We all hope that the future will be better than the present—and that the next generation will have more opportunities, not fewer. Today, those opportunities hinge on education. However, the future will not be better for the millions of young people who do not receive a high school diploma, are not prepared for college work, or do not complete a postsecondary degree. The United States and many other countries have established goals for college graduation. In the United States, for example, the goal is that by 2025, 60 percent of the U.S. population should hold “high-quality college degrees or credentials.” The United Kingdom seeks to have close to 50 percent of 18–30-year-olds participating in higher education by 2010. Australia’s goal is for 40 percent of the population 25 to 34 years old to have degree qualifications by 2025, with 20 percent of undergraduate enrollments coming from low socioeconomic status groups by 2020.
We know many improvements are possible when education focuses on identifiable gaps, loss points, and missed opportunities throughout a student’s educational progression.

In spite of these goals, college readiness and completion are significant challenges. This achievement gap carries a cost to the individual, his/her family, and the community. We know many improvements are possible when education focuses on identifiable gaps, loss points, and missed opportunities throughout a student’s educational progression. One of our profession’s greatest opportunities may be to use the breadth of the capabilities of information technology to address these challenges. Imagine if the next generation of learning mirrored the following experiences.

Collin attends a small liberal arts college where each year all incoming freshmen participate in a semester-long symposium designed to introduce them to the institution’s academic activities while connecting them to the physical campus and each other. This year’s topic is Renaissance art and music, and faculty have designed an alternate reality game (ARG) as one component of the symposium. A week before classes begin, the roughly 350 students are asked to sign on to a website where they can post information about their interests and set up learning teams with their peers. Collin registers on the site, a news alert reports that a 17th-century viola da gamba has been taken from the college’s Music History Museum. A note from the “thief”—who calls himself Mad Jack—says the instrument is hidden on campus.

Collin and his group have found digital images of similar instruments on the website of an Italian museum and discovered an article from the college newspaper about the original donation of the item. Initially, as Collin’s team follows-up on clues, they compete with other teams. At the second meeting of the full symposium, however, Mad Jack himself grabs the microphone to rile the students, calling them “thick as seven planks” and saying it’s a waste of his genius to stay ahead of them. The freshmen unite against Mad Jack and begin to trade clues and expertise across teams. They pursue hints and taunts from Mad Jack left on phone messages, a chalkboard in a coffee shop near campus, and in an article accessed through the college online library system.

The freshmen enlist the help and expertise of various departments—music, history, visual arts, language, sociology, and psychology—seeking faculty and staff to answer questions. Long before the students outwit Mad Jack, they begin to use the campus library and online databases for research and introduce themselves to the people who will influence their education. By the end of the semester, Collin has not only learned about the Renaissance and the ways art can influence history and culture, but he has also begun to understand the fundamentals of academic research and how to work collaboratively with other students and faculty.

Professor Donaldson teaches introductory chemistry at a large state university. An analytics program linked to the learning management system (LMS) helps him monitor the progress of the more than 500 students in this lecture class by compiling and analyzing information such as the number of times class notes are viewed, frequency of contributions to the discussion board, and quiz grades. From the application dashboard, Donaldson sees an indicator beside each student’s name, reflecting the program’s assessment of the likelihood that the student is on track to earn a C or better in the course—green denotes high likelihood, yellow suggests possible risk, and red indicates that, statistically, the student is at elevated risk. Donaldson can send e-mail to notify students if they appear at risk, congratulate them for work well done, or suggest ways to get more from the class.

In the third week of the term, Donaldson runs a diagnostic tool from the dashboard. The results show that for the past three years, the work of the 25 most active discussion-board contributors has correlated heavily with the top 25 class performers. Factoring in additional data, including scores on the departmental chemistry exam, Donaldson
has quantifiable evidence that increased participation correlates with greater success in the course and with the subject in general. He sends e-mail notices to the top 25 discussion-board contributors, thanking them for their participation and underscoring that their efforts suggest ongoing success in the study of chemistry. He also e-mails alerts to students whose profiles suggest they might be at risk of not earning at least a C in the course, and he includes individual suggestions of campus resources and strategies that, according to data, correlate with better academic performance.

Kelly is pleased to receive a congratulatory note about her high level of discussion-board participation. Ben, who never had difficulty in high school, is surprised by the e-mail that says he may be at risk. At the same time, he admits he has felt overwhelmed by the transition to college, and he is relieved to know that his professor cares enough about his success to suggest action. Accordingly, Ben uses his dashboard to schedule an appointment with his instructor, and he looks over the list of options in the e-mail, deciding to attend the help sessions held in the university resource center. He also resolves to take an active role in the discussion board and in class, rather than simply watching the questions other students pose.

Caitlin, a junior in archaeology, is doing fieldwork with her classmates at a site in Arizona slated for development. Part of the students’ work involves performing an archaeological survey of the 25-acre tract of land, looking for evidence that the site might have previously been home to a Native American settlement. Working in pairs, students carefully comb the property in search of artifacts and other clues. They photograph all intersecting points of the survey grid—as well as any tools they find and unusual landscape features—and tag all the pictures with longitude and latitude coordinates. The photos and location data are continually transmitted to a database on campus. As the students walk the site with their GPS-enabled mobile phones, a location-aware application at the university provides students with information from the database based on the students’ location on an ongoing basis. In this way, each pair of students sees an up-to-date digital map of where they are, where other students are, and which areas have already been surveyed, as well as the photos that have been collected. The geotagged photos preserve information about the provenance of every artifact for anyone standing in that location, and the survey produces a photographic record that alerts the development company that it need to examine further before construction can begin.

Caitlin and her fieldwork partner, Martina, are also assigned the delicate task of excavating a kiva floor with an elaborate pigment-painted design. As the floor pattern emerges during their work, they photograph it with a digital camera that embeds location data like latitude, longitude, and elevation. They use their laptops to add location-linked field notes about the tools and techniques they are using. This information is linked to a map back at their university for further study. After the season for fieldwork is over, the team will fill in the subterranean kiva with dirt to prevent erosion and looting. Researchers who enter the area later with a location-aware device will be offered the option to view the images Caitlin and Martina have uploaded.

The Value of Education

For decades we have had evidence of the value of higher education: greater lifetime earning power; reduced likelihood of unemployment; healthier, happier lifestyles; and greater civic engagement. In the United States, for example, the average income for workers with a bachelor’s degree is $43,000 a year, whereas those with a high school diploma earn $27,000. The percentage of jobs requiring some college or above grew from 28 percent in 1973 to 59 percent in 2007 and is expected to increase to 62 percent by 2018. In the modern economy, high school diplomas are no longer sufficient to secure career-track jobs capable of supporting a family. In addition, the value of education goes beyond the individual. “Boosting our college completion rate from 25 percent to 27.5 percent would yield a full one percent increase in real GDP per worker, or about $125 billion for the overall [U.S.] economy.”
In spite of significant improvements in postsecondary access in the last fifty years, educational attainment has not grown at a comparable rate.

Postsecondary education has become the threshold requirement for a middle-class family income—in good times and in bad. “It is no longer the preferred pathway to middle-class jobs—it is, increasingly, the only pathway.” Projections are that the U.S. economy will create 13.8 million new jobs and 33 million “replacement jobs” by 2018. Nearly two-thirds of these jobs will require at least some college education, an estimated 30 percent will require some college or an associate’s degree, and 33 percent will require a bachelor’s degree or more. Occupations, as a whole, are requiring more education. And, the fastest-growing industries require workers with disproportionately higher education levels.

College Completion
In spite of significant improvements in postsecondary access in the last fifty years, educational attainment has not grown at a comparable rate. Since 1970, enrollments have increased by more than 10 million students. In 2006, 66 percent of high school graduates enrolled in a postsecondary program within a year of finishing high school, compared with 49 percent in 1980. Yet completion rates have remained flat:

- In the United States, more than half of all college students do not complete a degree or credential.
- At four-year institutions, 56 percent of first-time students complete their degree within six years.
- At two-year institutions, only 28 percent of first-time students complete their credential within three years.

Low-income young adults may not complete degrees or obtain credentials because postsecondary education is a challenge to their work schedules and family needs, can be time-consuming, and may not be presented in ways that directly establish the relevance of the course or program to their lives.

Others may not attend college due to financial constraints. Even more may assume college is out of their reach. In a survey of New York community college students, 60 percent assumed they were not eligible for financial aid; 50 percent believed they could not show sufficient need. In addition, 25 percent had difficulty completing the financial aid form. These assumptions are at odds with the reality of the students’ financial aid eligibility and are critically important to the extent that they prevent students from effectively exploring financial aid options when research shows that financial aid increases college enrollment and influences retention.

College Readiness
Challenges to college readiness and success begin well before college. In the United States, only 71 percent of students earn diplomas (compared to 92 percent for OECD countries). High school completion is even lower for African American (55 percent), Hispanic (58 percent), and low-income students (~65 percent). Over 30 percent of learners enter high school below grade level in math and/or reading and fall even further behind during high school. By the 12th grade, at least 40 percent of students are below grade level. Students requiring remediation are disproportionately minority (60 percent) and low-income (41 percent).

Achievement levels are below federal standards in many cases. In 2006, for example, the percentage of 12th-grade students not meeting basic proficiency in math was 30 percent. The figures were 46 percent for low-income students and 60 percent for minority students. A similar pattern is emerging for language arts: 27 percent of students did not meet basic proficiency levels. For low-income students, the percentage increased to 43 percent, with 42 percent of minority students not meeting proficiency levels. Inadequate preparation for college has a significant impact on students’ success in college. For example, only 22 percent of U.S. high school students are prepared to earn a C or greater in first-year college courses, even though four of five students in college remedial courses earned good grades in high school. For high school graduates who require remedial math in community college, only 16 percent complete required classes. However, math proficiency is strongly correlated with students’ progression:

- For students 3+ grade levels behind, 8 percent of students move on.
- For students 2 grade levels behind, 15 percent of students move on.
- For students 1 grade level behind, 21 percent of students move on.

In one study, less than one-quarter of community college students who enrolled in developmental education completed a degree or certificate within eight years.
There is a link between education and the workplace even more fundamental than the higher salaries of college graduates. The preparation required for college necessitates the same level of mathematics and reading skill often required for work. Unfortunately, the number of students graduating from high school without adequate preparation for college or work will cost the United States $16 billion per year in remediation, lost productivity, and increased demands on criminal justice and welfare systems.28

Along with these troubling statistics, it is important to note that minorities account for much of the current and projected postsecondary student population growth in the United States. Such growth in diversity holds many positive benefits for higher education and society in general, but it also presents a major challenge when relevant groups have lower college-going or college completion rates, whether due to inadequate pre-college preparation or low educational aspirations. The impact of these deficits is clear: “[The] chronic gap in educational attainment contributes to the disparities in income between racial and ethnic groups [in the United States].”29

Challenges and Solutions

There are a number of “loss points” along the college readiness and completion continuum.20 Identifying the problem may be the first step; applying innovation and information technology comes next. Listed below are several persistent educational challenges, followed by examples of innovative solutions.

Enrollment

The Challenge: Many students do not enroll in college. A lack of college readiness, understanding of college requirements, financial aid, and college-going norms contributes to such deficits. Students often also lack needed personal skills and social support.
Solutions:

- Early college high schools blend high school and college in a rigorous, structured program that compresses the time it takes to complete a high school diploma and the first two years of college. Over 200 schools in 24 states and the District of Columbia have such programs. Designed for low-income youth and first-generation college-goers, students simultaneously earn a high school diploma and an associate’s degree or up to two years of credit toward a bachelor’s degree.\textsuperscript{21}

- California State University uses CSU Super Sunday events to inform African American communities about preparing and applying for college. The focus is on ensuring that potential students and their families understand what it takes to go to college. Points that are emphasized include (1) getting prepared for college and taking the right classes, (2) knowing when and how to apply for admissions, and (3) knowing how to request financial aid.\textsuperscript{22}

**Developmental and Gatekeeper Courses**

*The Challenge:* Many students do not progress past developmental education and/or “gatekeeper” courses. In community colleges, 60 percent of students are referred to developmental education courses, yet only 30–40 percent complete those developmental sequences.\textsuperscript{23} Others fail to pass “gatekeeper” courses, such as introductory math or English. Diagnostic assessment and placement tools might help, along with redesigned courses that can accelerate progress and improve learning outcomes.

*Solutions:*

- Foothill College in Los Altos Hills, California, is developing new ways to improve math success for students who enter with low skills. Math My Way, a pre-algebra course with an online component, moves low-skilled students quickly and successfully into college-level math. Math My Way shifts teaching approaches (practice rather than lecture), faculty role (on-demand tutor and facilitator rather than lecturer), structure (mastery-based learning of concepts rather than fifteen-week fixed semesters), and facilities (computer labs rather than traditional classrooms).\textsuperscript{24}

- To help speed integration into college-level courses and increase the confidence of students in developmental courses, the Community College of Baltimore County relies on “mainstreaming,” allowing developmental students to take college-level English alongside their developmental courses. In the Accelerated Learning Program (ALP) model, a small cohort of developmental students enroll in English 101 and then enroll in a second, companion class with the same instructor. The second class, held directly after the first, allows students to discuss key issues, revisit key themes, and receive more individualized instruction and remediation. Early assessment indicates that students enrolled in the ALP program had double the success rate of their peers in half the time.\textsuperscript{25}

- At the Community College of Denver, young adults who place into developmental courses enroll in FastStart@CCD, a semester-long program that aims to put students in credit-bearing courses by the second semester. Developmental courses of math, reading, and English are compressed into half-semester units, allowing students to take two semesters of classes in a single semester. Students can also opt to take a slower, self-guided online math course with the help of in-class tutors and instructors. A preliminary study indicates students who completed the program had higher retention rates and higher grade-point averages.\textsuperscript{26}

**Flexible Scheduling**

*The Challenge:* Progress through a program of study can be hampered by students’ need to work. Seventy-five percent of low-income students need to combine more than 20 hours of work a week with school and family obligations. Part-time enrollment slows students’ progress and creates a loss of momentum. Technology can provide real-time feedback and can support intensive advising along with accelerated courses, competency-based programs of study, and flexible learning environments.\textsuperscript{27}

*Solutions:*

- At the Community College of Baltimore County, the nursing program employs a blended model—clinical and laboratory work is done once a week in a face-to-face environment while didactic materials are delivered online—to help students juggle geography and work responsibilities. Students praise the program’s flexibility.

Early college high schools blend high school and college in a rigorous, structured program that compresses the time it takes to complete a high school diploma and the first two years of college.
Initial analysis reveals that students in the blended courses perform better than their counterparts in face-to-face courses.\textsuperscript{28}

- Wisconsin Indianhead Technical College deploys virtual trainers in its Industrial Maintenance Technician program to help students participate in hands-on lab activities for welding, hydraulics, and electrical maintenance. Activities once relegated to a face-to-face environment are mimicked in the virtual space, allowing students to work at their own pace and from their own computer at any time.\textsuperscript{29}

**Engagement**

*The Challenge:* Many students cite lack of engagement in and relevance of courses as a reason for poor performance or dropping out. Engagement correlates with improved learning outcomes, including a stronger understanding of concepts, a better retention of learned material, and the ability to apply that learning to different contexts. It also deepens and/or accelerates learning through increased time on task, active learning strategies, and stronger interaction. Deeper engagement has a positive effect on students’ persistence, particularly in the first two years of college.

**Solutions:**

- Faculty and staff at Pennsylvania State University have intertwined the functionality of a course management system with the interactions commonly found in a social networking site in the Penn Open Learning Commons, a platform for online learning. The site allows instructors to combine video, discussion forums, student profiles, blogs, and micro-blogs into course design.
Uniquely, the Commons also invites participation from people who are not enrolled in the course, opening the conversation to members of industry and other institutions. After its first pilot, one student reported: “I had never thought about interactions with others, and I thought I would just log in, study, log out, but the interactions with other, amazing, intelligent and insightful individuals from around the world has been a real highlight of the course.”

- Mentira is a mobile, place-based augmented reality game that helps students develop Spanish-language skills. The game is set in a Spanish-speaking neighborhood in Albuquerque where fact and fiction combine with simulated characters, other players, and “local” citizens. Players are required to solve a mystery by investigating clues, visiting “local” neighborhoods, and talking to various characters.

- The Wharton School of Business Online Trading and Investment Simulator (OTIS) helps business students master financial management skills by providing them with immersive learning experiences that underscore key concepts taught in the course. Students buy and sell equities, options, and future contracts using real data from the current day’s market. Students can then compare their performance with the S&P 500, historical investment returns, and the performance of their fellow students.

**Advising**

*The Challenge:* Completing a course of study can be hampered by limited advising that does not match credit accumulation with degree attainment.
Students may enroll in courses that do not lead to a degree or certificate or may find that fewer credits transferred than expected, leaving too large a gap for degree completion. Other students are unaware that their performance will lead to a poor or failing grade. Particularly for low-income young adults, strong guidance and intervention help ensure course and college completion.

Solutions:

■ Signals is based on a Purdue University student success algorithm that provides students with an early warning—as early as the second week of the semester—of potential problems in a course. It does this by providing near real-time status updates of performance and effort and offering positive steps for students to take to avert trouble.

■ Northern Arizona University has recently deployed GPS, Grade Performance Status, to provide timely and customized feedback from instructors to students. At pre-determined checkpoints throughout the semester, faculty are encouraged to send personalized update e-mails to students, rating their attendance, their academic performance, and their overall progress. In addition to standardized feedback, instructors are prompted to provide detailed guidance around major areas for improvement. Students can then choose to contact the instructor directly, access suggested resources, or discuss improvement with an advisor.

■ At LaGuardia Community College, faculty have seen a steady increase in the use of e-portfolios to track students’ progress and development. Using blogs, videos, and webpages, students create a visual and evolving representation of their academic goals, work history, and coursework. The process allows students to reflect on their progress and assess their cognitive development. At LaGuardia, courses that deployed e-portfolios reported a slightly higher retention rate. Students are supported in their creation efforts by special “studio hours” in specified courses; during these hours, trained e-portfolio consultants provide guidance, technical training, and mentoring.

Alternative Models
The Challenge: As the “traditional student” is being redefined, so too is the degree. The concept of a degree as the product of several years of study at one or two institutions may be outdated for a majority of learners. Degree options are
increasingly supplemented by notions of competency-based degrees (rather than degrees based on class time) and of degrees granted by an authority that spans multiple institutions, providing additional flexibility for students.

- Western Governors University (WGU) offers flexible online courses and a credit program in which students advance based on competencies rather than time in a classroom. Now serving more than 14,000 students in all 50 states, WGU’s academic model uses technology to make instruction individualized and self-paced, allowing faculty to provide one-on-one guidance and support. WGU is the only accredited competency-based online university in the United States.37

- The state of Washington has developed a unique integration of English as a Second Language (ESL) coursework with technical skills training designed to give non-native young adults a faster gateway to a livable wage. I-BEST, the Integrated Basic Education and Skills Training program, pairs instructors in ESL with instructors who can provide technical and vocational training in fields such as nursing, freight driving, and early childhood education. The result is a fully integrated curriculum in which young adults can gain technical skills while improving their language proficiency. Students enrolled in the program are shown to have achieved the same level of language proficiency as their peers despite the integrated program and, on average, to have gained more workforce and course credits than their counterparts. To help facilitate the spread of the program across the state, educators have created a website with course modules and program resources.38

### Scale

Information technology has the potential to address these educational challenges, yet most efforts remain pilot programs that affect small numbers of students. Although the expectation may be that effective pilot programs will be “brought to scale,” too often they are not. “Pilots are often implemented with special efforts by particularly energetic and entrepreneurial staff, and with outside funding. In many if not most cases, it is very difficult to expand the practices throughout the college or beyond.” In addition, the impact of effective programs may be diminished when students return to regular courses that do not include those innovations.

Perhaps the greatest challenge of information technology and education is to scale effective programs to reach the millions of learners who need education. The concept of scale goes beyond improving college readiness and completion for large numbers of students. Scale is a multidimensional concept that not only should include increasing the number of adoptions but also should include directing attention to the nature of change in instruction, the spread of beliefs, the development of a sense of ownership, and the long-term sustainability of the initiative. The nature of change must be part of the conceptualization of scale:

- Faculty beliefs about how students learn and how they should teach must shift as learning models are redesigned based on core pedagogical principles.

- Depth of implementation must include a shift in ownership from the originator of the idea or the funder to the institution and individuals.

- In addition to financial viability, sustainability must take into account the degree to which institutions and faculty have knowledge and authority to continue to grow the program.40

College readiness and completion challenges are of a size and scope that require a broad response. Far too many students are not ready to succeed when they enter postsecondary education. Far too many are not completing their education and reaping the benefits for themselves, their families, and their communities. Higher education must move beyond pilot efforts and identify models and approaches that can make a difference in college readiness and completion for large numbers of students across the country. Information technology can be the key to taking such approaches to scale in a flexible, cost-effective, and “learning effective” way.

### Creating the Next Generation of Learning

Although today’s educational system serves many students well, too many are unsuccessful. Both the problems and the exemplars suggest steps we might take to create the next generation of learning. One of today’s challenges is to bring together the individual innovations with scaling mechanisms and a broad commitment to college readiness and completion resulting in effective action. Next Generation Learning Challenges (NGLC), an alliance of multiple
organizations, seeks to dramatically improve college readiness and completion in the United States through the applied use of information technology. The program provides investment capital, builds evidence, and fosters an active community of innovators and adopters in pursuit of this goal. NGLC (http://nextgenlearning.com) emphasizes identifying proven and emerging technology-enabled solutions, moving them from “islands of innovation” to greater scale.

For technology-enabled solutions to be effective, institutions must have a solid technology, training, and policy infrastructure on which they can build. This must be matched with the insight and institutional will to focus on these persistent educational challenges. Although not all-encompassing, building blocks such as the following will be required to create the next generation of learning.

**National Broadband Policy**

Because many educational opportunities (ranging from formal classroom activities to informal web-surfing) depend on access to the Internet, the “digital divide” continues to limit educational access. Some communities do not have affordable access to broadband—if they have access at all. Many families still do not own a personal computer. Other learners do not possess the skills or confidence to successfully navigate the online environment. The U.S. Unified Community Anchor Network (UCAN) effort (http://www.usucan.org/) is seeking to bridge this divide using American Recovery and Reinvestment Act funds (approximately $7 billion) to help link existing state, regional, and institutional networks in a framework that will increase broadband access through community institutions such as schools, hospitals, and libraries. And in March 2010, the Federal Communications Commission (FCC) released its National Broadband Plan (http://www.broadband.gov/), which proposed a number of steps that might make broadband access truly ubiquitous in the United States.

**Net Neutrality**

For web-based learning to meet the needs of students seeking affordable, flexible access to online learning, all information must be treated equally—a policy called *net neutrality*. Efforts to control Internet traffic and privilege content and resources from some sources may limit both the effectiveness and the cost with which colleges and universities can deliver media-rich web-based learning options. Ensuring that online learning opportunities not be degraded or blocked due to mechanisms that may force them to stand in line behind other Internet traffic is essential to the future of effective, affordable web-based learning.

**Identity Management**

Sharing digital resources across multiple institutions is made easier when users’ identities can be verified. Many systems—such as e-mail, learning management systems, and library databases—require users to authenticate themselves (typically with a username and password). An authorization process then determines which systems an authenticated user is permitted to access. Federated identity management extends this approach, creating a trusted authority for digital identities across multiple organizations.

**Open Content**

Initiatives like MIT OpenCourseWare (http://ocw.mit.edu/) and the OpenCourseWare Consortium (http://www.ocwconsortium.org/) have established the value of freely sharing material. The availability of high-quality digital course materials has the potential to increase the quality and effectiveness of teaching and learning in many areas, as well as to enable faculty to focus more of their time on guiding students rather than developing and maintaining courses. To the degree that such courseware incorporates pedagogical approaches that support students’ in-
teraction and engagement, users will experience greater learning outcomes, enabling the improvement of college readiness and completion.

**Blended Learning**

Blended learning can be characterized in many ways, but it is often defined as a course that combines online and in-class components. An alternative model for blended learning—used in an increasing number of courses—requires face-to-face orientation and testing combined with strong online content and threaded discussion. Programs overall can be blended as well, mixing fully online courses with blended and face-to-face classes.

**Analytics**

Colleges and universities collect vast amounts of data that can be used to identify at-risk students, facilitate interventions, and/or monitor students’ progress. Analytics can use data from a course management system, student response systems, placement tests, e-portfolios, and other sources to generate predictive models that statistically correlate with students’ levels of success. Analytics can be used to alert students to performance patterns, guide them to resources, or individualize their instruction. Analytics relies on data collection, data warehousing, data mining, statistical analyses, predictive modeling, and presentation of learning performance data in meaningful, actionable ways.

**Professional Development**

Understanding alternative pedagogies and developing a level of comfort with technology may underlie faculty members’ adoption of IT solutions. Professional development is a critical element of ensuring the next generation of learning. Ongoing professional development will span cognition and learning science, pedagogical principles, data-driven tools, technology applications, and assessment/evaluation techniques.

**Conclusion**

We have in hand many of the tools, policies, and technologies to create the next generation of learning. The need to apply these resources to significant educational challenges such as college readiness and completion is clear. Although many institutions are committed to addressing these challenges, and are making progress, we can do more. One step is to create a committed community. Educators, students, and citizens must wrestle with complex questions:

- How do we better engage young people in learning and demonstrate its relevance to “real life” and their future aspirations?
How do we personalize learning to simultaneously accelerate and deepen learning?

How do we encourage persistence and completion in spite of the competing demands in students’ lives?

How can institutions and educational systems afford, in light of flat or declining budgets, the improvements needed for students’ success?

How do we encourage institutions and policymakers to make the hard decisions to implement promising approaches to educating young people?47

Another necessary step is to assemble evidence of what works—and what does not—by surface models and implementation practices that can be adopted and adapted broadly.

Improving college readiness and completion is a grand challenge for society. There are many ways to approach this challenge—technology must be one. EDUCAUSE is committed to “uncommon thinking for the common good.” Surely there is no better way to manifest uncommon thinking than to use information technology in service of improved college readiness and completion. If we are successful, the common good will be well served.

Notes


10. “Replacement jobs” are positions created by workers who have retired or have left their occupation.


34. Signals: <http://www.itap.purdue.edu/tlt/signals>.
35. GPS: <http://www4.nau.edu/ua/GPS/Faculty/>.
41. The Bill & Melinda Gates Foundation, the William and Flora Hewlett Foundation, EDUCAUSE, the League for Innovation in the Community College, the International Association for K-12 Online Learning, and the Council of Chief State School Officers.

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