

**Written Testimony of  
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**Before the Committee on Education and Labor  
United States House of Representatives  
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Chairman Miller, Ranking Member McKeon, Members of the Committee, my name is Mary Cullinane and I am the Director of the Innovation & Business Development Team in the Education Solutions Group at Microsoft Corporation. Thank you for providing me this opportunity to testify today. Prior to coming to Microsoft, I worked at Union Catholic High School in New Jersey as a teacher, technology director, and assistant principal. From 2003 to 2006, I served as project manager for the *School of the Future* (SOF), which is located in the western section of Philadelphia in Fairmount Park and was a joint project of Microsoft Corporation and the School District of Philadelphia.

**I. The Current Environment**

Before discussing the School of the Future, I believe it would be useful to review the current structure of America's education system which in many ways still reflects the needs of the 19<sup>th</sup> century, when the vast majority of students left school after eighth grade and the "three R's" were adequate for workers to provide for their families. As we all know, the knowledge economy has long since supplanted the industrial, and though many institutions in our society have adjusted rapidly to that change, our educational system - in particular our K-12 education system - has in some ways lagged far behind.

A few points for your consideration: today's average U.S. student has as many as four or five email accounts and the fastest growing segment of computer users in the country are children ages five through seven. For these so-called "digital natives," knowledge is the key differentiator - the "three R's" are no longer enough. Though vital, they are vastly insufficient to ensure success in our economy and our society. The knowledge economy requires employees who can solve problems, communicate effectively, and engage in ongoing decision making utilizing critical thinking skills and an understanding of complex systems. Those requirements, taken with an accelerating rate of change, require that we ask, and answer, new and different questions about our education system. What are the education requirements for the 21st century citizen? What has changed? What needs to change? What should stay the same? It was in pursuit of answers to these questions that Microsoft partnered with the School District of Philadelphia to create the School of the Future.

My testimony today will focus primarily on issues surrounding the process by which the school was literally built. A great deal could be said about curriculum and teaching practices, and I am happy to respond to any questions you may have on those issues, but

let me summarize that aspect of the school by saying that at the School of the Future, curriculum extends beyond content to everything in the school - organization, schedules, and even the building itself. Most notably, the curriculum utilizes a project-based learning model, where learners are asked to do more than master core skills. They explore their own ideas and are encouraged to raise questions about project topics and the best ways to learn about them. In addition, each project is multi-disciplinary in order to be more relevant to the complex way learning happens in everyday life. In this model, educators play a very different role, using an individual approach with each child while providing support and guidance when it is needed.

#### **A. Microsoft's Commitment: Partners in Learning Program**

In 2003, Microsoft established a global initiative known as Partners in Learning. The goal of this \$250 million investment was to work with governments and Local Education Authorities (LEA) to identify unique educational challenges that could be addressed through innovative public/private partnerships.

Partners in Learning aims to leverage the transformative power of software to create innovative educational experiences that better connect students and teachers worldwide. Despite real improvements, many students and teachers still lack basic access to technology and training. The result is a widening skills gap that contributes to disparities in quality of life, competitiveness, and economic development - an issue this Committee has worked diligently to address.

Three key programs within Partners in Learning have helped educators use technology throughout the learning process in an effort to enable students to achieve their learning goals. Partners in Learning's *Innovative Schools* program delivers expert guidance in comprehensive school reform and provides a roadmap for technology integration to help schools meet their education objectives. The *Innovative Teachers* program is designed to connect a global community of educators focused on 21<sup>st</sup> century learning and to recognize and reward their exemplary efforts to prepare students for the future. Finally, the *Innovative Students* program provides affordable, reliable software to qualifying governments purchasing Windows-based PCs for primary and secondary students' personal use at home. As part of the Microsoft Partners in Learning initiative, the *School of the Future* is an important example of our broader corporate commitment to education today. By providing tools and support we hope to enable educators and schools to deliver on the promise of technology in education.

#### **II. The Evolution of the School of the Future: Planning and Processes**

In 2003, Microsoft was approached by the School District of Philadelphia's CEO, Paul Vallas, about the district's desire to build a School of the Future. After discussions with district leaders, both parties concluded that they could each bring significant value to the project, and that the process could yield important outcomes and lessons for the district, the children of Philadelphia, and schools nationwide. As part of the district's new initiative to reform urban high schools, the goal of this project was to build and redefine

the “norm” for 9-12 urban education based on the recognition that the industrial model of education was obsolete. Fundamentally, our hope was to create a sustainable and replicable model that drove innovation and excellence in the multiple functions within a school, from business and administrative processes through the fundamentals of educational practices. We did not, however, seek to create a school that would only highlight the inadequacies of the current system. We sought to create a model process that could be replicated nationwide. With this goal in mind, the school operates and was built on a standard budget, and meets all state, district, and labor requirements.

At the core of this initiative lies the belief that by downsizing high schools to ideally no more than 800 learners, and by upgrading the level of academic support through non-traditional and innovative models, students can make greater gains both academically and socially. Microsoft requested that the school be a reflection of the population served by the School District of Philadelphia. Therefore, all learners are selected via the same lottery used for other neighborhood schools in the system. If a student’s name is submitted and selected, that student is able to attend regardless of their academic or disciplinary record. Seventy-five percent of SOF students come from the West Philadelphia neighborhood and 25% from the district as a whole.

In defining the scope of the partnership the question was immediately raised, "how much money will Microsoft donate?" From the outset, the development team understood that the value of this endeavor relied on the ability of others to replicate our model both in process and in outcomes. If Microsoft and our partners simply donated millions of dollars, others around the country might view the School of the Future as something to which they could only aspire but not achieve given resource constraints they might face. We quickly concluded that the school's funding needed to flow from the system as it was in Philadelphia, and that those funds needed to be designated within the district’s general school expansion capital plan.

These resource constraints made the planning process, which I will outline shortly, all the more important. They also highlighted for us the vital role programs such as the Enhancing Education through Technology (EETT or "E2T2") play in helping school districts overcome the fiscal challenges that stand in the way of creating 21<sup>st</sup> century learning environments. This critical source of federal funding for public school technology is one that Microsoft strongly supports.

Microsoft’s primary commitment to the SOF was that of human capital. The district had access to Microsoft personnel, as well as research in areas such as data integration and management, collaboration and communication, streaming media, organizational efficiency, and leadership development. By sharing our best practices and providing insight and access to internal Microsoft resources we developed a framework for others to follow.

#### **A. School of the Future Development Team**

The first critical step was to identify individuals who would be part of the planning and execution process. This included representatives from the higher education community, the school district, Microsoft staff, local community and business leaders, students and educators. An international advisory board was also established to provide global relevance and input to the project.

## **B. The “6i” Development Process**

Building the School of the Future required a process that would guide the development team and provide a rigorous framework for decision making. From this, the “6i” development process was born.

The “6i” development process is the term used to describe the methodology the SOF development team utilized throughout what were six major stages of the project. In our view, the “6i” development process is a useful organizational tool that policymakers at all levels can utilize as they seek to create learning environments appropriate to their circumstances and those of their students and educators in their constituencies.

1. The first stage of the development process was *introspection*. At the outset, our development team dealt with issues such as pedagogy, culture, project benchmarks, and overall success metrics. The introspection process demanded rigorous and objective self-analysis and was directed primarily toward identifying existing assets that could be leveraged by the development team as well as future resources and other requirements.
2. Next was *investigation*. This stage was characterized by wide ranging research and consultation. During this phase of the SOF’s development, the development team researched and identified best practices across a range of issues identified during the introspection process in addition to exploring innovations within other educational models. This process was led by an advisory council of education experts– including international thought leaders - who were tasked with reviewing and validating strategies and key decisions.
3. The third stage was *inclusion*. This critical component of the SOF’s creation saw the development team engage community leaders, key stakeholders from business, government, and other partners critical to the success of the School. As part of this stage, we drafted a community inclusion plan spearheaded by five key groups who were tasked with nurturing school development and providing organizational support.

*i. School Planning Team:* This team, formed as part of a preexisting district practice, served as an advocate for various constituencies within Philadelphia neighborhoods and helped present the vision and approved plans for the school to the community at large.

*ii. Community Advisory Board:* This board, comprising key community leaders within West Philadelphia, advised the School District of Philadelphia and

Microsoft. This group augmented the School Planning Team's citywide viewpoint by offering a unique perspective that is specific to West Philadelphia.

*iii. Curriculum Working Committee:* Consisting of education experts from the local district and around the world, this committee worked to define and develop the school mission in support of district goals, drove curriculum development, and ensured that all aspects of the school - from professional assets to physical spaces - supported curriculum goals.

*iv. District Planning Team:* Made up of Cabinet-level district officials, this team set policy and actively governed the implementation of school development - including budget allocations and final design plan recommendations - while also serving as a liaison to the School Reform Commission and Pennsylvania's Department of Education.

*v. School of the Future Advisory Board:* Led by national education leaders and organizational experts, this board reviewed and offered commentary on strategic plans, provided feedback and insight on design and development activities, and worked with community inclusion teams.

Through ongoing dialogue with these stakeholders, the development team sought to drive awareness and understanding in an effort to build support for the project and to engage the community in a manner designed to ensure sustained involvement in the life of the School.

4. The fourth stage was *innovation*. By integrating new ideas into every element of the process - from building design and information technology architecture to curriculum development and personnel selection - the SOF team utilized novel approaches and gained insights critical to the fifth stage of the development process, the implementation process. One such innovation was the introduction of a "competency wheel." At Microsoft we use a competency wheel to support both self-guided professional development and the hiring process. Seeing a need for a similar tool in education, we facilitated the creation of an education competency wheel.

Another example of our effort to build innovation into the system was in decisions made about the school's Performing Arts Center, or Auditorium. Auditoriums, due to their size, are often the most expensive and least utilized rooms in a school. The development team sought to make the space more conducive to regular use. So, while the total capacity of the SOF Performing Arts Center is 450, there are two round classrooms that rotate on hydraulics and seat approximately 100 individuals each. These provide great flexibility to the space, allowing for multiple settings depending on the desired learning environment.

5. Fifth was *implementation*: Using the first four stages of the development process, the team oversaw the implementation process including actual construction of the

building, the training of selected educators and other personnel, and the build-out of the school's technical architecture. With the addition of a 2<sup>nd</sup> class in September 2007, another wave of implementation was tackled as new learners and educators joined the community.

6. Last, we return once again to *introspection*. The development team assessed and reviewed outcomes and formally created a plan to reflect on the execution and ongoing implementation of the overall strategy. A summit was held after the first year of the school's operation to review successes and opportunities. This ongoing process is designed to ensure that the school continues to evolve to meet the changing needs of its population.

### **C. Critical Success Factors**

As a result of the work within the "6i" process the group identified and developed what we termed "Critical Success Factors." Critical success factors refer to a short list of clearly defined and agreed upon criteria that would be used to drive resource allocation decisions. Over the course of a two month planning process, the development team sought to create a common language - an agreed upon set of definitions for each critical success factor in order to ensure clarity and so that rigorous and effective SWOT (Strength - Weakness - Opportunity - Threat ) analysis could be undertaken during all phases of the process. The SOF development team identified five critical success factors.

#### *1. Involved and connected learning community*

A learning community that is involved and connected acknowledges that all stakeholders - students, parents, community organizations, higher education, businesses, and others - must participate if we are to succeed. The learning community is a dynamic, vibrant society that incorporates and represents the voices of all constituents. Multiple means for communicating, sharing information, and soliciting input must be established. Digital tools and electronic and print media must support inclusion, eliminating language and socioeconomic barriers. Finally, the learning community must provide opportunities that promote learning as a lifelong process.

#### *2. Proficient and inviting curriculum-driven setting*

The physical setting must support and be conducive to the continuous and changing needs of the learning community. The technical infrastructure must support current and future wireless and fixed technical equipment, and should enable the sharing of all data types. All learning spaces must provide the necessary elements that allow for instruction and learning at all times, and be mobile and flexible to adapt to changes in teaching and learning activities.

#### *3. Flexible and sustainable learning environment*

A truly effective learning environment is one that is fluid and responsive to the ever-evolving needs of community members. Such an environment is adaptable, differentiated, and student-centered, allowing all students to realize their full potential. The learning environment must discourage dependency on time and place for

instructional opportunities and must demonstrate instructional relevancy for students. Also, the environment created must be able to function independent of changes in faculty and administrative personnel.

#### 4. *Cross-curriculum integration of research and development*

To ensure a continuously evolving integrated curriculum, the professional staff, led by the director of research and innovation, must actively incorporate the latest findings in research and development from business, technology, and institutions of higher learning. In addition, the school must act as a learning laboratory, where staff and students can design, carry-out, and evaluate appropriate projects to enhance the teaching and learning.

#### 5. *Professional Leadership*

Professional leadership for the entire community encompasses the abilities to:

- Positively impact instruction
- Think strategically
- Motivate and engage stakeholders
- Use technology at every appropriate opportunity
- Design professional development to address identified needs
- Interact with the community
- Demonstrate fiscal responsibility
- Continuously evaluate and revise instructional programs in a collaborative manner

### **E. Establishing the Vision for the Learning Environment**

A critical element of the planning process is being able to answer a few key questions, in particular, “what are you trying to create and who are you creating it for?” By rigorously answering these questions, institutions gain a greater opportunity to build learning environments that truly support the needs of students in the 21<sup>st</sup> century. After going through our introspection and investigation stages, we were determined to create a learning environment that was:

- *Continuous*
- *Relevant*
- *Adaptive*

These are the core principles, the “non-negotiables,” established for the project and the principles that drove all resource allocation decisions. Countless hours were dedicated to discussions surrounding this vision and during the three years leading up to the school’s opening and since, this concept has proven a powerful tool in responding to suggestions that deviate from the original vision.

#### 1. *Continuous*

Teaching should not be limited to the classroom alone. SOF is an environment powered by 1:1 access to the tools of the digital age to nurture anytime, anywhere learning. For example there was significant conversation during the construction process around whether to extend the wireless signal to the outdoor amphitheatre. Many thought the security issues were too great. However the decision was made that in order to maintain

the “continuous” learning environment – learners should be able to walk outside the physical building and continue their work.

### *2. Relevant*

Learners are inspired by the connections they make between curriculum and the real world, so the SOF leverages community interaction and the latest instructional tools to increase relevance. One such example occurred in 2007 when a group of learners participated in a project at the Belmont Mansion, a local historical site that was a stop on the Underground Railroad, and created the content for public tours. This experience integrated national and local history, research, writing, presentation, and technology skills.

### *3. Adaptive*

Individual students learn in individual ways. The SOF is not a one-size-fits-all offering. Instead, we use technology and adaptive instructional models to effectively meet the needs of every learner.

## **III. Building the Learning Environment: Constructing the School**

The 160,000 square-foot School of the Future is designated as a 9-12 high school for 800 students. The building includes twenty general classrooms, five science rooms, art and music rooms, a fitness center, two gymnasiums, an Interactive Learning Center (media center), food court, special education spaces, and a Performing Arts Center (auditorium). The building and gathering areas are designed to promote interaction among students in an open, less rigid environment.

Site orientation has proven to be a significant factor in the success of the School of the Future. Three major components were considered when deciding on location:

- Relation to urban/community features
- Integration into Fairmount Park/Centennial District Master Plan
- Sustainability

### **A. Sustainable Architecture**

Through energy and day light modeling, the School of the Future is sited to optimize daylight, energy use, mitigate the urban heat-island effect, and to ensure optimization of HVAC systems. These features, along with the thoughtful use of water through the use of Green Roof and a rain water catchment system, help to reduce the building’s impact on the environment and infrastructure of Philadelphia, and help to create a learning environment that promotes attendance and enhances student performance.

The school is LEED Gold Certified - Pennsylvania’s first such high performing high school. The SOF received Gold LEED certification for the many green components incorporated into its design which over the life of the building are expected to save over \$10M.<sup>1</sup> Notable features include:

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<sup>1</sup> See Appendix A for photographic examples of the SOF’s architectural features.



- Green Roof over the Performing Arts Center which reduces the energy needed to cool the space
- Regulation of specific airflow and natural light in all spaces
- A water system used to gather rain water for use in restroom toilets which in conjunction with high efficiency or no-flush fixtures reduce water use by as much 80%
- Ice-cooling air conditioning system that cools air during non-peak hours and then makes it available during the school day
- Photovoltaic window panels that gather sunlight and convert it into electricity usage for the school
- Constructed wetlands designed to eliminate contaminant run-off from the school grounds

## **B. Information Technology Architecture**

Early on we decided that the School must be focused on teaching and learning, not technology for its own sake. Although technology plays a critical role in the creation of a 21<sup>st</sup> century learning environment, the development team sought to ensure that technology deployments adhered to the vision of a continuous, relevant, and adaptive learning environment. That belief guided decisions on issues ranging from Internet access to security. The School of the Future was not conceived as a “Microsoft-centric” institution. Rather, the IT architecture was built to create a system that was as fully integrative as possible with the District’s legacy systems so as to ensure that the core mission – creating a continuous, relevant, and adaptive learning environment - could be achieved.

The School of the Future features a collection of interconnected e-systems and Web-enabled services to facilitate student records, classroom management, electronic curriculum, procurement, environmental management, parental portals, and more. All these new systems required integration with key existing legacy systems that were often archaic. The lack of an effective data warehousing repository, the use of ineffective and “closed” database platforms, problems with database connectivity and data cleansing, and district-wide difficulties with data entry and ownership made the insertion of new technologies at times very difficult.

When the technology services team at the School District of Philadelphia first set out to imagine, concept, and specify the School of the Future’s IT infrastructure, they knew it would need to be “future-proof.” Imagining new technologies and how those technologies will be used in the future is a challenge shaped more by the unknown, making a focus on flexibility essential. Engineers and educators alike recognized they were designing a school that would open in 2006 - but one that would need to be ready for 2016. The team effectively needed to plan 10 years into the future of networking and computing. At the same time, the team also realized that the school could not exist in a vacuum. The technologies at work in the School of the Future would have to align with standards established for all new schools in the district if they were to realize the vision of testing and evaluating new ideas in the new school so that other districts would

replicate them. Moreover, the technologies would need to successfully interface with legacy systems at the district level. The team focused on keeping maintenance, support, and daily operational costs in check wherever possible. At the same time, the team carefully inserted “next-generation” systems and infrastructure into the existing technology environments.

The design and deployment of IT infrastructure needed to occur collaboratively alongside the design and construction of the building itself. To that end, the technology services team worked closely with the architects commissioned to build the School of the Future, exchanging ideas and understanding the implications of each group’s design solutions. However, architectural sketches and drawings don’t reveal the intricacies of the building until the school is actually constructed. So, although technical infrastructure and building architecture are ideally planned collaboratively and concurrently, the IT team was tasked with the significant challenge of imagining a fully finished building while still in the planning stages.

The first meeting of the technology services team was a two hour brainstorm culminating in a wish list of 100 items for the School of the Future. During the next meeting, the team anticipated cost concerns and set out to trim any nonessential items from the wish list. Over the next few months, as the realities of budget constraints became more clear, the team weighed the complexities of up-front costs and long-term operational costs—an exercise that forced them to focus on elements of the IT infrastructure that were vital to their vision. As with any other school, the technology team found themselves competing with advocates for other interests—from athletic facilities to landscape architecture to kitchen and dining areas. Given the inevitable budget constraints, the central challenge was not protecting their interests as technologists but understanding and communicating how each attribute of their technology plan aligned with the core functionalities of the school (instructional, operational, and environmental). In the beginning, there was a blurry line between what the team wanted and what the team needed. In the end, the budget helped them focus more clearly on the components of the infrastructure that are essential to the mission of the school.

#### **IV. Lessons Learned**

Lessons large and small were, and continue to be learned as the School of the Future unfolds. As I mentioned earlier, we are in a near constant process of assessment and evaluation. It is through this process that we hope to engage all stakeholders - in particular parents, educators, and policymakers - in an ongoing but actionable dialogue about how to provide the learning environment most beneficial to students. Each of the many lessons we learned were important and continue to shape the work being done at the school, but I would like to highlight several points that I think can help you as you seek to drive change and innovation in learning environments across our nation.

#### **Our current systems do not support innovation**

To create truly innovative learning environments that will support learning in the 21<sup>st</sup> century, greater support, resources, flexibility, and vision must be provided to districts.

Imagine if, in our schools, innovation was swimming downstream. Imagine how much further we could travel and how much faster we could get there. Unfortunately, in urban education, this is far from the case. In urban education, innovation is swimming upstream, encountering tides of policy and practice that slow its pace and prevent it from moving forward. And for those taking the trip: swimming upstream is tiring. In the past, the Federal Government has provided support for basic infrastructure through, for example, the “e-rate” and the E2T2 programs and by other means. These programs have proven critical to ensuring our schools are able to at least access the power of technology. But, as I mentioned earlier, technology for its own sake misses the point. The Federal government should now seek to build on the success of basic infrastructure programs to drive support for innovative learning models so that the true power of technology can be leveraged by students and educators. We remain strong supporters of the E2T2 program, but we believe by supporting greater risk taking and innovation in school reform initiatives, the Federal Government can help school districts drive change on every level – from architecture to curriculum.

### **True reform takes time**

Constructing new buildings, providing technology, creating new visions, and sticking to a rigorous process, are activities that alone will never ensure success or provide true transformation. For such an outcome to occur, communities and government organizations must recognize such reform will not happen overnight. The learners attending the School of the Future have had eight previous years of a different learning environment, to expect immediate change after a foundation of challenge is not realistic and we must set expectations and create systems that will support long term outcomes rather than short term gains.

### **Learning communities must consist of the ENTIRE community in substantive ways.**

When building new learning environments we must encourage organizations to reach outside of their immediate systems and include a variety of stakeholders in the design, implementation, and day-to-day activities in order for reform and growth to be significant and sustainable.

We at Microsoft are committed to the school’s success. But our hope was to create something that could truly drive change and innovation in the way we educate all of our children, not just the 800 learners fortunate enough to be selected for the School of the Future via lottery. Early on we determined that part of our success measurement would revolve around the extent we were able to ensure that the lessons we learned were available to educators worldwide. Since our goal was to create a new norm for high school education, we have sought to provide tools and resources that schools and school districts nationwide and indeed globally, can utilize so that similar initiatives can be undertaken elsewhere. This effort is well underway and is detailed on our website [www.microsoft.com/education/sof](http://www.microsoft.com/education/sof), but let me highlight some of the specific resources available to educators across the country and around the globe. They include:

- So- called “Discovery briefs” that detail the 6i strategic planning process, our approach to building design, and to curriculum formulation

- Training videos on the 6i development process and education competency wheel
- A documentary and resource kit showcasing multiple perspectives on the School of the Future
- Information about quarterly briefings at which educators can participate in interactive workshops regarding the creation of the SOF
- A worldwide initiative, the Innovative Schools Program, which uses the School of the Future approach and aims to create 12 regional examples of the best in schooling

These are but of few of the ways the lessons we continue to learn from the School are being shared and members of the Microsoft team would be pleased to provide additional information.

## **V. Conclusion**

Building the SOF brought many challenges; some more significant than others. At critical points our ability to not only identify the person who could remove the obstacle, but also have a pre-existing relationship with them, was essential. I can't imagine what I would have done without the support and responsiveness of district leaders. It shouldn't take a miracle to build a great school in an urban community. It should not be an exhausting experience, leaving participants tired and frustrated. We need more agile learning organizations. We need to determine the correct balance between control and creativity. We need to create an environment that is inspirational, not just functional. We need governance structures and public policy that set high standards, but also provides the resources to achieve them. Chairman Miller, Ranking Member McKeon and Members of this Committee, I believe we need even more inspiration in our schools than already exists. We need to fill district offices, hallways, community centers, and neighborhoods with a sense of hope. We need to communicate a message that we not only understand the challenges, but that we are ready to take them on.

Thank you for the opportunity to testify today. I look forward to answering your questions.

Appendix A. Architectural Features of the School of the Future

Overhead photo



Interactive Learning Center



Green Roof



Hallway



Performing Arts Center



Streetscape



Restroom

