youngsters dictates that our research will be empirical in nature, and most of educational theory is therefore

based on this type research. Empirical data is most useful when we set out to study entities designed to improve our own impact on society, for future generations:

- What are those qualities of teachers which are positive and desirable in an effective school?
- What are those qualities, though positive and desirable, which have little or no impact on student achievement?
- How many of these qualities or variables carry heavy weight in the hiring process? In the evaluation process?
- Which teacher qualities(prioritized) are essential for measurable academic achievement of students?
- Which teacher qualities are essential for the development of high pupil self-esteem, for the enhancement of pupil creativity, and can these teacher qualities be measured by traditional methods?
- What methods can be utilized to evaluate essential qualities which cannot be measured by traditional methods?
- How much weight should be attached to the following teacher qualities?

  Great personality
  Warmth, caring attitude
  Attractive physically
  Ability to "get along" with other faculty and administration

- Are there consistent specifically identifiable characteristics unique to the students of certain sucessful teachers in a given school? Can these characteristics be isolated and correlated with the learning environment and process(es) from which these students benefitted?

  Could such information be beneficial to the "state of the art"?

TEACHERS I HAVE KNOWN

I have known some very unpopular teachers; scorned by their colleagues, and highly respected by their students. These teachers were known to accent nothing but the very best from all of their pupils. They had no patience with student mediocrity and they spent no time with borderline students. They pushed the "real scholars" almost beyond their limits. They challenged their bright students,..excited them,..leaving the "dummies" by the wayside. IS there a place for teachers such as this in the American educational system?

I have known sympathetic teachers who could get unbelievable results from "slow pupils",--make them feel terrific, smart, useful, indefatigable in their quest for more knowledge, for the perfect score! These teachers were criticized often by the "smart high IQ students" who became impatient with the repetition, the praise (who needs it?), the compassion. Is there a place for teachers such as this in the American educational system?

I've known teachers who couldn't get to school in time to "check-in" by 8:00 AM but who managed to always be in place by 8:15 for their First Hour Class which began at 8:30 AM. They usually stayed in their classrooms long after the 3:30 PM "sign-out"; maybe until very late in the evening. They were "night people" who blossomed late in the day. They stayed until they were satisfied with the results which they diligently sought. Since time was not that important to them..they considered it not at all unusual to work after school, or on weekends with a student who needed the extra time, or an instrumental or vocal ensemble who needed extra rehearsals to ensure that the performance met the highest standard. These teachers were motivated by one entity; excellence! Further handicapped by their inability to get required reports turned in on time, these teachers' inability or unwillingness to submit timely reports placed undue inconvenience and aggravated baggage on the principal or on the principal's secretary. These unorthodox teachers almost always caused the school showcase to become overburdened by the countless Superior trophies garnered by their students in Debate, Gymnastics, Athletics, Science Fairs, Academic Olympics, Vocal and Instrumental Contests, etc. But, their report cards were never turned in on time, they were late for faculty meetings, and sometimes they even had the unmitigated gall to MISS IMPORTANT FACULTY MEETINGS! (Coaches work is important, but the line must be drawn somewhere!) Is there a place for teachers like this in the American educational system?

Bloom contends that teachers are seldom hired for those qualities which are essential to effective pupil achievement. I contend that too little information has been documented on the subject of teacher qualities which are measurable and/or widely accepted from school system to school system.

TEACHER/LEARNER OBJECTIVES DEFINED

The final area of this paper addresses a concern which I feel is perhaps discussed in Teacher Education 101, but which is seldom utilized by 99% of today's teachers. How many teachers ask themselves the question: What do my students know at the end of this 55 minute class period that they did not know at the beginning of the hour? What is the objective of this lesson today? What are the entry level cognitive skills needed by my pupils in order to understand today's lesson?

How many teachers actually set aside the last portion of each class period to review the last 45 minutes? How many teachers tell the students what the next class period will involve? Can the students relate each lesson with a part of their own world?

In conclusion, I return to the original question regarding the enhancement of self-esteem: What set of conditions must be present in the classroom to facilitate or bring about a student's sense of great self-worth"?

Does the achieving of excellence and the knowledge that one has successfully completed an assignment increase self-worth? Does success breed success again and again? Do teacher qualities need to be redefined and must teachers become a part of the process? Do role models enhance a student's desire to strive for excellence because they observe that excellence is achievable?

Is there need for diversity within the teaching ranks in a given school? Should teachers be matched with the type pupils who seem to thrive under their tutelage? Are the "personality types" rewarded for getting along with their colleagues and conversely, are the introverted teachers' effectiveness in the classroom often unrewarded? Are teachers evaluated by persons who are guided by a set of criteria that is just and fair and more importantly, is the evaluation process designed to enhance the educational environment?

Of course, it's easy to answer these questions, but is it easy to set up a system by which they can be effectively measured, reported, and disseminated to the classroom teacher and the administrator in those remote communities who do not encourage attendance at conferences where such data is reported? Is it now known the percentage of educators who take advantage of educational statistics and reports such as those published by NCES?

I intentionally avoided a long dissertation on the issues of science and mathematics education and the serious lack of knowledge of the usefulness of these academic areas to the present and future lives of today's students. It seemed self-serving; as I am a publisher of math and science curriculum materials. However; I have taken the liberty to include as an appendix, some new information recently distributed by Howard Adams, of GEM. (See reference page for additional information of Dr. Adams). It seemed vital to share this information as part of this report. Adams' complete report further enhances the material included in my introduction about the relationship between role models, academic success, and career aspirations particularly as this issue relates to minority students. Problems faced in graduate and undergraduate school must be addressed in elementary and secondary school.

The attempt has been made to raise questions for this commendable study undertaken by the National Center for Education Statistics. The following suggestions are made in response to QUESTIONS TO BE ADDRESSED from Attachment A:

1. In answer to question #1, please refer to page 5 of Attachment B

Public School Survey:

Summary level

Periodicity

Data set (1984-85

ADD:

Characteristics principals seek in hiring new teachers

Characteristics principals seek in evaluation of teachers

Characteristics teachers believe are important in hiring/evaluating of teachers

Characteristics needed for competent effective teachers as described by parents, community, students

What has been done to upgrade Teacher Staff Development since 1980(as perceived by teachers?

2. In answer to question #2, please refer to page (un-numbered 9)
CURRENT ELEMENTARY/SECONDARY EDUCATION DATA ACQUISITIONS

Under Fall Membership
Public by:
Private by:

Percent minority

The suggestion is made to specify races. Black children are quite different from Asian Americans. Asian Americans should be delineated by number of years in USA. Asian Americans who have been in America for ten years have had a totally different experience from those newly arrived Asians.

Many economically low Asian-Americans surpass Black Americans academically. Their lifestyles and American experiences should be chronicled for the BENEFIT of many Blacks who could perhaps appreciate "How do they do it?"

Hispanics and American Indians are also different from Blacks and Asians. The point: SPECIFY RACE.

NOTES

SOUNDS OF SCIENCE is a science curriculum program developed by Carole Hardeman et. al. This program is becoming widely used in several American school systems. It is unique in that it features on audio-cassette the lifestyles, childhood experiences, and career information of successful scientists of all races, persons with physical challenges, and over fifty percent of the role models are women. Although career based, this program engages students in excellent science laboratory activities which were developed by Otis Lawrence, Ph.D., Ray Broekel, Lh.D., and Richard Baim. Developed at the University of Oklahoma, the program is now under copyright to ADROIT Publishing, Inc.

REFERENCES

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BLOOM, BENJAMIN, All Our Children Learning. McGraw-Hill. 1981.

APPENDIX

ADAMS, HOWARD G., Engineering Education for Minority Students: A Status Report. (Dr. Adams is Executive Director of National Consortium for Graduate Degrees for Minorities in Engineering, Inc. (GEM)

Excerpts from his report are included as an appendix to this paper as informational data which might be useful. Additionally, it lends additional weight to some parts of the introduction to this paper.

APPENDIX

TABLE II

FULL-TIME FRESHMAN ENROLLMENT IN ENGINEERING BY ETHNICITY, 1973-1983

YEAR	TOTAL	TOTAL MINORITIES		BLACK		HISPANIC		INDIAN	
		NO.	%	No.	%	No.	%	No.	%
1973	51,920	2,987	5.8	2,130	4.1	790	1.5	67	.1
1974	63,440	4,018	6.3	2,848	4.5	1,068	1.7	102	.2
1975	75,343	5,344	7.1	3,840	5.1	1,384	1.8	120	.2
1976	82,250	6,315	7.7	4,372	5.3	1,766	2.2	177	.2
1977	88,780	7,133	8.0	4,728	5.3	2,161	2.4	244	.3
1978	95,805	8,792	8.7	5,493	5.7	2,662	2.8	225	.2
1979	103,724	9,792	9.4	6,339	6.1	3,136	3.0	317	.3
1980	110,149	10,399	9.4	6,661	6.1	3,373	3.8	365	.3
1981	115,280	11,116	9.6	7,015	6.1	3,689	4.1	412	.4
1982	115,303	10,721	9.3	6,715	5.8	3,633	3.2	371	.3
1983	109,638	11,478	0.5	6,342	5.9	4,760	4.3	376	.3

Source: Annual Reports, Engineering Manpwer Commission.

PARITY: Although the proportion of first year minority students entering engineering has risen significantly since 1973, the gains have done little to bring about parity within engineering education. When "The Effort" began, underrepresented minorities comprised 16.0 percent of the population and 5.8 percent of first year engineering enrollment (a difference of 10.2 percentage points). U.S. Census data for 1983 shows that the minority population had increased to 19.5 percent. Engineering first year enrollment for minorities in 1983 stood at 10.5 percent. The percentage difference for 1983 between population and first year enrollment was 9.0 percent.

TABLE III

POPULATION STATISTICS AND ENROLLMENT FOR MINORITIES IN ENGINEERING

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Population Statistics (In Thousands)											
Total Population	209,936	212,227	214,542	216,883	219,250	221,642	224,060	226,505	228,976	231,474	234,000
Minority Population	34,769	35,735	36,728	37,748	38,797	39,875	40,983	42,122	43,292	44,495	45,731
Percent Minority	16.6	16.8	17.1	17.4	17.7	18.0	18.3	18.6	18.9	19.2	19.5
Minorities As a Percentage of First Year and Total Enrollment											
First Year Enrollment	5.8	6.3	7.1	7.7	8.0	8.7	9.4	9.4	9.6	9.3	10.5
Total Enrollment	4.6	5.2	5.5	6.0	6.1	6.7	7.0	7.9	8.3	8.1	8.4
Minority Recipients As a Percentage of Total Degrees Awarded											
B.S.	2.9	3.5	3.9	3.9	4.0	3.7	3.7	4.1	4.4	4.5	4.8
M.S.	1.5	2.2	2.0	2.1	2.2	2.7	2.3	2.4	2.6	2.3	2.9
Ph.D.	0.7	0.9	1.5	1.2	1.4	1.7	1.5	1.6	1.4	1.4	2.0

Source: Annual Report- Engineering Manpower Commission and U.S. Department of Commerce, Bureau of the Census

To reach parity with population percentages, all minority constituent groups will need to experience increased enrollment rates. Using 1983 Census data (Table III) for parity comparisons, minority enrollment should be 19.5 percent in engineering.

TABLE IV
FULL-TIME UNDERGRADUATE ENGINEERING ENROLLMENT
BY ETHNICITY, 1973-1983

YEAR	TOTAL NO.	TOTAL MINORITIES		BLACK		HISPANIC		INDIAN	
		NO.	%	NO.	%	NO.	%	NO.	%
1973	186,700	8,558	4.6	5,508	3.0	2,769	1.5	281	.1
1974	201,100	10,530	5.2	6,287	3.4	3,380	1.7	323	.2
1975	231,379	12,828	5.5	8,389	3.6	4,111	1.8	328	.1
1976	267,835	15,412	6.0	9,818	3.8	5,138	2.0	446	.2
1977	289,248	17,753	6.1	11,388	3.9	5,747	2.0	618	.2
1978	311,237	20,729	6.7	12,954	4.1	7,150	2.3	625	.2
1979	340,488	23,999	7.0	14,786	4.3	8,454	2.4	759	.2
1980	365,117	28,944	7.9	16,181	4.3	11,860	3.3	903	.2
1981	387,577	32,196	8.3	17,611	4.5	13,615	3.5	970	.3
1982	403,390	32,711	8.1	17,598	4.4	14,035	3.5	1,078	.3
1983	406,144	34,126	8.4	17,817	4.4	15,182	3.7	1,127	.3

Source: Annual Reports: Engineering Manpower Commission

Trends in Full-Time Total Undergraduate Engineering Enrollment By Ethnicity, 1973-1983

Total enrollment for all engineering students increased from 186,700 in 1973 to 406, 144 in 1983. During the same period, total minority engineering enrollment rose from

1973 to 3,817 in 1984 (Table V). As a percentage of total B.S. degrees awarded in engineering, the increase was from 2.9 percent in 1973 to 5.0 percent in 1984.

The distribution of B.S. degrees among minority groups in 1973 was: Blacks 1.5 percent; Hispanics 1.3 percent; and American Indian 0.15 percent.

Advanced Degree Graduates

The national effort to address the underrepresentation of minority students at the graduate level was launched with the founding of the National Consortium for Graduate Degrees for Minorities in Engineering, Inc. (GEM) in 1976.

TABLE V

B.S. Engineering Graduates in The United States by Ethnicity, 1973-1984

Year	Total B.S.	Total Minorities		Black		Hispanic		Indian	
		No.	%	No.	%	No.	%	No.	%
1973	43,429	1,255	2.9	657	1.5	566	1.3	32	.07
1974	41,010	1,423	3.5	756	1.8	636	1.6	31	.07
1977	39,718	1,582	4.0	844	2.1	702	1.8	36	.09
1978	45,753	1,679	3.7	894	2.0	748	1.6	37	.08
1979	52,161	1,943	3.7	1,076	2.1	808	1.6	59	.11
1980	58,413	2,383	4.1	1,320	2.3	1,003	1.7	60	.10
1981	62,615	2,728	4.4	1,445	2.3	1,193	1.9	90	.14
1982	66,652	3,007	4.5	1,646	2.5	1,270	1.9	91	.14
1983	72,122	3,493	4.8	1,862	2.6	1,534	2.1	97	.13
1984	76,576	3,817	5.0	2,022	2.6	1,683	2.2	112	.15

Source: Annual Reports, Engineering Manpower Commission.

TABLE VI

M.S. ENGINEERING GRADUATES IN THE UNITED STATES BY ETHNICITY
1973-1984

Year	Total M.S.	Total Minorities		Blacks		Hispani		American Indian	
		No.	&	No.	&	No.	%	No.	%
1973	17,152	258	1.5	104	.6	139	.8	15	.08
1974	15,885	345	2.2	158	1.0	187	1.2	4	.03
1975	15,773	320	2.0	141	.9	176	1.1	3	.02
1976	16,506	351	2.1	154	.9	183	1.1	14	.08
1977	16,551	364	2.2	147	.9	210	1.3	7	.04
1978	16,182	439	2.7	201	1.2	234	1.5	4	.03
1979	16,036	366	2.3	152	1.0	205	1.3	9	.02
1980	17,229	415	2.4	162	.9	249	1.5	4	.02
1981	17,643	466	2.6	182	1.0	276	1.6	8	.05
1982	18,289	414	2.3	184	1.0	215	1.2	15	.08
1983	19,673	580	2.9	258	1.3	306	1.6	16	.08
1984	20,992	636	3.0	253	1.2	358	1.7	25	.12

TABLE VII

Ph.D. ENGINEERING GRADUATES IN THE UNITED STATES BY ETHNICITY
1973-1984

Year	Total M.S.	Total Minorities		Blacks		Hispanic		American Indian	
		No.	%	No.	%	No.	%	No.	%
1973	3,587	26	.7	13	.3	12	.3	1	.03
1974	3,362	31	.9	12	.4	19	.6	0	.00
1975	3,138	47	1.5	17	.5	28	.9	2	.06
1976	2,977	35	1.2	10	.3	15	.5	0	.00
1977	2,814	39	1.4	16	.6	22	.8	1	.04
1978	2,573	43	1.7	15	.6	25	1.0	3	.10
1979	2,815	41	1.5	19	.7	22	.8	0	.00
1980	2,753	45	1.6	19	.7	25	.9	1	.04
1981	2,841	39	1.4	16	.6	20	.7	3	.10
1982	2,644	38	1.4	20	.8	15	.6	3	.10
1983	3,023	60	2.0	19	.6	41	1.4	0	.00
1984	3,234	49	1.5	24	.7	25	.8	0	.00

Source: Annual Reports, Engineering Manpower Commission

Obstacles to Success and Future Concerns

Underrepresentation of minorities in engineering is primarily caused by two obstacles:

1. Lack of knowledge about engineering as a profession; and,

2. Lack of preparation at the precollege level in math and science.

For the first area, the sparcity of professional engineers within the minority community leaves a void of role models. This results in minority youth not viewing engineering as a viable career path that would lead to success.

The second area is caused by the problems minorities encounter moving through the educational system in this country.

Some of these problem areas are:

1. Attrition from the pipeline--only 72 percent of Black and 55 percent of the Hispanic and American Indian students complete high school (Figure I).

2. Curriculum placement--only 28 percent of minority students pursue academic programs in high school. The rest are in either vocational (32%) or general (40%) programs.

3. Course Choice--among minority high school students only:

   50% take Algebra I
   35% take Geometry
   30% take Algebra II
   15% take Trigonometry
    5% take Calculus
   25% take Chemistry
   20% take Physics

The complexity of the problem is exacerbated by the manner in which the academic abilities of minority students are viewed. For example:

1. The educational system continues to use negative counseling when advising minority students. In the counseling process, minority students are too frequently counseled away from college preparatory programs and into nonacademic areas. Thus, minority students are often counseled below their abilities.

2. Some teachers fail to challenge minority students by teaching down to what they perceive to be the level of the student. In their efforts to offer under-

standing, they actually hinder academic growth by telling the student, "I know you are doing the best that you can do."

3. School personnel charged with counseling and advising minority students, too often associate learning difficulties with the economically disadvantaged. They tend to think that if a child is minority, he/she is automatically deprived and therefore probably cannot function educationally.

Because of these and other negative attitudes about the academic abilities of minority youth, the educational system,in spite of all the talk about change, remains ineffective in providing these students with a sound educational grounding in academic subjects. Thus, 75% or more of all minority students who graduate from high school do so unprepared to gain regular admission to post-secondary institutions of higher learning. That is why the work that is being done through the "Minority Engineering Effort" is so important and needs to be strengthened, expanded and continued. Future consideration needs to be focused on finding ways to:

1. Continue support for public education which is paid for by taxes. The notion of a voucher system of education will not work for the masses. If the U.S. is to have an educated populous, it will have to be done through a public system of education.

2. Identify academically talented minority students early in their education and counsel them into both academic curricula and courses that contain prerequisite preparation for college level work in engineering and/or other math-based disciplines.

3. Have teachers and administrators, at all levels of the educational structure, become positive about the abilities of minority students. In so doing, they must be made to realize that neither talent nor ability is defined by ethnicity. They must be made cognizant of the fact that students don't start out as failures--rather, the system designates who shall succeed and who shall fail. Through attitudes and expectations, the system conveys to minority students what is perceived as their chances for success. Studies show (Astin 1982, Brooks, 1983) that where the level of expectation is high and is com-