



# Expanding education beyond the classroom door

e-Learning offers compelling answers to questions  
of equity and access

A Datamonitor whitepaper

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## **BEYOND THE CLASSROOM DOOR**

While distance learning is hardly a new phenomenon in education – correspondence courses have been offered for decades if not centuries – the more widespread and substantive adoption of e-Learning is a relatively new one. Access to online courses, including those that are delivered entirely online and those that are comprised of both online and classroom components, is growing rapidly. Moreover, these courses are increasingly using advanced technology, such as video-conferencing and content authoring tools, to make the online educational experience as engaging, if not more so than those in traditional classroom settings.

The growth of e-Learning offers education institutions the potential to address pressing equity of access questions, particularly for rural and non-traditional students for whom online learning is often their best, or even only, option for obtaining an education. Yet while the benefits of adopting e-Learning applications and solutions are considerable for education, there are a number of challenges that institutions must address in order to realize the full benefit from online learning.

This whitepaper will explore the issues driving the adoption of e-Learning as well as the questions that must be answered in order for e-Learning to expand education beyond the classroom door and the transform teaching and learning.

### **The education eco-system is poised for the more rapid and substantive adoption of e-Learning**

Including both institutional and external causes, the set of factors driving the uptake of e-Learning is large and complex. From a purely pedagogical perspective, the belief that technology is a powerful tool for customizing instruction to the needs of individual students is widely held amongst educators. Educators will often reference technology as having the unique potential to help them overcome the challenges associated with effectively teaching a large and diverse group of students. From a demographic standpoint, the percentage of individuals for whom using technology is an assumed rather than novel activity continues to grow, shifting the balance of institutional power toward educators who have only known a digital world. As these individuals populate education institutions, the purchase and adoption of online learning technology will move forward rapidly. Finally from a purely cost viewpoint, the adoption of educational technology offers institutions attractive tools to scale and individualize their educational offerings while maintaining costs. Datamonitor

believes that there are three key factors driving the more widespread adoption of e-Learning, including:

- Government policies are driving more educators to tailor their instruction to the individual needs of students;
- Important constituency groups expect to see technology used in the classroom; and
- Online learning offers a solution to the challenge of increasing access while maintaining costs.

### Government policies are driving more educators to tailor their instruction to the individual needs of students

Addressing the academic needs of individual students is the primary focus of many new government policies. The federal No Child Left Behind (NCLB) Act and a myriad of state-level education policies have placed an unheralded level of attention on tracking the academic progress of individual students and holding institutions and educators accountable for students performing to defined curricular standards. Education bellwether states, such as Massachusetts, New York and Texas, have expanded existing programs or implemented new ones requiring their students to pass a high-stakes exam or series of exams in order to graduate from high school or be promoted from one grade to the next. Educators in these states, and others across the US, are carefully tracking student performance on the curriculum standards assessed by these exams.

While in the past, an institution's focus might have concentrated more heavily on aggregate student performance, the introduction of high-stakes exams has moved the focus to individual student performance. Similarly, the federal NCLB policy requires that students make adequate yearly progress (AYP), as measured by performance on standardized tests, in order for K12 institutions to avoid a series of negative repercussions related to school choice and losing control over Title I funding. As institutions must disaggregate student AYP by a series of sub-segments, such as ethnicity, language proficiency and special education status, most institutions are under considerable pressure to improve academic performance at the individual student level. Ultimately, the outcome of these policies is that education institutions are increasingly focusing their attention on a more narrowly defined and easily measured set of student outcomes.

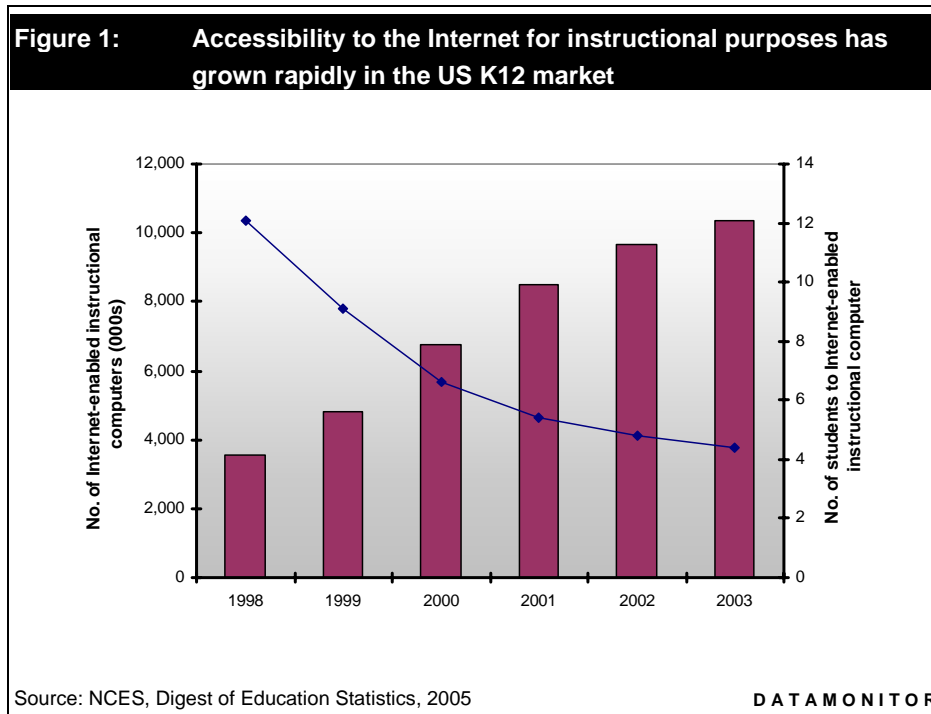
The implications for online learning from state and federal accountability policies are considerable. With 25 – 35 students in most classrooms, it is difficult, if not

impossible, for teachers to individualize instruction to the academic needs of each student and then track each student's progress toward making AYP or passing a high-stakes exam. The unique power of technology to efficiently manage complex algorithms, manage content and store data offers a reprieve, if not a solution, to this dilemma. With the introduction of e-Learning, faculty are able to focus on lesson planning, classroom leadership and group instruction while technology provides individualized instruction or remediation to help students meet curricular performance standards and pass high-stakes exams. Solutions that assess a student's particular academic needs and then develop a customized program of instruction offer institutions a compelling tool to meet the demands of accountability policies and to remediate student performance when necessary. Many vendors have taken their solutions one-step further by including robust reporting functionality that tracks student progress on curriculum standards or even predicts student performance on standardized tests. These solutions help educators to "peak around the corner" and see a student's predicted exam performance so that they can provide targeted instruction *before* the student faces a high-stakes exam and increase the likelihood that he or she will pass it.

### Technology has come to be an expected component of any classroom

While the public once marveled at classrooms with four computers at the back of the room, it now increasingly expects that all classrooms have laptops, wireless Internet access and a full array of curricular software titles. While the reality of many education institutions does not entirely support this expectation, over the past five years the accessibility of classroom technology has made considerable progress, particularly at the primary and secondary school levels. The Schools and Libraries Program of the Universal Service Fund, commonly known as the 'E-Rate' program, has been a driving force behind the wiring of the US K12 market. Spending over \$2 billion each year, this program has helped schools and districts to build their network infrastructures and change the national landscape for school connectivity in a relatively short period. According to the National Center for Education Statistics (NCES), the number of Internet-enabled instructional computers grew by nearly 35% and the student to computer ratio dropped from 6.6 to 4.4 between 2000 and 2003. Given the significantly higher availability of classroom hardware and connectivity, it is fair to assume that parents, business people and other constituent groups are increasingly taking it for granted that students are using this new technology infrastructure for educational purposes. Recognizing this expectation, more institutions are adopting online learning solutions to enhance the interactivity of their

classes, increase access to educational content outside of the traditional school day and offer additional academic programs.



### Having grown up with technology, the millennial generation expects to use it as a tool for learning

Propelled by media coverage and rapid technology adoption in the consumer market, the idea that students prefer to learn with the aide of technology has become part of the popular consciousness. Despite the absence of definitive research concluding that students learn more effectively with technology, the belief that they do seems to have edged from opinion into 'fact' with few questions. While it is beyond the scope of this paper to consider why the public believes so strongly that when instruction is computer-based students engage with it more actively, it is fair to suggest that the seemingly constant usage of technology by students is contributing to this belief. According to a recent study by the Pew Internet and American Life Project, in 2005, 87% of US teens reported that they use the Internet, 51% use it everyday and 84% have some sort of media device, including desktop computers, laptops, cellular

phones or personal digital devices. It is, therefore, not surprising that the public has made the leap from seeing students' higher general usage of technology to believing that students also prefer to use technology for learning. As education institutions are eager to find new ways for engaging students more actively in learning, they will be willing to invest in online learning solutions and applications that meet the perceived preferences of students.

It is also important to recognize the new and different ways that the Internet is being used by the millennial generation and the implications from these types of usage for online learning. Not only does this generation of students expect the Internet to be "always on," but also that it is a tool for interaction and collaboration rather than simply data collection. Consider the rise of social networking and such popular websites as MySpace and Facebook. Students go to these sites to exchange information, arrange logistics and collaborate on ideas. While these activities are often for social rather than educational purposes, it is not difficult to see the commonalities between what students do on MySpace and how one would describe the most effective teaching and learning environment. The question, however, is how can educators harness what we know students like about social networking and apply it to online learning.

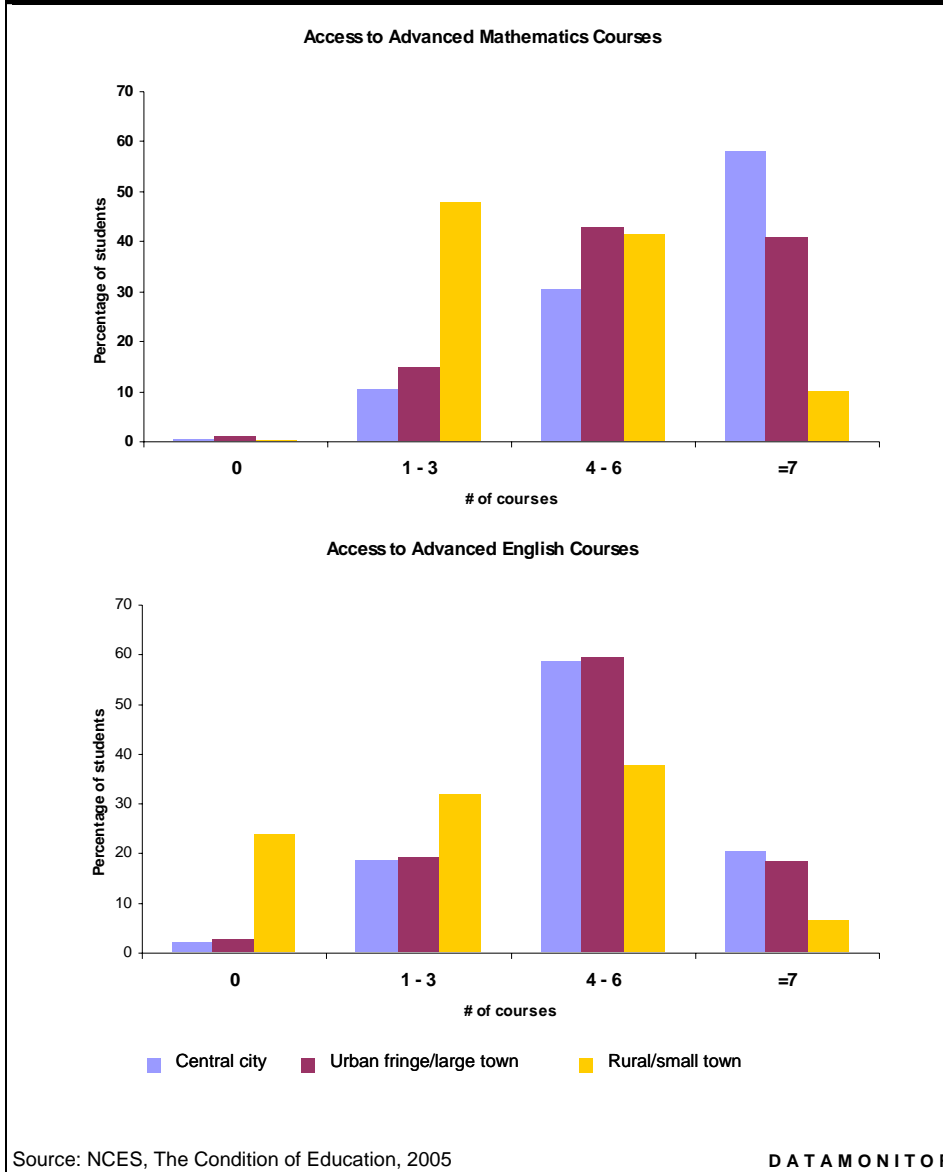
### **As the baby boom generation retires, the next generation of teachers will only know a digital world**

The majority of newly certified teachers have no recollection of a world without the Internet. Having been born after the founding of Apple Computers and graduated from secondary school after the burst of the dot-com bubble, these individuals have only a limited memory of a time when the Internet did not support and enable the daily activities of life. Consequently, the next generation of teachers will expect to use technology for supporting administrative tasks, instruction and parental communications in a way that few teachers do today. Moreover, these teachers, in many cases, will not know of any other way besides using technology to conduct these activities. For example, the teachers of tomorrow will have only accessed course syllabi through an online learning management system (LMS), such as *Blackboard* or *eCollege*. A web-cam will be viewed as a simple peripheral that even a child could use rather than a cutting-edge piece of technology solely for business people. As this new generation of teachers moves into institutional leadership and decision-making roles, not only will it accelerate the uptake of e-Learning, but decrease the cultural hurdles to its implementation as well.

## Online learning offers a potential solution to the challenge of increasing access while maintaining costs

Education institutions have been keen to invest in online learning programs because these programs offer a way to increase student access without the subsequent need to expand the physical plant. Adding virtual classrooms, when done effectively, is a far less expensive proposition than adding physical ones. Increasing access, however, is not simply about increasing the number of “seats” – physical or virtual – but also about changing the mix of where those seats actually sit. As indicated in Figure 2, students in small towns or rural areas have far less access to advanced courses in English and mathematics. While some may argue that there are more pressing issues facing education than offering students access to advanced calculus or British literature, nevertheless having access to these types of courses has a significant impact on a student’s ability to be successful in college. It is hardly equitable for the location of a student’s hometown to influence, at least in part, whether he or she obtains a college degree. By reducing the relevance of distance, e-Learning offers powerful ways for education institutions to overcome this accessibility issue. With an Internet connection and a web-cam, a student living in New York’s rural Adirondack Mountains, for example, can enroll in a calculus course offered by a school in Brooklyn and have access to the courses he or she needs to be prepared for college.

**Figure 2: Where a student lives has an influence on where he or she will have access to an advanced course**



## A few loose ends remain for e-Learning

While powerful forces are driving the uptake of e-Learning, significant hurdles are mitigating their strength. The combination of shifting public perceptions of and priorities for educational technology and the inherent difficulty of embedding its usage more deeply within the classroom is prompting many educators to reconsider their unbridled enthusiasm for investing in educational technology. In no way does this suggest that institutions will stop purchasing or drastically reduce their investment in curricular software titles, such as *Reader Rabbit* at the primary school level or LMS solutions such as *ANGEL Learning* at the tertiary level. Instead, educators will be increasingly likely to require vendors to provide appealing pricing strategies, evidence that solutions are effective and direct alignment between the solution's functionality and existing classroom practices. If vendors are able to meet these requirements, these hurdles to more substantive adoption of educational technology will be only short-term ones and overcoming them will usher in a new era of more robust technology uptake. Datamonitor believes that there are four important inhibitors to the uptake of online learning, including:

- Popular support has waned for using technology as a tool to reform education institutions;
- Technology purchases must compete with other priorities for increasingly scarce budgetary resources;
- A “wobbly” IT infrastructure can make e-Learning a house of cards for education institutions; and
- Moving to the next level of technology adoption requires significant and difficult behavioral changes.

### Popular support has waned for using technology as a tool to reform education institutions

As much of the public assumes that technology already exists in schools or has reached a sufficient level of adoption, education institutions can no longer rely upon unfettered support for further investment in technology. Given that the current student-to-computer ratio in K12 institutions is 4.4 to 1, the urgency for purchasing school technology is no longer as immediate or palpable as it has been in the past. Recent budget cuts to the US Enhancing Education through Technology (EETT) federal education program is an example of this shift in public support. While the federal government funded this program at \$496 million in fiscal year (FY) 2005, it cut

the program to \$272 million in FY2006 and has proposed to cut it entirely for FY2007. Without question, EETT funds represent only a small portion of overall spending on technology by K12 institutions, yet the ease with which the current administration cut this program from its budget in combination with its allocations to evaluate the effectiveness of educational technology suggest its belief that the public is skeptical that using technology is the most effective way to improve student performance. Regrettably, this type of retrenchment in technology spending is both premature and shortsighted, as institutions are not yet fully equipped with technology and the maintenance of the existing infrastructure and professional development requires continued investment. As a result, judgment, in effect, is being passed on the effectiveness of technology as a tool to improve student learning before it has been fully implemented.

It is important to note the apparent contradiction in the public's expectation that technology is already being used in the classroom is both driving and inhibiting the uptake of e-Learning. The problem is that while a portion of the public may perceive the existing investment in technology to be sufficient, in reality many institutions are still struggling to build out and maintain their technology infrastructures. As a result, there is tension between demonstrating the use of e-Learning in order to manage relationships with these "doubting" external constituencies and finding the resources to support that usage. Datamonitor anticipates that as the overall cost of online learning solutions and applications falls, particularly the necessarily peripherals and services such as web-cams and broadband access, and important advocacy groups, including the International Society for Technology in Education (ISTE) and the Consortium for School Networking (CoSN), communicate the value of e-Learning more broadly, this hurdle will be only a short-term one.

### *New governmental priorities are impeding the adoption of e-Learning*

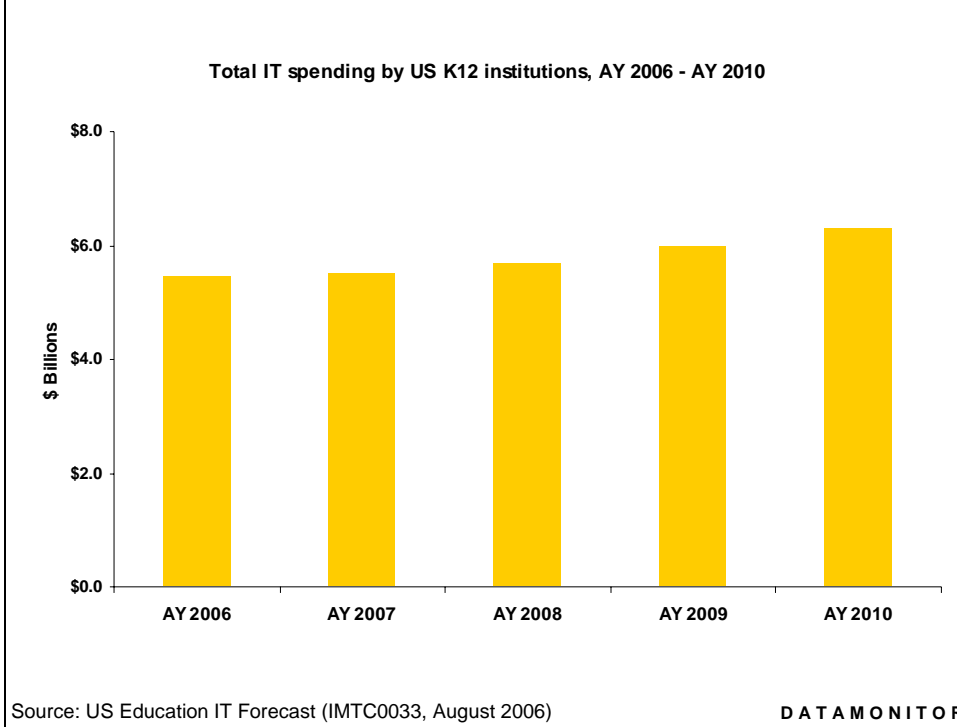
Education policy has shifted its focus from pedagogical interventions to accountability policies, making it increasingly difficult to garner support for investments in e-Learning. With the adoption of NCLB, this shift has been particularly prominent in the US education market. By no means does this suggest that education institutions will cease to be interested in adopting online learning, instead they will focus, at least in the short-term, their technology budgets on solutions that directly support accountability programs in general, and those solutions related to performance reporting in specific. Institutions are unlikely to prioritize the purchase of solutions that focus on improving an institution's performance on indicators of effectiveness that accountability policies do not measure.

It is important to note that the NCLB Act requires institutions to spend federal funds only on reform initiatives and classroom interventions that have been proven effective by scientifically-based research methods. Using the strictest definition, scientifically-based research methods require the random assignment of study participants to treatment and control groups in order to tease out the unique impact of the studied intervention. Education does not have an established history of using this type of evaluation method because of the logistical difficulties and moral dilemmas of assigning children to treatment and control groups. Consequently, the NCLB policy was initially contentious in the market. In recent years, as educators have become more familiar with what scientifically-based research means, the Department of Education has not strictly enforced its provision and vendors have found providing evidence of their solutions' effectiveness to be less difficult than anticipated the policy has gained some acceptance. As a result, evidence of effectiveness is increasingly becoming an important characteristic for any educational technology solution.

### Technology purchases must compete with other priorities for increasingly scarce budgetary resources

Rising fixed costs are undermining the ability of institutions to invest in e-Learning. Healthcare and energy costs have risen rapidly, placing considerable pressure on the already tight budgets of education institutions. Moreover, as faculty salaries account for the majority of institutional spending, few budget areas exist from which institutions can reallocate spending to compensate for these rising costs. Given these factors and others, Datamonitor forecasts that spending on IT by US K12 institutions will increase at only a modest rate over the next five years. As a result, many institutions will find it difficult to invest in new educational technology solutions as they struggle to maintain their existing programs.

**Figure 3: IT spending by education institutions will continue to grow over the next five years**



### A “wobbly” IT infrastructure can make e-Learning a house of cards for education institutions

As the adoption of e-Learning grows, new and more strident demands will be made upon the institutional IT infrastructure which may or may not be ready to answer these demands. Over the last decade education institutions have invested heavily in the development of their networks, adding bandwidth and coverage, yet at the same time, the appetite for both of these network characteristics has grown at an even fast pace. In some ways, institutions are peddling faster and faster but are staying in the same place when it comes to their networks.

Without question, one of the strongest drivers of this appetite is online video. Both educational and commercial content is rapidly being made available as video either in a streaming or podcast format. iTunes, as well as its sister solution iTunesU, and YouTube are excellent examples of the massive amount of content that is currently available. Consider, however, the impact on an institutional network of a 30 tenth-

graders simultaneously downloading a 4-minute video on photosynthesis while in biology class or students throughout the day watching videos from the prom on YouTube or even uploading their own videos while in the computer laboratory. In order for e-Learning to meet the expectations of these millennial generation students, video must be a key component of it. But if the network is unable to deliver adequate levels of performance to view or create these videos than the likelihood students will realize the full educational benefit from it are seriously undermined.

Many institutions will realize considerable value from collaborating with vendors, such as AT&T, to overcome the challenges of providing sufficient bandwidth and video capabilities to support online learning. Through partnerships with video and voice-conferencing solutions providers such as Polycom, Tandberg and VBrick, AT&T leverages its global MPLS IP-enabled network to provide education institutions with a robust, fully hosted network infrastructure and cutting-edge applications to enable online learning.

After bandwidth, ensuring network security is a perennial issue for education institutions that has the power to bring down e-Learning like a house of cards. As students remotely access the institutional network, increasing the sites from which a denial of service (DoS) attack or infiltration of the network can occur, firewalls and bundled anti-virus, IDS, IPS, spam and email filtering are all necessary part of an e-Learning implementation. The area of deployment for security solutions can no longer be found at the perimeter of the network, as the perimeter is no longer a fixed entity. With the adoption of e-Learning, the importance of internal and inter-departmental firewalls is highlighted and the safe storage of confidential information must be maintained.

Further exacerbating the challenge of IT security is that with the more pronounced, differentiated access required by faculty, staff and students, either remotely or on campus, a tight yet realistic security policy needs to be followed. Authentication and authorization tools will be a critical part of securing the IT infrastructure, especially for remote access sign-on.

A potential way for education institutions to address both bandwidth and network security issues is to explore fully hosted solutions. By outsourcing their IP network to a vendor, institutions are able to access cutting-edge technology, better up-time and performance and more effective security at a far more affordable cost than if they had attempted it on their own. AT&T, for example, has one of the largest global IP networks with leading security solutions and reliability. When a vendor, such as AT&T, manages the institutional network, educators are able to spend less time

worrying about network constraints and risks and spend more time on educating students.

### Transforming instruction requires consistent and effective professional development

Embedding e-Learning more deeply within the core institutional mission of teaching and learning requires faculty to move their classroom practice beyond simply accommodating technology to fully leveraging it within their daily practice. This type of change is fundamentally dependent upon teachers making substantive and often difficult changes in their beliefs about what constitutes effective pedagogy. Historically, education institutions and teachers have been particularly resistant to reform initiatives that require exactly these types of changes. A common saying amongst educators is that the most successful educational reform of the 20<sup>th</sup> century is the move from blackboards to green boards. While witty, this saying has profound implications for the most substantive use of online learning. Overcoming increasingly scarce resources and shifting policy priorities will require that these solutions take a more central rather than supporting role in the classroom. Supplemental or ancillary roles are unlikely to provide sufficient value to motivate institutions to make additional investments in online learning. Only when the instruction of a primary curriculum area, such as math or reading, depends on or substantively leverages the use of a specific online learning will the solution reliably compete with other budgetary priorities.

Founded in 1995 as a philanthropic program, AT&T's Education Advocate program is an excellent example of how vendors and education institutions can work together to provide professional development to teachers so that they can more effectively leverage technology in their daily instructional practice. Using both in-person and online pedagogical techniques, the advocates work directly with schools and teachers to learn how online and e-Learning can be used most effectively in their classrooms. As part of this program, for the past 12 years AT&T has developed and maintained the Knowledge Network Explorer service ([www.kn.att.com](http://www.kn.att.com)) which reviews educational content and then puts it in a useable format for online learning activities. Educators will find this service to be an invaluable source of online learning resources for both novice and experienced teachers.

## **APPENDIX**

### **Abbreviations**

AYP – Adequate Yearly Progress

CoSN – Consortium for School Networking

DoS – Denial of Service

FY – Fiscal Year

IDS – Intrusion Detection System

IPS – Intrusion Prevention System

ISTE – International Society for Technology in Education

LMS – Learning Management System

NCES – National Center for Education Statistics

NCLB – No Child Left Behind Act

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