

August 4, 2004

The Honorable Phillip J. Bond
Under Secretary of Commerce for Technology
U.S. Department of Commerce
1401 Constitution Avenue, N.W.
Washington, DC 20230

Dear Under Secretary Bond:

On behalf of the Software & Information Industry Association (SIIA), thank you again for meeting with our member companies at our spring policy conference to discuss education technology opportunities and barriers. We greatly appreciate your leadership in this area. As requested, we follow up with recommendations to help the federal Interagency Working Group on Advanced Technologies for Education and Training enhance national support for the development of, market for and integration of learning technologies into the nation's education enterprise.

In *Visions 2020: Transforming Education and Training through Advanced Technologies*, the Bush Administration makes a compelling case for technology's role in transforming education and improving achievement for learners of all ages and needs. The Administration has also recognized technology's importance as an enabling tool to meet *No Child Left Behind Act* goals. Many NCLB and other education and training needs are most efficiently and effectively achieved with technology tools. From diagnosing learner needs to managing accountability data and from distance learning to individualized instruction, technology is helping improve educational opportunities, productivity and outcomes. From Kindergarten to the corporate classroom, technology is encouraging us to rethink teaching and learning traditions and to fundamentally transform many long-standing education models.

As you know, SIIA is the principle trade association for the software and digital content industry. Many SIIA members provide educational software applications, electronic curriculum, online instruction, computer-based assessment and other technologies to the K12, higher education and corporate training markets. All of our members depend on the nation's schools for a workforce equipped with technology literacy and other 21st Century skills. SIIA and our member companies view learning technologies as essential to achieving a well-educated citizenry and workforce. SIIA has long led partnership collaborations with education, industry, research and government stakeholders to support the public policies, research, technical standards and market forces needed to leverage education technology innovation and adoption.

Enhanced federal leadership and coordination through the Interagency Working Group is critical to this effort. While great strides have been made in integrating technology into education and training, this transformation is relatively young. Among the challenges appropriate for federal involvement, we agree with a two-part approach that addresses research & development and market barriers. Core to both are a supportive policy environment and public-private partnerships. We encourage the Working Group to address issues related to: scientific issues and technical standards; infrastructure and availability; educator training; educational culture and tradition; legislative and regulatory barriers; market dynamics and "customer" resources; among others. We attach a set of comments and recommendations to help the Working Group identify and address key challenges.

Core among these issues is the need to enhance the demand for, availability of and integration of high-quality educational software applications and electronic curricular materials. The focus in

education on baseline hardware, Internet connectivity and infrastructure needs has left software and content issues disproportionately under addressed. Yet, technology's true impact will only be realized when the power of these applications and curriculum resources is fully leveraged. Education publishers and developers are acting as key partners to fill this need. They develop electronic learning resources that are rich and engaging, learner-appropriate and safe, aligned to the curriculum and state standards, and incorporate effective pedagogy and instructional design.

As our top, overarching recommendation, we urge the working group to develop a common research and development framework for all federal agencies involved in learning technology and the development of electronic educational content. To date, these funding choices often appear haphazard, uncoordinated, and without regard to how they may fit into the broader needs arising from the vision for technology in 21st century education. As a result, R&D monies have often been allocated without an appropriate way to measure their results, while some product development efforts inappropriately compete with private sector products and services.

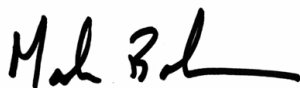
As a starting point, we suggest the establishment of metrics for federal R&D that focus on ensuring the investment:

- provides broad-based benefit to learning technology, including meeting consumer (learner, educator, institution, employer) and supplier (publishers and developers) needs;
- first reviews market needs and the availability of existing products and services to ensure it does not compete with the private sector, but rather encourages further private development;
- facilitates innovation by addressing areas of technical or financial risk not easily otherwise undertaken by the private sector; and
- relies on market forces and joint public-private/education-industry ventures to identify, conduct and disseminate the R&D, including use of a technology transfer plan that best leverages the project's commercialization.


As such, this framework and metrics would be relevant for both the R&D and Market Barrier priorities of the working group. Because it is focused on federal R&D investment, this metric would likely not include federal grants provided directly to students, educators and institutions for the acquisition and integration of existing technologies. This use of federal resources, such as the e-Rate and the Enhancing Education Through Technology programs, is critical and requires increased funding, but should be separated since decisions fall to practitioners rather than government entities.

We thank you again for your leadership in advancing the use of technologies to help address the nation's goals for a well-educated and highly-skilled citizenry and workforce. We look forward to working with you to further develop and then implement a federal agenda necessary to enact and achieve these goals. Please do not hesitate to contact us at 202-289-7442.

Sincerely,



Mark Bohannon
General Counsel and Senior Vice
President Public Policy



Mark Schneiderman
Director, Education Policy

cc: Susan Patrick, Director, Office of Education Technology, U.S. Department of Education

Attachment

RECOMMENDATIONS SUBMITTED TO
THE INTERAGENCY WORKING GROUP ON ADVANCED
TECHNOLOGIES FOR EDUCATION AND TRAINING

AUGUST 2004

RESEARCH & DEVELOPMENT

With the integration of technology into education at a relatively early stage, a considerable R&D effort will be necessary to develop innovative technologies and determine the most effective tools and models. While much is known, many questions remain. Yet, despite continued calls for research on education and education technology, a number of fundamental issues stand as barriers to progress. These include models for funding and for gaining participation of educational institutions, educators and students.

The community of educational software publishers and other technology developers is key to the research effort. Industry makes significant multi-year, multi-million dollar investments to develop electronic learning resources and deliver them to market, while many online materials and other applications are further updated to ensure timely content. Industry brings knowledge of the market and practical experience in product development, delivery, and support. However, market dynamics make it very challenging for companies to invest in long-term, next-generation products; and so public resources must be appropriately targeted and designed to fill the gaps and enhance industry's ability to deliver effective products and services.

GUIDING PRINCIPLES:

- Research demonstrates that the appropriate use of educational technologies can help to transform educational practice, improve teaching and learning, and increase student achievement. Success requires an appropriate match of technologies, user training, educational needs and technology implementation, among other factors.
- Integration of technology into teaching and learning stands at a relatively early stage. Further advances and integration of information, communications and computer technologies in combination with cognitive and pedagogical sciences can further improve development of innovative and effective educational software, digital instructional content and related technologies.
- Product R&D in isolation (i.e., “build it and they will come”) is not sufficient to provide innovation, scalability or sustainability in the complex educational environment. Success requires that an R&D roadmap must address the many environmental and related factors, including: infrastructure and availability, training and support, educational culture and institutional barriers, educational practice and effective technology implementation, and regulatory barriers. Many needs and factors are unique to an education sector – primary and secondary, postsecondary, training, etc. – and so an R&D roadmap must be designed accordingly to account for these variables. An education

technology R&D roadmap must therefore address and inter-relate this wide variety of technology product and education context factors.

- Success requires that an R&D agenda must involve stakeholders (educators, public officials, industry, etc.) in the process of identifying needs and conducting research. Collaboration among the education customer (e.g., student, teacher, education institution), industry provider, research community and government stakeholders is critical to leveraging an R&D investment, building effective public-private partnerships and ensuring lab results are deployed and impact the classroom.
- Government-funded R&D must focus on basic pre-competitive, niche, high-risk and/or prohibitively expensive areas and avoid applied research projects that potentially intrude on product applications most appropriately led by the private sector (both for- and non-profit). A primary goal is to ensure R&D findings are most effectively and efficiently translated to the classroom market through transfer and integration into private sector offerings. The federal government should not develop for delivery in the public domain any educational technologies that compete with those already offered or best-offered by the private sector.

AREAS FOR STUDY:

1. Infrastructure. Computer science, telecommunications and related research is necessary to ensure education has the infrastructure sufficient and appropriate to its needs for reliable, high speed, secure, real-time and readily available access. This might include: a low cost, educationally designed hardware device; platform and interoperability standards; and simplified but secure network models, for example. Education is particularly sensitive to high costs of support and needs a protected, secure working environment for students.
2. Instructional Content. R&D can leverage advanced technologies and recent cognitive and pedagogical breakthroughs to develop advanced instructional software. Especially critical is further instructional science R&D to improve computer-based instruction that leverages recent cognitive/learning discoveries. While solutions now exist to provide personalized instruction that adapts to the learner's unique learning needs and pace, instructional software and electronic curriculum needs to be enhanced to provide improved diagnostics, 21st century skill assessment, real-world or simulated context, and even more adaptive computer-based instruction in all areas from basic reading and math achievement to advanced life-long learning and training. As one element, research is needed into techniques and templates for making technology, software and digital content more accessible to special student populations – including physically and learning disabled learners – in a cost-effective manner.
3. Context. Even the greatest infrastructure and content advancements must recognize that technology is a tool in the teaching and learning process. As such, development does not necessarily translate into effective deployment without ensuring an appropriate and accepting educational context. Research is therefore needed to identify effective, transformative implementation models (policies, leadership, institutional culture and practices), the conditions and practices under which technology is most effective (i.e., what interventions work best with students of what learning styles and under what conditions), and ultimately how these models can be scaled, replicated and sustained.

RECOMMENDATIONS:

- **Develop a common research and development framework for all federal agencies involved in learning technology and the development of electronic educational content.** To date, these

funding choices often appear haphazard, uncoordinated, and without regard to how they may fit into the broader needs arising from the vision for technology in 21st century education. As a result, R&D monies have often been allocated without an appropriate way to measure their results, while some product development efforts inappropriately compete with private sector products and services. **As a starting point, establish metrics for federal R&D investment that focus on ensuring the investment:**

- **provides broad-based benefit to learning technology**, including meeting consumer (learner, educator, institution, employer) and supplier (publishers and developers) needs;
 - **first reviews market needs and the availability of existing products and services to ensure it does not compete with private sector investment**, but rather encourages further private development;
 - **facilitates innovation by addressing areas of technical or financial risk** not easily otherwise undertaken by the private sector; and
 - **relies on market forces and joint public-private/education-industry ventures** to identify, conduct and disseminate the R&D, including use of a technology transfer plan that best leverages the project's commercialization.
- **Federal R&D should be focused on:**
 - **long-term basic research**, especially in expensive, high-risk areas companies can not undertake alone, as the adoption cycle in education is often too slow to justify the investment needed for certain innovations.
 - **creating bridges from 1st to 2nd stage and commercialization**, including facilitating partnerships from the outset between traditional research institutions and private companies;
 - **development in smaller and under-served niche product markets**, including facilitating partnerships from the outset with private companies best positioned to deliver;
 - **creation of methods and tools to reduce the costs of instructional software development**; and
 - **evaluation research**, including the identification of effective models and key factors (i.e., what interventions work best with students of what learning styles and under what conditions), how these models can be replicated, large-scale empirical evaluations and funding for industry to evaluate their proprietary products.
 - **Identify new, supplemental resources for R&D so as not to detract from existing, already under-funded national education funding.** Federal grants such as the U.S. Department of Education's Enhancing Education Through Technology program, which are already targeted to empower users (e.g., educators, employers, students, etc.) to acquire, integrate and be trained in technology, should not be diminished. To the degree resources are reprogrammed, such resources should be those already targeted to R&D.
 - **Federal R&D should help fund and strongly encourage or require partnerships between education, industry, and institution-based researchers** to ensure the efforts are shaped by practice and the results, in turn, help to mold that practice. Public-private partnerships must be at the core of an R&D roadmap development and implementation. With academic institution R&D often not in sync with the real-world market needs of both vendors and consumers, incentives and models are especially needed to best leverage university R&D investment.
 - **Identify, design and commit to one or more sustained, large-scale basic research projects on computer-based learning** in areas such as instructional simulation, personalized tutorial, problem-solving, problem-based learning and performance-based assessment. Such a project(s) could be funded through one government agency or diffused throughout several agencies provided there is

coordination in agenda setting and the dissemination of findings. Such large, sustained projects were common in the past, but have been replaced by a more fragmented effort that has greatly diminished the impact on product development and practice. The following are two such priorities:

- **Problem Solving & Instructional Simulation.** Research on technologies for the design and development of simulations (and games) should be a major research priority, with benefits at every level and sector of education and training. The advantages of simulation for performance-based learning and problem solving have long been recognized. Yet, despite considerable progress developing simulation technologies, much less is understood about how to systematically design and implement simulations to reliably produce defined learning outcomes. Building effective instructional simulations (and games) remains an expensive, difficult, and intuitive craft, rather than a technology.
- **Technologies of Instruction and Assessment.** A new generation of basic research into instruction and assessment and related design technologies is needed to exploit recent exciting advances in learning. Such research could result in a new generation of technologies for building more cost-effective next-generation computer-based instruction and assessments. At present as a result of the focus on learning over instruction/assessment, we know much more about what learning is, cognitively and neurophysiologically, than we do about how to measure it, or how to reliably and cost-efficiently cause it. Furthermore, high-quality software for instruction or assessment is at least as expensive to develop now as it was a generation ago, thus restricting high-quality solutions to applications where economies of scale are quite large or the need is critical enough to justify the expense.
- **Allow for-profit entities to compete for federal research grants** to ensure the best proposals are funded and the results of those R&D efforts are brought to market, including through enhancement of the small business innovation research program.
 - **Open up grants to the private sector for researching and developing proprietary products and services,** recognizing of course that such arrangements must provide for a public good. Government-funded R&D too often remains locked in a report, rather than incorporated into practice and product development. In contrast, education publishers work closely with educators to understand and respond to their needs, including by translating research findings into market solutions. As a result, companies are often in the best position to identify research gaps, respond in partnership with practitioners, translate findings to software and digital content, and ensure these resulting products are made available.
 - **Make federal evaluation grants available to the private sector for evaluation of their proprietary products and services.** The costs of random control trials and other scientifically-based research can be prohibitive for vendors, but consumers need this information to make informed choices. Yet, current U.S. Department of Education and NSF grants are biased against proprietary products and normally targeted non-profit institutions for the study of generic or non-proprietary education technologies.
- **Enhance cross agency collaboration to provide a centralized point of contact by which to disseminate federally-funded educational technology related R&D.** This could be as simple as an FTE who operates an organized and easily searchable online clearinghouse of such government research. Such an effort will better enable researchers, developers and practitioners to leverage these results for their own needs, thus accelerating and advancing the development and adoption of advanced learning technologies. This is especially true in the private sector, where most companies lack the capacity to effectively track government-funded research as it is currently disseminated.

- **Enhance the Small Business Innovation Research (SBIR) program**, including addition of a loan program and requirement that awardees, beginning in Phase I, work with an organized network of business consultants aimed at ensuring product sustainability and impact.
- **Enhance tax treatment for research, development and evaluation of instructional technologies by the private sector.** For example, IRS regulations do not consider research for instructional materials as a “research and experiment expenditure . . . in the experimental or laboratory sense” that can be deducted as a current year expense. The regulations provide that research “in connection with literary, historical, or similar projects involving the production of property, including the production of . . . books, or similar properties” are subject to the less-favorable uniform capitalization requirements. Instructional materials are not differentiated from “literary, historical, or similar projects.”
- **Increase support for evaluation research, including both studies of the implementation of new technologies as well as synthesis of existing research.** Research does provide both a sound theoretical basis for technology’s positive impact on teaching and learning, as well as strong evidence that technology improves the educational process and student achievement. Yet, despite many positive successes, many education leaders and policy makers are not yet convinced. Additional evidence will increase technology investments and integration.
 - **Make federal evaluation research funding available to the private sector for evaluation of proprietary products.** The high cost of such research is prohibitive for many companies and products, yet this information is critical to inform consumer choices.
 - **The evaluation agenda should also include incentives and encouragement of often unwilling educational institutions, local communities, education leaders, etc. to participate** in education technology studies, including those of proprietary products, which are ultimately important to meet their needs.
 - **In addition to identifying what is known about where technology makes a positive educational impact, the R&D effort should examine why**, including what are the supporting conditions, practices and other contextual factors that provide for an effective technology implementation. These elements include the degree to which, for example, software matches needs, is appropriately used by trained teachers, etc.
 - **Synthesize research evidence of technology’s effectiveness** to ensure evidence makes its way to education stakeholders in a manner useful for their decision making and practice, allowing them to better match technology to educational needs and capacities.
- **Ensure an evaluation research agenda employs outcome measures appropriate to technology’s multiple purposes, goals and functions.** While student achievement is the primary and ultimate goal, too narrow and direct of a measurement may ignore both complementary goals (cost savings, teacher satisfaction, etc.), as well as intermediary goals (teacher skills, student access to learning opportunities, student engagement, improved system of instruction, etc.). In addition, technology can both help deliver a richer set of skills (e.g. communications, technology literacy, problem-solving, etc.), as well as allow for measurement of those skills in a way otherwise not possible or practical. Recognizing this diversity requires multiple, robust rubrics for measuring technology’s benefits and outcomes. The federal government can provide a great service in supporting development of tools to make possible the evaluation of learning technologies that match this vision.

MARKET BARRIERS

Technology is an important tool for improving educational opportunity, productivity and outcomes, but one that we have only begun to leverage. Many market barriers stand in the way. Technology's educational potential is both to improve the efficiency and effectiveness of current practice (e.g., automate assessment), as well as to transform traditional practices and models (e.g., allow more sophisticated assessment of skills not otherwise measured). Both are important, but business has learned that the true power of technology comes largely from the latter – from its use in rethinking possibilities and restructuring methods. While great strides have been made, the use of technology to both improve and reengineer the education and training enterprise is relatively young on both fronts.

Many market barriers stand as challenges to a more mature use of technology in the education and training enterprise. Needs to be addressed include resources and cost structures, training and technical support, technology standards, infrastructure and access, leadership and institutional cultures/traditions, long-standing policies and regulations, a sufficient market demand to reduce costs and drive innovation, and effective public-private partnerships with appropriately defined government and private sector roles.

GUIDING PRINCIPLES:

- With the market still not mature, students, educators and educational institutions need increased assistance in securing resources to access technology tools and technology-enabled instruction. Targeting investment to empower the market must remain the primary public policy for enhancing the degree to which technology is employed to improve education and training. Yet, targeted federal investment in education technology has decreased in recent years.
- Government should not develop or deliver educational technologies that compete with the private sector, while public-private partnerships are needed to most effectively and efficiently meet user demands.
- Unique market solutions must be crafted as warranted when challenges are specific to a sector of the learning enterprise – elementary and secondary education, postsecondary education, corporate training, adult learning, etc. Each market sector roadmap must reflect the particular characteristics of that field.
- With the nation's education system largely under public governance, the market is greatly influenced by a complex and quickly evolving policy environment of local, state and national laws and regulations. Learning technology can only meet its potential through reform of the many policies crafted prior to, or without thought to, unique technology and distance learning issues and which now stand as barriers to its further adoption.
- At the extreme, technology is seen as a threat by many educators and educational institutions. At the least, a significant challenge exists to foster the leadership needed for the education and training system to embrace the transformative changes brought by technology. These long-standing cultural and institutional barriers must be addressed to create a context where learning technologies can be successful.
- The education and training market for technology-based learning resources and services is challenged by, among other factors, decentralized decision-making, multiple decision-makers, long

buying cycles, customer confusion, and a desire for customization that exceeds ability/willingness to pay. A more sophisticated and simplified procurement process is needed for market maturation.

RECOMMENDATIONS:

Leadership & Organizational Capacity

Build Capacity for Organizational and Systems Change in Education and Training Institutions

Use of technology in education and training can transform long-standing practices, policies, institutional models and professional roles. Encouraging and successfully managing this organizational change process requires leadership, whether from an educator, school superintendent, university president or corporate training officer. Yet, too few models, resources and support mechanisms exist to foster this transformational change on a wide-scale basis. Efforts are therefore needed to cultivate the vision, leadership, budget models and training to achieve this transformation.

- **Provide a Vision & Foster Leadership:**

Technology too often remains viewed as supplemental, and relegated to the stewardship of technology directors. Instead, education leaders and policy makers must be encouraged with a vision of how 21st century education (and today's student) demands 21st century technology tools.

A 21st century vision for education infuses technology throughout the educational enterprise and:

1. expands educational goals to include student technology literacy and other 21st century skills such as communication, collaboration, problem-solving and the capacity for self-directed life-long learning;
 2. employs technology to improve both student engagement and the efficiencies of current educational practices; and
 3. reengineers educational models, including through use of technology and distance learning.
- **Use the federal bully pulpit to represent technology as an integral element of our nation's educational enterprise** -- a "need to have," and no longer just a "nice to have." This would include outlining technology as a delivery medium to meet educational purposes, functions and goals in educational, rather than in technology terms. Technology should be mapped in terms of the dimensions of learning and the functions of instruction.
 - **Present best examples of successful technology integration into teaching, learning, and educational institutions, as well as models for how those falling behind can set their own course to reach this goal.** As part of this, outline reforms needed both for technology-based solutions to complement traditional educational models, as well as for changes to educational processes perhaps perceived as threatening to long-standing institutional models and professional roles.
 - **Support training of educational leaders in modernizing schools and instruction through the use of technology.** Such training could include development of new professional development programs and materials, refinement of existing resources, etc. Few administrator training programs or professional standards include technology.

- **Foster a 21st Century Teaching Force:**

There is a growing gap between “digital kids” and “paper teachers.” Instead, technology should be better leveraged to transform the instructor’s role, reinvigorate the teaching experience and improve success. For example, technology can replace many low-value educator administrative and other tasks (such as grade books and attendance reporting), thus freeing time for high-value tasks. Technology can also positively transform the role of instructors from that of passively delivering the same information to all students to that of actively guiding each student in an individualized learning process. This shift would also change the skill set required of teachers, thus changing the profile of the “highly qualified teacher” and their required training.

- **Facilitate the sharing of best practices and case studies for how teachers at all levels of education are integrating technology into their classroom**, including guidance on the reform models employed to change an institution’s teaching practice and culture.
- **Dedicate resources to both training educators to effectively integrate technology, as well as to changing the culture of teaching** in a manner that best leverages technology to improve the role of teachers. The goal is a teaching force both proficient in, and embracing of, technology and a redefined instructor role.
- **Coordinate across various federal educator training programs** to ensure initiatives aimed at educators/instructors both employ technology to deliver that training as well as ensure those educators/instructors are trained in the use of technology as a tool in their own teaching.
- **Provide incentives or requirements for the many states that have not already done so to include in their teacher licensure/certifications requirements a component of technology literacy** (i.e., ability to integrate technology into their instruction, curriculum and classroom management). This would include required technology coursework as well.
- **Provide funding to transform antiquated schools of teacher education to better infuse teaching with/through technology into their curriculum.** Too many students are entering teacher colleges enthused about technology but leaving without the teaching skills to integrate it into their instruction and modernize the teaching practice. This could be most easily accomplished by restoring funding for the Preparing Tomorrow’s Teachers to Use Technology (or a similar) federal program.
- **Support innovative models that employ technology to transform professional development** from a one-time, disconnected activity to an ongoing, customized, “just in time” model through online training and peer-to-peer networks/collaboration.
- **Support Innovative Budgetary Models & Cost Structures:**

Despite significant investment in recent years, few communities or institutions have fundamentally examined, let alone restructured, their budgeting to reflect the new options and realities presented by technology. Technology is generally budgeted as requiring new funds. Yet, alternative long-term budget models do exist where technology is integrated as a core education tool that can change fundamental cost structures and ultimately provide savings.

A number of factors present significant challenges to education’s ability to strategically budget for technology. Technology is:

- a relatively new item in budgets that are crafted at the margin and slow to change;

- a relatively expensive item in a budget that devotes most resources to personnel, facility and other basic operation costs seen as largely fixed;
 - cross-cutting, but sharing costs across line items challenges education budgeting traditions and targeted grant funding rules; and
 - a hybrid item in a budget that categorizes costs as either capital or recurring expenses.
- **Support the identification, development, piloting and dissemination of budgetary models that enable the educational enterprise to overcome funding barriers to successful technology acquisition.** Such models would rely on a long-term, comprehensive model whereby traditional cost structures are redefined through technologies ability to both transform educational practice and provide long-term budget neutrality. It would also include use of zero-based budgeting, where a thorough top-to-bottom review can lead to fundamental shifts in spending and/or reallocation of resources.
 - **Fund a number of studies to create specific examples of how technology investment can result in significant realignment of spending and reinvention of the educational enterprise.** For example, what would the savings (e.g., buses, commute time, school buildings) be, or possible efficiencies derived (e.g., expanded depth and breadth of curriculum), from delivering instruction in part via distance learning to secondary students' households or neighborhood centers as opposed to delivering instruction in a secondary school campus?
 - **Explain the costs of technology in the context of its educational benefits, thus empowering decision makers to conduct a more thorough cost-benefit analysis.** For example, costs of high-quality educational software may be perceived as beyond budgetary means. But if its use results in improved student achievement, the costs are offset by savings in more traditional remediation interventions such as extra schooling, tutors, or societal costs of school dropout.

Funding & Policy Climate:

Encourage Market Development to Spur Private Sector Investment in Technology Development and Commercialization

- **Reform public policies to create an even playing field between digital/virtual education and print/classroom education:**

Technology is helping drive a shift from assembly-line and institution-based education to individualized and learner-based education. This requires that many long-standing laws, regulations and rules be updated to reflect the new model. These include those rules based on a seat-time (classroom- and semester-based) and single institution model, as well as those aligned singularly to the printed context. These regulations often inappropriately and unnecessarily prejudice technology and especially web-based distance education and hinder its growth. Absent such regulatory evolution, technology and web-based education will be hindered from achieving its full potential and transforming traditional models of instructional delivery.

- **Intellectual Property.** A 1999 Supreme Court case held that state entities – including state universities and colleges – cannot be held liable for their copyright, patent or trademark infringements. As a result, state entities are free to violate the intellectual property rights of inventors, creators and entrepreneurs without fear of facing the penalties that everyone else would face for the same violations. This hurts especially private intellectual property owners; and private universities and colleges – because they are on uneven footing with these public

institutions who do not have to pay for copyrighted works and other intellectual property products. **Legislation must therefore be enacted to encourage states' to waive their sovereign immunity with regard to intellectual property violations.** This can be done by rewarding a state that waives with certain benefits under IP law that they do not presently have, by penalizing those states that do not waive, or by some combination.

- **Student Access to Distance Learning.** Technology and the shift to anytime, anywhere and any pace e- learning hold great promise to improve educational opportunity and achievement, but adoption is often now impeded by longstanding education models and rules. Among the most significant federal barriers are the 50% federal student aid rules. Reform must include changes to the federal Higher Education Act rules limiting to 50% an institution's share of students and classes employing distance education. At the K-12 level, issues around funding, accreditation, teacher certification, etc. must be overcome. **The federal government can provide incentives, facilitate consortium agreements, fund development of new models and otherwise provide national leadership in this area.**
- **Competency-based Education.** Any place, any pace learning through technology places a priority on outcomes to determine educational effectiveness. While education is already placing a premium on accountability, it does so within the current constraints of seat-time and credit hours, thus hindering a student's ability to progress through a rich curriculum at their own pace, including an accelerated pace. True leveraging of technology to meet individualized learner needs will require a shift to a competency-based model, greater emphasis on performance and new metrics to measure achievement. **Encourage governing bodies and institutions to develop and implement new competency- or performance-based criteria, models, and understandings that shift the focus from seat-time to more relevant metrics,** thereby fostering an environment where technology's potential to expand learning opportunities for students can be realized.
- **Technology Integration.** **The federal government should promote technology integration by requiring that all grant applications/plans include information about how technology will be used to achieve the program's needs and goals.** The integration of technology can be thought of in two fundamental ways: (1) as an impetus and means to reengineer the process and practice of education; and (2) as a tool to improve existing instructional, administrative and other educational tasks. While use of technology should only be done as appropriate and need not be required in all cases, every federal grantee should at least engage in the thought process of how to use technology either as a tool to improve current practice or as a means for reengineering this practice.
- **Instructional Materials Funding.** **Identify model reforms, create incentives and otherwise provide national leadership to overcome the various budgetary and regulatory barriers that create a bias and barrier to state adoption of K-12 software and electronic learning materials.** State processes for funding and approving instructional materials often include antiquated rules that directly or inadvertently bias electronic learning resources. Incentives such as requirements linked to federal K-12 education grant programs would encourage states to reform these regulations to allow educators to have the opportunity to choose from a wide array of print-based and electronic learning resources to meet students' diverse learning needs. Finally, though these rules are being changed, gradually, these adoptions often do not provide additional funds to compensate for the dual track development of both print and electronic offerings that many publishers incur, thus slowing the evolution from print to electronic.

- **21st Century Skills.** As alluded to above, current K-12 education standards, assessments and funding streams do not create conditions supportive of many 21st century skills that truly leverage the power of learning technologies. The academic and procurement focus on math and reading basics leaves little incentive for development of innovative learning technologies in other subject areas or skills. **Efforts are therefore needed to both broaden our educational goals, and to target funds to meeting those goals.**

- **Target Funding to Education Technology:**

Several years into the recent boom in education technology, the danger exists that policymakers, educators, and the public may view these costs as one-time capital expenses, thus slowing its integration before it becomes sustainable. Targeted investment is critical to maintaining forward momentum and ensuring decision makers can avoid having to make a false, shortsighted choice between funding technology and funding other priorities. In addition, these technology resources should be largely targeted to disadvantaged communities, institutions and students. While great strides have been made to reduce the digital divide, continued and expanded efforts are needed to ensure all students have access to high-quality learning technology tools.

Targeted state and federal education technology funding has largely supported technology infrastructure. However, investment has not yet been sufficiently leveraged through technology-based learning resources, services and other applications. Further targeted investment is needed to make this jump, and to create a critical mass of demand to spur competition, innovation and improvement in digital learning resources. Policymakers should therefore encourage market development by continuing to empower students, educators and institutions in the following ways:

- **Increase and target public investment in education technology** to empower students, educators and institutions to meet their needs and ensure education technology is brought to scale, updated and effectively integrated
- **Increase funding for the core federal education technology program -- No Child Left Behind Act's Title II, Part D Enhancing Education Through Technology -- from the current \$700 million to \$1 billion or more.** Enhanced and better targeted to disadvantaged communities as part of NCLB, the program has been level-funded for several years. However, this program can only be as effective as the appropriations to meet the raised goals and expectations. The program was authorized at \$1 billion to recognize the shift to a state-to-local formula program; but the current \$700 million will leave some one-third of all districts with grants of less than \$5,000 (or only enough for just a few PCs).
- **Enhance the E-Rate to better meet both the law's intent and the nation's education technology needs.** SIIA's comments were based on the association's experience and that of its members in working with stakeholders to leverage the E-Rate and implement education technology solutions. In the comments, SIIA President Ken Wasch cited the E-Rate as "critical to the efforts of eligible elementary and secondary schools and libraries to access the telecommunications, Internet and related technologies so important to their educational mission." SIIA has "been generally pleased with the administration, implementation and impact of the E-Rate . . . [and SIIA believes] continued federal leadership through the E-Rate is an essential element of the
- **Create and fund a new postsecondary technology grant initiative** aimed at providing disadvantaged students and higher education institutions with resources to acquire and

integrate technology into education. Among the goals would be to ensure that students meet the requirements of college-level academic and technical training.

Public-Private Partnerships & Government Competitive Neutrality:

Encourage private education technology investment and development by helping define the appropriate roles of government and educational institutions. Build communications and bridges for market responsiveness and technology transfer.

New technology models and a strong public commitment to improving education are together leading government – including the federal government – to increase the direct public role in developing and delivering digital curriculum, e-learning platforms and other computer-based education applications. As a result, the education technology industry is increasingly concerned about unfair competition posed by government agencies. Ultimately, such efforts provide a significant disincentive for private involvement, thus leading to fewer choices, less innovation, and a remaining public supply that increasingly fails to meet evolving education needs. Such a scenario contradicts the long held premise that government should not compete with its citizens, and that the private sector is most often best equipped to provide inherently non-governmental products and services.

A basic model for addressing this situation is presented in the introductory letter and as the first R&D recommendation above. Following are additional recommendations:

- **Support an ongoing process for educators to better share their needs and requirements with developers.** Such a publicly-supported “focus group” would enable the market stakeholders to come together in a neutral forum to develop common understandings of capacities, needs and expectations as well as to forge ahead on a common agenda. While many forums now exist for consumers and developers to interact, none is appropriately designed in the best interest of moving forward the learning technology agenda and development of products and services.
- **Help educators and policy makers understand the tremendous resources (costs, time, skills, etc.) needed to develop, maintain and support high-quality educational software, electronic curriculum and related learning technologies.** An informed decision maker will be better able to appreciate education technology’s value, recognize that “web-based” does not equate to “free,” and refrain from engaging in publicly-funded development of such products without full appreciation of the costs, risks and other challenges. Regardless of the delivery mechanism (paper or pixel), the core costs of instructional materials are research and development of the content and the pedagogy. In addition, a technology-based solution is generally more expensive, because it offers so many more options for delivery, management and update of content and pedagogy. This effort could include a “build vs. buy” decision tool as well as case studies demonstrating the shortcomings of previous publicly built and owned education technologies.
- **Enhance federal regulations to ensure government does not expend resources to create educational technology products and services where the private sector is already providing them, or is best equipped to provide them.**
 - **Further disseminate and enforce existing federal technology transfer laws and regulations among federal agencies** to ensure the results of federal R&D are appropriately turned over to the private sector, where this work can be best leveraged to create products/services of value to the education consumer (student, teacher, institution, etc.).

- **Assure that private-sector intellectual capital is protected when its creation is partially federally funded.** For example, the SBIR program does this by distinguishing between pre-commercial research (public domain) and product research (proprietary). In contrast, the NSF instructional materials development contract has no such provision, requires all findings from a project with NSF funding to go into the public domain, and thus provides a disincentive for private involvement.
- **Require that all government agencies conduct a public comment and review process before creating and delivering an education/information technology product or service** to ensure: (a) it is an inherently governmental function and delivers inherently governmental information; and (b) there does not exist a private sector entity currently providing, or best positioned to provide, the same or similar product or service. Such Federal Register listings should be centralized, or at least cross-referenced, under one recognizable heading.
- **Limit government development and delivery of education technologies to so called “thin markets,”** whereby government gets involved if there is a small, niche market that is defined as an important need, but which the private sector does not and can not serve. Even in such cases, technology transfer models should be undertaken before turning to a wholly government solution.
- **Enhance federal regulations to ensure government does not inappropriately pick, either directly or indirectly, the “winners” among private sector providers of educational technologies.** Government identification of one provider/solution will ultimately create disincentives for others and force them to relinquish their efforts, thus leaving educators with fewer choices. In addition, when such solutions are directly underwritten by government funds, recipients will ultimately undervalue both that specific technology as well as the value of education technologies in general, further weakening incentives for private sector development and delivery. Ultimately, imposition, either directly or through a contractor, of a technology solution on educational institutions, educators or students will undermine the degree to which future evolving and individualized educational needs will be met.
- **Encourage reliance on the private sector and public-private partnerships to meet the demand for software and digital content:**
 - **Districts and other government agencies should not view the ease of distributing educational content over the Internet as carte-blanche cause to produce and make available these materials on their own and/or for free.** Such a dissemination plan ignores the substantial costs needed to ensure ongoing quality improvement, support and scalability. Instead, such government action must be evaluated on a case-by-case basis to ensure it is not beyond its mission, does not distort educational decisions, and does not weaken the overall supply. When it comes to such products and services, education has long been served, and is nearly always best served, by the free-market convergence of supply and demand. In this regard, web-based curricula is no different than textbooks, desks, and computer hardware -- the public sector is neither well-positioned nor well-equipped to produce these products for schools.
 - **In general, government created and owned technology-based solutions that are provided for free have ultimately proven to be insufficient and non-sustainable.** Initial development of technology-based instructional materials often accounts for a minority share of its life cycle cost. As a result, such government-funded products

usually lack the infrastructure and sustained, annually renewed investment necessary to enter the market (e.g., marketing), sustain the product (e.g., technical assistance), and update and improve these products over multiple generations. The result has most often been failed implementation, including the failure to reach the intended audience and make it past release 1.0. In addition, most such grant-funded and free products are not large-scale and high-quality enough to provide the value educators are seeking.

- **By largely relying on free market mechanisms and creating incentives (e.g., school technology funding, and opening R&D competitions to the private sector), public policies will create an environment in which private sector and public goals coincide and providers better meet education needs.** Competition between publishers will spur innovation, improve quality and reduce consumer costs. To the extent that government inappropriately competes in the software and curricula market via the Internet or other technology-based means, it will produce the following negative consequences: (1) create disincentives to private investment; (2) perpetuate the notion that web-based products in particular are free and thereby force the private sector to turn increasingly to alternative business models, such as when products are provided at reduced or no cost in return for advertising; (3) inhibit competition and innovation; and (4) ultimately limit choice and facilitate a more standardized, quasi-national, curricula.

Technical Standards:

Develop and Deploy Standards and Interoperability to Underpin New Technology-Enabled Education and Training Systems. Build “Infrastructure” (rules and systems) to Support New Paradigms in U.S. Education and Training

The multitude of programming languages, platforms, devices and standards have provided some barrier to education’s further adoption of technology. Already challenged to find the resources for core technology acquisition and technical management needs, educational institutions often lack the capacity to carry out more complex integration efforts needed to merge different systems and data into a more seamless solution. The Schools Interoperability Framework (SIF) stands as an example of a well-vetted, joint education-industry effort to develop a standard aimed at improving integration and interoperability across disparate, proprietary systems and applications.

- **Facilitate the identification and resolution of, and provide funding to solve, the various technical barriers to the interoperability of disparate technologies** to, among other purposes, both ease integration between components as well as ease integration of technology as a whole into educational practice.
- **Encourage public and private stakeholders to develop a roadmap that identifies technical barriers, areas of possible standards development and pathway for addressing these needs.** The Plan should not set specific technical standards. Priority should be put on clear interoperability standards, including for use of assistive technologies.
- **Develop models for, and educate school personnel about, the need for systems integration services in the deployment of complex technology infrastructures and systems.** In addition to interoperability between databases, for example, systems integration personnel (or investment in vendors that provide this service) is still often required to implement the protocols, business logic, and communication layer between technologies.