STATEMENT OF ALLYSON KNOX
DIRECTOR OF EDUCATION POLICY AND PROGRAMS
MICROSOFT CORPORATION

BEFORE THE
ENERGY AND COMMERCE COMMITTEE
SUBCOMMITTEE ON COMMERCE, MANUFACTURING, AND TRADE
UNITED STATES HOUSE OF REPRESENTATIVES

"OUR NATION OF BUILDERS: TRAINING THE BUILDERS OF THE FUTURE"

NOVEMBER 15, 2013

Thank you, Chairman Terry and Ranking Member Schakowsky, and all the Members of the

Subcommittee for inviting me to testify today. My name is Allyson Knox and I am the Director of

Education Policy and Programs at Microsoft Corporation.

As this subcommittee knows, the U.S. economy is challenged by a growing gap in STEM skills. I hear

about this talent crises every day as I travel across the country talking to educators and employers –

they tell me they cannot find enough skilled workers to fill the jobs they have; even more telling they say

this talent crises is hindering their ability to add jobs into the future. Today, I will describe that skills gap

from Microsoft's perspective, highlight some of Microsoft's public-private initiatives that focus on STEM

skills development, and offer policy recommendations for the subcommittee's consideration.

Like other employers with significant numbers of high skilled job openings around the country,

Microsoft has been confronting the challenge of finding workers for our open jobs in a labor market

where the necessary skills are in short supply. For example, WA State where Microsoft is headquartered

has the fourth most STEM jobs in the country, yet its four-year colleges produce the fourth least STEM

graduates. In an effort to address this challenge, Microsoft undertakes substantial recruiting activities at

more than 150 universities in the U.S. and conducts targeted recruitment of experienced workers in the

industry, including veterans and candidates with diverse backgrounds.
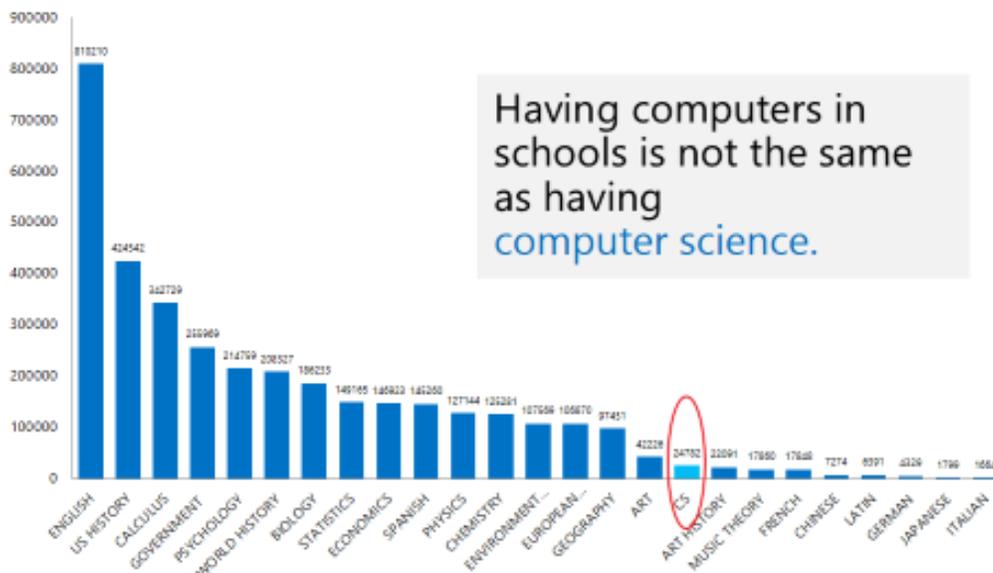
Despite these efforts, Microsoft currently has thousands of open positions in the U.S., many of which

are for jobs in research, engineering, and development. Our experience at Microsoft is no different than

the challenge being faced by employers with high skilled job openings around the country.

Challenges of preparing Americans for the job opportunities of tomorrow.

While companies are experiencing a national talent crisis, too many young people today are

experiencing an opportunity divide between the training they have and the skills they need to succeed.

This growing challenge is the result of our education system not keeping pace with the changing needs

of the workplace, especially in the computer science and other high demand STEM fields. Our K-12

educational system is not producing enough high school graduates with sufficient preparation for success in college. In 2011, only 45 percent of U.S. high school graduates were prepared for college-level math, and only 30 percent were prepared for college-level science. More recently, last week's results of the National Assessment for Educational Progress (NAEP) showed that despite positive trends, only 36 percent of our 8th graders are proficient or advanced in mathematics. Our students are also scoring significantly lower in math and science literacy compared to their counterparts in other developed countries.
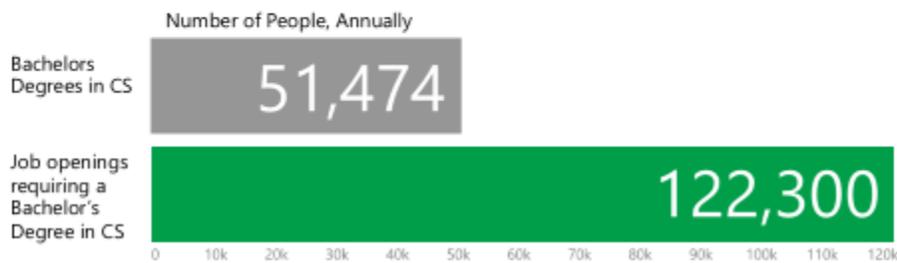

The lack of emphasis on computer science in high school is a particularly acute concern as our nation seeks to keep pace with our global competitors. Of the more than 42,000 high schools in the U.S., only 3,249 were certified to teach the Advanced Placement (AP) computer science course in 2013. That's fewer than 10 percent. Looking at this from a different angle, we know that introductory secondary school computer science courses have decreased in number by 17 percent since 2005 and the number

of AP Computer Science courses has similarly decreased by 33 percent. The bottom line is that computer science courses in K-12 education are disappearing from the national landscape at the very time they are needed most, given the skills requirements of employers to secure these high paying IT jobs.

Our Computer Science Shortage
Supply is not meeting demand

Number of People, Annually

Bachelors Degrees in CS: 51,474

Job openings requiring a Bachelor's Degree in CS: 122,300

The pipeline of talent is restricted within the higher education system as well. The Bureau of Labor Statistics has projected that there will be approximately 122,300 new job openings in the U.S. each year in computing occupations requiring at least a bachelor's degree through the end of this decade. Yet nationally, our universities are producing just over 50,000 bachelor's degrees in computer science each year.

Our colleges and universities simply do not have the capacity to meet the demand for educating and graduating students with degrees in key STEM majors. The Seattle metropolitan area is home to one of the top computer science departments in the U.S. at the University of Washington. Yet, that department turns away 75 percent of students at the university who complete the prerequisites and apply for the major simply because it doesn't have the faculty or space to educate them, despite the demand for engineers graduating from the department. Currently, the program has the capacity to graduate a mere

200 students—at the bachelor's, master's and doctoral levels combined—each year. This is just one example of a leading university that still can't meet the demand of the number of students who want to major in computer science. We need to do better.

Addressing the Skills Gap through Public-Private Partnerships

In order to meet our current employment demands – collaboration and partnerships become critical. Microsoft partners directly with schools, community and four-year colleges, non-profit organizations and governments at the local, state, and federal levels to try to achieve a larger impact with our initiatives. We believe these partnerships become even more essential in an era of reduced government spending.

In fact, Microsoft takes partnership development, expansion, and management seriously. Many Microsoft employees earn a "Partnership Brokers Training Certification" from the Partners Brokers Association to gain the skills needed to design, facilitate, and manage public-private partnerships. This five-day training program helps employees recognize the unique assets of public partners, establish mutually beneficial goals, speak in multiple languages, and drive for results in a complex context.

Many of our "partner certified" Microsoft employees manage large public-private skills training programs within Microsoft.   Examples include: Microsoft's Corporate Citizenship program called YouthSpark; Microsoft Learning's program called IT Academy; and Microsoft Education's program called Partners in Learning.   The majority of Microsoft's public-private partnerships are designed to help drive employability, digital literacy, technical and STEM-focused training and certification, and 21st-century workforce development for high school, community college, and college students.

A clear example of this work is Microsoft's YouthSpark (www.microsoft.com/Youthspark) initiative. One year ago, Microsoft announced YouthSpark, a company-wide initiative to empower youth to imagine and realize their full potential by connecting them with greater opportunities for education, employment, and entrepreneurship. Through more than 30 programs and partnerships with youth-

serving nonprofits, in its first year alone Microsoft YouthSpark has created opportunities for more than 103 million young people in over 100 countries around the world. Here in the U.S., we partner with five major nonprofit organizations with missions to give youth the skills, education, and job training they need to succeed. Our national partners include The Boys & Girls Clubs of America, City Year, Junior Achievement USA (JA), Network for Teaching Entrepreneurship (NFTE), and Year Up. We also partner with the CityBridge Foundation and the College Success Foundation in Washington, DC.

On the surface, the national partners aim to bolster programs that help youth learn important 21st-century skills, find jobs, and connect with caring adult mentors. Beneath the surface, however, are thousands of stories of real young people who have been impacted by these programs, gotten off the streets, found their dream jobs or been inspired to further their education.

Although there is still more to do, we have been inspired by the results. Across the country, young people are taking the lead in gaining the skills they need to succeed while making a real impact in their communities. These stories include young mothers who have gained the skills they need to support their children, underperforming youth who experienced math "clicking" for the first time, young entrepreneurs who have created their own innovative businesses, and many more. Here is one of many U.S. YouthSpark stories of success:

> **Anthony Halmon:** In his younger years, Halmon felt a lot of pressure to become involved in gang-related activities. His life changed forever the year his father passed away and his daughter was born. Determined to take a different path, Halmon enrolled in the Perspectives Leadership Academy in Chicago and his grade point average skyrocketed from a 1.0 to 3.6. During his junior year, he became involved with the Network for Teaching Entrepreneurship and designed the thermofier – a pacifier with a built-in thermometer, inspired by his infant daughter. He presented his invention at the White House Science Fair, where he met President

Obama. Now, Halmon is a freshman at Cornell University, where he says he may pursue civil

engineering. He wants to speak to upcoming generations and inspire them with his story.

In addition to partnering with skills-focused, national non-profits operating in communities around the

country, Microsoft also engages in successful public-private partnerships to help solve the opportunity

divide and provide youth with the skills they need to succeed. To help today's students obtain high-tech

skills, Microsoft's TEALS (Technology Education and Literacy in Schools) program places computer

science professionals in high schools. Working side-by-side with in-service teachers, TEALS volunteers

teach basic and Advanced Placement (AP) computer science courses.

The TEALS program brings together computer science engineers from across the tech industry and uses

the team-teaching model to promote self-sustaining computer science programs in their high schools.

The program began with one Microsoft employee who recognized need for computer science courses in

high schools and started volunteer teaching AP computer science in one Seattle high school three years

ago. He worked closely with Seattle school district leaders to learn how an urban school district

operates, manages volunteers, and integrates professionals into classrooms. After further feedback,

many discussions, and students passing the AP computer science exam - the employee recruited more

software engineer volunteers into additional Seattle classrooms. He presented the success to Microsoft

and now this employee manages TEALS as a full time job.

Today the TEALS program is operating at 70 schools in 12 states (AK, CA, DC, KY, MA, MN, NC, ND, NY,

UT, VA, and WA). Currently, more than 280 volunteers will teach 3,000 students during the 2013–2014

school year alone. With the demand for TEALS continuing to grow, this partnership is making a positive

impact in schools across the country, as evidenced by the story of an important difference in a Lee

County, Kentucky student.

Jeremy Moore: Jeremy never thought he would go to college. The struggling economy in his

rural Kentucky hometown provided Jeremy with few opportunities. But, he always loved

technology, even without formal instruction. "He learned what he could on his own, but didn't

really know where to go from there," says Tammy Moore, Jeremy's mother. Jeremy now learns

about computers and computer programming every day. "TEALS has been a godsend to us,"

says William Owens, Lee County Board of Education chairman. "We couldn't afford the teachers

and the program, so Microsoft stepped in — and we are very grateful." The program has been a

huge success so far. "We wanted to see if we could take the successes we had locally and make

a national impact," says Microsoft Software Engineer Isaac Wilson, who teaches Jeremy

remotely from Redmond, Washington. More important, Jeremy made the honor roll for the first

time ever in the 2012–2013 school year, and hopes to attend college and fulfill his dream of

becoming a software engineer. "TEALS helped him all around," says Tammy. "The sky's the limit

for him now."

TEALS is the programmatic demonstration of Microsoft's commitment to broadening access to

computer science education. We are also committed to supporting programs that motivate students to

take computer science courses. By partnering with national non-profit organizations like the Computer

Science Teachers Association (CSTA) and Code.org, Microsoft is working to ensure more students are

have the opportunity and are incentivized to take a computer science course at the high school level.

In more than 30 states, when a student completes a computer science, course they only receive an

"elective" credit, none of which help them fulfill their high school graduation requirements[i]. When

competencies such as algorithmic problem-solving, data analysis, and modeling real-world problems are

taught in a computer science course – that course should also be able to be counted as a math or

science credit. By counting it as a math or science credit – students have more of an incentive to take

computer science classes.

 Microsoft and its partners are working closely with state policymakers in more than 15 states to

increase the number of states that count computer science as a math or science credit toward high

school graduation requirements. This policy and advocacy effort demonstrates Microsoft's two-pronged approach to ensuring all students have the education and skills they need to compete in the global economy.

Microsoft also supports public-private partnerships at the state level through its IT Academy (ITA) (www.microsoft.com/itacademy) program. ITA is designed to provide students with college and career-ready technology skills on a range of industry programs including network administration, collaboration tools, spreadsheets, databases, word processing, presentation tools, programming, etc. Built with a series of online learning courses and modules mapped to industry demand certifications, courses cover a range of technologies and subject areas, including Microsoft Office, applications development, database management, and network and systems administration with Windows Server. In total, ITA offers more than 250 courses.

Microsoft works directly with state government leaders to systematically deploy the ITA program to students throughout the state. By working with state departments of education and state education associations, an increasing number of educators, principals, and local superintendents become aware of the ITA opportunity and are trained in how to infuse it into classrooms. This systemic approach increases program efficiencies, reduces costs, and increases ITA access for urban, rural, and suburban students.

Microsoft's IT Academy program is a leading U.S. education program for secondary and higher education students that boost technology skills and help connect learning with potential careers, providing schools with official learning content, online courses, digital books, software licenses, lesson plans, quizzes, and teacher prep resources to help students realize their potential and pursue industry-recognized certifications. In recent years, IT Academy partnerships have expanded to include libraries and workforce development initiatives as well as to help meet the growing needs associated with the transitioning adult learner community. IT Academy emphasizes industry certification attainment as a
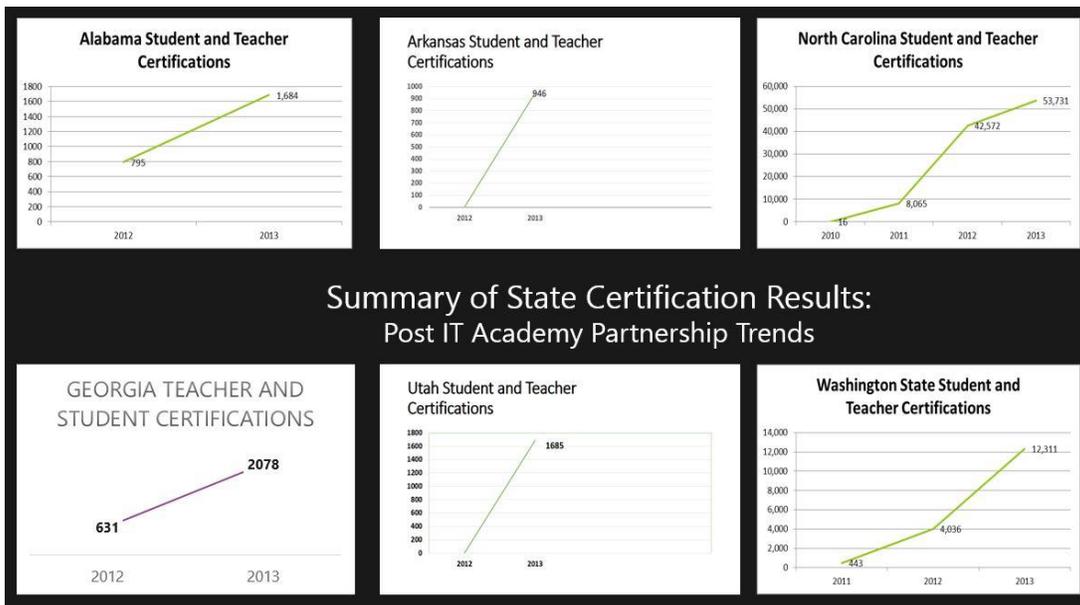
benchmark for achievement, giving all students the opportunity to earn one of several industry-recognized credentials. The most common certification earned at the high school level is the globally-recognized Microsoft Office Specialist (MOS) certification.

A student can be certified on any single Microsoft Office application to be Microsoft certified (e.g., MOS Excel). Microsoft works with state leaders to ensure that IT Academy program helps not only help students gain certifications but their teachers can become certified as well. Currently these skills-focused partnerships are operating in the following states:

State	Organization	Number of Microsoft IT Academies
Arkansas	High Schools and Workforce Agencies	343
Alabama	High Schools	132
Delaware	High Schools	36
District of Columbia	High Schools	30
Georgia	High Schools	463
Hawaii	State Public Library System	52
Iowa	STEM Schools	150
Louisiana	High Schools	307
Nebraska	Universities/Community Colleges	3
New York	Universities/Community Colleges	25
North Carolina	High Schools	628

	Community Colleges	58
Utah	High Schools	150
Virginia	High Schools	321
Washington	High Schools	702
	Library Branches	400

The following charts indicate examples of explosive student and teacher certification attainment growth in some of these states:

One of Microsoft IT Academy's best practices is North Carolina. North Carolina was the first state to adopt ITA and since August 2009 has certified approximately 100,000 students and teachers in Microsoft Office Specialist.

MS ITA Best Practice
NORTH CAROLINA STATE-WIDE ADOPTION

	Pre-IT Academy (Aug 2009-June 2010)	1st Year of IT Academy (Aug 2010-June 2011)	2nd Year of IT Academy (Aug 2011-June 2012)	3rd Year of IT Academy (Aug 2012-June 2013)
Number of **total** MOS certifications	21	8,794	43,630	53,731
Number of **student** MOS certifications	16	8,065	42,563	52,922
Number of **teacher** MOS certificates	5	729	1,148	809

Microsoft Office Specialist (MOS) certifications through the Microsoft IT Academy across North Carolina's public high schools

Statewide public-private partnerships focused on building 21st century skills are also created through Microsoft's U.S. Partners in Learning (PiL) initiative (www.microsoft.com/partnersinlearning). Partners in Learning's goal is to strengthen students' 21st century competencies by infusing technology into their regular classroom learning. Microsoft is committed to training teachers and school leaders to effectively use technology in learning. This is a 15-year, $750 million worldwide commitment. Over the last ten years and in the United States, Microsoft invested $50 million dollars in specific PiL programs such as the Innovative Teachers Program, Partners in Learning Network, Innovative Schools, and the Microsoft Innovative Educator Program. We have reached 1 million U.S. teachers and student through this initiative.

As one example, U.S. PiL is in the early stages of partnering with Omaha Public Schools by working closely with one of its outstanding educators – Maddie Fennell. Maddie Fennell is an Omaha Public Schools Literacy Coach at Miller Park Elementary School, an inner-city school in Omaha, Nebraska. She has taught for 24 years in Omaha Public Schools, was named 2007 Nebraska Teacher of the Year, and is

currently serving as a U.S. Department of Education Teaching Ambassador Fellow. After learning about

and meeting with U.S. PiL leaders, she is committed to bringing PiL's robust technology in education

offerings to the district to achieve transformational learning. She has worked with her district to inform

all 3,000 Omaha Public School teachers about the Partners in Learning Network which provides all

teachers online professional development, self-assessments, and lesson plans for free.

Recognizing the need to help great teaching candidates find jobs in the classroom, Microsoft is also

partnering with a coalition of public, private, and government leaders to support a new website called

TEACH.ORG. This website features a wide variety of resources ranging from detailed information on

how to find student aid, to link, for job opportunities in schools throughout the country. Each PiL

program furthers educator professional development, highlights exemplary practices, fosters greater

educator collaboration, and provides access to online learning communities.

A particularly successful Partners in Learning statewide partnership focused on helping students gain

career planning and online learning skills continues today. In 2008, Michigan education leaders and

students struggled to meet the state's new high school graduation requirement that was to complete

twenty hours of online learning. CareerForward, a 20-hour online course designed to meet the new

requirement for free, was created by MVU® through substantial partnership support from both

Microsoft Partners in Learning and the Michigan Department of Education.

The course helps students plan their work lives and career opportunities amid the implications of the

global economy. It teaches students about the global economy, why finishing high school is important,

why gaining technical skills is important, how to manage their personal finances, and how to become a

young entrepreneur. As a result of major investments by Microsoft's Partners in Learning program and

MVU, CareerForward is available to all secondary students at no cost, and other states offer the course

to their students to help them meet online learning requirements and gain course competencies.

Microsoft also engages in public-private partnerships in key cities to help students build new and important 21st century competencies. For example, Microsoft is partnering with four other technology companies, Chicago Public Schools, the City Colleges of Chicago (CCC), and Chicago Mayor Rahm Emanuel to expand the P-Tech model in Chicago. The P-Tech model, developed by IBM, provides students with the opportunity to attend an Early College STEM School that focuses on technology skills and career readiness – as well as earn college credits. Companies are paired with specific high schools while also remaining connected with the larger Chicago P-Tech network.

Microsoft's primary partner school is Lake View High School where each student will be able to graduate in four-years with a high school diploma with college credits, with a goal of graduating within six years with an Associate of Science (AS) degree in computer science or an Associate in Applied Science (AAS) in Information Technology. In addition, each school solicits auxiliary partners to offer tutoring and college guidance to ensure high graduation and college completion rates and receives technology infrastructure to support the program as well as targeted professional development. Upon graduating from the programs and schools, students are prepared for careers in science and technology.

Every day Microsoft partners with local education and non-profit organizations to help ensure all students access technology and 21st century skill development opportunities. For younger students, Microsoft offers fun coding experiences through competitions like KoduKup. Kodu is a visual programming language made specifically for creating games. For high school minority students – Microsoft manages DigiGirlz programs where minority girls gain the opportunity to learn about careers in technology, connect with Microsoft employees, and participate in hands-on computer and technology workshops.

For older students, Microsoft helps match students' skills with the needs of local businesses through its Students to Business (S2B) program. Older high school students and students pursuing post-secondary

degrees can experiment with coding and game design by downloading professional Microsoft developer, designer, and gaming software at no charge or compete in Imagine Cup.

Imagine Cup (www.microsoft.com/imaginecup) is the world's most prestigious student technology competition, bringing together 300,000 student innovators from all over the world. With Microsoft resources and support, students bring their ideas for new apps, games, and social entrepreneurship to life. All of these student-focused programs can only be successful when Microsoft effectively partners with the organizations where students are already engaged and learning and supported by a mentor or teacher or leader.

Microsoft's most recent public-private partnership – the Microsoft Software and Systems Academy – was unveiled just this month, on November 4. The program is designed to provide software development training and testing to U.S. active duty service members transitioning out of the military and aims to offer America's veterans the opportunity for new careers in the growing technology field. The Academy consists of a 16-week course to prepare U.S. service members to obtain the certification required for technology careers such as a developer, applications engineer, and IT project manager.

Beginning as a pilot program with Saint Martin's University at Joint Base Lewis-McChord in Washington state — the largest military installation west of the Mississippi — the program will be available later this year on key bases in California and Texas, with additional locations to be announced in coming months. Active duty service members transitioning from all branches of the military as well as members of the National Guard and Reserves returning to their civilian jobs are eligible for the academy. In addition to receiving a Microsoft IT Academy-powered curriculum provided by Saint Martin's University, service members who complete the pilot program will be hired into entry-level roles as software testers by either Microsoft or Launch Consulting, the technology consulting firm administering the program.

Recommendations:

Based in part on the insight and experience we have gained through our support of the initiatives described above, we believe there are several areas where Congress can strengthen our nation's STEM pipeline. These include: supporting great teachers; expanding access to STEM courses; promoting college completion; and strengthening our nation's job training system.

Supporting Great Teachers: Through our partnerships, we see firsthand the dedication and determination of teachers striving to help their students be successful. And, while we commend the states for aligning K12 standards to college and career, we recognize that teachers and schools need additional supports to implement these more rigorous standards. To help support teachers in the classroom, we must ensure federal programs address key issues such as the adequate preparation of teachers so they have the knowledge and ability to be successful as soon as they begin their teaching career. These programs must also provide flexibility for schools and districts and allow for innovative ways to recruit teachers, especially in shortage areas such as those related to the STEM subjects. In addition, it is critical that the significant investments being made at the federal level for professional development are used in ways that leverage innovative partnerships and strategies that have a proven record of success and which respond to the needs of teachers in the classroom.

Expanding STEM Courses: Too few students have access to high quality STEM courses. While the proliferation of STEM education programs at the Federal government has been well documented, the reality is that many "authorized" programs are not funded. This is particularly true for programs that have historically provided assistance directly to schools to support programs related to technology and science in the classroom. We would encourage members of this Subcommittee to support those federal programs that focus on expanding access to STEM education courses, including computer science in high school.

College Access and Completion: Our nation must also address the fact that too few students enter STEM subjects in college and of those who do, too few are successful in completing their degree. As part of the upcoming reauthorization of the Higher Education Act (HEA), Congress has the opportunity to address these issues through a variety of strategies including: increasing the capacity for community colleges and universities to offer more STEM degree opportunities; promoting college completion by making degree programs easier for students to navigate from start to finish; and incentivizing colleges to focus on other strategies to improve completion rates and ensure transparency.

Strengthening our Nation's Job Training System: The fact that so many individuals are unemployed while employers simultaneously face such difficulty in finding the right skilled workers to fill a variety of high paying jobs points to a skills mismatch that must also be addressed through better integrated technical career and job training systems. The current system of job training through both Career and Technical Education and the Workforce Investment Act (WIA) are long overdue for major overhauls to ensure more economically disadvantaged adults and dislocated workers have access to high quality training programs that reflect the realities of the skills that are needed in the workplace. Here too, we look forward to working with Congress as efforts are underway in both the House and Senate to update and reform these laws.

Again, thank you for the opportunity to testify today. I look forward to answering your questions

15 States that Count Computer Science Toward H.S. Graduation Requirements		
1 District of Columbia	Math	
2 Georgia		Science
3 Indiana	Math	
4 Michigan	Math	
5 Missouri	Math	
6 North Carolina	Math	
7 Oklahoma	Math	
8 Oregon	Math	Science
9 Rhode Island	Math	Science
10 Tennessee	Math	
11 Texas	Math	Other
12 Utah	Math	
13 Vermont	Math	
14 Virginia	Math	Science
15 Washington	Math	Science

Source: Computing in the Core

Summary—Testimony of Allyson Knox, Director of Education Policy and Programs at Microsoft

Allyson Knox will testify about the STEM skills gap from Microsoft's perspective, highlight some of Microsoft's public private initiatives that focus on STEM skills development, and offer policy recommendations for the subcommittee's consideration. While companies are experiencing a national talent crisis, too many young people today are experiencing an opportunity divide between the training they have and the skills they need to succeed. In order to meet our current employment demands – collaboration and partnerships become critical. Microsoft partners directly with schools, community and four year colleges, non-profit organizations and governments at the local, state, and federal levels to try to achieve a larger impact with its' initiatives. Examples of Microsoft public-private programs include: Microsoft's Corporate Citizenship program called YouthSpark; Microsoft Learning's program called IT Academy; Microsoft's TEALS (Technology Education and Literacy in Schools) program; and Microsoft Education's program called Partners in Learning.

Microsoft also engages in public-private partnerships in key cities to help students build new and important 21st century competencies. In addition, Microsoft partners with local education and non-profit organizations to help ensure all students access technology and 21st century skill development opportunities. Microsoft works to provide hands-on learning opportunities for students and to actively engage traditionally underrepresented populations in STEM field, including girls and minorities.

Recommendations:

Based in part on the insight and experience Microsoft has gained through support of the initiatives described above, Microsoft believes there are several areas where Congress can strengthen our nation's STEM pipeline. These include: supporting great teachers; expanding access to STEM courses; promoting college completion; and strengthening our nation's job training system.