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REMARKS BY

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The
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TECHNOLOGY-BASED COOPERATIVE PROGRAMS
FOR IMPROVING EDUCATIONAL OUTCOMES

I AM HONORED BY YOUR INVITATION TO SPEAK HERE ON THE ISSUE THAT YOU AND I KNOW IS MORE IMPORTANT THAN ANY OTHER IN DETERMINING WHETHER THE U.S. WILL BE COMPETITIVE IN THE 1990'S AND BEYOND IN THE GLOBAL MARKETPLACE. THAT ISSUE, WHICH I'VE BEEN DEEPLY INVOLVED IN FOR THE PAST 25 YEARS, IS IMPROVING EDUCATION AND TRAINING FOR ALL AMERICANS.

UNFORTUNATELY, TOO LITTLE PROGRESS HAS BEEN MADE DURING THAT PERIOD TOWARD THIS GOAL. TO SAY THE LEAST, THIS HAS BEEN DISCOURAGING, ESPECIALLY DURING THE PAST FIVE YEARS, CONSIDERING MYRIAD RECOMMENDATIONS FOR IMPROVEMENT EMANATING FROM STUDIES BY HIGHLY COMPETENT COMMISSIONS AND TASK FORCES, AND THE ENORMOUS AMOUNT OF ATTENTION FOCUSED ON THE NEED FOR CONSTRUCTIVE NATIONWIDE CHANGE BY TEACHERS, SCHOOL BOARDS, STUDENTS, PARENTS, STATE AND LOCAL GOVERNMENTS, BUSINESSES, FOUNDATIONS AND OTHERS, INCLUDING PRESIDENT BUSH, WITH HIS STATED PRIORITY ON EDUCATION. A RECENT HEADLINE REFERRING TO THE PRESIDENT'S PROGRAM, "EDUCATION: ALL TALK AND NO ACTION," REFLECTS CONTINUING FRUSTRATION OVER WHERE WE ARE VERSUS WHERE WE OUGHT TO BE ON THE ROAD TO IMPROVEMENT.

HOWEVER, SINCE AN OVERWHELMING DESIRE FOR ACTION IS EVIDENT, THE CENTERPIECE OF MY TALK WILL BE A REVIEW OF TWO NATIONWIDE COOPERATIVE PROGRAMS FOR IMPROVING EDUCATIONAL OUTCOMES. ONE IS THE K-12 TRANSFORMED SCHOOLS CONSORTIUM, AND THE SECOND IS THE TECHNOLOGY-BASED ENGINEERING EDUCATION CONSORTIUM. BOTH ARE UNDER THE AEGIS OF THE WILLIAM C. NORRIS INSTITUTE.

BEFORE DESCRIBING THE TWO PROGRAMS, I SHOULD COMMENT ON TWO RELEVANT FACTORS. ONE CONCERNS INADEQUATE PROGRESS IN THE IMPROVEMENT IN EDUCATION WHICH IS, IN LARGE PART, A REFLECTION OF THE LACK OF A BROAD CONSENSUS ON HOW TO BRING IT ABOUT. THIS POINT IS COGENTLY MADE BY THE RECENT REPORT OF THE BUSINESS-HIGHER EDUCATION FORUM, "AMERICAN POTENTIAL: THE HUMAN DIMENSION," WHICH STATED, AND I QUOTE: "SOME 20 MAJOR REPORTS ON EDUCATION AND THE ECONOMY WERE EXAMINED; TOGETHER THEY OFFER 285 DISCRETE RECOMMENDATIONS. AMONG THESE 285, ONLY NINE ENJOY THE SUPPORT OF FIVE OR MORE OF THE 20 REPORTS. MORE TO THE POINT, OVER 70 PERCENT OF THE SPECIFIC RECOMMENDATIONS HAVE ONLY A SINGLE CHAMPION STANDING BEHIND THEM. IT IS LITTLE WONDER THAT PROGRESS IN RAISING STUDENT ACHIEVEMENT HAS BEEN MUCH TOO SLOW: AS DIFFERENT PILOTS SEIZE THE RUDDER OF EDUCATIONAL REFORM THE SHIP GOES ROUND IN CIRCLES." END OF QUOTE.

FURTHERMORE, ACTIONS FOR IMPROVEMENT THAT HAVE BEEN TAKEN ARE OFTEN FRACTIONATED, ISOLATED AND DUPLICATIVE. CONSEQUENTLY, EVEN WORTHWHILE CHANGES HAVE HAD ONLY LIMITED BENEFIT, AND THE WHEEL IS BEING RE-INVENTED IN HUNDREDS OF PLACES.

THE K-12 TRANSFORMED SCHOOLS AND TECHNOLOGY-BASED ENGINEERING EDUCATION CONSORTIA WHICH FOSTER BROADLY-BASED COOPERATION, CANNOT ONLY HELP GAIN A CONSENSUS ON WHAT NEEDS TO BE DONE, BUT CAN HELP DEVELOP IMPROVEMENTS MOST EFFICIENTLY BY POOLING RESOURCES AND ELIMINATING DUPLICATION THROUGH COOPERATION.

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THE OTHER FACTOR FOR COMMENT IS THE ROLE OF THE WILLIAM C. NORRIS INSTITUTE OF WHICH I AM CHAIRMAN.

IN THE SIMPLEST OF TERMS, THE MISSION OF THE NORRIS INSTITUTE IS TO CATALYZE PUBLIC/PRIVATE COOPERATION TO ADDRESS MAJOR UNMET OR POORLY MET SOCIETAL NEEDS, WHICH WILL ONLY BE ADEQUATELY MET THROUGH COOPERATION BECAUSE OF SCARCE RESOURCES.

HOWEVER, IN AMERICAN SOCIETY, WE HAVE YET TO DEVELOP A TRUE CULTURE OF COOPERATION -- WE ARE PRONE TO COMPETE AMONG OURSELVES RATHER THAN COOPERATE. THUS, IT USUALLY TAKES A CATALYST TO GET ORGANIZATIONS TO COOPERATE TO THE REQUIRED EXTENT, AND THAT IS A MAJOR FUNCTION OF THE INSTITUTE. IN ORDER TO IMPLEMENT A NUMBER OF INSTITUTE INITIATIVES, CONSORTIA ARE BEING FORMED COMPRISED OF REPRESENTATIVES OF APPLICABLE PUBLIC/PRIVATE SECTORS WHO COME TOGETHER TO HELP SHAPE THE DIRECTION OF THE INITIATIVE, AGREE ON A COMMON STATEMENT OF PRINCIPLES AND DEVELOP A PLAN FOR ACTION AND PROCEED WITH IMPLEMENTATION.

PREMISES

AS I INDICATED, TWO OF THE INSTITUTE'S MAJOR INITIATIVES ARE THE K-12 TRANSFORMED SCHOOLS AND TECHNOLOGY-BASED ENGINEERING EDUCATION CONSORTIA. THESE COOPERATIVE PROGRAMS ARE BASED ON A NUMBER OF PREMISES, WHICH INCLUDE:

1. THE U.S. EDUCATION SYSTEM REQUIRES BASIC STRUCTURAL CHANGE; MODIFICATIONS HERE AND THERE HAVEN'T PRODUCED THE DESIRED RESULTS.
2. PERSONALIZED INSTRUCTION, MANAGED AND DELIVERED BY COMPUTER-BASED TECHNOLOGY, IS ESSENTIAL FOR ACHIEVING THE REQUIRED PERFORMANCE AT AN AFFORDABLE COST.

3. EVIDENCE ABOUNDS THAT CURRENTLY AVAILABLE COMPUTER-BASED TECHNOLOGY IS COST EFFECTIVE AND THAT ITS COST WILL CONTINUE TO DECREASE WHILE PERFORMANCE INCREASES.
4. MOST IMPORTANT, WIDESPREAD COOPERATION IS REQUIRED TO ACCELERATE THE UTILIZATION OF TECHNOLOGY IN EDUCATION AND CONTINUE ITS DEVELOPMENT, BECAUSE EDUCATIONALLY AND ECONOMICALLY, IT IS NOT FEASIBLE FOR ONE SCHOOL OR A FEW SCHOOLS TO PERFORM THE NECESSARY DEVELOPMENT AND IMPLEMENT SUCH A PROGRAM. THE MAGNITUDE OF THE UNDERTAKING REQUIRES THAT A LARGE NUMBER OF SCHOOLS WORK COOPERATIVELY IN A NATIONWIDE ORGANIZATION.

THESE PREMISES UNDERLIE AN APPROACH PROVIDING PERSONALIZED LEARNING FOR EACH STUDENT AND THE MEANS TO ACHIEVE FULL INDIVIDUAL POTENTIAL. A COMPUTER-BASED TECHNOLOGY SYSTEM IS UTILIZED TO THE MAXIMUM EXTENT. IT INCLUDES VARIOUS COMBINATIONS OF AUDIO, INTERACTIVE VIDEO, GRAPHICAL DISPLAYS, SIMULATION, ANIMATION, EXPERT SYSTEMS, AND OTHER LEARNING TECHNOLOGIES AND MATERIALS, ALL MANAGED BY COMPUTER.

K-12 PROGRAM

LET ME NOW DESCRIBE THE K-12 CONSORTIUM PROGRAM. MAJOR OBJECTIVES INCLUDE IMPROVEMENT IN THE ACADEMIC PERFORMANCE OF THE ENTIRE RANGE OF STUDENTS WHICH WOULD SIGNIFICANTLY EXCEED THOSE ANTICIPATED BY THE TRADITIONAL MODE OF INSTRUCTION, REDUCING DROP OUTS AND LEVELING OFF THE EVER-RISING COST OF EDUCATION.

AT ITS FOUNDATION, AND ONE OF THE UNDERLYING PREMISES PREVIOUSLY NOTED, IS THE FULL IMPLEMENTATION OF AN INDIVIDUALIZED COMPUTER TECHNOLOGY-BASED APPROACH. THIS IS ACCOMPLISHED IN A SERIES OF STEPS.

THE INITIAL STEP IN THE PROGRAM IS TO ESTABLISH TRANSFORMED SCHOOLS. THESE CAN BE NEW SCHOOLS WITHIN EXISTING SCHOOLS, OR THEY CAN BE FREE STANDING. EACH TRANSFORMED SCHOOL WILL COMMENCE WITH STUDENTS IN ONE GRADE OR UP TO THREE CONSECUTIVE GRADES BETWEEN THE FOURTH AND NINTH GRADES, WITH THE TOTAL NUMBER OF STUDENTS DETERMINED BY LOCAL CONDITIONS. ADDITIONAL GRADES WILL BE ADDED EACH YEAR UNTIL THE FULL K-12 CONTINUUM IS IN PLACE.

A PRIMARY FEATURE IS THE MULTIFUNCTIONAL TECHNOLOGY CORE, CONSISTING OF THE COMPUTER HARDWARE, SOFTWARE AND COURSEWARE.

IT WILL ESSENTIALLY BE THE SAME FOR ALL PARTICIPATING SCHOOLS. HOWEVER, THAT DOES NOT MEAN THAT ALL SCHOOLS WILL BE ALIKE, BECAUSE THE COMPONENTS OF THE TECHNOLOGY CORE ARE TOOLS TO BE USED BY TEACHERS TO HELP ACHIEVE THE BEST LEARNING OUTCOMES AT THE LOWEST COST.

THE EDUCATION FORMAT AND PROGRAM THAT WILL BE UTILIZED IN THE NEW SCHOOL IS BUILT AROUND THE BASIC TRANSFORMATION FROM TRADITIONAL GROUP LEARNING TO INDIVIDUALIZED EDUCATION. IN THE NEW FORMAT, EACH STUDENT IS ASSESSED AND DIAGNOSED BY A LOCAL TEAM OF TEACHERS AND THE YOUNGSTER'S PARENT(S) TO ASCERTAIN HIS/HER STRENGTHS, WEAKNESSES, NEEDS AND CAPABILITIES. TEAM CONSENSUS DETERMINES AN INDIVIDUAL LEARNING PLAN. THE STUDENT FOLLOWS THE LEARNING PLAN AT A RATE AND PACE APPROPRIATE TO INDIVIDUAL CAPABILITIES. THE LEARNER'S PROGRESS IS MONITORED, THE LEARNING ACTIVITIES ARE GUIDED BY THE TEACHER(S), AND THE INDIVIDUAL PLAN IS ADJUSTED WHENEVER NECESSARY TO ENHANCE PERFORMANCE.

BECAUSE OF THE LARGE AMOUNT OF DETAILED INFORMATION IN A LEARNING PLAN AND THE CONTINUING NEED TO MONITOR STUDENT PERFORMANCE AGAINST THE PLAN, MANAGEMENT BY COMPUTER IS ESSENTIAL. WITH THE AID OF THE LABOR-SAVING COMPUTER TECHNOLOGY, TEACHERS ARE FREED FROM THE TRADITIONAL GROUP LEARNING RESTRICTIONS TO WORK WITH INDIVIDUAL LEARNERS AND WITH SMALL GROUPS AND FUNCTION AS DIAGNOSTICIANS AND FACILITATORS OF LEARNING. MUCH OF THE NON-TEACHING, CLASSROOM MANAGEMENT CHORES AND FUNCTIONS THAT CONSUME VALUABLE TEACHER TIME IN THE TRADITIONAL FORMAT IS MANAGED BY THE COMPUTER-BASED SYSTEM.

COMMITMENT: PARTICIPANTS IN THE CONSORTIUM ARE COMMITTED TO WORK COOPERATIVELY TO PLAN AND ESTABLISH TRANSFORMED SCHOOLS.

PLANNING IS BEING PERFORMED BY FOUR TASK FORCES CONSISTING OF CONSORTIUM MEMBERS IN THE KEY AREAS OF:

- o MULTIFUNCTIONAL TECHNOLOGY CORE
- o PERSONALIZED EDUCATION MANAGEMENT SYSTEM, WHICH INCLUDES THE ESSENTIAL COMPONENT OF A PERSONALIZED EDUCATIONAL PLAN FOR EACH STUDENT
- o EVALUATION
- o STAFF DEVELOPMENT

COST: LAUNCHING THE NEW SCHOOLS REQUIRES FUNDING FOR ONE-TIME COSTS OF MAKING THE TRANSITION FROM THE TRADITIONAL SYSTEM. THESE CONSIST MAINLY OF PLANNING, TEACHER TRAINING, EVALUATION AND THE MULTIFUNCTIONAL TECHNOLOGY CORE, I.E, THE COMPUTER

EQUIPMENT, SOFTWARE AND COURSEWARE. START-UP COSTS WILL VARY ACCORDING TO THE INITIAL NUMBER OF GRADES AND STUDENTS AND THE EXTENT OF EVALUATION DESIRED. FOR PRELIMINARY PLANNING PURPOSES, A FIRST-YEAR COST OF \$60,000 IS APPROPRIATE FOR A NEW SCHOOL WITH ONE GRADE AND 25 STUDENTS. THE TRANSITION COST AFTER THE FIRST YEAR WILL CONSIST MAINLY OF THE ADDITIONAL COMPUTER EQUIPMENT REQUIRED FOR THE INCREASED NUMBER OF STUDENTS.

PROGRESS: BY NOW, YOU MAY BE WONDERING ABOUT THE PROGRESS BEING MADE BY THE K-12 TRANSFORMED SCHOOLS CONSORTIUM. I WILL ONLY TAKE TIME TO SPEAK TO TWO ASPECTS OF IT - MEMBERSHIP AND THE COMPUTER SOFTWARE FOR MANAGING INDIVIDUAL LEARNING PLANS.

MEMBERSHIP: WITH RESPECT TO MEMBERSHIP, CONSORTIUM ORGANIZING ACTIVITIES HAVE BEEN PRIMARILY FOCUSED IN MINNESOTA BECAUSE OF STAFF LIMITATIONS AND GEOGRAPHICAL PROXIMITY. AT THE PRESENT TIME, 14 MINNESOTA SCHOOL DISTRICTS ARE PARTICIPATING IN THE CONSORTIUM. MEMBERS ARE AT VARIOUS STAGES OF IMPLEMENTING THEIR VERSION OF A TRANSFORMED SCHOOL. THE TRANSFORMED SCHOOL IN ST. PAUL OPENED IN SEPTEMBER. OTHER DISTRICTS ARE NOT AS FAR ALONG; AND PROGRESS, IN MANY INSTANCES, IS BEING DELAYED BY LACK OF ADEQUATE FUNDING.

ORGANIZING EFFORTS ARE BEING GRADUALLY EXTENDED TO OTHER STATES, WHICH HAVE RESULTED IN MEMBERS IN VERMONT, NEBRASKA AND UTAH. THERE ARE SCHOOL DISTRICTS WITH SERIOUS INTEREST IN LOUISIANA, CALIFORNIA, NEW JERSEY, DELAWARE, MASSACHUSETTS AND OTHER STATES.

SOFTWARE: PROGRESS IS ALSO EVIDENT IN THE DEVELOPMENT OF THE PERSONALIZED EDUCATION MANAGEMENT SYSTEM, ABBREVIATED PEMS. VERSION 1.0 OF PEMS WAS COMPLETED FEBRUARY 1st AND IS NOW IN ALPHA TEST. EIGHT MINNESOTA AND TWO NEBRASKA SCHOOLS ARE SERVING AS ALPHA TEST SITES. THESE TESTS WILL BE COMPLETED BY JUNE, AND THE RESULTS UTILIZED TO FURTHER REFINE AND ENHANCE PEMS.

ESSENTIAL LEARNER OUTCOMES: AT THIS POINT, I SHOULD MENTION THE RELATIONSHIP BETWEEN THE K-12 TRANSFORMED SCHOOLS CONSORTIUM (TSC) AND THE MINNESOTA DEPARTMENT OF EDUCATION (DOE), WHICH INCLUDES EXPLORATION OF THE LINKAGE OF ITS ESSENTIAL LEARNER OUTCOMES (ELO's) TO PEMS.

ESSENTIAL LEARNER OUTCOME-BASED EDUCATION CONSISTS OF PROGRAMS DESIGNED AND IMPLEMENTED IN A MANNER THAT ASSURES ALIGNMENT OF THREE BASIC ELEMENTS: LEARNER OUTCOMES ASSESSMENT AND FEEDBACK PROCESS AND INSTRUCTIONAL PROCESS.

ELO'S HAVE BEEN DEVELOPED FOR MATH, LANGUAGE ARTS, PHYSICAL EDUCATION AND INDUSTRIAL ARTS/TECHNOLOGY AND SCIENCE. THESE ARE AVAILABLE FOR USE BY ALPHA TEST SITES.

OTHER RELATIONSHIPS: IN ADDITION TO COLLABORATION WITH THE MINNESOTA DEPARTMENT OF EDUCATION, THERE ARE SIMILAR IMPORTANT RELATIONSHIPS DEVELOPING WITH OTHER ORGANIZATIONS, WHICH INCLUDE THE ARTHUR ANDERSEN COMPANY AND CITIES IN SCHOOLS.

COLLABORATION WITH ARTHUR ANDERSEN WILL FOCUS ON EVALUATION AND THE INVESTIGATION OF THE APPLICATION OF THE PERSONALIZED EDUCATION MANAGEMENT SYSTEM TO INDUSTRIAL EDUCATION AND TRAINING.

CITIES IN SCHOOLS (CIS), AS MANY OF YOU KNOW, IS A NATIONAL NON-PROFIT ORGANIZATION, WITH OVER TEN YEARS EXPERIENCE IN DEVELOPING PUBLIC/PRIVATE PARTNERSHIPS THAT BRING EXISTING HUMAN RESOURCES INTO THE SCHOOLS, THUS ADDRESSING THE MULTIPLE NEEDS OF YOUTHS AT HIGHEST RISK OF EDUCATIONAL, SOCIAL AND ECONOMIC FAILURE. IT OPERATES DROPOUT PREVENTION PROGRAMS IN 33 COMMUNITIES. WHILE CIS IMPLEMENTS ITS PROGRAM VERY WELL, IT LACKS A COMPONENT FOR BRINGING TECHNOLOGY INTO THE SCHOOLS. THUS, THERE IS A BASIS FOR A COMPLEMENTARY RELATIONSHIP.

FINANCING: PROGRESS IN IMPLEMENTING TRANSFORMED SCHOOLS IS IMPEDED BY LACK OF FUNDING. IN TODAY'S ENVIRONMENT, PUBLIC SCHOOLS, EVEN THE LARGEST, HAVE LIMITED LATITUDE TO EFFECT CHANGE BY REALLOCATION FROM EXISTING BUDGETS. FURTHER, IT IS DIFFICULT TO GET APPROPRIATIONS FROM MOST STATE LEGISLATURES FOR NEW PROGRAMS. MAJOR REASONS ARE ALREADY TIGHT STATE BUDGETS, THE MANY OTHER URGENT SOCIAL PROGRAMS TO BE ADDRESSED, SUCH AS DRUGS, CRIMINAL JUSTICE AND THE HOMELESS, AND, AS NOTED EARLIER, THE LACK OF A BROAD CONSENSUS ON WHAT SHOULD BE DONE.

CONSEQUENTLY, IMPLEMENTATION, IN THE MOST TIMELY MANNER, OF A NATIONWIDE TRANSFORMED SCHOOLS PROGRAM WILL REQUIRE PARTIAL FEDERAL FUNDING. A BROAD CONSENSUS ON WHAT NEEDS TO BE DONE IS ESSENTIAL IN ORDER TO GET APPROPRIATE ACTION BY THE U.S. CONGRESS; AND, AS NOTED EARLIER, THE CONSORTIA ARE HELPING TO DEVELOP IT.

TBEEC

LET ME NOW REVIEW THE PROGRAM BEING PLANNED BY THE TECHNOLOGY-BASED ENGINEERING EDUCATION CONSORTIUM -- TBEEC, IN SHORT. MAJOR GOALS OF THE TBEEC PROGRAM INCLUDE THE IMPROVEMENT OF THE PROCESS AND QUALITY OF ENGINEERING AND CONTINUING EDUCATION AND TO DRAMATICALLY INCREASE THE COMPLETION RATE FOR ALL STUDENTS ENTERING ENGINEERING AND TECHNOLOGY PROGRAMS OF STUDY.

THE TBEEC PROGRAM IS SIMILAR TO THAT OF K-12 IN THAT PERSONALIZED LEARNING WILL BE PROVIDED FOR EACH STUDENT WITH MAXIMUM UTILIZATION OF COMPUTER-BASED TECHNOLOGY FOR THE MANAGEMENT AND DELIVERY OF INSTRUCTION.

THE NECESSARY COMPUTER SOFTWARE AND COURSEWARE FOR ENGINEERING AND CONTINUING EDUCATION WILL BE DEVELOPED, EVALUATED, DISSEMINATED, USED AND MAINTAINED THROUGH COOPERATIVE EFFORTS OF CONSORTIUM MEMBERS. THIS WILL BE DONE IN ACCORDANCE WITH STANDARDS DETERMINED BY THE CONSORTIUM.

THERE IS A CONSIDERABLE AMOUNT OF COMPUTER-BASED LESSON MATERIALS, I.E., COURSEWARE, AVAILABLE FOR THE FIRST TWO YEARS OF AN ENGINEERING CURRICULUM. HOWEVER, IT NEEDS TO BE UPDATED BY INCORPORATING THE LATEST ADVANCES IN TECHNOLOGY. MOST OF THE COURSEWARE FOR THE LAST TWO YEARS HAS TO BE DEVELOPED. BOTH WILL REQUIRE A LARGE INVESTMENT IN DOLLARS AND FACULTY TIME. FOR EXAMPLE, THE COST TO DEVELOP ONE COURSE RANGES FROM \$1,000,000 TO \$1,500,000 AND MAY REQUIRE TWO YEARS. COOPERATION AMONG A LARGE NUMBER OF ENGINEERING SCHOOLS IS NECESSARY TO ASSURE THAT THE COMPUTER-BASED COURSEWARE WILL BE OF HIGHEST QUALITY AND DEVELOPED AND MAINTAINED MOST EFFICIENTLY.

CONTINUING EDUCATION: THE CONTINUING EDUCATION COMPONENT WILL HAVE THE SAME PRIORITY AS UNDERGRADUATE ENGINEERING EDUCATION. MUCH OF THE COURSEWARE PREPARED FOR ENGINEERING CURRICULA WILL, OF COURSE, BE APPLICABLE TO RE-TOOLING PRACTICING ENGINEERS. BECAUSE THE SKILLS OF A GRADUATE ENGINEER ARE ESTIMATED TO BECOME 50% OBSOLETE FIVE YEARS AFTER GRADUATION, CONTINUOUS RESKILLING IS REQUIRED. THIS IS COSTLY AND, IN THE LONG RUN, ONLY AFFORDABLE THROUGH THE USE OF TECHNOLOGY.

STATUS: TBEEC HAS MADE CONSIDERABLE PROGRESS. CURRENTLY, MORE THAN 50 ENGINEERING SCHOOLS HAVE JOINED, OR ARE IN THE PROCESS OF JOINING, THE CONSORTIUM, AND I'M CONFIDENT THAT MEMBERSHIP WILL CONTINUE TO GROW.

TBEEC ACTIVITIES BEING PLANNED INCLUDE:

- o THE ASSEMBLY OF A CATALOG OF AVAILABLE EDUCATIONAL COURSEWARE;
- o DEVELOPMENT OF TESTING/EVALUATION AND DISSEMINATION MECHANISMS;
- o AUTHORIZING COURSEWARE FOR INTRODUCTION TO ENGINEERING;
- o CREATING A GENERAL ENGINEERING, MATHEMATICS AND SCIENCE COURSEWARE LIBRARY;

- o A NEW C.B.E. CURRICULUM INTEGRATING DESIGN AND MANUFACTURING;
- o LAUNCHING A COMPREHENSIVE EFFORT FOR INCREASING WOMEN/MINORITIES IN SCIENCE AND ENGINEERING.

I WON'T TAKE TIME TO ELABORATE ON THESE INITIATIVES, EXCEPT TO NOTE THE OBVIOUS OPPORTUNITIES FOR TBEEC AND THE K-12 (TSC) CONSORTIUM TO COLLABORATE, ESPECIALLY TO EXPAND WOMEN/MINORITIES' PARTICIPATION, AND TO MORE EFFECTIVELY COUPLE THE LAST TWO YEARS OF HIGH SCHOOL AND THE FIRST TWO YEARS OF UNDERGRADUATE EDUCATION.

SUBSTANTIAL FEDERAL FUNDING WILL BE REQUIRED TO SUPPORT THE NECESSARY DEVELOPMENT OF ENGINEERING AND CONTINUING EDUCATION COURSEWARE. SINCE VERY LIMITED FEDERAL FUNDING IS CURRENTLY AVAILABLE FOR THESE PURPOSES, NEW LEGISLATION IS REQUIRED.

THERE IS EVIDENCE THAT CONGRESS IS INTERESTED IN SUPPORTING SUCH PROGRAMS. E.G., LEGISLATION IS PENDING WHICH AUTHORIZES THE ESTABLISHMENT OF A TECH-PREP EDUCATIONAL PROGRAM LINKING THE LAST TWO YEARS OF HIGH SCHOOL WITH TWO YEARS OF COMMUNITY OR TECHNICAL COLLEGE IN A SERIES OF COURSES AIMED AT PRODUCING MORE PROFICIENT TECHNICAL GRADUATES. IMPLEMENTATION, THROUGH A CONSORTIUM OF SCHOOLS, AND THE USE OF TECHNOLOGY IN TEACHING ARE ENCOURAGED. \$200 MILLION IS AUTHORIZED FOR FISCAL YEAR 1990. I UNDERSTAND THAT PASSAGE IS ASSURED, ALTHOUGH FUNDING MAY BE DECREASED BECAUSE OF THE BUDGET SQUEEZE.

IN ANTICIPATION OF THE LEGISLATION BEING ENACTED, THE K-12 AND ENGINEERING EDUCATION CONSORTIA, ALONG WITH THE NORTH CENTRAL ADVANCED MANUFACTURING CENTERS PARTNERSHIP, HAVE COMMENCED WORK ON A PROPOSAL FOR A COMPUTER TECHNOLOGY-BASED TECH PREP CURRICULUM. THE TECHNOLOGY-BASED COURSES WILL INITIALLY BE USED BY SELECTED SCHOOLS IN THE CONSORTIA AND BY THE CENTERS OF THE NORTH CENTRAL ADVANCED MANUFACTURING CENTERS PARTNERSHIP, WHICH ARE IN OPERATION OR PLANNED IN SEVEN STATES.

THE 1991 PROPOSED FEDERAL BUDGET REFLECTS ANOTHER POSITIVE SIGN, WHICH IS AN INCREASE OF 26 PERCENT OVER LAST YEAR'S DIRECT SPENDING BY A NUMBER OF AGENCIES, MAINLY THE NATIONAL SCIENCE FOUNDATION, AIMED AT IMPROVING THE QUALITY OF INSTRUCTION IN MATH, SCIENCE AND ENGINEERING AND INCREASING THE NUMBER OF STUDENTS ENTERING THE SCIENCE AND ENGINEERING PIPELINE.

CONCLUSION

MUCH MORE CAN BE SAID ABOUT THE TBEEC PROGRAM AS WELL AS THE K-12 CONSORTIUM PROGRAM; HOWEVER, IT IS TIME TO CONCLUDE.

LET ME RE-EMPHASIZE THAT BOTH THE TBEEC AND THE K-12 PROGRAMS ARE BEING PLANNED AND IMPLEMENTED BY TEACHERS WHICH IS, OF COURSE, ESSENTIAL FOR SUCCESS.

FURTHER, BECAUSE BASIC TOOLS ARE BEING PROVIDED, BOTH PROGRAMS, ESPECIALLY K-12, CAN SUPPORT MANY OTHER CHANGES, AS PART OF THE RESTRUCTURING PROCESS, WHICH ARE BEING ADVOCATED, INCLUDING CHOICE, SCHOOL-BASED MANAGEMENT, OUTCOME-BASED EDUCATION AND MENTORING.

AS I INDICATED AT THE OUTSET, I'VE BEEN ENGAGED IN PROGRAMS TO IMPROVE EDUCATION AND TRAINING FOR 25 YEARS. WHILE THIS GOAL APPLIES TO ALL PEOPLE, I ESPECIALLY WANT TO REACH THE DISADVANTAGED WITH HIGH QUALITY EDUCATION AND TRAINING. EVEN THOUGH CONSIDERABLE PROGRESS HAS BEEN ACHIEVED HERE AND THERE, IT IS FAR SHORT OF WHAT IS FEASIBLE. AS A RESULT, THERE HAS BEEN AN ACCOMPANYING HIGH DEGREE OF FRUSTRATION IN THE PAST BECAUSE SOMETHING WAS ALWAYS MISSING -- LACK OF TECHNOLOGY WHICH WAS NOT AS COST-EFFECTIVE AS DESIRED -- LACK OF CONVICTION, BY MANY, THAT PERSONALIZED EDUCATION WAS THE WAY TO GO -- LACK OF UNDERSTANDING OF THE POTENTIAL OF TECHNOLOGY, AND SO ON.

TODAY, HOWEVER, WE HAVE AN ARRAY OF POWERFUL, AFFORDABLE TECHNOLOGIES, WHICH CAN PROVIDE LEARNING EXPERIENCES BEYOND WHAT A HUMAN BEING CAN OFFER; A GOOD TEACHER CAN BE EVEN A BETTER TEACHER WITH TECHNOLOGY; AND A GROWING BELIEF THAT EDUCATION MUST BE RESTRUCTURED TO INCLUDE A PERSONAL LEARNING PLAN FOR EACH STUDENT. MOST IMPORTANT, AMERICA CAN AFFORD THIS COMPREHENSIVE COMPUTER-BASED, INDIVIDUALIZED EDUCATION SYSTEM IN EVEN THE POOREST COMMUNITIES. THE TASK AT HAND IS TO GET IT IN PLACE IN THE MOST TIMELY MANNER.

TO THAT END, I HAVE TWO CHALLENGES FOR THE MEMBERS OF THIS AUDIENCE. ONE IS THAT YOU AND YOUR ORGANIZATIONS BE THE CATALYSTS FOR A PROGRAM TO ESTABLISH A NUMBER OF TRANSFORMED SCHOOLS IN YOUR STATE. THE SECOND IS THAT YOUR ENGINEERING SCHOOLS AND COLLEGES OFFERING PRE-ENGINEERING, ALONG WITH MANUFACTURING COMPANIES, SHOULD PARTICIPATE IN THE TECHNOLOGY-BASED ENGINEERING EDUCATION CONSORTIUM.

I WILL PLEDGE MY FULL SUPPORT TO THESE INITIATIVES, BUT PARTICIPATION IS A TWO-WAY STREET. BOTH CONSORTIA NEED YOUR HELP IN GAINING A BROAD CONSENSUS AND MEETING THEIR GOALS. BY JOINING US, YOU CAN PLAY A PART IN A NATIONWIDE EFFORT IN TECHNOLOGY-BASED EDUCATION. IN RETURN, YOUR STATE AND YOUR COMMUNITIES WILL BENEFIT FROM IMPROVED EDUCATION. EVERYONE WINS.