#### Written Statement

Of

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Good afternoon, Chairman Baird, Ranking Member Ehlers, and members of the Subcommittee on Research and Science Education. I thank you for the opportunity to testify before your Subcommittee today. My name is Margaret Ford, and I am President of the Houston Community College – Northeast and a Board Member of the American Association of Community Colleges (AACC).

I have the great privilege of serving on the AACC Board and working with Dr. Ed Coulter, Chair of the AACC Board of Directors, 31 fellow Board Members who were elected to the Board, and AACC President Dr. George Boggs. AACC serves as the national voice for the country's 1,202 community colleges, counting more than 90% of these institutions as its members. On behalf of AACC and the students who benefit from competitively-funded programs provided by the National Science Foundation, I sincerely thank you, Chairman Baird and Ranking Member Ehlers, for your interest in the efficacy of technical training at two-year colleges through the Advanced Technological Education (ATE) Program and the success of community colleges in delivering STEM education.

Community colleges play a major role in educating residents of the nation's communities. Did you know that community colleges enroll 11.6 million students annually? Forty percent of the students who enroll at community colleges are full-time students. The majority (60%) of students who enroll at community colleges, however, are part time students. The part-time students are usually employed, many full time; they have families or other obligations, and they recognize the importance of a college degree to improve their earning potential, their job security, and their upward mobility on their jobs. An important distinguishing feature of community colleges is that 46% of all U.S. undergraduates enroll at community colleges; they are first –time freshmen who, according to national reports, perform just as well or better academically when they complete their associate's degree and transfer to a 4-year university as students who began at the university level as freshmen.

These data, in part, illustrate why community colleges provide the comprehensive educational programs to facilitate student success – whether for academic transfer to a senior-level institution or for technical degree completion that will lead to employment. In either case, the community college Open Door provides access for millions of students who might not initially be accepted to a senior-level institution as a freshman. Community colleges prepare students with the tools to succeed and create a sequential pathway, for many students, to senior-level institutions. Community colleges enroll a higher percentage of minority students than any other sector of higher education. 47% of Black; 55% of Hispanic; 47% of Asian/Pacific Islander, and 57% of the country's Native American undergraduates are enrolled at our institutions, where the average student age is 29.

As you consider reauthorization of the National Science Foundation, we appreciate your acknowledgment that some community college students may not have all competencies required for success when they enroll at our institutions, but they will have attained all of the competencies prior to exiting our institutions. In that spirit, I acknowledge the testimonies of National Science Foundation Board Chairman, Dr. Steven Beering and NSF Director Dr. Arden Bement. Dr. Beering stated, and I agree, that the most effective partnership with industry is accomplished through training undergraduate and graduate students who in turn enter the private sector with advanced skills in science and engineering fields." Community college students, many of whom enroll to complete technical Associate in Applied Science (AAS) degrees, are employed in industry positions before they graduate from our institutions. This success in placement is due, in large part, to the high caliber of training that occurs, the competencies and skills that students attain, and the close alliance that community colleges have with industry advisors in the development and implementation of all AAS degree programs. Thus, community colleges are poised, Mr. Chairman, to produce more student completers with the advanced skills in science and engineering fields to help achieve the goals that you mentioned of increasing global competitiveness and students' interest in math and science.

My testimony today is based upon my employment with the Houston Community College where I have served in various administrative roles for over twenty years and where I have served as president of the Houston Community College – Northeast for ten years. Prior to beginning my testimony, I acknowledge the fine work of the Chancellor of the Houston Community College, Dr. Mary Spangler; the dedication of the faculty and staff teams at all six HCC colleges, and the District personnel who help to create the outstanding student successes that we experience in carrying out the vision of our Board. I particularly acknowledge Dr. John Galiotos, who has done an exemplary job in creating new Science and Technology Programs at the Northeast College to train technicians for employment in the energy sector.

NSF support for community colleges is a relatively recent phenomenon. No substantial NSF funds went directly to community colleges before the first year of funding for the ATE program in FY 1994. In FY 2006, NSF provided over \$80 million in support of community and technical colleges, primarily through the ATE program, but

also through several other initiatives. The NSF has become an important source of support for community colleges, and it is safe to say that the NSF's attitude towards community colleges has evolved from one of reluctant acknowledgment to enthusiastic partnership.

Chairman Baird and Ranking Member Ehlers, given the introductory information provided, my testimony will address the specific areas noted in your invitation: (1) to provide a brief overview of science, technology, engineering and technician training programs at the Houston Community College – including partnerships with local industries and the number of students we reach through these programs, (2) to describe the NSF-funded Advanced Technological Education (ATE) program at the Houston Community College –Northeast and identify its markers of success. As requested, I will provide specific suggestions for NSF on how to improve its ATE program, and (3) to describe HCC's relationship with the NSF outside of the ATE program. Finally, I will respond to your questions that ask whether we believe that NSF is adequately serving the science and technology education and research needs of U. S. community colleges, and what might NSF do differently or better, other than providing more money, to serve community college needs.

In addressing these questions, I hope to make clear that as it develops NSF reauthorization legislation and in its endeavors in general, the committee should be mindful of the vital role that community colleges play in STEM education. In particular, community colleges are crucial to educating the nation's technical workforce, increasing the pipeline of students in STEM majors, and preparing and providing professional development for the nation's K-12 STEM teachers.

# Overview of Houston Community College Service-Area Demographics

As background information, the Houston Community College is the third largest singularly accredited community college in the nation. There are six regional colleges within the District which serves 56,000 students per semester in academic transfer, workforce, and continuing education courses. The College District has achieved excellence in many areas of student success. Some of those areas include the rate and percentage of student transfer, student certificate and degree completion in technical program areas, the number of exemplary technical programs as designated by the Texas Higher Education Coordinating Board, rate of student job placements, pass rate on State Exams, employer satisfaction, and the high level of student satisfaction in the "Report of Findings" in the Community College Student Engagement Report.

The Houston Community College District includes seven school districts with a total population of more than two million residents and slightly over 1.5 million residents comprising the adult population. The ethnicity of Houston Community College's service area is 22.5% African American, 33% Hispanic, 7.1% Asian, 37.1% White, and 0.3% other. Within the Service Area Population, the educational attainment for residents 25 years and older is as follows: 26.3% have no high school or GED, 21.1% have high school or a GED, and 52.6% have high school plus college, and 8.7% enrolled in college.

In the Northeast College Regional Service area where I serve as president, there are 350,000 residents. The ethnicity reflects that 19.7% are White, 30.9% are African American, 48.5% are Hispanic, 0.7% is Asian or Pacific Islander, and 0.1% is other. Within the service area, the educational attainment for residents 25 and older reflects the following: 33.3% of the residents lack a high school diploma or GED, 27.7% have a high school diploma, and 18.8% have high school and some college, and 21.2 percent have a degree (associate, bachelor's, graduate or professional degree). These demographics are important because they help focus the training opportunities for the community and the support services needed to ensure student success.

# Overview of Science, Technology, Engineering and Technician Training at the Houston Community College

The Houston Community College offers over 75 technical programs in diverse areas under the leadership of Dr. Charles Hebert, Associate Vice Chancellor for Technical Education and Dr. Charles Cook, Vice Chancellor for Instruction. Below is a list of some of the programs and the number of student completers. All programs are industry driven and have industry advisors. There are 350 industry advisors in the Science, Engineering and Technology areas. In the area of Energy, there are two Energy Collaborative partnerships. One is with the Great Houston Energy Committee, and the other is with the Great Houston Energy Collaborative.

Below are the top ten academic programs by contact hours:

Biology
English
Mathematics, Developmental
Mathematics
History
Government
Guided Studies
Psychology
Intensive English
Chemistry

Below are the top ten technical programs by contact hours:

Corrections
Emergency Medical Technician
Computer Science Technology
Fire Protection Technology
Business Technology
Accounting
Business Administration
Associate Degree Nursing
Audio Recording Technology

# Cosmetology

An abbreviated list of the Science, Technology, and Engineering Programs (including some in the health fields not typically funded by NSF) are listed below with the total number of graduates over a three-year period.

Abbreviated List	<b>Graduates Over Three Years</b>
Industrial Production Technologies Technician	28
Computer Engineering Technologies Technician	137
Drafting Design Engineering Technologist	91
Computer Systems Networking	27
Electronic Engineering Technology	102
Biotechnology	29
Chemical Process Technology	87
Health Information Technology - Medical Reco	rds 71
Pharmacy Technician	140
Nuclear Medicine Technology	133
Emergency Medical Technology	121
Surgical/Operating Room Technician	169
Radiography	146
Nursing	416
Business Technology	450
Fire Protection Technology	671

The Houston Community College has an increasing number of students completing Certificates and Degrees. In the 2005-2006 Academic Year, there were a total of 5,741 completers.

#### **Academic Completers:** Associate in Arts 1,242 Associate in Science 262 Core Curriculum Certificates 1,188 **Associate in Applied Science Degree and Certificate Completers**: Associate in Applied Science 731 Associate of Arts in Teaching 7 Level One Certificate 1,240 Level Two Certificate 41 **CEU Certificates** 5

The placement rates for graduates are high, and the satisfaction rate of employers is also consistently high.

Marketable Skill Achievers Certificate

755

## Community Colleges Educate the Nation's Technical Workforce

The nation's global competitiveness in STEM fields has, as the committee is well aware, been the subject of a tremendous amount of discourse in recent years, especially with the publication of popular books such as *The World is Flat* and seminal reports like the National Academies' *Rising Above the Gathering Storm*. Much of this discussion has been about the number of American students obtaining bachelor's or advanced degrees in the STEM fields, and on the quality of K-12 STEM Education. These are both vital topics, and I will address the community college role in them below. However, there is another important facet to this issue which is often overlooked, and that is the education and development of the nation's technical workforce.

There are many STEM-oriented jobs that, at least at the entry levels, require some postsecondary education, but not necessarily a bachelor's degree. These are the people that keep our laboratories running, man the floors of advanced manufacturing facilities, and provide information technology support to the nation's businesses.

The need to produce more of these skilled workers, which continues unabated today, led to the creation of the Advanced Technological Education program. ATE was originally authorized by the Science and Advanced Technology Act of 1992 (SATA), and first funded at \$10 million in FY 1994. Now in its 14<sup>th</sup> year of funding, the program has grown to \$45.4 million, and the Administration has proposed increasing ATE's funding to \$51.6 million in FY 2008.

The ATE program is jointly administered at NSF by the Division of Undergraduate Education (DUE) and the Division of Elementary, Secondary and Informal Education (ESIE). NSF funds projects and centers across the nation to carry out the ATE program's mission. Currently, the ATE program supports 33 national, regional and resource centers and approximately 250 active projects. Centers focus on systemic approaches to technician education, usually within a specific discipline, and are expected to have broad impact. Projects focus on specific aspects of technician education, such as standards development, curriculum development, and faculty development. The ATE program supports centers and projects in fields such as aerospace technology, biotechnology, advanced manufacturing, environmental technology, and a host of others. All centers and most projects create extensive partnerships with businesses and industry, other two-year colleges, four-year colleges, and universities and secondary schools. The ATE program supports curriculum development; professional development of college faculty and secondary school teachers; career pathways to two-year colleges from secondary schools and from two-year colleges to four-year institutions; and other activities. A secondary goal is articulation between two-year and four-year programs for K-12 prospective teachers that focus on technological education. The program also invites proposals focusing on applied research relating to technician education.

According to researchers at The Evaluation Center of Western Michigan University, which annually surveys ATE principal investigators, nearly 800 projects have

been supported by the ATE program through the years, reaching 320,000 two-year college students, 48,000 high school students, and 6,000 students at baccalaureate institutions. More than 2,000 two-year college programs and 16,800 courses have been created, as well as hundreds of programs and courses at the secondary and baccalaureate level. More than 80,000 educators have received professional development. As you might guess from these numbers, the ATE program is the cornerstone of the community college – NSF partnership.

# HCC's ATE Program

HCC's ATE project was funded by NSF in May 2004. The project supports articulation partnerships so students can complete the two-year Process Technology (PTEC) program and transfer to a four-year PTEC program. The focus of the grant is to improve the way technicians are educated for the workplace. Faculty development, industry involvement, and student engagement are core requirements in the professional development component of the program. The industry involvement is through an established alliance with the Gulf Coast Technology Articulation Partnership (GCTAP) that represents 100 industry members and 20 colleges. The intent of the partnership is to transition students from the Associate in Applied Science Degree to the Bachelor of Science in Engineering Technology Degree. The Principal Investigator is Dr. John Galiotos, Department Chair of Science Technologies and Manager of the Energy Institute at the Houston Community College – Northeast. The Co-Principal Investigators are Dr. Nikos Kiritsis, Ms. Dorothy Ortego, Ms. Carol Schulte, and Mr. James Dautenhan. HCC-Northeast, through this program, is one of the educational partners of the Center for the Advancement of Process Technology (CAPT), an ATE National Center of Excellence.

The focus of our ATE grant is to provide AAS Degree holders in PTEC an opportunity to continue their education towards a Baccalaureate Degree given the industry demand for higher level credentials. The project includes a significant outreach component and support systems to attract and retain Hispanic students. This outreach includes meeting with parents of high school students, developing promotional materials in Spanish, providing scholarships to students attending both institutions, developing yearly one-day workshops at each institution for counselors and high school teachers to become more informed about PTEC and to raise their student's awareness about the opportunities in PTEC, creating student cohorts that includes mentoring support, and providing trips to McNeese State University to understand how job opportunities in PTEC are enhanced by obtaining a four-year degree.

Like nearly every ATE project, there is strong industry support for our ATE project and the larger partnerships in which it is involved. Industry partners supporting the partnership for the Gulf Coast Articulation include British Petroleum, Shell Chemical Company, NALCO Chemical Company, Berric Davis International, Exxon Mobil, Chevron, Environ Test, Goodyear, Liquid Environmental, Halliburton, Emerson, Schlumberger, and Pasadena Refining.

The work of GCTAP and the CAPT has had a profound impact on its industry partners. BP reports saving \$16,000 per person in reduced overtime expenses and training time by hiring PTEC AAS graduates. Additionally, PTEC graduates have a 37 percent better safety record than new hires. According to the NSF publication *ATE Centers Impact 2006-2007*, "representatives from BP and Shell Oil Co. have identified the core curriculum developed by CAPT for the PTEC degree as essential to the strength of their internship programs. Their long-term hiring projections now include the expectation that their PTEC internship programs will grow and that successful interns will increasingly fill full-time process technician jobs." This type of impact on the nation's industries can be seen across the spectrum of the ATE centers and projects.

Thirty two students have completed the Houston Community College program and have transferred to McNeese State University which is located in Lake Charles, Louisiana. McNeese State University was established in 1939 and is the largest comprehensive university in Southwest Louisiana – serving 9,000 students per year. Student-friendly features of the partnership allow students to pre transfer and to co-enroll. The program is enhanced by a 2+2+2 partnership where dual credit is available to eligible high school juniors and seniors, via an HCC board-approved waiver of tuition and fees, to enroll in the AAS Degree Program in PTEC.

The positive outcomes, or markers of success, are derived primarily from the application of the partnership concept. Currently, application of the concept is underway as listed below:

- The University of Houston Downtown is using a similar format to develop articulation partnerships between the Biotechnology program at HCC and with their BS program in Biotechnology.
- The Sam Houston State University Criminal Justice program articulates with the HCC Public Safety Program using the GCTAP platform.
- Prairie View A & M University will use a similar platform to articulate the HCC Chemical Laboratory Technology Program with their Chemical Engineering Program.
- Bellingham College, Bellingham WA, uses the platform to articulate with the Western Washington University BS program in Engineering Technology.
- The platform is used for the University of Houston College of Technology to articulate all of the HCC programs in the Science Technology Division with the University of Houston Engineering Technology Division.
- GCTAP is used as the model for articulation for a NSF/ATE grant on Stationary Fuel Cells education submitted by TATC-Waco, HCC-NE, and Alamo Community College.
- GCTAP is used as the model for articulations for a Center grant in Nanotechnology by Austin Community College in collaboration with HCC-Northeast Energy Institute.

• The GCTAP platform model will be used as the articulation platform for a new certificate in Advanced Manufacturing funded by a Carl Perkins grant from the State of Texas.

### Reauthorization of the ATE Program

By all accounts, the ATE program as currently operating, and as originally authorized by SATA and modified by the NSF Reauthorization Act of 2002, is serving the needs of its constituents very well. The Evaluation Center at Western Michigan University, which annually surveys the ATE principal investigators to identify the key factors either contributing to or inhibiting program improvement, has generally found that none of these factors are "substantial enough to be addressed on a programmatic level for ATE as a whole." This finding backs the overall satisfaction with the program that we hear from the field. From our experience at HCC, I recommend that the ATE program continue to emphasize articulation between two-year and four-year institutions to increase the number of AAS to BAAS degree programs in STEM disciplines and in STEM Career Pathways. Increasing federal support for establishing such articulation agreements and other modes of cooperation between the sectors of higher education, both inside and outside the STEM areas, is one of AACC's top priorities in 2007.

AACC supports reauthorization of the ATE program to reaffirm the strong support that this committee, and Congress as a whole, has shown for this program over the years. In the past, NSF has indicated that \$70 million would be required to achieve their preferred acceptance rate for ATE proposals. If this is still the case, we propose that this figure serve as the authorization amount for FY 2008, with increased amounts for succeeding years.

On a side note, the Western Michigan surveys identify "student recruitment" as the main "inhibitor" to ATE program improvement. Community colleges still find that, on many fronts, there is an awareness gap in regards to technical programs of study. Some students, parents, guidance counselors, and in some cases our colleagues at four-year universities still hold the outdated distinction between "higher education" on the one hand and "vocational education" on the other. While maybe not a subject for the reauthorization legislation, I would suggest that the NSF, perhaps in conjunction with other federal departments such as the Department of Labor and Commerce, increase their efforts to educate the public on the sophisticated nature of today's technical careers, in terms of their "respectability," attractiveness, and the benefits to be derived from them for the student; and also in terms of the serious academic preparation necessary to embark on careers in these areas.

# Community Colleges Are Vital to Increasing The Nation's Pipeline of STEM Students

Any serious effort to increase the number of students in STEM majors and entering STEM fields, particularly those from underrepresented minority populations, must include a significant focus on community colleges. A brief look at the numbers backs this assertion. As noted above, community colleges enroll 45% of the nation's undergraduates, and higher percentages of minority and first-generation college students

than any other sector of higher education. Even within the STEM fields, the numbers are striking: 44% of students who obtain a bachelor's or master's degree in science and engineering attended a community college at some point during their degree studies.

AACC applauded and has supported the STEM Talent Expansion Program (STEP) since its inception, and supports its reauthorization in the coming legislation. Currently, community colleges directly receive approximately 20% of the grants from this program, and are partners in a substantial number of the other grants. I believe that the facts I cited above support an even greater presence for community colleges in this program, or perhaps even a separate program focused on the unique role of community colleges in this area. In any case, AACC strongly supports substantial growth for this program both in its authorization and appropriations.

Another program that has been very important to community college efforts to grow the number of STEM students has been the NSF Scholarships in Science, Technology, Engineering and Mathematics, or S-STEM program (formerly CSEMS). This program makes grants to institutions of higher education to support scholarships for academically talented, financially needy students, enabling them to enter the workforce following completion of an associate, baccalaureate, or graduate level degree in science and engineering disciplines. Grantee institutions are responsible for selecting scholarship recipients, reporting demographic information about student scholars, and managing the S-STEM project at the institution. In FY 2006, community colleges and their students received nearly \$18 million from this program, which is funded by the fees employers pay to obtain H-1B visas for skilled foreign workers.

HCC has an S-STEM (then CSEMS) grant that was funded in 2000 and refunded in 2004. Our grant has been quite successful in meeting the objectives established to (1) recruit and enroll 33 students a semester into an Associate of Science and Associate of Applied Science MET Scholarship Program; (2) retain at least 75% of participants to the completion of a degree and transfer to a baccalaureate degree program; (3) establish six paid summer internships in STEM fields for promising students in the scholarship program to increase collaborations with industry. The program is quite successful in increasing skilled employees in technical areas and increasing student retention and completion.

The goal of the grant was to target students who can commit to two years as a full-time student at HCC and retain them for transfer to a four-year institution to complete their degrees in the S-STEM areas. According to the Co-Principal Investigator, Dr. Kenneth Holden, there are 53 students active in the program who are pursuing careers in engineering, biomedical engineering, electrical engineering, civil engineering, biotechnology, environmental science, mathematics, chemical engineering and computer science fields of study. Since 2000, there have been 45 graduates. All have transferred to a 4-year university.

<u>Community Colleges Are Crucial to the Preparation and Professional Development of K-12 STEM Teachers</u>

The anticipated demand for new teachers in the near future is daunting. It has been estimated that 2.5 million new teachers will be needed over the next decade to replace retirees, and deal with high attrition rates and population growth. The issue is not just one of quantity, as the requirements for high-quality teachers and paraprofessionals found in the No Child Left Behind Act also make it one of quality. This problem is especially acute in STEM fields. In dealing with this looming crisis, no stone must go unturned in recruiting and educating more qualified teachers, both from our student bodies and from the professional ranks.

While definitive numbers are hard to come by, various studies have shown a tremendous community college role in the preparation of K-12 STEM teachers. These studies have indicated that up to 40% of teachers, and perhaps significantly more, have completed some of their STEM coursework at community colleges. This is not surprising given the percentage of STEM degree recipients overall that study at community colleges.

Teacher preparation and certification are significant activities at my institution. HCC offers a Semester-Credit Hour Teacher Education Program. The education curriculum is designed to help students develop competencies in selected teaching skills that are basic to implementing the reflective decision-making model. As a prerequisite to entering the Teacher Education Program, a student must be considered "college ready." Students must have a passing score in Reading and English. The term-to-term completion shows an 80% retention rate of students in the Teacher Education Program. During the 2006-2007 academic year, there are 1,521 students enrolled in the program that leads to the Associate of Arts in Teaching Degree. The program is fully articulated with several 4-year institutions in Texas.

In addition to the Teacher Education Program, HCC also offers educational preparation in an alternative certification program that is offered via continuing education. The Alternative Certification Program is a state-approved teacher certification program that prepares individuals for certification in elementary and secondary levels of teacher education. The College offers certifications in 12 areas (Bilingual Generalist, Generalist, ESL, History, Life Science, Mathematics, Physical Education, Physical Science, Science, Social Studies, Special Education, and Technology Applications). Since January 2003, the College has enrolled 398 students in the program. Of that total, 148 students have completed the Alternative Certification Program. Among the requirements for the program are a bachelor's degree from an accredited institution of higher education, an overall grade point average of 3.0 or an advanced degree, 2.50 on bachelor's degree, and 2.5 overall. The State Board of Educator Certification approved the Alternative Certification Program in November 2002.

The NSF has recognized the importance of community colleges to growing the numbers of qualified STEM teachers with a series of publications and conferences addressing the issue. In terms of ongoing programmatic support for community college teacher recruitment, preparation, and professional development efforts, however, I

believe there is room for growth. Support for these efforts at community colleges is found on a relatively small scale across a number of current programs, including the ATE program as noted above and the Math and Science Education Partnerships. In general, the NSF approach to this issue is fairly research-oriented. This research is important, but so are the "implementation" activities aimed at growing the ranks of teachers.

For this reason, I applaud the introduction of the "10,000 Teachers, 10,000 Minds Science and Math Scholarship Act" (H.R. 362). In recent years, the Robert Noyce Scholarship Program has been an important NSF program in this area, which provides scholarships and stipends to juniors, seniors and current professionals intending to become STEM teachers, as well as additional programming to support their studies. Because of its design, community college involvement in the program has been limited. For this reason, I am heartened to see in H.R. 362 an intention to widen the program to the first two years of undergraduate studies. I believe that further refinement of the language in that legislation may be needed to effectively bring community colleges into the fold of this important program. I also welcome the separate authorization for the Teacher Institutes for the 21<sup>st</sup> Century. AACC looks forward to working with the community to ensure that community colleges are active partners in these efforts.

<u>Do community colleges believe that NSF is adequately serving the science and technology education and research needs of U. S. community colleges?</u>

I am persuaded that the National Science Foundation continues to do an excellent job in identifying specific areas for academic concentration and research funding based upon their input from partnering agencies, such as the American Association of Community Colleges, the National Academy of Science, and other agencies that provide information on the "current needs" of the Nation. As I mentioned above, the NSF has become a key source of federal support for our institutions and students and I look forward to our continued partnership. As reauthorization moves forward, I believe there is an opportunity to build upon this partnership through the suggestions made above to ensure that community colleges are fully utilized in increasing the nation's STEM competitiveness.

Chairman Baird, Ranking Member Ehlers, Members of the Committee, I thank you for the opportunity to testify before the Research and Science Education Subcommittee today.