

Innovation and Infrastructure

Kenneth C. Green • The Campus Computing Project

INNOVATION AND INFRASTRUCTURE

Issues and Opportunities for Educational Entrepreneurs

Casey Green
THE CAMPUS COMPUTING PROJECT
campuscomputing.net

The Saylor Foundation
12 April 2013

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Wisdom from the Software Industry

The Innovator's Dilemma

God could create the world in seven days . . .

because there were no legacy systems

and there were no legacy users.



What are the legacy systems in education?

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The Education Market

Key Issues

- The consumer experience now defines (rising) expectations about IT resources & services.
- Rising pressure for education to provide the much promised productivity bang for all the IT bucks.

Key Questions

- Why don't teachers and faculty make better or more effective use of IT in instruction
- Why don't schools and colleges make more effective use of IT in operations and management?

Great Aspirations

Both the processing and the uses of information are undergoing an unprecedented technological revolution. Not only are machines now able to deal with many kinds of information at high speed and in large quantities, but it is also possible to manipulate these quantities so as to benefit from them in new ways. This is perhaps nowhere truer than in the field of education. One can predict that in a few years, millions of schoolchildren will have access to what Philip of Macedon's son Alexander enjoyed as a royal prerogative: the services of a tutor as well-informed and as responsive as Aristotle.

Patrick Suppes
Scientific American
October, 1966



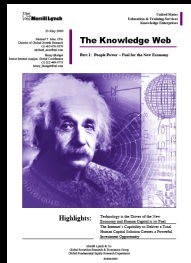
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Greater Aspirations

Education is the killer app of the Internet.

John Chambers
Chairman & CEO
Cisco Systems



Moe & Blodgett
The Knowledge Web
May 2000

The new economy moves at a pace never seen before. The new economy is a knowledge economy based on brainpower, ideas, and entrepreneurship. Technology is the driver of the new economy, and human capital is its fuel.... in the next five years there will global virtual universities with potentially millions of students enrolled.

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déjà vu

For better or worse, television dominates much of American life and manners....Part of [the] lackluster record of the educational uses of television is of course due to the heretofore merciless economies of the medium. But profound pedagogic mistrust of the medium also remains a fact of life. The proof of the pudding lies in the fact that on many campuses, fancy television equipment...now lies idle and often unused.... Academic indifference to this enormously powerful medium becomes doubly incomprehensible when one remembers that the present college generation is also the first television generation.

George Bonham
Television: The Unfulfilled Promise
Change, 1972



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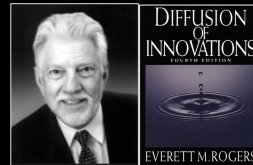
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Technology is a Metaphor for Change

Technology is also a metaphor for risk.

Technology is a means of **uncertainty reduction** that is made possible by the cause-effect relationships upon which the technology is based A technological innovation creates a **kind of uncertainty** (about its expected consequences) in the minds of potential adopters, as well as representing an **opportunity for reduced uncertainty** in another sense (reduced by the information base of the technology). . . . Thus, the innovation-decision process is essentially an information-seeking and information-processing activity in which the individual is **motivated to reduce uncertainty** about the advantages and disadvantages of the innovation.

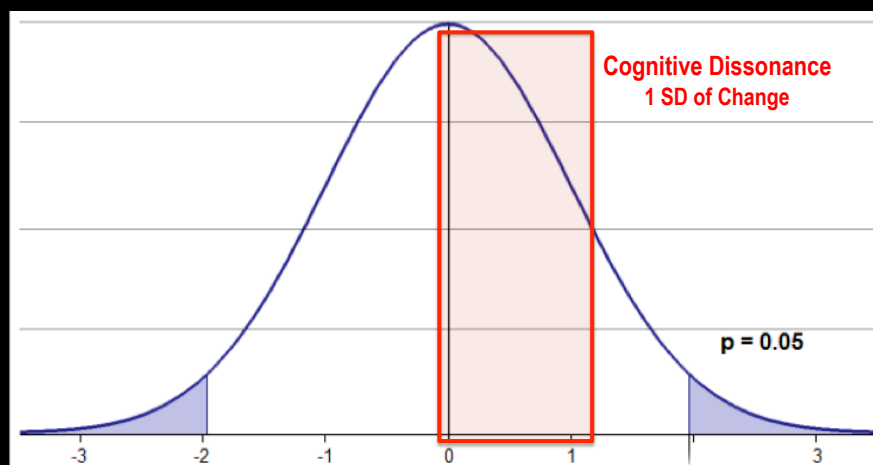


Everett M. Rogers
The Diffusion of Innovation

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Statistics: The T-Distribution



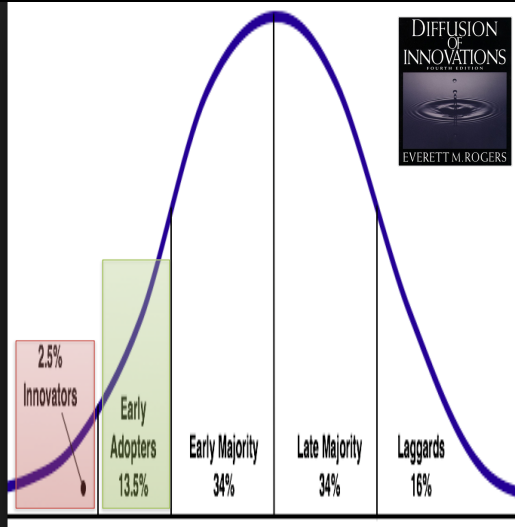
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The Innovation Curve



Source: Everett M. Rogers, *The Diffusion of Innovation*

- **INNOVATORS:** Venturesome; cosmopolitan; they can cope with uncertainty; not always influential.
- **EARLY ADOPTERS:** Greatest degree of opinion leadership; respected; serve as role models for others; help off-set uncertainty among others.
- **EARLY MAJORITY:** Deliberate choices; longer decision cycle; links to late majority.
- **LATE MAJORITY:** Traditional, cautious and skeptical; may adopt out of necessity. Innovation must be safe.
- **LAGGARDS:** No roles as opinion leaders; they reference the past not the future. Must be certain that innovation will not fail.

Technology is Disruptive

Issues & Impacts

- Organizational practice & process
- Individual behaviors and preferences
- *Visualization:* can I see me/us doing that?

Response

- Denial
- Anger
- Bargaining
- Depression
- Acceptance

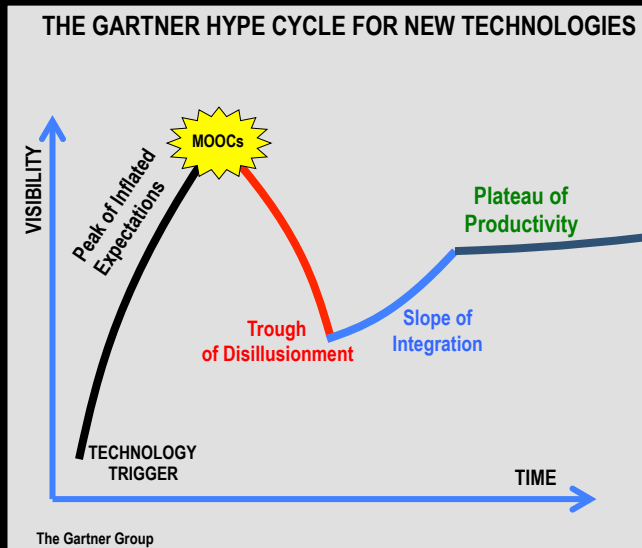
On Death and Dying
 Elizabeth Kübler-Ross



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Be Conscious of the Hype Cycle



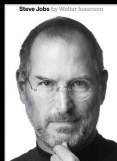
Mission, MOOCs, & Money
 Trusteeship, Jan/Feb 2013

MOOC Madness

- Big numbers, big media coverage, big expectations
- Big dollars?
- Growing trustee and state interest in MOOCs as a way to make money and/or reduce costs

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TARGET: Textbooks



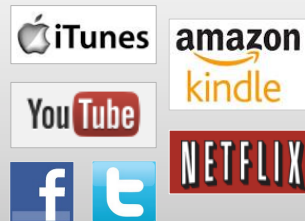
Steve Jobs set his sights on textbooks as the next industry he wanted to transform, seeing it as “an \$8 billion a year industry that was ripe for digital destruction. . . . His idea was to hire great textbook writers to create digital versions and make them a feature on the iPad.” *Walter Issacson, Steve Jobs*

Underlying Premise

CONTENT IS KING

IN THE REAL WORLD

Content becomes King only because of an effective (almost idiot-proof) **infrastructure** and **ecosystem**.



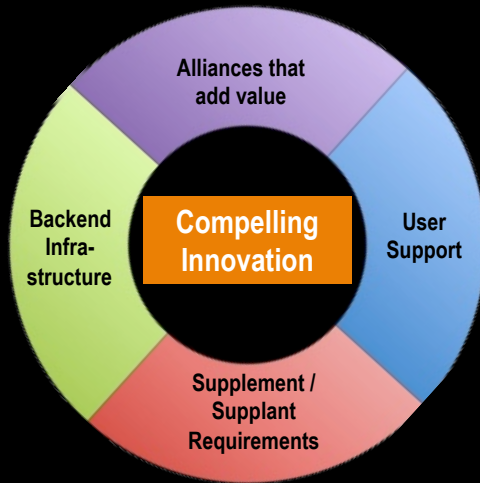
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The (Educational) Innovator's Ecosystem

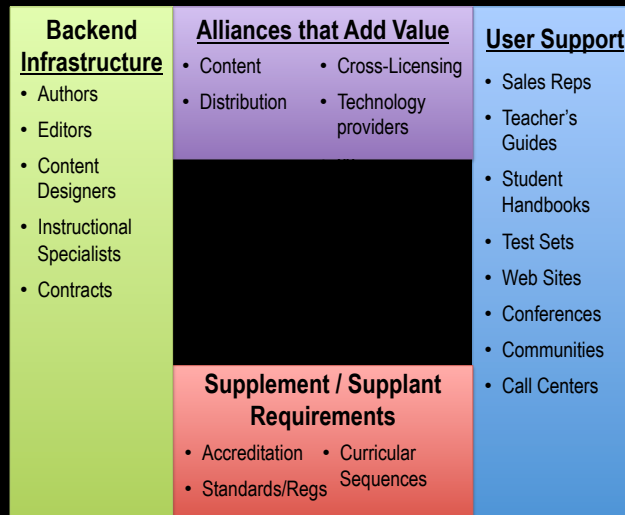


Successful (effective) innovation depends on a ecosystem

- Backend infrastructure
- Front-end user support
- Alliances
- Supplanting current practice

Mapping the Textbook Industry

The Ecosystem Can Also Be a Fortress



- High transition costs
- Risk
- Reliability and Sustainability



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Visualization



Underlying Issues

Can I do this? Why should I do this?

Evidence of benefit?

Seven Key Challenges

- Map the market(s)
- Know the data: be conscious but not captive
- Recognize that you are not your target client
- Acknowledge that your price is not my cost
- Anticipate the need for mid-course corrections
- Listen to potential clients
- Be patient

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Suggestions

- Study failures
- Read!
- Seek dissonant perspectives
- Form alliances
- Walk the halls at conferences
- *Enjoy the ride!*



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November 2012

The National Survey of Computing and Information Technology

A Mixed Assessment About the Effectiveness of Campus IT Investments; More Campuses Go Mobile and Slowly to the Cloud, While Fewer Experience IT Budget Cuts

New data from fall 2012 Campus Computing Survey offer a mixed assessment about the effectiveness of institutional investments in information technology. The new survey also confirms big gains in the proportion of institutions that are activating mobile apps and services for their students. Additionally, the 2012 data document the continuing decline in the number of campuses that have experienced IT budget cuts as a consequence of the economic downturn that began in 2008.

Assessing the Effectiveness of Campus IT Investments

A new question on the 2012 Campus Computing Survey reveals that senior campus IT officials offer a very mixed assessment about the effectiveness of various institutional investments in information technology. For example, three-fifths view the institutional investment in IT for library resources and for administrative information systems to be “very effective,” while just over half (55.2 percent) cite the investment in IT for on-campus instruction as “very effective.” In contrast, less than a fourth (22.7 percent) view the IT investment in “data analysis and managerial analytics” as very effective. Among CIOs at research institutions, only a two-fifths (41.7 percent) at public universities and a third (32.6 percent) in private universities assess current IT investments to support research and scholarship as “very effective.”

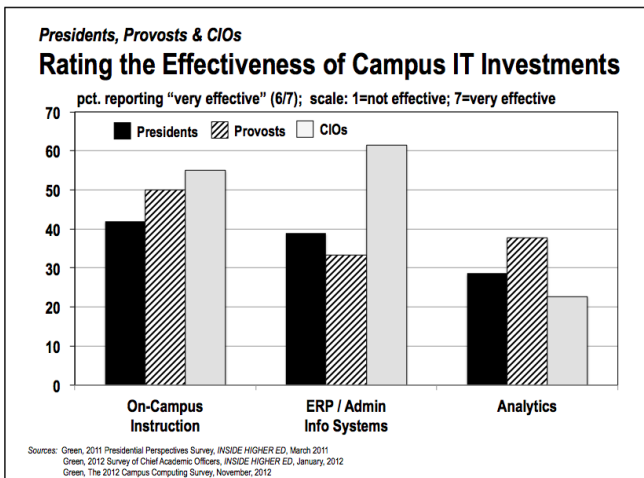
“These new data suggest that CIOs recognize the need for their institutions to extract more value from the continuing and significant dollars their campuses invest in information technology,” says Kenneth C. Green, founding director of The Campus Computing Survey. “Although colleges and universities are doing many things well with IT, for many campus officials the return on the institutional investment in information technology often falls short of both expectations and need.”

are less sanguine about campus IT investments than their IT officers: just 42.1 percent of presidents and 50.0 percent of chief academic officers view the IT investment to support on-campus instruction as “very effective,” compared to 55.2 percent of CIOs. Although 61.5 percent of CIOs report the institutional investment in administrative information systems to be “very effective,” only 39.0 percent of presidents and 33.4 percent of provosts offer a similar assessment. Interestingly, CIOs offer a lower assessment about effectiveness of IT investments to support campus analytical efforts: just 22.7 percent of CIOs view the investment in IT to support data analytics as very effective, compared to 28.6 percent of provosts and 37.7 percent of presidents.

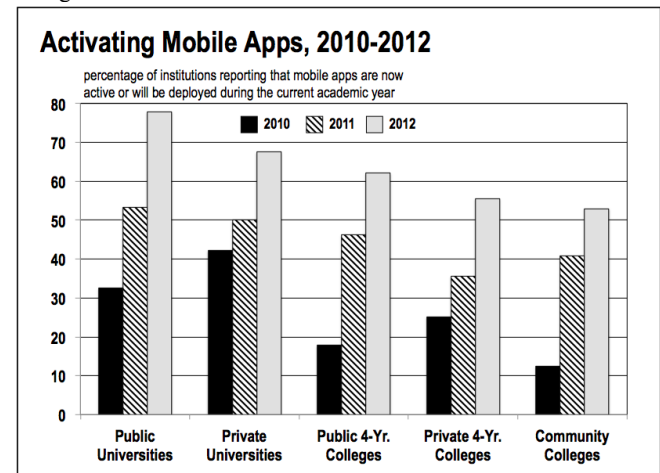
Green says that this gap in the assessments of IT effectiveness among of presidents, provosts, and CIOs could be explained in several ways: “For some campus officials these numbers reflect unfulfilled expectations, while for others it could be that both technology advocates and technology providers have frequently over-promised and under-delivered. And in other instances it may well be that institutional IT officers have failed to communicate the effectiveness of IT investments at their campuses.”

More Colleges Go Mobile

Across all sectors of higher education, the 2012 survey documents another year of big gains in the proportion of colleges and universities that have activated mobile apps. Three-fifths (60.2 percent) of the campuses participating in this year’s survey have activated mobile apps as of fall 2012 or will do so in the coming academic year, compared to two-fifths (41.5 percent) in fall 2011 and 23.1 percent in fall 2010. Across sectors, public universities lead the move to mobile: more than three-fourths (77.8 percent) report active or impending mobile apps for fall 2012, compared to 67.5 percent for private universities, and a range of 50-60 percent for public and private four-year colleges and also for community colleges.



The numbers on the effectiveness of campus IT investments become even more striking when compared to the data from two national surveys of college and university presidents and provosts that Green conducted for *Inside Higher Ed* in 2011. Taken together, the three surveys reveal that many presidents and provosts



“Several factors explain these continuing gains, “ says Green. “Colleges and universities are clearly playing catch-up with the

consumer experience. Students come to campus with their smartphones and tablets expecting to use mobile apps to navigate campus resources and use campus services. Also important is that compared to two years ago, more firms – both LMS and ERP providers – now offer mobile options for their campus clients.” Green adds that some technology providers now offer free mobile apps, which also means that the costs of going mobile have changed significantly in recent years.

Fewer Campuses Experience Budget Cuts

The 2012 data indicate that just over a fourth (27.0 percent) of the surveyed institutions experienced cuts affecting the current (A/Y 2012-13) budget for central IT resources and services, down from more than a third (35.8 percent) in fall 2011, 41.6 percent in 2010, and fully half (50.0 percent) in fall 2009.

Among public institutions, about a third of universities, four-year campuses, and community colleges reported reductions in the central budget for IT fall 2012, down dramatically from 2011, when more than 54.7 percent of public universities, 43.6 percent of public four-year colleges, and 39.0 percent of community colleges experienced central IT budget cuts.

Private/non-profit institutions continue to fare better than their public counterparts: 16.3 percent of private universities experienced central IT budget cuts this year, compared to one-fourth (24.9 percent) in fall 2011 and 56.9 percent in 2009. Among private four-year colleges, the percentage reporting budget cuts fell to 18.3 percent, down from 24.7 percent in fall 2011 and 41.9 percent in 2009.

“The new data offer some generally good news, as fewer institutions experienced IT budget reductions this year than last,” says Green. “But the IT budget cuts continue for many and the proportion of public campuses experiencing IT budget reductions remains high, about a third across all sectors.” Green cites the rising demand for an array of campus IT resources and services – mobile apps, high speed wireless, IT user support services, instructional design assistance for faculty teaching online, and IT security, plus the need to refresh an aging campus IT infrastructure – as major sources of pressure on campus IT budgets, and by extension, major challenges for campus IT leaders.

Small Gains in Cloud Computing

Despite the continuing discussion in both the campus and the corporate sectors about the operational and financial benefits of Cloud Computing, the 2012 survey data show only small gains in the movement of mission-critical campus operations to the Cloud. Just 5.9 percent of the survey participants report that their campus has moved or is converting to Cloud Computing for ERP (administrative system) services, up from 4.4 percent in 2011 (range: from 10.2 percent for private universities to 2.1 percent for private four-year colleges). Similarly, just 9.8 percent have moved to Cloud Computing for storage, archiving, or business continuity services as of fall 2012, compared to 6.5 percent last year. And

of public universities have migrated these activities to the Cloud as of this fall, compared to 6.6 percent in 2011; among private universities, 7.0 percent report cloud-based HPC activities, compared to 1.1 percent last year.

Other Cloud services post higher numbers. This fall almost two-fifths of the survey participants (38.1 percent, up from 27.8 percent in 2011) report that they have moved or are migrating LMS applications to Cloud services, while a sixth (16.6 percent, up from 10.9 percent last year) indicate that their institution is using a Cloud-based CRM (Customer Relationship Management) application.

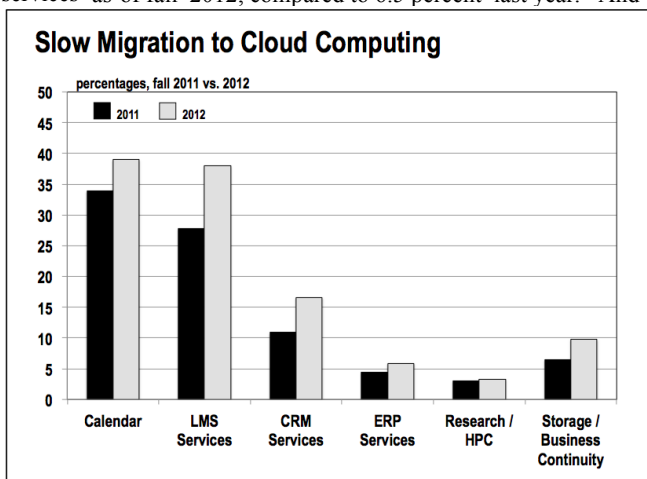
“The gains for Cloud Computing posted this year should be encouraging to both campus IT leaders and to technology providers,” says Green, although he notes that the major campus ERP providers only recently began to offer Cloud-based services to their campus clients. Even as the performance benefits and cost savings of migrating to the Cloud appear compelling, “trust really is the coin of the realm: many campus IT officers are not ready to migrate mission-critical data, resources, and services to the Cloud services offered by their IT providers.”

Continuing Shifts in the LMS Market

The 2012 data also document an increasing competitive campus market for Learning Management Systems (LMS). The proportion of survey participants reporting that their institution uses various versions of Blackboard (including Angel and WebCT) as the campus-standard LMS fell to 44.8 percent in fall 2012, down from 50.6 percent in 2011, 57.1 percent 2010, and 71.0 percent in fall 2006. Concurrently, Blackboard’s major LMS competitors – Desire2Learn (11.1 percent in fall 2012), Moodle (20.1 percent), and Sakai (6.1 percent) - have all gained share during this period. Additionally, Canvas by Instructure has emerged as an aggressive new competitor: 4.6 percent of the 2012 survey participants report that their institution has selected Canvas as the campus-standard LMS application, up from zero percent just three years ago.

“The campus LMS market remains a textbook example of a mature market with immature, or evolving, technologies, and that’s a prescription for both volatility and competition,” says Green. “Two-thirds of this year’s survey participants report that their campus is or will soon begin a review of the institutional LMS strategy, affirming the assessment that higher education can be a very volatile market for LMS providers.”

The 2012 Campus Computing Survey is based on survey data provided by senior campus IT officials, typically, the CIO, CTO, or other senior campus IT officer, representing 542 two- and four-year public and private/non-profit colleges and universities across the United States. Survey respondents completed the online questionnaire from September 20 through October 26th. Copies of the 2012 Campus Computing Survey will be available on December 15th from The Campus Computing Project in Encino, CA (campuscomputing.net). Price: \$45, which includes shipping to US addresses.



although Cloud Computing should offer significant benefits for research and high performance computing (HPC) activities, just 8.3

THE CAMPUS COMPUTING PROJECT

Beginn 1990, The Campus Computing Project is the largest continuing study of the role of computing, eLearning, and information technology in American higher education. The project’s national studies draw on qualitative and quantitative data to help inform campus IT leaders, college faculty and administrators, policy-makers, and others interested in a wide array of information technology planning and policy issues that affect colleges and universities.

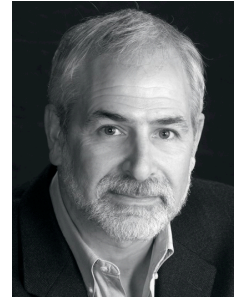
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THE CAMPUS COMPUTING PROJECT
 PO Box 261242 • Encino, CA 91426-1242 • USA
 TEL: 818.990.2212 • FAX: 818.979.6113 • campuscomputing.net



Kenneth C. Green

KENNETH C. GREEN is the founding director of The Campus Computing Project, the largest continuing study of the role of computing, eLearning, and information technology in American colleges and universities. Campus Computing is widely cited by both campus officials and corporate executives as a definitive source for data, information, and insight about planning and policy issues affecting information technology and online education in American higher education. Green also serves as the senior research consultant to *Inside Higher Ed*, and directs *Inside Higher Ed's* national surveys of presidents, provosts, and other senior campus officials.



An invited speaker at some two dozen academic, industry, and campus conferences each year, Green is the author, co-author, or editor of 20 books and published research reports and more than 100 articles and commentaries published in academic journals and professional publications. He is often quoted on higher education and information technology issues in *The New York Times*, *The Washington Post*, *The Los Angeles Times*, *The Wall Street Journal*, *The Chronicle of Higher Education*, *Inside Higher Education*, and other print and broadcast media. Green's blog, DIGITAL TWEED, recently cited by *EdTech Magazine* as one of the "50 must read IT blogs in higher education," is published by *Inside Higher Education*.

In October 2002, Green received the first EDUCAUSE Award for Leadership in Public Policy and Practice. The award cites his work in creating The Campus Computing Project and recognizes his "prominence in the arena of national and international technology agendas, and the linking of higher education to those agendas."

Green's corporate clients and project sponsors number more than three dozen firms in the information technology and college publishing industries including Adobe, Apple, Blackboard, Campus Management, CDW, Cengage Learning, Copia, CourseSmart, Dell, Echo360, Desire2Learn, Ellucian (formerly Datatel + SunGard), Epsilen, Follett Higher Education Group, Google, Hobsons, Instructure, Jenzabar, McGraw Hill Higher Education, Moodlerooms, Microsoft, NEC, Oracle, Pearson, Sonic Foundry, SONY, and TouchNet, among others.

From 1989 to 1994, Green was a senior research associate (1989-1991) and later director (1991-1994) of The James Irvine Foundation Center for Scholarly Technology at the University of Southern California. Prior to his affiliation with USC, Green held concurrent appointments from 1983-1989 as the associate director of UCLA's Higher Education Research Institute and as the associate director the American Council on Education/UCLA Cooperative Institutional Research Program (CIRP), the nation's largest and oldest empirical study of higher education.

A graduate of New College (FL), Green completed his Ph.D. in higher education and public policy at the University of California, Los Angeles.