

Recommendations Submitted by the Software & Information Industry Association

To the U.S. Department of Education National Education Technology Plan

July 2003

The Software & Information Industry Association (SIIA) is pleased to submit the following views and recommendations to the U.S. Department of Education regarding development of the National Education Technology Plan. SIIA and our member companies are very supportive of the Department's efforts to update the current national plan, and in the process to examine and help address the many critical issues facing the nation's efforts to improve teaching and learning through the integration of technology.

SIIA is the principal trade association for the software and digital content industry. SIIA provides global services in government relations, business development, corporate education, and intellectual property protection to more than 650 leading software and information companies serving business, education, consumers, and the Internet. SIIA provides a neutral, global business forum for its members to understand business models, technological advancements, industry trends, and best practices.

Many SIIA member companies produce and market software tools, digital curricula and related technologies and services for use in K-12 schools, higher education institutions, corporate training, homes, and other educational settings, while all SIIA members depend on the nation's schools for a skilled high-tech workforce. In representing companies that employ skilled high-tech workers, utilize technology for employee training and other purposes, and develop and deliver educational software and other technology products and services, SIIA is therefore well positioned to understand the related opportunities and challenges.

From Kindergarten to the corporate classroom, SIIA members are shaping and experiencing how technology is challenging traditional views of teaching and learning, fundamentally changing many long-standing education models, and improving educational opportunities and achievement. While great strides have been made, this transformation is relatively young. Maximizing the benefits of technology-based solutions will require additional efforts, including a supportive policy environment and public-private partnerships that support publishers and developers in meeting educational needs. It will also require that technology not be viewed as a product, but rather as an enabler to improve instruction and learning through the development and delivery of high quality

content and pedagogy, assistance to teachers in planning and delivery of instruction, assessment of learning and organization of information. In addition, high quality content – with a solid foundation of research and practical experience in pedagogy and instructional expertise – is necessary to ensure technology-based solutions or improve instruction and learning. Publishers and developers play a crucial role in applying their expertise to ensure that technology is in fact part of the solution to improved education.

The Software & Information Industry Association is pleased to present the following comments, and encourages the Department to give proper consideration to the industry's unique expertise, perspective, challenges and recommendations. SIIA and our member high-tech companies look forward to the National Education Technology Plan. We also look forward to working with the Department and other stakeholders on its implementation to help realize the virtually unlimited potential of education technology to transform the education system and improve student achievement and other learning outcomes.

Additional information about SIIA and our education efforts is available at <http://www.siiia.net> and <http://www.siiia.net/divisions/education/>. If we can be of further assistance, please contact Mark Schneiderman, SIIA's Director of Education Policy, at (202) 789-4444 or marks@siiia.net.

Section I: Identification of Plan Priorities

We ask that you please identify your organization or constituency's top ten issues that should be addressed as part of the National Education Technology Plan. Rank the issues in order of priority, with one as the highest. You may provide recommendations or issue clarification using bullet points.

1. Promote the use of technology as integral to the educational enterprise and the improvement of education.

Technology is first and foremost a tool to improve educational efficiency and effectiveness, including by its transformation of the teaching and learning process. However, technology too often remains viewed as supplemental, identified as a technical and infrastructure issue, and relegated to the stewardship of technology directors. While there are certainly unique technology issues and needs to be addressed, the plan should look first to breaking down the language, perception and practical barriers that prevent technology integration.

SIIA Recommendations:

- Define this “technology” plan first and foremost as an “education” plan in terms of its name and characterization. For example, the Plan could be titled, “Redefining Education for the 21st Century.” The Plan must appeal from the start to core education needs and goals to ensure its reach outside the usual circle of technology supporters to mainstream educators and education leaders who can ensure its realization. To that end, while it should present a vision, it must first be pragmatic and practical, including by presenting clear action points.
- Outline technology purposes, functions and goals in educational, rather than technology, terms. Technologies can be mapped in terms of the dimensions of learning, thus positioning technology as a tool and delivery medium for addressing core learning goals. For example, technology is critical in the current environment of standards and accountability, providing tools to more efficiently align standards to curriculum, assess student needs and performance in a more timely and robust manner, analyze student data and provide performance reports at all levels. Technology should also be framed in terms of school reform efforts as a tool for reengineering education processes at both the administrative and instructional levels.
- Tactfully represent technology in our nation’s educational institutions as a “need to have,” and no longer as a “nice to have.” Not only are many learning opportunities and management efficiencies not attainable without technology-based solutions, but our ability to transform teaching and learning will only arrive when technology integration is viewed as fundamental. 21st Century education demands 21st Century technology tools. This requires a recognition that the “audience” for education is changing. Students, particularly younger ones, now do not learn the same way – non-linear approach, multi-tasking, video games – as today’s adults had learned. This fundamental reality should be reflected in education. There is a growing gap between “digital kids” and “paper teachers,” and if it is not recognized and reflected in the Plan, a wonderful opportunity to help today’s students learn better will be wasted.

- 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. Key issues to be addressed would include teacher support and training, budgeting (including technology as both a cost and a long-term cost savings), acquisition of digital curriculum and technology infrastructure, technical assistance and maintenance, etc.
- The Plan also needs to differentiate, from an instructional perspective, between the varying needs at different age and learning levels. Technology-mediated learning provides promise of 'individualized' instruction, however, the Plan needs to accommodate the diversity of learning environments represented by the national structure and composition of our school systems (elementary, secondary, postsecondary, etc.) and the uniqueness of the learning requirements associated with each institutional setting.

By speaking in educational parlance, the Plan can help bridge the gap between the “average” educator, school administrator and policy maker and their technology-adaptor colleagues.

2. Present an educational vision and role of technology that appropriately represents its scale and scope in terms of education purpose, function and goal.

Education technology provides a diverse and rich set of tools to improve and transform educational practices and outcomes for all learners, from children to college students to educators in their professional development. Just naming a few, these include enhancements to:

- **Personalized Learning.** Sophisticated software with rich curriculum and embedded diagnostic assessments enables customization to the individual's unique learning needs, styles and pace. Courseware enables educators to assess student skills, align computer-based instruction to the state's graduation standards, and prescribe appropriate coursework to fill in students' skill gaps.
- **Instructional Management.** As with business, instructors and administrators can use technology to efficiently collect, manage and analyze data. The result is informed decision making, improved accountability and reduced costs, including through e-procurement savings. These tools empower educators to manage more effectively student performance and data, while providing parents with real-time access to their children's information.
- **Distributed Learning.** The Internet enables real-time, flexible access to engaging instruction and content often available only at a distance. This instruction can be provided both synchronously or asynchronously to allow for the student's (e.g., a child, adult, or an educator) learning needs and pace, thus extending access to courses for students who wouldn't otherwise have the opportunity. Customized solutions include live instruction, supplementary tutorials and explorations, chat rooms and reporting.
- **Robust Communications.** Integrated communication tools ensure critical interaction between and among students, families, educators and communities, thus moving education from the isolated classroom out to the community. Unified messaging technologies provide

educators with more efficiency, while web-based portals give families access to assignments and resources from home.

A paramount consideration is that technology may best succeed in improving education when it serves to facilitate the re-engineering of educational process and practice.

Recognizing this rich diversity in purpose and goal requires a robust rubric for measuring technology's benefits and outcomes, as well as its costs. While student achievement is paramount, too narrow and direct of a measurement may ignore both complementary goals (cost savings, teacher satisfaction, technology literacy, etc.), as well as intermediary goals (teacher skills, student access to learning opportunities, student engagement, improved system of instruction, etc.). The Plan should therefore also help inform recent policies that may have too narrowed the focus in terms of ends, means and measures.

3. Inform the discussion around education spending by providing a comprehensive review of the budgetary dynamics and strategies involved in technology acquisition and implementation, including long-term and cost savings issues.

Just as it has the power to transform educational process and practice, technology can both have dramatic impact on education budgets as well as change the very cost structure of education. Despite significant investment in recent years, few communities or institutions have fundamentally examined, let alone restructured, their budgeting to reflect the new realities presented by technology. 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. It is a relatively expensive item in a budget that devotes most resources to personnel and operations. And technology is a hybrid item in a budget that categorizes costs as either capital or recurring expenses. Yet, technology needs to be viewed as part of operational budget in schools and districts (not simply funded through discretionary funds or bond issuances), and funds need to be identified to support the long-term total cost of ownership.

Technology presents many costs, both initial and ongoing, but these must be viewed in the context of both offsetting cost savings (compared to alternatives) as well as benefits and efficiencies (e.g., higher student achievement, increased opportunity, etc.) Decision makers should also be encouraged to consider the acquisition of comprehensive solutions that include technology – for which technology is the “glue” – instead of thinking about technology as independent and non-compatible elements of a program. At the same time, technology costs must be considered from a long-term perspective, including total cost of ownership issues such as training, maintenance, replacements/upgrades and software/content. Only by recognizing all of the costs and benefits, objectively weighing them against alternatives, and adjusting budgets accordingly will technology be fully and truly integrated into education management and budgeting decisions.

SIIA Recommendations:

- Present a model for an institution's/agency's technology-related zero-based budgeting effort, where a thorough top-to-bottom review can lead to fundamental shifts in spending

and/or reallocation of resources. This might include both case studies, as well as guidance for how other communities and institutions can conduct such an examination.

- Provide a number of 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, buildings) be, or possible efficiencies derived (e.g., expanded depth and breadth of curriculum), from delivering instruction via distance learning to secondary student households as opposed to delivering instruction in a secondary school campus? Case studies could include resource implications among similar items (e.g., from predominately print-based programs to digital curricular materials), resource savings (e.g., online professional development compared to traditional alternatives) and educational transformations (e.g., substitution of online courses for the traditional classroom setting).
 - Explain the costs of technology in the context of its educational benefits, thus empowering educators 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 the savings in more traditional remediation interventions such as an extra year of schooling, tutors, or societal costs of school dropout. Increased expenditure in technology and instructional software development can be rationalized through demonstrating a direct correlation between improved learning efficiency, student achievement, increased graduation rates, etc.
 - Present technology in terms of the total cost of ownership to enable education policy makers and administrators to better understand long-term costs, and thus more accurately budget for these requirements. The total cost includes maintenance and technically proficient support staff, equipment replacement, network and infrastructure installation, upgrades, software licenses and renewals, etc. This information should be presented in conjunction with technology's savings and benefits. Total cost of ownership should not only reflect direct technology costs or benefits but also factor in a closer bundling of content and technology-based solutions.
4. Enhance the availability and integration of high-quality educational software applications and electronic curricular materials through a focus on improving the market dynamics.

The integration of high quality software and digital content is critical to the successful use of technology to improve education. While access to computers and the Internet are necessary pre-conditions, their core function and value is to deliver software and content. The focus on acquiring baseline hardware and infrastructure, while necessary, 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. Efforts are therefore needed to better balance this equation. Such a balance does not imply that hardware and infrastructure resources should be reduced.

Access to any online content is not sufficient. Most of what is available at no cost on the Web is information in the form of primary, static source materials and stand-alone lesson plans, rather than instruction-ready curriculum; but students and educators require effective, engaging, and

appropriate learning resources. Educators generally lack the time and skills to successfully incorporate such raw information into the curriculum. It is essential that the Plan consider that a primary goal of technology-based solutions is to make the life of teachers easier.

Education publishers and developers are therefore acting as key partners to fill this need. They develop and package online and technology-based learning resources in a manner that adds value to content and enables fluid and effortless integration into the curriculum. Regardless of medium (e.g., print or electronic), publisher research and development ensures content is rich and engaging, learner-appropriate, and safe, aligned to the curriculum and state academic content standards, and incorporates effective pedagogy and instructional design. Publishers also provide tools and professional development to ensure technology-based solutions improve educational efficiency and effectiveness. Well-crafted public policies and practices are therefore critical to ensuring all teachers have pre-service through in-service professional development to maximize the acceptance and utilization of technology-based solutions, and that students have access to high quality software and technology-delivered content, including through teacher acceptance and utilization.

SIIA Recommendations:

- Inform educators and policy makers about the resources (costs, time, skills, etc.) needed to develop high-quality educational software and electronic content. An informed decision maker will be better able to appreciate its value, recognize that “web-based” does not equate to “free,” and refrain from engaging in publicly-funded development of such products without fully appreciating the costs 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.
- Present educational models whereby digital content is not supplemental, but is integrated as the core and primary learning resources.
- Outline a vision and plan for supporting public-private partnerships that inform and support educational software R&D. The plan could identify the following elements:
 - a process for educators to better share their needs and requirements with developers;
 - research models to enable the R&D needed to test theories and new, advanced applications; and
 - funding models to lower the publisher risks inherent in R&D in the challenging education market, including identification of public resources.
- Empower educators with the information, resources, and flexibility to best address their instructional materials needs. Identify model reforms to the various budgetary and regulatory barriers that create a bias and barrier to adoption of electronic materials. For example, many instructional materials adoptions include rules not yet modified for software or web-based content. Similarly, subscription models can pose challenges to budgets long allocated for software licenses, acquisition of textbooks, etc. States should work with providers on defining more precisely what these components should be, moving from a

“tick-box approach” to something more useful, which could be facilitated in part by the Plan. 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.

- Encourage targeting of resources to software and electronic content, much as there has been recent emphasis on teacher training in the use of technology. The dedication of additional resources to software and content is necessary to: (1) best leverage other technology investments toward educational change and improvement; and (2) ensure a dynamic market that encourages continued product innovation and improvement.
- 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. 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.
 - Technology based products are, and should, be developed by education and curriculum experts. They are extremely complex and expensive developments and much more suited to the private sector. However, public support can be useful to bridge the gap between immediate costs and investments and slow adoption. Publishers and developers are eager to take risks, but rewards often take too much time to support the investment case needed for certain innovations. Again, it is not about developing technology, but technology based education products, requiring a close connection to education content and publishers expertise.
 - 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.
5. Synthesize research evidence of technology's effectiveness, as well as the conditions and practices supporting this effectiveness.

After several years of significant investments in education technology to address educational needs and goals, education decision makers are demanding increased evidence of effectiveness. Among the contributing factors are accountability requirements at both state and federal levels, the scientifically based research (SBR) requirements of NCLB, and budget pressures. While additional studies are needed, years of research provides both a sound theoretical basis for technology's positive impact on teaching and learning, as well as strong evidence that technology does improve the educational process and student achievement.

SIIA Recommendations:

- As a vision and blueprint for the nation's future education technology efforts, it is critical that the Plan include a review of the research literature in terms of where and why technology is known to improve teaching and learning. The focus should not necessarily be on products or limited to specific design technologies, but should look more broadly. This would include both generalizable principles of instructional design, as well as the contextualization of the technology medium within the instructional framework of its use. While resources and space are likely insufficient for a comprehensive and detailed review, some broad synthesis with references is necessary and appropriate.
- The Plan should define the purposes, goals and effectiveness metrics for technology-based education products in a broad and comprehensive educational manner. While student achievement is the primary and ultimate goal, many uses of technology-based products serve that purpose indirectly; technology, after all, is an enabler and not an end in itself. Alternative and intermediary outcomes must therefore be highlighted to ensure the Plan represents the breadth and depth of technology-based solutions. In addition to considering student academic achievement, these benefits include improvements to: cost efficiencies, professional development, teacher quality, collection and use of student data, instructional practices, access to information and courses, student engagement, parental involvement and student technology literacy.

- The Plan should include case studies that provide anecdotal examples of where technology has improved educational institutions and practices and led to greater student success. These should combine vision with practical experience.
 - In addition to identifying what is known about where technology makes a positive educational impact, the Plan should highlight research findings about 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. By sharing these issues that position technology as a tool within a broader educational context, the Plan can help provide educators with a better understanding of how to best match technology expectations to their needs and capacities.
6. Outline a national research agenda, including both the issues to be studied as well as the models needed for its implementation.

With the integration of technology into education at a relatively early stage, a considerable R&D effort will be necessary to 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 both for funding as well as 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. Because industry continues to make significant capital investments to research and develop education software and digital content, public resources must be appropriately targeted and designed to fill the gaps and enhance industry's ability to deliver effective products and services. Industry's investment is epitomized by the multi-year, multi-million dollar investments made to deliver products to market, while many online materials are further updated to ensure timely content.

SIIA Recommendations:

- Federal R&D should be focused on long-term basic research, large-scale empirical evaluations, development in smaller and under-served niche product markets, and other R&D that better identifies effective models, the factors that determine effectiveness (i.e., what interventions work best with students of what learning styles and under what conditions), and ultimately how these models can be replicated.
- Outline an agenda based around the principles included above in SIIA's Recommendation #5 regarding a synthesis of technology effectiveness. This agenda must be sensitive to, among other factors, both time (i.e., research moves at a much slower pace than technology innovation) and context (i.e., the content, environment, people, etc. in which the technology is employed).
- Enhance industry's ability to address education needs by both targeting government R&D to fill the gaps in private research and allowing private entities to compete for R&D grants.

Federal R&D should 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. Due to the lack of incentive in the system, the results of government-funded R&D too often remains locked in a report, rather than incorporated into practice and product development. In contrast, in order to stay competitive, education publishers operate at the cutting edge of research and work closely with educators to understand and respond to their needs. 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.

- 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. In fact, publishers frequently follow this model now by partnering with educators to conduct their research and development. Technology transfer is an important part of this model.
- Define “research” broadly to recognize unique technology challenges, as well as to inform the breadth of issues related to effective practice and product innovation. For example, in light of the faster pace of technology evolution, narrowly defined research standards may prevent innovation and improvement such as when evaluation research timelines are extremely long.

7. Outline reforms needed both for technology-based solutions to complement traditional educational models as well as for changes to educational processes not necessarily in the best interest of education and students in the context of the changed environment and availability of new alternatives.

Technology is helping drive a shift from assembly-line and institution-based education to individualized and learner-based education. This requires that many practices and regulations 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. Constraints that hinder accelerated achievement of students should be examined to ensure that learners can progress through a rich curriculum at their own pace, thus greater accommodation and new metrics for measuring performance of students in a competency-based instructional program need to be developed. The role of the educator should also be reconsidered in light of how this educator will interact with students in a digital learning environment (e.g., will the educator reside in a classroom and/or be available online and on demand? reside in the same state as the student? etc.) Absent such regulatory evolution, technology and web-based education will be hindered from achieving its full potential and transforming traditional models of instructional delivery.

SIIA Recommendations:

- Identify long-standing rules, policies and procedures that inappropriately and unnecessarily prejudice technology and especially web-based distance education, including in the areas of school accreditation, academic credit, teacher certification, and student financial aid.

- Where possible, provide alternatives for these current processes, including through example of where such reforms have been instituted and succeeded and; more significantly, how these reforms can be scaled (or replicated). Where such solutions are not readily apparent, provide guiding principles and frameworks upon which stakeholders can devise solutions.
 - Identify model reforms to the various budgetary and regulatory barriers that create a bias and barrier to adoption of electronic learning resources. For example, many instructional materials adoptions include rules not yet adapted for software or web-based content. Similarly, subscription models can pose challenges to budgets long allocated for software licenses, acquisition of textbooks, etc.
 - 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.
8. Provide a vision for how a teacher's role is transformed by technology, reinvigorating their experience and improving their success. This would include a change to the culture of teachers and training of educators in a way that supports their effective use of technology to improve teaching and learning.

Among other factors, the high turnover rate suggests the elementary and secondary teaching profession is not sufficiently satisfying and rewarding for many teachers. Technology can redesign the job of teaching at all levels by helping educators reach more students, uniquely tailor instruction, and enable greater success for all learners, thereby increasing teacher job satisfaction and retention. For example, technology can replace many low-value teacher administrative and other tasks (such as gradebooks and attendance reporting), thus freeing time for high-value tasks. Technology can assist teachers in diagnosis of learning needs and then recommend, or orchestrate, the appropriate resources to accelerate student achievement. Technology can also positively transform the role of teachers from that of passively delivering the same information to all students to that of actively guiding each student in an individualized learning process. And technology can transform professional development from a one-time, disconnected activity to an ongoing, customized, "just in time" model through online learning and peer networks. The Plan also should recognize that the profile of teachers might change radically.

SIIA Recommendations:

- Outline a vision for how technology can transform an instructor's role and reinvigorate their teaching spirit, and challenge education to adopt this model. This vision should be clear that technology is not intended as a threat to or replacement of educators, but rather a tool to improve their effectiveness.
- Share 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 the teaching practice and culture at a given institution. .

- Encourage demonstration, training and use of technology-related products during the earliest phases of teacher training as a fully integrated component of initial training. Describe how teacher in-service and pre-service training should include training in the use of technology. The federal Preparing Tomorrow's Teacher to Use Technology (PT3) program is a critical element of this effort.
 - Outline innovative models for delivering professional development that include online training and peer networks/collaboration.
9. 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.

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.

SIIA Recommendation:

- 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.
10. Debunk the myth that technology infrastructure and access needs are adequately addressed, and outline a model for realistic and continued funding of the creation, update and maintenance of this infrastructure.

While much is made of the nation's success in bringing the Internet to most schools and improving the student to computer ratio, educational access to technology and online resources remains inadequate to serve needs in the manner necessary for their true integration. For example, T1 access to the school building is increasingly prevalent but largely insufficient to meet the classroom needs of demanding multi-media applications. Consequently, vendors develop web-products to the lowest common denominator of access, which constrains the richness of the learning product. Increased bandwidth to the classroom, and the home, is needed for the reliable delivery of robust educational content. A device for every student and teacher is needed for full integration so that the technology is as reliable as a book or pencil. And network infrastructure and support must be improved to ensure dependability.

Section II: Identification of Plan Themes

Please provide your perspective on any or all of these guiding questions—or on topics related to these guiding questions. These sample questions are intended to help identify themes that could be addressed in the National Education Technology Plan.

- **What is the single greatest opportunity or best way technology can help improve school systems?** How can school systems best employ technology to support teaching and learning and increase student achievement?

Personalized learning is the most promising use of technology to increase student achievement. Sophisticated software with rich curriculum and embedded diagnostic assessments enables customization to the individual's unique learning needs, styles, and pace, including for students with learning disabilities and other special needs. Instructional management applications enable educators to assess student skills, align computer-based instruction to the state's graduation standards, and prescribe appropriate coursework to fill in students' skill gaps. This individualization can be both automated at the student level (i.e., computer tutorials), as well as managed by the teacher (i.e., use of data to inform and tailor instruction). This use of technology can also positively transform the role of teachers from that of passively delivering the same information to all students to that of actively guiding each student in their individualized learning process, thus reinvigorating a tired and underappreciated field.

- **What are the most critical questions that need to be answered in a research agenda?** What information do you need to know about the use of technology in education that could be addressed by research? What should be the top priorities of an educational technology research agenda?

Please see SIIA Recommendations #5 and #6 as outlined above in Section I.

- **How can the effective integration of technology into instruction be increased?**
 1. **Improved Leadership.** Like many key education elements, effective leadership is critical to providing the necessary vision, support, resources, etc. The Plan should both challenge educational leaders to understand, embrace and implement technology integration, as well as provide them the information necessary to adopt this view. Leadership is needed to change the culture of education to better embrace technology as an integrated part of teaching and learning.
 2. **Teacher Training.** Most teachers have not received the training necessary to truly embrace the power of integrating technology into their instruction, including its opportunities to redefine their roles and methods. While new teachers grew up with and generally embrace technology outside the classroom, most continue to be taught how to teach without inclusion of technology and so enter the classroom unable to effectively integrate technology.

3. 1:1 Computing. While technology can be effectively integrated in settings where computers are shared among several students, more effective integration requires that every student have a computer. Only in that environment can educational practices be truly reengineered to embrace true individualized learning.
4. Model Development. Models are needed that place technology at the center of the school, rather than the periphery, and that are demonstrated to be more educationally and financially effective than conventional methods.

- **Are there other ideas or initiatives that should be considered that would improve the framework in which the Federal Government promotes the use of technology to improve student achievement?**

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. The Plan should include this recommendation.

- **What are the most critical lessons we have learned about the use of technology to support students, teachers, educational leaders, and parents?**

1. Simply placing computers in the classroom will not result in its effective use. Like most educational changes, top-down leadership, initiatives and resources must be balanced with bottom-up support. Technology must be introduced as a planned school improvement intervention to achieve a clear goal, with coordinated professional development, support and change management.
2. Technology, by itself, makes no difference in learning outcomes. Its impact is dependent on its appropriate and effective use. A product is only as good as the instructional environment in which it is instituted. Similarly, hardware and Internet access, while providing some benefit in isolation, are best leveraged when used to deliver high-quality educational software and electronic content.
3. Technology must be reliable, well-supported, and readily accessible. Unable to depend on its availability, teachers and students will return to previous methods. Quality infrastructure, technical assistance, and other support is therefore a necessary precondition.

- **What lessons have been learned by other types of organizations, sectors, or industries about changes that need to be made in order for technology to be used effectively?**

Business and industry have learned that the true power of technology can only be leveraged if it is used to not only make current practices more efficient and effective, but also to reengineer these practices in a manner not otherwise possible. This enterprise reengineering requires significant investment in planning and design, and then in technology acquisition and employee training. However, this investment will pay dividends in time in terms of improved efficiencies and effectiveness.

Optional Contact Information:

Name: Mark Schneiderman, Director of Education Policy

Organization/Constituency Represented:
Software & Information Industry Association (SIIA)

Role(s) - Mark item(s) that most closely describe your current role(s).

- | | |
|--|---|
| <input type="checkbox"/> Student | <input type="checkbox"/> Public or Private Sector Training Provider |
| <input type="checkbox"/> Parent | <input type="checkbox"/> Education Association/Coalition |
| <input type="checkbox"/> preK-12 Educator | <input checked="" type="checkbox"/> Non-profit, Business or Trade Association/Coalition |
| <input type="checkbox"/> Local preK-12 School Official | <input type="checkbox"/> Research Organization |
| <input type="checkbox"/> State preK-12 School Official | <input type="checkbox"/> Public or Private Foundation |
| <input type="checkbox"/> Teacher Candidate | <input type="checkbox"/> Content Provider or Publisher |
| <input type="checkbox"/> College/University Educator | <input type="checkbox"/> Hardware or Telecommunications Provider |
| <input type="checkbox"/> College/University Official | <input type="checkbox"/> Investor |
| <input type="checkbox"/> State Post-secondary Education Official | <input type="checkbox"/> Journalist |
| <input type="checkbox"/> Federal Education Official | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Local or State Elected Official | |
| <input type="checkbox"/> Federally Elected Official | |

Address: 1090 Vermont Ave, NW, 6th Floor
Washington, DC 20005

Phone: (202) 789 – 4444

E-mail: marks@siia.net

Please send your input by email to feedback@nationaledtechplan.org or
by fax to 202-401-3941.