



**Software & Information
Industry Association**
BUILDING THE DIGITAL ECONOMY

Trends in Educational Software

**NCSL Foundation Project:
Using Technology to Improve Student Achievement**

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SIIA appreciates the opportunity to present various findings on the use of technology and e-learning in K-12 education. While focused on software, much of the information and trends applies more broadly to the full range of technologies.

Overview

- About SIIA
- Technology Use Today
- Drivers
- Trends
- Paths to Integration
- Working with SIIA

About SIIA

- Principal trade group of software and digital content industry
- Represent 750+ high-tech companies publishing for consumers, business, entertainment, education and Internet
- Education Division Mission:
 - Advocate for technology in education among educators, policy makers and other stakeholders
 - Liaison to educators to ensure the industry meets their needs and requirements
 - Leadership to foster collaborative problem solving necessary to advance development and integration of education technology.
 - Provide actionable market intelligence and business development opportunities

The Software & Information Industry Association (SIIA) is the principal trade association of the software and digital content industries. SIIA provides global services in government relations, business development, corporate education, and intellectual property protection to more than 750 leading high-tech companies that produce software and electronic information for business, education, consumers and the Internet.

SIIA's Education Division represents more than 150 leading and innovative companies that provide education software, digital curriculum, online learning, computer-based assessments and other technology tools to the nation's schools. Many also provide textbooks and other print-based curricular materials and assessments.

SIIA and our member companies have long worked with educators and state officials to leverage opportunities and address challenges aimed at delivering innovative educational technologies that meet education's evolving needs. All SIIA members depend on our nation's schools to provide a skilled high-tech workforce.

More information: <http://www.sii.net>

SIIA Leading Members (with an education focus)

- Apple Education
- Carnegie Learning
- Compass Learning
- Curriculum Advantage
- ETS - Educational Testing Service
- Excelsior Software
- Harcourt Education
- Houghton Mifflin
- Inspiration Software
- Kaplan K-12
- Larson Learning
- Learning.com
- LearningStation
- Macromedia
- Mathsoft
- McGraw-Hill
- Oracle
- Pearson
- PLATO Learning
- ProQuest
- Red Hat
- Reed Elsevier
- Riverdeep
- Scantron
- Scholastic Education
- SchoolNet
- Siboney Learning Group
- STI - Software Technology Inc
- Sun Microsystems
- Texas Instruments
- Thomson Corp.
- Time Warner
- Tutor.com
- Wireless Generation

Develop/publish educational software, digital curriculum, online learning, computer-based assessment, productivity tools, school/network/classroom administrative applications and related technologies.

Technology Use Today

- School Access to Technology (NCES 2004)
 - Internet Access: 99% schools / 93% classrooms
 - Student to computer ratio 4.4:1
 - 600+ district (4%) and 2 state 1:1 Pilots (QED 2003)
- Teachers Take Advantage of Technology (NetDay 2004)
 - 75% incorporate Internet materials into lessons
 - 78% view technology as asset in meeting standards
- Students Surrounded by & Masters of Technology
 - 74% K-6 and 91% 7-12 students say technology helps them with their schoolwork (NetDay 2004)
 - During the 2002–03 school year, 36% of public school districts had students enrolled in distance education courses. (U.S. DoED, 2005)

There has been great progress in the last decade on the integration of technology into the nation's elementary and secondary schools.

The question now is not “if” technology in school, but “how.” The goal is to leverage/translate this investment to better enhance and transform education.

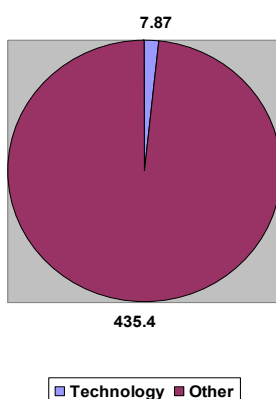
BUT . . .

- School Access to Technology . . . INADEQUATE
 - Bandwidth per student often insufficient at classroom level
 - Majority of computers in back of classroom, computer labs
 - 33% of districts report limited infrastructure as barrier to expanding distance learning (U.S. DoED, 2005)
- Teachers TRY to Take Advantage of Technology
 - Only 37% of schools with a full-time school technology coordinator (U.S. DoED, 2005)
 - Only 62% of teachers felt their pre-service education on technology prepared them at all. (NetDay, 2004)
- Students Surrounded by & Masters of Technology . . BUT DISSATISFIED IN SCHOOL
 - Students see access as the overarching obstacle to using technology more at their school. For students in grades 7-12, the most frequently cited obstacles are lack of time during the school day, slow Internet access time, and not enough computers. (NetDay, 2004).
 - Nearly all states w/technology literacy standards, but only 4 measure it in their assessment/accountability systems (Education Week, 2005).

But . . . We have much more opportunity ahead of us. State leadership is key.

School Technology Expenditures

Expenditures (\$Billions)
(U.S. DoED, 2002; QED, 2004)



Technology Breakdown
2003-04 (QED, 2004)
Not including eRate

Hardware	40%
Internet & Networking	15%
Prof. Dvlpmnt. / Training	8%
IT Services & Support	16%
Instructional Software	11%
Administrative Software	9%

Instructional Materials

Total = \$8.3 B
Digital = \$1.4 B (17%)

(Eduventures, 2004)


School spending figures help provide perspective.

1. $7.87/435.4 = 1.8\%$ (relatively steady over several years; includes e-Rate)
2. Per-Pupil Spending (excluding eRate) = \$110 (QED, 2004)
3. Excluding e-Rate, about 70% to infrastructure and support, and about 30% to training and applications.
4. About \$1 of every \$6 spent on instructional materials is for digital/electronic/online resources.

Other:

- Computing Hardware = \$4.2 B (2003) (Eduventures, 2004)
- Enterprise Software & Services = \$2.4 B (2004). Includes HRFPS, SIS & IMS (Eduventures, 2004)

E-Rate: The federal e-Rate program provides discounts to schools and libraries off their telecommunications and Internet access as well as their internal connections/wiring. It is funded at about \$2.25 billion per year and administered through the Federal Communications Commission using fees collected on phone bills and other telecom services. For more information, visit <http://www.sl.universalservice.org>.

Software & Information Industry Association


Technology Drivers: Mission Critical to Education

Education Goal:

- Student Achievement & 21st Century Preparedness
- Accountability & Data Driven Decision Making
- Ongoing Professional Development
- Parental Involvement and Community Outreach
- School Financial & Resource Management
- Articulation with Higher Education & Workplace

Technology Tool:

<p><u>eLearning</u></p> <ul style="list-style-type: none"> eTextbooks (basal) Comprehensive Courseware Supplemental Software & Digital Content Instructor-Mediated & Blended Online Learning Learning & Productivity Tools Digital Reference & Curriculum Database eAssessment (Formative & Summative) 	<p><u>Enterprise Software & Services</u></p> <ul style="list-style-type: none"> Student Information Systems Instructional Mgt. Systems Business Applications (HR, Act. etc.) Network & Website Administration Communication (e-mail, web, etc.) Data Warehousing
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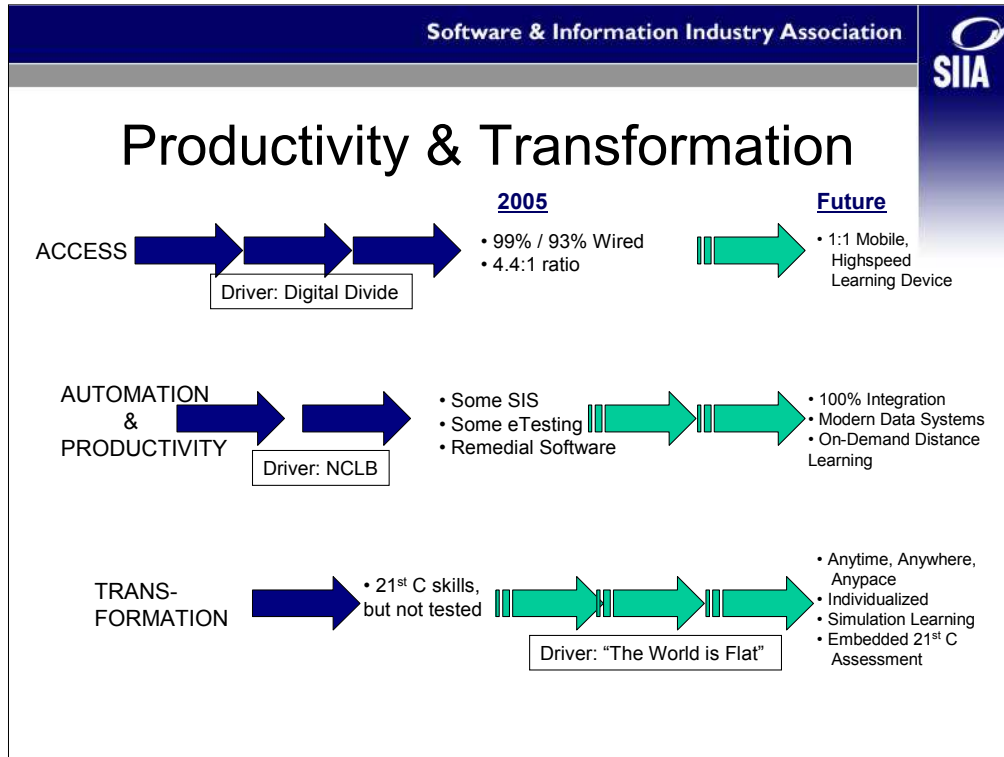
So, what is driving technology investment and use, and what should be driving it even more?

Starting with the broad picture: For every education need, there is a technology solution that can provide access, automate, transform, or all 3.

Technology is mission critical to education, just as it is for all other disciplines and sectors of our society.

To name just a few, uses of technology include:

- (1) courseware that helps diagnose and address student learning needs through embedded assessment and personalized and engaging instructional content;
- (2) information management applications that efficiently disaggregate and report student test scores, help track adequate yearly progress, and inform instruction and professional development;
- (3) computer-assisted and online assessment that provides for more immediate results on both formative (to inform instruction) and summative (for accountability) assessments, and
- (4) online distance learning for supplemental services and professional development, especially in rural areas.



Technology drivers can also be looked at in terms of its purposes/dimensions, which can be roughly divided into 3 broad categories, each driven by various environmental factors. The arrows are intended to represent progress across time, and future goals:

-First was access – “We need to wire the schools.” It fueled much of the increase in investment in the late 90’s. New energy around 1:1, but too many policy makers falsely believe the job is done. In fact, we need more robust systems, and technology must be maintained and updated over time.

-Second was NCLB, and automation/productivity. With access increasing, need to leverage it through computer-based testing, courseware remediation and data-accountability systems necessary to meet NCLB goals and requirements, and to make schools a modern enterprise that employs data-driven decision making. For example, computer-based assessment can be more efficient – no shipping, grading done automatically, results immediately

-The third dimension of technology is for transformation. It took business many years to figure this out, and education is just beginning this process, with many legacy institutions and practices acting as barriers. Some progress has been made in terms of setting student standards for achieving 21st century skills, but little accountability for this. Thomas Friedman’s “the world is flat” is a good metaphor for the U.S. need to modernize our educational system to compete globally. This brings us to technology’s transformative possibilities when schooling is reengineered to be anytime, anywhere; to individualize learning to each student’s unique pace and interests; and to deliver next-generation learning applications similar to what our military may use for training.

Benefits of e-Instructional Materials

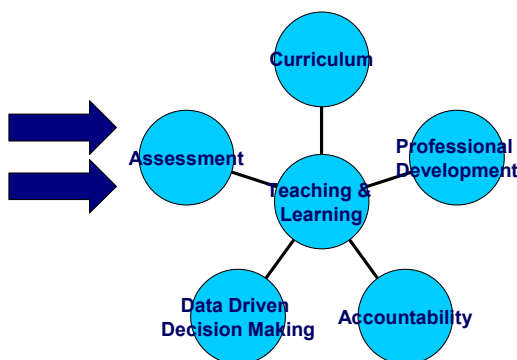
- Learner appropriate, aligned to state standards, and built around effective pedagogy and instructional design
- **Engage** students through multi-media, interactive and **adaptive** instructional content
- Support **differentiated** or personalized learning for unique student learning style, pace or needs
- Keep knowledge **current** and information accurate
- Support **accountability** through integration of assessment and classroom management tools
- **Expedite** delivery/access and increase **portability**
- Enhance **flexibility** to meet evolving curriculum needs

Electronic instructional materials is another major driver of technology:

In addition to instructional and practical benefits, education technology is increasingly important in light of the changed learning needs and styles of today's students. Today's students matured in a digital world and are masters of technology. They seamlessly integrate multiple technology tools and digital resources into their daily lives, but are too often forced to leave these skills and aptitudes at the classroom door. As a result, students are increasingly disengaged in school, and are forced to adapt to a learning process and medium that stands in contrast to that which is most comfortable and successful for them.

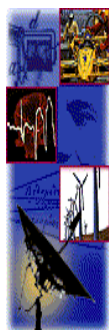
Fragmented Elements Integrated by Technology

- Curriculum
- Instruction
- Assessment
- Professional Development
- School Management
- Community Involvement



Integration is another key technology driver: The left column lists various elements of education that are often fragmented and disconnected, while technology allows integration of those functions whereby information is shared more seamlessly and efficiently to allow for data-driven decision making (for instruction, school management, professional development, etc.) as well as reduce the costs of sharing information.

3Rs X 7Cs = 21st Century Learning



<i>Seven Cs</i>	<i>Component Skills</i>
<i>Critical Thinking-and-Doing</i>	Problem-solving, Research, Analysis, Project Management, etc.
<i>Creativity</i>	New Knowledge Creation, "Best Fit" Design Solutions, Artful Storytelling, etc.
<i>Collaboration</i>	Cooperation, Compromise, Consensus, Community-building, etc.
<i>Cross-cultural Understanding</i>	Across Diverse Ethnic, Knowledge and Organizational Cultures
<i>Communication</i>	Crafting Messages and Using Media Effectively
<i>Computing</i>	Effective Use of Electronic Information and Knowledge Tools
<i>Career & Learning Self-reliance</i>	Managing Change, Lifelong Learning and Career Redefinition

Bernie Trilling, Oracle

The final drive highlighted in this report is the drive for a modern and more relevant set of skills students must have today.

Technology is mission critical to providing today's students with a learning environment and opportunities that both reflect and prepare them for the world beyond the classroom. They are surrounded by technology in their daily lives, but are disengaged from learning in today's schools that have changed little over the last century. Education technology and Internet-based tools are critical to ensuring all students achieve to high standards and gain the 21st Century knowledge and higher-order thinking skills necessary to succeed in today's highly competitive and information technology rich economy. Skills include technology literacy, problem solving, communication, information synthesis and the ability to be a self-directed learner in an age when most will need to retrain continuously in the evolving workplace. In fact, NCLB requires students to be technology literate by the 8th grade.

Technology is both a critical end goal for students to master, as well as a means for achieving other 21st century skills.

Technology Trends: Overarching Principles

- Integration & Interoperability
- Function lines blurring between applications
- Comprehensive, TURNKEY solutions
- Distance learning
- Client-Server (LAN/WAN, ASP) Replace PC/Mac Hosted Software
- Software as a Service (Subscription Model)
- Centralized decision making
- Open Source back end (not Applications)
- Increasing TCO Sophistication
- COWs; Digital Whiteboards; Wireless; PDAs

These trends in use of technology in education can be grouped as follows:

1. Lines are blurring as software applications become more comprehensive and integrated. For example, many assessment applications also include remedial content, while most instructional software is embedded with various assessment tools.
2. Technology is making distance less relevant, including through use of distance learning as well as through the shift in software hosting from the local PC/Mac to a district network and even to servers hosted by the software vendor.
3. These two trends above (along with accountability for student achievement, tight budgets and increasing use of technology for instructional and school management) are driving more centralized decision making for the acquisition of technology

Technology trends include Computers on Wheels (carts with wireless laptops), digital whiteboards, and multiple types of devices including PDAs and student survey devices.

Technology Trends: Content & Curriculum

- Basal Programs / Textbooks
 - \$3.9 B for Basal/Textbooks, only \$177 M (4.5%) for digital. (Eduventures, 2004)
 - Increasing use of blended approach (software/online bundled with textbooks)
 - Barriers: state adoption policies; ubiquitous computing; educator readiness
- Supplemental Instructional Resources
 - Of \$3.3 B for supplemental materials, only \$550 M (17%) for digital (Eduventures, 2004)
 - Reading and math remediation focus given NCLB
 - Range from comprehensive courseware to skill building to learning tools
 - Lines blurring between applications with cross-over functionality
- Reference
 - Of \$1 B for reference resources, \$650 M (65%) for digital (Eduventures, 2004)
 - Increasingly aligned to state standards and integrated into classroom materials
- Assessment
 - \$1.2 B total (Simba, 2004)
 - Formative / Test Prep = 10%, but fast growing
 - Formative Integrated with curricular, instructional and SIS systems
 - 20 States w/computer-based testing, but most pilots or limited to certain subjects/grades/students

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- There is only very limited use of software as a core instructional material (i.e., alternative to the printed textbook). Where electronic materials do serve as the core/basal program, it is most often in subjects such as computer science or technology literacy.
 - Many textbooks are made available in digital form, but these are most likely not as interactive, adaptive and robust (in terms of multi-media) as are software and electronic content that are originally born (developed) in digital form.
 - The primary use of instructional software and digital content is for supplemental materials, of which a tremendous range exists of type, subject, scope, instructional design, etc.
 - Assessment is perhaps the fastest growing area for instructional technology, including both state summative tests as well as formative testing.

Technology Trends: Enterprise Software & Services

- \$2.4 B, 80% SIS (Eduventures, 2004)
- Increasing integration, but legacy barriers
- Network build-out
- Administrative Management
 - student information systems, data management analysis, e-gradebook, data warehouse
 - 90% w/SIS, but many outdated
 - data standards (U.S. DoED) & interoperability (SIF)
- Instructional Management
 - classroom management, learning platforms, content delivery systems
 - web-based learning platforms integrated with publisher's content
- General Purpose/Back Office/Network
 - financial/accounting; transportation; office productivity; procurement; network/portal/middleware

Various types of management applications comprise the largest area of software use.

Technology Trends: Services

- Professional Development
 - \$3.2 B, not including in-house (Eduventures, 2004)
 - Districts 'in-sourcing' the services due to budget shortfalls
 - Programs increasingly aligned curriculum/standards
 - Blended approach most favored – technology for ongoing training
- Online Distance Learning
 - 325,000 students enrolled (full- or part-time) (NCES, 2005)
 - More students in south/west; Higher % in small, rural
 - High School AP most popular
 - 23 States with Virtual School (Education Week, 2005)
 - Legacy policies and practices are barriers to growth
- Online Tutoring and Test Prep
 - \$700 M (Eduventures, 2004)
 - NCLB Driver (SES, Accountability)

Path to Integration

- Leverage past investment through technology integration and transformation of school practice
- Invest in software, digital content & educator training
- Continue to modernize infrastructure and improve access
- Measure appropriately - complementary & intermediary goals
 - 21st Century Skills
 - Efficiency & Productivity
 - Access to courses
- 21st century public policy and regulation
- Inform false perceptions that “e”= free & tech build-out is done
- Modernize school budgeting – technology is cross-cutting, but budgeted for as supplemental and stand-alone

Technology is . . .	But education budgets are . . .
Relatively new	Crafted at the margin & slow to change.
Relatively expensive	Squeezed w/most \$ to personnel & operations
Hybrid budget item	Divided into capital/recurring expenses

The goal is to identify and replicate paths to maximize technology as a tool to enhance education (instruction, curriculum, assessment, school management, etc.) and improve student achievement and preparedness.

With technology's recent integration into the classroom, we have started to realize its potential to transform teaching and learning and improve educational efficiency, opportunity, and student achievement. However, schools are slow to change, and budgets have not yet adjusted to technology,

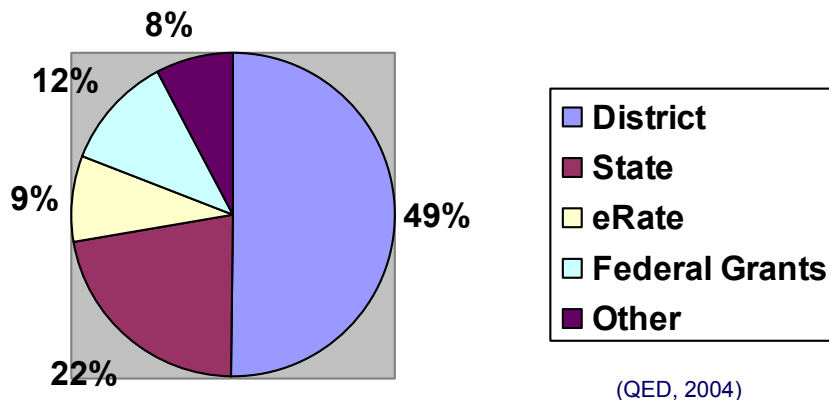
State leadership and investment are therefore critical to ensure all communities have the capacity to address education needs through technology. In fact, our nation's K-12 schools spend only about one-twentieth per student on technology as does the private sector spend per employee.

Too many communities lack infrastructure and access, software/digital curriculum, and well-trained educators to effectively integrate technologies into the classroom.

State assistance must recognize the unique technology funding challenges.

- Technology is a relatively new item in local district budgets typically crafted at the margin and slow to change.
- Technology is a relatively expensive item squeezed into district budgeting processes that devotes vast majority of resources to personnel and operations.
- Technology is a hybrid budget item whose costs are oftetn categorized as either capital or recurring.

School Technology Funding Sources



•36 States Allocate No or Little Funding Explicitly for Technology
(State Education Technology Directors Association, 2005)

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- Total Expenditures for U.S. Public ElSec Schools = \$435.4 B (2001-02), (U.S. Department of Education, 2002)
 - Technology Expenditures for U.S. Public ElSec Schools = \$7.87 B (2003-04), (QED, 2004) [=1.8%]
 - Per-Pupil Spending (excluding eRate) = \$110 (QED, 2004)
 - Fed Share higher for low-poverty states/districts
 - State technology support largely concentrated in a few states, with 36 states providing little or not funding directly to schools for technology.

eLearning Policy Reforms

- Funding
 - Targeted Technology Funding
 - Flexible Uses of Program Funds
 - Base-Line School Budgeting
- Instructional Materials
 - “Textbook” Adoption Reform
 - Public-Private R&D Partnership / Build vs. Buy
 - Evaluation Research
- **Infrastructure & Support**
 - Ubiquitous Computing and High-Speed Access
 - Teacher Training (pre-service and in-service) and Support
- 21st Century Regulation
 - Certification, Accreditation & Academic Credit Transfer for Distance learning
 - Achievement Outcomes / e-Time vs. Seat-Time / ADA
 - Innovation & Flexibility over Prescriptive Standards

Must remove regulations in place from before the Internet to ensure innovation and modernization.

- For example, states with outdated textbook adoption rules – dynamic content; physical depositories; reviewer training.

See SIIA state initiative on State Textbook Adoption Reform for Electronic Instructional Materials:

- Policy Brief with State Policy Options:

<http://www.siiia.net/govt/docs/pub/SIIAAoptionLtrBrf.pdf>

- State Survey Results:

http://www.siiia.net/press/releases/Nasta_Survey_PressRelease_v.4.pdf

- Budgeting perhaps the largest obstacle as the lack of baseline and long-range budgeting combined with a traditional silo approach makes it difficult for technology infrastructure costs to be spread across various uses. For example, professional development may be more effective and cost-effective online, but PD budget can't pay for the hardware alone.

State Leadership Opportunities

- Benefits to major initiatives to transform schools through technology:
 - Improve education efficiencies and outcomes
 - Ensure 21st Century skills in graduates to meet workforce & economic needs
 - Growing the (education) technology industry to fuel economic growth
- State initiatives can drive the ed tech industry:
 - If you demand it, the ed tech industry can provide it
 - SIIA members will either have the solutions or develop them

Examples of State Initiatives:

- VA provides a tech coordinator for every 1,000 students
- Maine/Michigan with 1:1 computer initiatives to provide each student (and teacher) with a laptop/notebook computer. These are currently pilot programs limited to certain grades.
- TX with first exclusive online “textbook” adoption using subscription model for electronic instructional materials. Also TX replacing “textbook” with “Instructional Materials”
- Alabama providing free tutoring online to all 4-12 students 7 days a week
- TX increasing flexibility of funds between technology and instructional materials

Work with SIIA

- Use SIIA as a conduit to eLearning publishers, developers and service providers:
 - provide information about state initiatives
 - broadcast state education needs & requirements
- Look to SIIA:
 - as an ongoing source of information
 - as a neutral liaison to the eLearning industry
 - as a partner in addressing policy, regulatory technical and other eLearning challenges

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