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October 7, 2005

Dr. Charles E. Smith
Executive Director
National Assessment Governing Board
800 North Capital Street, NW
Suite 825
Washington, DC 20002

Dear Dr. Smith,

As a member of the NAEP 2009 Steering Committee I must inform you that there is no consensus on our Committee regarding the recent proposal to eliminate the assessment of Technological Design as a practice that is parallel to, yet distinct from scientific inquiry. Although I am unable to meet you in person on October 25th, my views on the subject will be presented by Patti Curtis, the representative of the Museum of Science in Washington D.C. My urgent request is to at least retain the current level to which technological design is represented in the framework, and further—to strengthen it.

Before summarizing key points to support my recommendation I want to point out that the currently posted Framework draft, which includes technological design as parallel to inquiry, is consistent with the guidelines that my committee drafted a year ago. That is:

> "The [2009 NAEP]Framework should address science in both the natural and designed world. The Framework needs to identify commonalities and differences between 'technology' and 'science.' Design tasks may be an exemplary bridge."

It is difficult for me to understand why some of my colleagues on the Steering Committee have retreated from this earlier position, since the ability to address human problems and meet human needs is an essential skill in today's increasingly technological society, and is at least as important as the ability to inquire into the natural world.

In the remainder of this letter I will make the following points:

1. There is an urgent need in our nation for more of our citizens to pursue careers in technical fields.

2. The majority of states already have a strong technology/engineering component in their standards.

3. Expanding the pool of future engineers, technicians, and technologists requires a united K-20 effort.

4. The decision of NAGB on this issue is critical to our nation's future.

Need for more citizens to pursue technical careers. The percentage of college students in the United States who choose to pursue technical fields hovers around 5%, in contrast to students in other countries, such as China, Japan, and South Korea, where the percentages are closer to 20% or 30%. In terms of absolute numbers, China alone produces six times as many engineers as the United States, and comparably large numbers of well-trained engineers receive degrees in India, Russia, and other countries. There is a significant danger that leadership in technological innovation—widely acknowledged as a critical driver of our prosperity—will pass to other countries if we do not improve our educational system so as to increase the number engineers and technicians, as well as a populace that understands and supports our technical workforce.

Educational leaders in many states have recognized this national problem and are taking steps to modify their educational systems to increase the number of students who choose to enter technical fields, as well as raise the level of technological literacy of all citizens. That effort begins by changing state standards to include engineering and technology as an equal partner to science, and then aligning curricula and programs, professional development of teachers, and state assessment systems.

Many states are increasing technology and engineering education. Massachusetts is well known as the first state in the nation to include technology and engineering in the title of its standards, but a recent study by the International Technology Education Association (ITEA) reveals that in 2004, 38 states included a strong technology thread in their standards (up from 30 states in 2001).

Nationally more and more educational leaders realize that technology and engineering provide an excellent means of integrating science and math through real-world problems, that many students are motivated by solving problems that make a difference in people's lives, and learning about careers in technology and engineering greatly expands students' options in life. (It is ironic that students have many opportunities to learn about the work of scientists during their K-12 schooling, and few opportunities to learn about the work of engineers, even though the US Department of Labor Statistics shows that there are four times as many positions for engineers as there are for scientists.) Furthermore, the ability to solve problems and to use technologies of all sorts is an important life skill for everyone.

A united K-20 effort is needed. Given the changing demographics of our population, it has become clear that we need to attract more women and members of historically underrepresented groups to technical fields. The split between those who do and do not see a future for themselves as engineers or technicians begins prior to middle school. That is why it is important to introduce elementary school children to a wide diversity of role models who find these fields to be rewarding. Opportunities to engage in hands-on, challenging and skill-building activities must be available at the middle school level to sustain that interest, and pathways are needed at the high school level to continue to nurture students who develop an early interest in engineering and technology, alongside

courses that help our young people increase their knowledge and skills in mathematics and science. Programs are also needed to ease the transition to college and then to graduate school, as well as improvements in teacher preparation, so that we continue to grow and sustain a vital workforce that will lead our nation confidently in the 21st century.

The decision of NAGB is critical. In the past decade we have seen that assessment is an essential component of the educational system; and NAEP is the only assessment instrument capable of providing feedback and fostering change at a national level. NAGB is at a crossroads. If the Board decides to limit its test to what students have studied in the past, it will perpetuate a system that has resulted in what a Presidential Commission has called "a rising tide of mediocrity." On the other hand, if the Board decides to support the 38 states that have already committed to increasing the level of technology and engineering education, plus the other states that are certain to do so by 2009, then it will play a critical role in helping our nation retain its world leadership, and in helping us prepare for the challenges that we are certain to face in the future.

In conclusion, I must add that this is not the letter I expected to write at this time. Although I approve of including technological design as a parallel to scientific inquiry, the term is now obsolete. While it may have been appropriate in the 1990s, when the Benchmarks for Science Literacy (AAAS, 1993) and the National Science Education Standards (NRC, 1996) strongly advocated its inclusion along with science, the term "engineering design" is now preferred. I think it is time that we called it that in the NAEP Framework, and therefore remove the possibility of confusing this important and very broad conception of problem solving skill with the relatively limited knowledge about how to use computers. And, of course, I recommend that we rename the Framework itself as the ***Science and Engineering Framework for the 2009 National Assessment of Educational Progress.***

Sincerely,

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President and Director

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