

Testimony of James H. Simons

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Good Morning Chairman Gordon, Ranking Member Hall and members of the Committee. My name is Jim Simons and I am here today as the Chairman and Founder of Math for America (MfA) which was created to offset the alarming shortage of knowledgeable mathematics teachers in our public schools.

We appreciate your continued focus to improve mathematics and science education in our secondary schools and for recognizing the importance of a high quality science and math teaching workforce. The Congressional Innovation Agenda championed by this committee over the past two years, including the passage of the America COMPETES Act, has reinvigorated the essential role of math and science education in our country.

While I was especially pleased that Chairman Gordon, using the MfA model of stipends, scholarships and support, included an amendment to the COMPETES bill to substantially bolster the existing Robert Noyce Scholarship program, I strongly believe we need to continue to strengthen that effort during this reauthorization process.

Before talking about Math for America I wanted to give you a brief glimpse of my personal background and how mathematics has been the driving force in my life.

I am Chairman and Founder of Renaissance Technologies. The company's investment approach, fueled by my background in mathematics, has been enormously successful. Before I entered the business world, I was a mathematician. I have a Ph. D. from Berkeley, won the 1975 Veblen Prize of the American Mathematical Society and taught mathematics at Massachusetts Institute of Technology and Harvard University before becoming chairman of the mathematics department at the State University of New York at Stony Brook.

Along the way, I spent four years as a code breaker for the National Security Agency.

I serve as a Trustee of The Institute for Advanced Study, The Rockefeller University, MIT, the Mathematical Sciences Research Institute in Berkeley and Brookhaven National Laboratory. With my wife Marilyn, I am actively engaged with my charitable foundation, the Simons Foundation. Recently, we created The Simons Center for Geometry and Physics at Stony Brook which looks at the crucial interdependence between theoretical physics and the geometric side of mathematics. More recently, we initiated a Postdoctoral Fellows Program to support 68 postdoctoral positions at 46 universities. These will be three-year positions in mathematics, mathematical physics and theoretical computer science.

With Marilyn's leadership, the Simons Foundation seeks to advance math and science research through grant making that particularly encourages collaborations between the physical and life sciences. We fund studies aimed to heighten interchanges between institutions, across fields, and among scientists to facilitate the exchange of new ideas. I am especially proud of the significant work of the Simons Foundation Autism Research Initiative, which supports research to better understand the causes of autism. This initiative is the world's largest private investment in the field of autism research.

It's an honor for me to be here today to discuss strategies to improve student achievement by creating an environment that encourages people with high content knowledge in math and science to establish successful careers as public schools teachers.

Drawing a straight line from the problem to the solution, the simple answer for improving STEM education is to have the best, most knowledgeable teachers in the classroom. My thesis is that unless we meaningfully and immediately increase the level of respectability and compensation earned by secondary school mathematics teachers with strong knowledge in their subject, our nation will continue to lose its competitive edge in the technology based global economy of the 21st century.

Our economy is increasingly dependent upon technology that uses math as the starting point, and there are many private sector career opportunities for a young person with math skills and knowledge in finance, technology and research. Given

that, flat salaries for teachers are thwarting the supply and demand. If we want knowledgeable mathematics and science teachers in the classroom, we must dramatically increase their compensation and give them the respect they deserve.

This is a supply and demand issue. It's clear that the widening salary gap, between quantitative skills based private sector jobs and teaching jobs in our secondary schools, has discouraged many capable people from launching a career in teaching. Taking that into account, as well as the unlikelihood that those private sector jobs will decrease their compensation in the years ahead, we instead need to increase teaching salaries to make teaching a legitimate career option. By doing so, we are providing our students with the edge they need to keep the nation competitive and progressive.

The relative weak ranking of US students in international assessment tests clearly demonstrates the urgency. The most recent TIMSS (Trends in International Math and Science Study) report shows that by the eighth grade, our students are rated average in mathematics, and by the twelve grade, they drop to near the bottom. Moreover, even our top 10 percent does worse when compared to the top 10 percent of most other countries. Research indicates that the best performing nations employ rigorous entry requirements and high standards for teachers, and that high performing students in math and science more likely had teachers with content-specific training. We are facing an economic onslaught of a highly competitive global workforce, causing us to fall behind to some measure because of the more rigorous teacher preparation policies of other countries—and it is these students who are outperforming our math and science students.

How do we solve this problem? The idealistic nature of many has sparked volunteerism and short-term programs to make an immediate, although temporary, impact. We need a long-term, sustainable solution to ensure that math and science teaching jobs are attractive so that teachers stay in the classroom and remain involved with education. Currently, about one-half of new mathematics teachers leave by the end of five years. Obviously, paying more is necessary, but giving teachers more recognition and respect are equally important components. Moreover, American schools and policymakers must do better. There is a preponderance of top down solutions and slogans, mostly related to testing data, standards and curriculum that does not get to the heart of the problem. We need to

go directly to the center of the issue—ensuring that we have inspiring and knowledgeable teachers in the classroom.

Math can be difficult to understand and explain. Excellent teachers know and love their subjects. Outstanding teachers will not merely follow the material in a lesson plan or teach to the test, but instead will sufficiently and intelligently answer questions that enthusiastically encourage and engage students to seek further inquiry. This is not a question of the number of teachers. This is about knowledgeable teachers who are impacting the lives of countless students every day. Students today need the necessary mathematical and scientific tools to learn and think critically and analytically in order to be adequately equipped for the jobs of the future.

Having briefly touched on the roots and barriers of our national STEM educational crisis, I would like to focus on our approach to the solution and tell you about Math for America. We sponsor three Fellowship programs make teaching jobs more attractive through financial rewards, recognition and respect.

Our endeavor in starting Math for America in New York City in 2004 was to create a pilot program for a national model. MfA is a private nonprofit organization with a mission to improve math education in US public secondary schools by recruiting, training and retaining outstanding mathematics teachers.

Along with New York City, we have sites in Boston, Los Angeles, Berkeley, San Diego and Washington, DC. We are currently negotiating with several other cities and states interested in joining our network. We are ready to grow and provide substantial matching funds for those efforts while looking at existing state and federal programs to best leverage our impact. For example, MfA sites in Boston, Washington, DC, Los Angeles and San Diego were recently awarded National Science Foundation Robert Noyce Teaching Fellowships and Master Teaching Fellowships grants. That NSF support, leveraged by the MfA commitment, is expected to have a significant impact on their work.

MfA offers Fellowships for both new and experienced teachers, including the MfA Fellowship which aims to increase the number of mathematically talented individuals entering the teaching profession, as well as the MfA Early Career Fellowship and MfA Master Teacher Fellowship, which support outstanding

mathematics teachers already in the classroom. To date, we have more than 300 teachers in the program with about 100 additional Fellows and Master Teachers poised to enter the program this spring.

The MfA Fellowship is a five-year program where recent college graduates and mid-career professionals make a commitment to teach math in public secondary schools. MfA Fellows are mathematically sophisticated individuals who are new to teaching and use their talents to make a difference in students' lives. The program includes one year earning a master's degree in education and four years of teaching math in public secondary schools. The MfA Fellowship provides a full tuition scholarship, annual stipends of up to \$100,000 over five years, in addition to a full time teacher's salary, and mentoring and professional development services. During the fifth year, Fellows may apply to become Master Teachers.

The MfA Early Career Fellowship, a pilot program, provides professional support and growth opportunities to current new teachers of secondary mathematics in a public school or recent graduates of education training programs who are certified to teach and have secured an eligible job. The four-year program includes annual stipends of up to \$70,000 over four years, camaraderie with a cohort of outstanding secondary math teachers, mentoring and professional development support.

The MfA Master Teacher Fellowship rewards exceptional public secondary school math teachers with a four-year Fellowship in New York City. The Master Teacher Fellowship includes annual stipends of up to \$60,000 over four years, professional development and leadership opportunities and support for mathematical and educational interests.

MfA staff, along with part-time New Teacher Advisors and Master Teachers, provide Fellows with regular professional and instructional support and guidance. MfA also hosts a variety of workshops and seminars to keep Fellows connected to one another and learn new math and education skills and strategies. Selected meetings are open to the public and Fellows are encouraged to bring colleagues and other department members. In addition, MfA urges Fellows and Master Teachers to create professional development sessions and attend and present at local and national conferences.

The MfA Fellowships and MfA Master Teacher Fellowship are based on three key principles:

- To teach math effectively, one needs a strong knowledge of mathematics, solid pedagogical skills and a desire and ability to interact with young people.
- Generous incentives make it possible to recruit highly qualified individuals into teaching and to retain outstanding mathematics teachers.
- By providing strong support services, including continuing education, mentoring and professional development, it is possible to inspire a commitment to a long-term career as a mathematics teacher.

We have established extensive partnerships with universities and school districts at each program site to provide our Fellows with the best resources and education and continuously improve overall secondary mathematics education in these public schools. In addition, working with other math education stakeholders, we created a Professional Development and Outreach (PDO) group with the Park City Math Institute to support mathematics teachers in the five boroughs through workshops and outreach activities. MfA Los Angeles has also worked with Harvey Mudd College and the Park City Math Institute to establish the Harvey Mudd Professional Development and Outreach Group for mathematics teachers in the Los Angeles area. It's this kind of collective effort that builds a sense of purpose, self respect and recognition that their work, as teachers, is meaningful and important.

We have found that this injection of teachers—who are highly knowledgeable and passionate about math—into public schools directly helps students, while also encouraging and inspiring other teachers, schools, districts and parents. And, by creating a community of like-minded mathematicians in the classroom, we have watched the important role of esprit de corps in fostering our mission and impact.

When Sputnik went up fifty years ago it shook our country because we were underprepared in Defense. Quick and effective congressional action, including the National Defense Act, which helped me get my Ph. D. in 1961, remedied that by creating an outstanding pool of scientists and mathematicians. Today, we are facing a vastly different and more difficult challenge with both our economic and

national security threatened and our role as a leader of innovation and ingenuity considerably lessened. We must find a way to meet that challenge, and the ideas that underlay Math for America suggest a way to do this.

MfA attributes much of its success to its commitment to providing professional enrichment opportunities, developing leaders and creating a strong community of mathematics teachers. I believe this can be done on a national level through the creation of a Math Science Teaching Corps (MSTC). In 2006, this notion was introduced by my friend, Congressman Jim Saxton and perhaps it's time to revisit that effort. The Robert Noyce Teacher Fellows and Master Teaching Fellows Programs, which encourage talented science, technology, engineering, and mathematics majors and professionals to become K-12 mathematics and science teachers, could become a pilot program for such a national corps.

Thank you again for the opportunity to testify before the Committee and for your work over the past two years under the leadership of Chairman Gordon. I intend to continue my modest contribution to make MfA successful in New York City and around the country by working with the NSF and other entities. We greatly appreciate your efforts as you go through the reauthorization process of the America COMPETES Act. I believe private sector support combined with a robust federal government commitment will achieve results.