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Going the Distance With Online Education

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This article charts the promissory notes and concerns related to college-level online education as reflected in the educational literature. It is argued that, to appreciate the potential and limitations of online education, we need to trace the issues that bind online education with distance education. The article reviews the history of distance education through the lenses of three historical themes—democratization, liberal education, and educational quality—and charts the current scene of online education in terms of three educational visions that may inform the development of online initiatives: the presentational view, the performance-tutoring view, and the epistemic-engagement view. The article emphasizes the potential contributions of online education to democratization and the advancement of the scholarship of teaching.

The United States is at a remarkable moment in the history of higher education. Educators have at their disposal sets of tools in the form of the Internet and a science of learning and teaching that permits the alteration of the nature of instruction at the university level. The alteration might affect who is educated, what they experience as education, who educates, and what the very practice of education itself means. As a society, the United States can engage in this effort either in a reflective fashion, sensitive to its own experiences and others' history, or blindly, in a utilitarian or empirical set of activities (if it works, do it). However, if educators are going to engage in the practice of online education in a thoughtful fashion, then they need to understand two things: first, that online education has evolved from previous conceptions of education; and second, that there are social, political, economic, and ethical assumptions and implications in what appear to be simple actions of design and instruction.

Existing discussions of online education (Jaffee, 1998; Kriger, 2001; Merisotis & Phipps, 1999; Tallent-Runnels et al., 2006; University of Illinois Faculty Seminar, 1999; Werry, 2001) are helpful in providing factual information about the ventures undertaken and in suggesting issues in need of conceptual consideration. In this article, we add to that discussion by charting the promissory notes and concerns about online education as they are reflected in the educational literature. We do not provide an inventory or a review of all online educational initiatives in higher education. Rather, we contribute to the existing literature by providing a historical reading of the current scene and by tracing the issues that bind online education with its

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parent fields. In our view, online education is an emerging field that lies at the junction of distance education, human-computer interaction, instructional technology, and cognitive science. Thus promises and concerns are scattered throughout a vast and uneven literature.

Although definitions of distance and online education vary significantly in their scope and critical features, we adopt Holmberg's (1986, p. 26) perspective, according to which "distance education includes the various forms of study at all levels which are not under the continuous, immediate supervision of tutors present with their students in lecture rooms or on the same premises, but which, nevertheless, benefit from the planning, guidance and tuition of a tutorial organization." In turn, following the University of Illinois Faculty Seminar (1999), we take online education to imply instruction through a connection to a computer system at a venue distant from the learner's personal computer. Seen this way, online education is both an instructional alternative for on-campus learning and teaching and a case of distance education.

We make the connection between the history of distance education and contemporary online education because the visionary promises and concerns that many current educators claim as novel actually have a past, one whose themes signal both continuities and ruptures. In that sense, the history of distance education constitutes not only a repository of experiences with heuristic value but also the frame within which the community of educators and the public at large may make sense of online initiatives. It is the merger of distance education and online education that we explore here with an eye to its combined advantages and pitfalls.

We also argue that different conceptions of what it takes to know and learn specific subject matter underlie varying ventures in both traditional distance education (i.e., through mail, radio, and television) and current online education. Conceptions of knowledge and learning both embody and constrain visions about the role of distance education in society. Finally, we contend that one of the most promising contributions of online education is the advancement of the scholarship of teaching. The convergence of interest in technological innovation and the visibility of online pedagogical practices and materials can help educators to constitute communities where teaching is both a joint effort and a subject of collegial inquiry.

We begin our review by considering the changing landscape of distance programs in institutions of higher education as it relates to the growing use of online technology. We show that online initiatives are often coupled with visions of educational outreach, expectations of increased revenues, and renewed scholarly interest in teaching. To trace the antecedents of these visions, we turn to the history of distance education, examining it in terms of three major themes: democratization, liberal education, and instructional quality. We selected these themes in part because they constitute what Schwab (1962) refers to as a "commonplace"; they are argued to be goals and guiding principles in the rhetoric of educational institutions and funding agencies that support online initiatives (Alfred P. Sloan Foundation, 2004; Andrew W. Mellon Foundation, 2004; William and Flora Hewlett Foundation, 2003).

By "democratization" we mean increasing either the access to higher education of populations that would be otherwise excluded, or increasing the range of people who might be served by elite institutions. In adopting this view of democratization, we make no claim about the particular political or ideological commitments of proponents of distance or online initiatives. We recognize that increasing access to

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meaningful educational experiences can occur without changes in political democ-ratization, social justice, or equity. However, we are also aware that, regardless of the educators' explicit intent, democratizing educational experiences is an act not without societal consequences.

By "liberal education" we mean an education that is broad, deep, and philo-sophically anchored to a sense of purpose and general utility. Liberal education in its classical sense is the education necessary to the making of a free human being and is often contrasted with training for a particular profession. It generally attempts to shape a person's critical and analytic competencies with respect to disciplinary knowledge.

Finally, by "instructional quality" we refer to concerns and considerations about the effectiveness of teaching or instructional environments in the light of particular learning goals and educational standards. We also use that term to refer to the epis-temic authenticity associated with a particular course and the inclusion of faculty and courses in a given institution's community of scholars.

In exploring these themes, we focus on experiences that are broadly construed as foundational in the history of distance education. Then, we return to the current scene and examine how contemporary trends in online education articulate with some of the lessons learned from history. In particular, we explore various edu-cational visions that may inform online education: the presentational view, the performance-tutoring view, and the epistemic-engagement view. In considering these approaches, we identify their underlying conceptions of learning and teach-ing; we examine how they meet unfulfilled promises of distance education; and we underscore their limitations in the light of the historical goals of distance education. We then consider the social and organizational issues that act as constraints on the potential for online education. Finally, we focus on the pitfalls and promissory notes that stand out in light of the legacies of distance education and the pedagogical affor-dances of online technology.

We built this review through an examination of published and fugitive literature. In addition to classical writing in the area of online education and distance educa-tion with which we were familiar, we also searched the Educational Resources Information Center (ERIC), the Scholarly Journal Archive (JSTOR), Ingenta elec-tronic journals, the PsycInfo database, and the Academic Search Premier through the year 2003. Search keywords included the following: *online education, distance education, higher education, liberal arts education, democratization,* and *edu-cational quality.* Searched areas included cognitive science, human-computer interaction, instructional technology, and distance education. Selected sources included journal articles, white papers, conference proceedings, books, edited books, and newspaper articles. In addition to sources located in databases, we accessed documents cited in bibliographies (e.g., Agassiz, 1897/1971). A total of 294 published sources were selected, including research articles, descriptions of experiences, anecdotal accounts, statements of policy, and review and analytical papers. Sources were then considered in light of concerns and promissory notes. Sources were examined with respect to their reference to online education, dis-tance education, or both. Sources were also analyzed for their reference, explicit or implicit, to democratization, liberal arts education, and educational quality. As part of our exploration, we also searched for disconfirming information about our emerging positions.

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Distance Education Meets Online Education

Distance education has always been known for its departure from the conditions in which teaching and learning "naturally" take place. To some extent, distance education is a pedagogical oddity, often requiring further justification, such as the extension of educational opportunities or the encouragement of life-long learning. The perceived "unnaturalness" of distance education has been consistent with the divide between "university proper" and "university extension," and with the location of distance programs at the periphery of university life.

Over the past 10 years, distance learning and teaching have moved from the periphery to the center of university life (Feenberg, 1999) and are no longer bound to the university extension. In recent years, distance learning has become a ubiquitous practice as a result of the spread of the Internet. Students now learn informally as they navigate through virtual museums (Corredor, 2006; Crowley, Leinhardt, & Chang, 2001); seek advice from tutors who may be a few feet or a thousand miles away (Light, Colbourn, & Light, 1997; Lovett, 2001; Lovett & Greenhouse, 2000); experiment in virtual labs (Carnevale, 2003b; Cartwright & Valentine, 2002; Davies, 2002; Hmelo & Day, 1999; Larreamendy-Joerns, Leinhardt, & Corredor, 2005; Yaron et al., 2001; Yaron, Freeland, Lange, & Milton, 2000); participate in asynchronous discussions (Vrasidas & Stock-McIssac, 1999); and enroll in online courses as regular resident students (Larreamendy-Joerns, Leinhardt, & Corredor, 2005; Malloy, 2001; Scheines, Leinhardt, Smith, & Cho, 2003; Scheines & Sieg, 1994).

The growing presence of distance learning has changed the landscape of formal education. Some signs of this change are that the U.S. Senate considered easing the rule by which a college must enroll no more than 50% of its students through distance programs if the students are to be eligible for federal aid (Carnevale, 2003a; Mayadas, 2001); that some universities, in their pursuit to educate "global scholars," now require students to enroll in at least some online distance courses (Carr, 2000); and that a faculty commission at Harvard has considered reducing the time of residence required for students to earn a degree (Young, 2002).

Various strands of evidence support claims about the transformation of distance learning and teaching in higher education. First is the launch of major online initiatives by first-rate institutions such as Columbia University, Yale University, Stanford University, the University of Chicago, the London School of Economics (LSE), the Massachusetts Institute of Technology (MIT), and Carnegie Mellon University (CMU) (Kriger, 2001; Woody, 1999), among others. The initiatives are, to be certain, dissimilar in purpose, strategies, and scope. For example, Columbia, Stanford, Chicago, LSE, and CMU created Cardean University, an institution devoted to online distance education in business and administration and tailored for corporations worldwide. The emphasis in these initiatives is on high-quality, highly selective, and comparatively expensive educational programs. At the other end of the spectrum are MIT's Open Courseware (OCW), CMU's Open Learning Initiative (OLI), and Yale's Open Educational Resources Video Lecture Project. The OCW, though not a distance program in the traditional sense, makes available on the Internet MIT course materials, syllabi, video clips, and notes used in undergraduate and graduate teaching. OLI is developing Web-based college courses and is working to make them widely accessible at little or no cost to individual students and at minimal cost to insti-

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tutions. The promise of all these undertakings is to deliver courses that possess the signature of academic excellence and incorporate sound cognitive and instructional principles. These initiatives have been launched against the backdrop of longstanding endeavors such as the British Open University, almost prophetic in its vision; Pennsylvania State University's World Campus program, which continues a vigorous tradition of more than a hundred years of distance education; and the University of Wisconsin-Extension, one of the longstanding leaders of distance education. Although some online ventures by top schools have failed (for example, Columbia's Fanthom.com), these initiatives have succeeded in capturing the attention of the public and have provided legitimacy to similar ventures in less renowned institutions.

A second strand of evidence for distance education's changing role is the growth of e-learning, an umbrella term for receiving instruction over the public Internet, through private distance learning networks, or through an in-house intranet. Market analyses (Adkins, 2002; Anderson, 2003; Moe & Blodgett, 2000; Woody, 1999) indicate that, as of 2003, the e-learning industry was healthy and growing. There are signs of consolidation or concentration of providers and commodification (i.e., migration of value from features to price) in e-learning, as well as a growing market in online textbooks (Blumenstyk, 1999) and computer-mediated instructional technology, which includes everything from online learning objects (i.e., digital entities that can be used to support learning) to intelligent tutoring systems (i.e., computer-based environments that provide students with adaptive guidance and feedback that resemble the personalized interaction between a tutor and a student).

In sum, the Internet has given distance education a new appeal, either because it taps into unexplored instructional niches, such as just-in-time learning (i.e., training delivered to workers when and where they need it) and corporate training (Oblinger, 2001), or because it deals more effectively with limitations that traditionally have been attributed to distance learning (Murray, 2003). In this context of technological change, it is not surprising that universities attempt to seize the online market with the expectation of expanding their reach, increasing revenues, and recovering some of the investments that they have made in technology (Holzen & Rickman, 2003). In addition, universities and corporations often see investments in online technology and development of online programs as indicators to the outside world that they are up-to-date and on the cutting edge of instructional strategies. In that sense, the use of online technology is both a medium and a message of educational innovation.

A third strand of evidence for the changing role of distance education within university campuses is the profusion of scholarly articles and academic journals about how Internet technology is transforming the practice of teaching (Daugherty, Grubb, Hirsch, & Gillis, 2000; Kelly, 2000). While some claim that the thrust toward online education comes mainly from university administrators (Feenberg, 1999; Noble, 1998), there are noticeable traces of a more bottom-up faculty involvement. Dozens of new articles are published monthly in which faculty recount their experiences with course websites, asynchronous discussions, virtual labs, and online simulations.

The fourth strand of evidence focuses on the reemergence of bold promises regarding the mission of distance learning and teaching programs. Chris Werry (2001) has argued eloquently for an analysis of the rhetoric of online education. The field is inhabited by metaphors and analogies that suggest hints of the ideological

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commitments that underlie collective and individual initiatives, from the industrial resonances of "educational pipelines" to the corporate flavor of "educational providers" to the current literature on online education as democratization (Agre, 1998; Duderstadt, 1997; Edgerton, 2001; Keats, 2003; Margolis, 2000; Vest, 2002). Although democratization has been always present in the discourse of distance educators (MacKenzie & Christensen, 1971; Mallory, 1916; Storr, 1966; Watkins & Wright, 1991), more recently the Internet has allowed institutions of higher education to wed democratization and technological innovation. In doing so, universities can simultaneously expand their constituencies and flag their institutional pledge to cutting-edge technologies. Major philanthropic foundations, such as the Alfred P. Sloan Foundation (2004), the Andrew W. Mellon Foundation (2004), and the William and Flora Hewlett Foundation (2003), have been attentive to this new turn on the university's social mission and have invested heavily in initiatives that further the quality of higher education through the extensive use of Internet technologies, while expanding exponentially the reach of university programs.

In summary, we have observed two complementary movements in the educational landscape: the merging of online teaching and learning into the stream of everyday practices at universities, and the increasingly salient role of distance programs in institutions of higher education. As expected, both phenomena have stirred reactions in the academic community. For some, online education constitutes an unprecedented opportunity to overcome the limitations of traditional classroom instruction. For others, online education threatens the very essence of quality education. Nevertheless, a look at the history of distance education shows that these reactions are not unique to online education. They occur whenever pedagogical innovations challenge the classroom as the privileged scenario for learning and instruction, and the teacher as ultimate source of knowledge and control.

Historical Backdrop: Promises and Pitfalls of Distance Education

The genealogy of online education is complex. On the one hand, it is a direct descendant of instructional technology and computer-assisted instruction. On the other hand, online instruction has a shared history with distance education. Online instruction has inherited virtually all of the concerns and promissory notes voiced about distance education, from faculty reticence about instructional quality to the perils of pedagogical imperialism, and from the promise of autonomous student learning to the mitigation of social inequalities. While its proximity to computer-assisted instruction and instructional technology locates online education in the context of a rich scholarly discussion about the nuts and bolts of student learning, its shared past with distance education makes visible many of the societal and institutional issues involved in a new educational technology. We would like to cut through the history of distance education by highlighting three historical themes that we regard as especially relevant to understanding the evolution of online education: the promise of democratization, the tension between professional education and liberal arts education, and the issue of instructional quality.

Democratization

The exact origins of distance education are debated by scholars (Holmberg, 1986; Keegan, 1990), who depend on chosen definitions of distance learning and teaching. Definitions may be broad enough to include any form of instructional

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correspondence, such as the use of epistles in early Christianity (Blinderman, 1969), or restricted to the off-campus outreach of degree-granting institutions (Tabs, 2003). However, from historical records and analyses, it is apparent that visions of democratization were present in many of the germinal experiences in distance education. Again, in this context, democratization does not refer to the direct advancement of particular political ideas but to increasing access to higher education by underserved populations (e.g., women, blue collar workers, farmers) through the delivery of distance instruction that is not less compelling and motivating than its campus counterpart.

One of the first meaningful experiences of distance education was Anna Eliot Ticknor's Society to Encourage Studies at Home (Agassiz, 1897/1971; Bergmann, 2001). Anna, daughter of George Ticknor, a prominent Boston scholar and Harvard professor, founded the Society in Boston in 1873 to provide women with a liberal education. Ticknor's Society launched one of the first correspondence study programs, that is, distance, personalized instruction conducted through regular mail. Upon request, applicants received information about the program; and, after acceptance into the Society, students selected one of six departments (English, history, science, French, German, and art) in which to study. The instructors mailed syllabi to the students, who were responsible for going through the assignments and submitting "their memory notes to their correspondents for comment and discussion" (Bergmann, 2001, p. 452). Learning was self-paced, a modality that was certainly an asset for women whose study time was limited by domestic obligations.

Although the Society was not widely publicized and was founded when there already existed an emerging trend toward coeducation and the establishment of institutions of higher education for women (Albisetti, 1992; Bergmann, 2001; Wein, 1974), it enrolled more than seven thousand women, apparently regardless of class and geographical boundaries (Agassiz, 1897/1971). Ticknor recruited wealthy, well-educated friends to subscribe as volunteer correspondents. Among them were Elizabeth Agassiz, Lucrecia Crocker, Elizabeth Cleveland, Katherine Peabody Loring, and Alice James, members of the 19th-century New England elite, many of whom would later become prominent figures in American education.

An early memorial and history of the Society, printed in the year after Ticknor's death, stated that the Society's purpose was "to induce ladies to form the habit of devoting some part of every day to study of a systematic and thorough kind" (Bergmann, 2001, p. 451). A Ticknor quotation in the memorial added: "This Society does not, however, wish to attain its end by any factitious excitement, and does not desire publicity for its Managers or for its Students" (Bergmann, p. 451).

It is difficult to assess the impact of Ticknor's Society. However, personal testimonies give us a glimpse of how women's lives were transformed as a result of their engagement in distance learning. For example, Bergmann (2001) quotes, from the 1897 memorial, the words of a young mother who "wrote after studying Spencer: My little ones have forsaken Mother Goose, and neglect Hans Andersen; while all the bedtime stories must be about the lovely Lady Una, with her milk-white lamb, or the brave Red-Cross Knight" (p. 466).

It is tempting to consider Ticknor's initiative as conservative in matters of gender equality and education (Wein, 1974). Elizabeth Cary Agassiz, Ticknor's closest collaborator, called the society the "silent university" and openly praised its unobtrusiveness (Agassiz, 1897/1971), for "it was intended to change women's

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lives without altering or impairing the role society had sanctioned for them" (Bergmann, 2001, p. 449). Yet the Society was groundbreaking in its means, for it made used of the ubiquity of correspondence to counter the American rendering of the Victorian family and endowed women with a liberal education outside the campuses of elite women's colleges.

The drive toward democratization acquired institutional dimensions with William Rainey Harper, both as a collaborator in the Chautauqua movement and as the first president of the University of Chicago. Harper is credited with being one of the founders of university correspondence instruction or teaching by mail (Holmberg, 1986; Storr, 1966; Watkins, 1991). Although the distinction between university proper and university extension (which included correspondence programs) was always maintained, Harper developed a Department of Home-Study that was an integral part of the university, through which students could take as much as one-third of the coursework required for a bachelor's degree through correspondence.

The origins of correspondence study at the University of Chicago are closely related to the development of the university extension movement in the United States and England (Storr, 1966). Richard Moulton, one of the pioneers of university extension (first at Cambridge University, then at Chicago), expressed the rationale for extension activities as follows:

> A university remains in an imperfect stage until it realizes how it must extend its influence to the whole body of people; how it must extend its education to the whole period of the human life; and how it must bring its high ideas to bear upon all the vital interests of mankind. (Moulton, 1917, p. 59)

Teaching by mail was a premium strategy to accomplish such ideals, for it allowed the university to reach a vast audience, recruit students of all ages, and address issues tangential to the academic world. These ideals of university extension account for the broad audience that administrators and faculty at the University of Kansas had in mind when they enumerated potential participants at the launch of a correspondence program in the early 1900s:

> 1. Students preparing for college work; 2. Students needing high school completion; 3. College students whose resident study had been interrupted; 4. Teachers in public schools; 5. Professionals and businessmen; 6. Farmers, artisans, and shop workers; 7. Club women; and 8. Anyone anxious to keep intellectually alert. (Watkins, 1991, p. 19)

Richard Storr, a historian of Harper's University of Chicago, reminds us how much this view of a broadened university constituency owed to the parallel between extension and evangelism. Storr (1966) quotes the University of Chicago Annual Register of 1896–1897: "University Extension . . . is for all classes, rich and poor, men and women alike, and in so far resembles the church in its comprehensiveness. Its work resembles, moreover, that of the church in another point, namely, that is essentially missionary in character" (p. 196).

However, correspondence study and other forms of university extension were not just charitable, they were self-serving. They constituted, in Harper's view, a quintessential aspect of the university's commitment to the betterment of society and individuals. The University of Chicago's *Official Bulletin* of June 1892 stated that the goal of correspondence study programs was

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> to provide instruction for those who, for social and economic reasons, cannot attend in its classrooms is a legitimate part of the work of every university. To make no effort in this direction is to neglect a promising opportunity for building up the university itself, and at the same time to fall short of performing a duty which, from the very necessities of the case, is incumbent upon the university. (Mallory, 1916, p. 42)

It is clear, then, that at the University of Chicago the promise of democratization became not only an institutional response to inequalities but also a defining feature of the university's organizational and cultural life.

In addition, by enrolling students who otherwise would be barred from quality higher education, correspondence study programs helped the university to achieve its social mission and also constituted one of the university's first experiences in reaching out to international students. A telling testimony is Harvey F. Mallory's statement at the annual meeting of the National University Extension Association held in Chicago in 1916:

> Our classroom can be world-wide. Its present bounds are marked by Western China in the far East, Dawson, Fairbanks, and Kodiak Island to the North, Chile to the South, and Senegal and the Union of South Africa in the near East. Our constituency embraces college presidents, government officials, representatives of most of the professions and vocations, and those who by stress of circumstance are debarred from the ordinary means of education. (Mallory, 1916, p. 42)

Out of context, Mallory's words of 1916 could be easily attributed to a contemporary advocate of online education, and taken as yet another instance of the power of the Internet to constitute learning communities that transcend traditional classrooms. In its proper context, though, Mallory's worldwide classroom constitutes an early record of the cultural diversity that democratization brings to the educational scene. Of course, because of the precariousness or nonexistence of communities of distance learners, cultural diversity was limited to Mallory's own teaching experience.

The experience at the University of Chicago was soon replicated and amplified at other universities, most notably the University of Wisconsin. Correspondence study started at Wisconsin as early as 1891, under the leadership of Frederick Jackson Turner; but it was William Lighty and Louis Reber who developed what would become a leading program in extension and correspondence study in the 1920s (Watkins, 1991). Lighty (1915/1971) drew from Harper's vision and underscored distance education as a democratic undertaking:

> Extramural teaching in the university answers to the social present-day demand for a share in the intellectual and spiritual pleasures and the material benefits of the accumulated knowledge and wisdom of the race. This is the demand for the opportunity to know—educational rights. (p. 21)

However, the efforts for democratization through distance programs at Chicago and other institutions did not go unchallenged. First, there was the perspective of the university as an elite institution, exclusively devoted to the pursuit of truth and scientific knowledge and to serving an elite student community. From this point of view, distance education was deemed dispensable. As Pittman (1991) reminds us,

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> The noted economist Thorstein Veblen scorned the Chicago program in his extended attack on William Rainey Harper in *The Higher Learning in America* (1918). Veblen defined an extremely narrow range of proper activities for universities, research and graduate education only. He called Harper's democratizing efforts, such as offering community service and extension work—including correspondence study—frills, no more appropriate to higher education than football and fraternities. (pp. 114–115)

In a similar vein, John Burrell's (1954) history of adult education at Columbia University considers Abraham Flexner's criticism of the university serving the community:

> When universities preach that their function is to serve the members of the community, Dr. Flexner pertinently asks: "Serve them how and serve them what?" He feels very strongly that values have been lost sight of in American universities, and if these universities announce that they are public service institutions, then Dr. Flexner believes that the university has become a different thing, a thing which may have its uses but is assuredly no longer a university within his definition. (p. 82)

Today, these criticisms might be considered excessive, even within institutions that stand ideologically far from the university ideal advanced by figures such as Harper and Cardinal Newman. Yet the criticisms were not all that extreme in times when American universities were defining their identity with respect to English and German institutions.

A second challenge to Harper's vision of democratizing the university came because of misalignments between expectations and actualities with regard to distance programs' capacity to democratize higher education. Grandiose promises overestimated the power of distance initiatives to reach out to a vast constituency and simultaneously underestimated what it takes to empower a community. A pressing difficulty was the absence of adequate organizational infrastructure to sustain the initiatives as they scaled up. This included a lack of attractive incentives for participating faculty, who often deemed their teaching load through correspondence oppressively time consuming. Most distance programs also lacked sound financial support (Burrell, 1954; Reber, 1915; Watkins, 1991) or were forced to finance themselves, leading administrators to advertise services and to search for students through solicitors. Advertising and soliciting were indeed a partial solution to the funding problem, but one that stirred criticisms from faculty and nurtured in public opinion the association between collegiate correspondence programs and proprietary schools, often the center of public scandals (Burrell, 1954; Pittman, 1991).

Although the number of students enrolled in collegiate correspondence programs was impressive even by today's standards, one question is the extent to which distance initiatives fostered authentic communities of learners and users in general. In our view, this is an issue of particular significance: If one of the primary goals of distance education was to broaden the university's constituency, one would expect the recipients to have increasing participation in and impact on the university's life.

In the early days of correspondence study in particular and distance education in general, the venues of dissemination were mostly individual. Courses were offered by colleges and universities directly to individual students. Teaching and learning occurred in the privacy of personal correspondence, and students did not have the

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opportunity to interact with their peers. One notable exception was Ticknor's Society, which invited all students and correspondents to annual meetings featuring guest speakers, usually Boston and Cambridge luminaries (Bergmann, 2001).

In the end, Harper's and Lighty's efforts for democratization produced mixed results. On the one hand, they constituted a bold attempt to use available technology to break the isolation of universities, to reach out to a more diverse student population, and to experiment with pedagogies that contested rooted beliefs about learning and teaching. On the other hand, advocates of democratization through distance education often did not go beyond glittering rhetoric. Facing increasing faculty skepticism, distance initiatives remained marginal to the university (Stein, 1971), and the distinction between university proper and university extension, far from fading, was buttressed by the attitudes of scholars from each side of the divide.

Distance Initiatives and Liberal Arts Education

In contemporary online distance education, courses span the spectrum of disciplinary subjects, from logic to chemistry, to meteorology, to statistics. Courses also aim to cover content or develop skills that are required in particular professional settings (e.g., business, administration, computer technology). Although this diversity mirrors the distribution of course offerings in most campuses, we contend that it also responds to two visions of the role of distance learning in higher education: first, that distance education is opportunistic learning; and second, that distance education is a substitute for on-campus learning.

By "opportunistic learning" we mean learning that is sought to address specific needs in the context of professional activities. According to this vision, distance education is an alternative for individuals for whom on-campus learning may be unavailable or, more important, undesirable. For example, working professionals may require information carefully tailored to their occupation and professional interests. By supplying learning opportunities without disrupting the flow of everyday activities, online distance education benefits from the situatedness of learning and helps to bridge the gap between work and school. In so doing, distance education colonizes an educational niche traditionally overlooked by formal higher education. This vision is consistent with recent trends in just-in-time learning and corporate universities (Oblinger, 2001).

On the other hand, the vision of distance education as a substitute for on-campus learning stresses the role of distance initiatives in the dissemination of general education along the ideals of the liberal arts tradition (Kimball, 1986). Here, the emphasis is twofold: first, on humanistic and scientific knowledge; and second, on critical inquiry and questioning. According to this vision, distance education is crucial in mitigating the traditional elitism of liberal arts education. Yet its significance stems from the access it provides, not from the fit between knowledge and the context of learning. In that sense, distance education expands on what is already available and valued in on-site education.

The distinction between distance education as opportunistic learning and as a proxy for on-site teaching has antecedents in the history of correspondence study. An early example of opportunistic, situated learning through correspondence was the for-profit school founded by Thomas J. Foster at Scranton, Pennsylvania, around 1891 (MacKenzie & Christensen, 1971). Foster, a Civil War veteran, became interested in mining accidents after the Avondale mine disaster of 1869. He founded a

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newspaper and later a school for mining students. After attempting, not quite successfully, to enroll miners in a resident mine-surveying program, Foster experimented with correspondence courses about mine mapping. The response was enthusiastic. Relying on engineers, Foster launched distance courses in mechanical drawing, and mechanical and electrical engineering. (Ironically, following the 2006 Sago mine disaster in West Virginia, the call for improved mapping and map-reading skills for miners and engineers was renewed.) Foster's initiative became the International Correspondence School, then Thompson Education Direct, and now is Penn Foster Career School, which offers distance programs in a variety of professional areas. The strength of Foster's school lay in its local adaptation to the needs of a specific community, whose members were unable to avail themselves of a traditional collegiate liberal education.

Ticknor's Society to Encourage Studies at Home represented the opposite view from that of Foster's school. The Society could easily have slipped into the emerging field of home economics (Rury, 1984), which merely provided women with knowledge that was consistent with their culturally sanctioned role at the time. Ticknor opted instead for a program of studies that included, among other subjects, ancient and medieval history, zoology, geology and mineralogy, mathematics and astronomy, and German and English literature (Bergmann, 2001). It is difficult to imagine a set of courses further removed from the particularities of domestic life or more revolutionary.

The opposition between Foster's school and Ticknor's Society also illustrates the distinction between schooling as training and schooling as engagement (Resnick & Resnick, 1977). In the former, skilled behavior is seen as the goal of instruction, and learning amounts to producing results when requested (e.g., drawing and interpreting a blueprint, solving an equation, providing information). In the latter, the goal of instruction is not only securing skilled performance but also providing tools for participation and argument. In schooling as engagement, learning is as much an issue of identity and empowerment as it is of proficiency. The development of both proficient performance and engagement is seen as necessary for true democratization of quality education.

While Foster and Ticknor tended to favor only one vision within their institutions, at other places different approaches to distance education coexisted and often collided. For example, at the University of Wisconsin, Louis Reber and William Lighty (director of University Extension and secretary of correspondence study, respectively) held opposite views of the aims of distance education during their long-standing collaboration from 1907 to 1926. "Lighty emphasized the development of 'cultural' courses, while Reber's primary interest lay in vocational and professional education. Conflict developed between Lighty and Reber over what Lighty perceived as Reber's 'commercial' approach to correspondence study" (Watkins, 1991, pp. 15–16). Reber's view was consistent with Moulton's (1917) appraisal of the value and dignity of nonacademic subjects and their role in University Extension. But this view was also a corollary of the idea that one mission of the University was the widespread dissemination and application of research findings in nonscholarly contexts (Reber, 1915). In the end, Reber's slant not only took advantage of the situatedness of learning (derived from the closeness between the subject matter and the students' professional requirements) but also constituted a more successful approach, given the chronic underfunding of extension programs, including correspondence study.

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A similar tension occurred at Columbia University, when Edward A. Richard was director of Home Study from 1930 to 1937. From its inception in the 1920s, Columbia's Home Study strived to compete with well-organized commercial institutions and tax-financed state universities (Burrell, 1954). Richard took an idealist stance on correspondence teaching:

> The eager desires of students should be met by an educational, rather than by a merely mercenary, institution, where for the most part only utilitarian demands are met. The commercial schools were weak in cultural courses, and it was in this field that Home Study was set to correct the balance diet [sic]. (Burrell, 1954, p. 37)

Although cultural courses in the liberal arts and science were rarely withdrawn for financial reasons, an analysis of adult participation in home study courses from 1925 to 1932 at Columbia suggested that course offerings had to adapt more closely to the pressing needs of the students if Home Study was to remain viable. In 1937 the Administrative Board of University Extension decided to terminate the program. Burrell, a historian of adult education at Columbia and a former correspondence instructor, points out that the nonviability of Home Study could be attributed in part to the disproportion between the effort and money spent in certain subject areas and the demand for courses in those areas. Burrell's hypothesis suggests that the views of distance education as opportunistic learning and as a substitute for campus education imply not only different stances on the role of institutions of higher education, but also different models of financial sustainability.

The history of correspondence teaching and learning suggests that distance initiatives' proclivity toward professional and vocational fields has varied over time. From the beginning, distance education exhibited a diversity in emphases that parallels that of the landscape of institutions of higher education. This diversity is more accurately portrayed as a tension, for underlying the efforts in professional and liberal arts education are often contrasting, though not necessarily conflicting, visions of how distance learning and teaching should contribute to the aims of higher education.

The Issue of Instructional Quality

In addition to the issues of democratization and the tensions between liberal arts and professional education, the final issue for distance education that will haunt us in online education is instructional quality. Historically, quality holds the key to academic acceptance (Institute for Higher Education Policy, 2000; Pittman, 1991).

Quality is a polemical issue because definitions vary greatly and because untested assumptions easily get in the way of fair judgments. Since the inception of correspondence study, classroom instruction has been the standard to match. Consequently, advocates of distance education were expected to demonstrate that distance teaching and learning were at least as good as residence education. It is noteworthy that, after more than a century of collegiate distance education, pro and con arguments have changed very little. Most of the concerns about distance education have focused on the limitations inherent in different delivery technologies (e.g., correspondence, radio, television, Internet) as they seek to replicate critical features of classroom instruction: social interaction, prompt feedback, engaging activities,

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instructional flexibility, the dynamism of a knowledgeable scholar, and adaptation to individual needs.

The responses to such criticisms have been diverse. Some acknowledge the limitations of distance instruction and provide ways around them; some have turned to anecdotal and, more recently, to experimental empirical evidence to validate the effectiveness of distance teaching relative to classroom instruction; still others have challenged the classroom as a standard of quality by focusing on features or contexts that make distance instruction unique (or uniquely appropriate).

Numerous approaches to the issue of quality can be found in the history of the correspondence movement in the United States (Allen, 1971; Chase, 1916; Childs, 1971; Egbert, 1916; Harper, 1886/1971; Holmberg, 1986; Lighty, 1915/1971; Mallory, 1916; Stein, 1971). When he was a collaborator in the Chautauqua College of Liberal Arts, Harper reviewed the advantages and disadvantages of the correspondence system. Among the disadvantages, he cited the lack of the instructor's personal magnetism; the absence of classroom interaction leading to emulation; the loss of unexpected, yet fruitful, suggestions on the part of the teacher; the irregularity of correspondence work; the drudgery of writing up long lessons (for the instructor) and recitations (for the student); and the increased opportunities for dishonesty on the student's part. Despite Harper's acknowledgement that correspondence teaching could not supplant oral instruction, he was quick to debunk myths concerning the inherent superiority of classroom education, which he approached with healthful skepticism. Regarding teacher magnetism, he wrote: "If personal stimulus furnished by the teacher is absolutely necessary to good results on the part of the student, then two-thirds of the oral instruction given is valueless" (Harper, 1886/1971, p. 10). As an alternative, Harper emphasized the role of writing in correspondence education, praising the exactness of knowledge that it demands and exhorting correspondence instructors to engage students through powerful prose.

Three decades later, Lighty (1915/1971) would contrast the tutorial quality of correspondence study with the often impersonal character of conventional teaching in lecture rooms. Like Harper, Lighty was aware that distance teaching would require the development of a "new type of teacher and [a] new type of text and instruction" (Lighty, 1915/1971, p. 20), customized to adapt to individual needs and to overcome the obvious limitations of the learning environment. Lighty made an analogy between the work of extramural teachers and that of artists, and emphasized the need to convey, through correspondence, the uniqueness of the teacher's stance on the subject matter.

The testimony of Wayland J. Chase at the annual meeting of the National University Extension Association in 1916 shows how the need to persuade others of the soundness of correspondence teaching led some distance educators to a genuine inquiry about the general nature of successful teaching, as opposed to a heartfelt, yet limited, defense of their own pedagogical choice:

> Is distance between teacher and pupil, professor and student, an insuperable difficulty? What is involved in teaching? What are its essential elements? If propinquity of the two persons concerned is essential, it is not because telling is teaching and hearing is learning, for we know that in one ear and out the other is the course that is traveled by most of what is told students unless it is arrested and fixed by more effective educational processes. (Chase, 1916, p. 64)

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Chase stressed the potential of correspondence study to foster individualized teaching and autonomous learning. Like Egbert (1916), he also stressed the need to develop teaching practices founded on a working understanding of the student's psychology.

As distance programs consolidated, empirical evidence of various kinds about the quality of instruction accumulated, from student surveys to experimental comparisons between distance and classroom learning, and from analyses of student attrition and success rates to psychometric studies of the relationship between intelligence and performance on distance courses. One early example of the press for empirical evidence is Bittner and Mallory's "University Teaching by Mail" (1933), which compares the achievements of distance learners to those of resident students at universities such as Chicago, Wisconsin, Colorado, Indiana, and North Carolina. In accordance with subsequent empirical literature on distance learning, use of delivery technologies, and student achievement (for extended reviews, see Russell, 1999, and Cuban, 1986), the authors concluded that "correspondence students do make good by arbitrary standards commonly employed to measure achievement. And they succeed in academic achievement in the opinion of examiners, deans, and instructors" (Bittner & Mallory, 1933, pp. 165–166).

Historically, judgments about the quality of distance education have been also influenced by perceptions of the quality of the professoriate involved. A decisive factor for the legitimacy of distance teaching and learning, within institutions and in society at large, has been the degree of participation of mainstream academics. Chicago's experience is illustrative. Bittner and Mallory (1933) point out that the faculty's initial opposition to the establishment of correspondence study at Chicago decreased considerably over time. This détente was no doubt due to Harper's activism as university president: Under him, many influential and respected residence faculty served as correspondence instructors. Nevertheless, the involvement of regular faculty in correspondence teaching declined over time. Regular teaching and research responsibilities left residence faculty little time for correspondence work (Storr, 1966; Watkins, 1991). In addition, residence faculty resented the disproportion between the low monetary compensation and the high quality of their teaching services, an imbalance that ultimately led some regular faculty to limit their duties to better match the rate of pay.

In this context, some universities began recruiting full-time correspondence instructors as early as 1930; their selection and evaluation often depended on the extension director and not on the department head concerned. Although this recruitment furnished correspondence faculty, it eroded the academic control of extension activities by departmental committees and reinforced the common belief that correspondence instructors and regular faculty had different scholarly standards.

This history may explain the widespread belief that distance education faculty do not have sufficient academic credentials and that, as a result, the quality of their educational practices should be questioned. Judgments about the quality of correspondence programs and other distance programs may also have been influenced by the proliferation of public scandals involving for-profit distance schools whose instructional activities were hidden from public scrutiny and bordered on fraudulent practices.

As a corollary, we believe that the quality of distance programs historically has been as much an empirical issue as a matter of social representation. Distance

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education has often been dismissed without careful consideration of its aims, processes, and products. It has been required to meet standards of perfection that we know are exceptional in classroom teaching and learning (Jaffee, 1998). More often than not, empirical research has been directed to test the effect of delivery technologies (i.e., the medium effect), without considering the extent to which principles of good teaching and effective learning are enacted in the instructional environments (Cuban, 1986; Russell, 1999). Finally, claims about the quality of distance education have been influenced by the unfortunate and too real existence of "matchbox universities" and diploma mills—fraudulent institutions that sell degrees with little or no quality control (Pittman, 1991).

Lessons Learned From History

What have we learned from the history of distance education? First, we agree with Watkins that the history of distance education is "the story of creative adaptation, visionary leadership, financial challenges, politics, both internal and external to universities, and, most importantly, a commitment to service" (Watkins, 1991, p. 1). However, as other scholars suggest (Allen, 1971; Cuban, 1986; Pittman, 1991; Storr, 1966; Wright, 1991), it is also a story of grandiose promises, marginal commitment, and abandonment. In that sense, distance education has not followed the ascending, linear path that technological innovation might have initially suggested. The success and the endurance of distance initiatives have been greatly influenced by perceptions of quality and the vigorous institutional support resulting from social visions of the university mission.

Second, it is clear that there is an underserved population that can benefit from distance programs. The value of democratization has been not just in creating a utopian vision of the University or of educational visionaries, but also in meeting a real demand. Historically, the diversity of beneficiaries has been considerable, from working professionals whose daily obligations interfere with attendance at on-campus courses to faculty members who want to keep informed of the advances in their disciplines. In this regard, a constant challenge to distance education has been reaching a vast audience without compromising quality, if we understand that an essential component of educational quality is the adaptation of teaching to the needs and characteristics of individual learners.

Third, we have learned, particularly from the experience of Ticknor's Society, that instructional quality can override media limitations. Even quite limited instructional venues such as correspondence can make a difference in students' lives. Just as technology in and of itself does not guarantee educational improvement, instructional quality is not necessarily breached by technological constraints. Educational quality certainly involves sensible use of media potential, but, most important, it also requires student engagement, a vision of what students need and should learn, and deep understanding of the subject matter on the part of the teacher.

Fourth, the history of distance education reveals that status and quality issues emerge when disparities arise between faculty in face-to-face teaching and faculty in distance education. The separation of faculty is predictable when distance programs scale up and distance teaching obligations interfere with the traditional faculty responsibilities. Problems emerge when there are disparities in hiring practices, academic qualifications, research opportunities, and criteria for evaluation, most

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notably when distance faculty are outside the tenure stream and of lower rank (lecturers, instructors).

Finally, the history of distance education teaches us that quality is undermined when business becomes the prevailing model of distance programs. While a market approach to distance education may allow institutions to secure funding and increase revenues, it may bypass academic controls and practices in favor of supply-and-demand opportunities if unchecked. Business models may dissociate, in the name of efficiency, course conception and development from their pedagogical enactment, and in doing so compromise the desirable integrality of the scholarship of teaching.

These are critical lessons if we want to sustain distance initiatives, namely, appropriateness of expectations, attention to student diversity and learners' individual needs, educational quality as it relates to the use of instructional media, engagement in the initiatives of mainstream scholars, and observance of academic models of organizational functioning. We contend that these lessons constitute the backdrop against which promises and concerns about online education are made and raised. In that sense, they bring continuity to an educational enterprise—distance education—that has been deeply transformed by recent technological breakthroughs. In the next section, we return to the current landscape of online distance education and trace some of these new promises and renewed concerns.

Current Visions Shaping the Future

Online initiatives vary along multiple dimensions. For example, they can be characterized in terms of the location of the target student population relative to that of the offering institution (that is, whether they aim at off-campus or on-campus students, or both). Online courses also vary in the degree to which they stand alone or involve supplemental interaction between students and faculty in the form of face-to-face encounters (hybrid or blended instruction) or computer-mediated communication in the form of electronic chats or e-mail. The specificity of the audience is yet another dimension of variability. Some courses aim at a clearly defined population (e.g., corporate or nursing online programs) and others at anonymous users. Finally, variation in online education can be described in terms of the extent to which online initiatives involve formal or informal learning. Issues of audience location, instructional autonomy, audience specificity, and formality are important because they shape the assumptions that designers make about the students' prior knowledge and learning goals, and they determine the depth and breadth of instructional explanations as well as the types of scaffolding provided.

In each of these dimensions, online initiatives take on the unfulfilled promises of traditional distance education and open new instructional possibilities. Unlike most traditional distance programs, for example, some online initiatives currently aim at both on- and off-campus students in a way that reenacts Harper's initial vision of correspondence study at the University of Chicago. An illustrative example is Psych3000 *(http://www.psych.utah.edu/stat/),* an Internet statistics class at the University of Utah, which is offered for credit to on-campus students and, under the same premises, to off-campus individuals. Likewise, online instruction that relies on synchronous and asynchronous learning networks fulfills the ideal of interactive distance learning. In so doing, it breaks the isolation of distance learners and introduces the fluidity of discourse into the landscape of distance education (Jacobsen, 2002; Metz, 1996).

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Although these dimensions of variability are helpful in mapping the landscape of online education, we are especially interested here in examining various visions of educational quality that may inform online initiatives. Educational visions imply assumptions about what it means to know; the goals of teaching and learning; the anticipated scenarios for knowledge use; and the mechanisms, tools, and mediations that leverage learning. In that sense, educational visions also set expectations for and guide instructional design. We have chosen to focus here on stand-alone online instruction, which relies on instructional materials (e.g., multimedia Web pages, downloadable documents) and learning environments (e.g., virtual laboratories, animations, simulations) delivered over the Internet, without the mediation of or interaction with human counterparts. In our view, stand-alone online instruction embodies the bold promise of massive, effective, and comparatively inexpensive instruction. Thus it constitutes a privileged case through which we examine how themes that played a crucial role in the history of distance education—democratization, liberal arts education, and educational quality—are recast in the scenario of online education.

If we look at current online education from the perspective of its underlying pedagogical assumptions and compare those to the assumptions permeating the history of distance education, we can see a major difference. There has been comparatively little conversation between distance educators and mainstream educational researchers about learning processes (Allen, 1971; Holmberg, 1986; Stein, 1971). Until recently, the prevailing conception of distance learning and teaching was close to behavioral theory in the sense that it focused on programmed instruction. Today, however, we observe a growing dialogue between distance educators and educational researchers. As a result, the landscape has gained conceptual diversity and depth, and plays out some of the major theoretical trends and tensions of the field of educational research. This theoretical enrichment is a consequence of the representational and interactional affordances of online technologies. As Agre (1998) claims, the Internet is capable of producing laboratories, classrooms, tutors, lectures, textbooks, and libraries that exhibit many of the properties of their real counterparts. Hence we face an environment that has considerably more degrees of freedom than before, one that is flexible enough to be modeled in pursuit opposing educational visions (Stenning, 1999, 2002).

We see three major educational visions emerging in the panorama of stand-alone online instruction. The first vision, which we call the *presentational view,* sees the unique potential of online education in the increased visualization and presentational capabilities of online multimedia environments, which overcome the limitations of written text and static representations. The pedagogical contention is that the abstract nature of disciplinary concepts and processes is the crux of learning, and that enhanced presentational capabilities restore to distance learning the vividness and instructional creativity of quality classroom instruction. The second vision, which we call the *performance-tutoring view,* sees the potential of online education in environments that support problem solving and that allow for precise instructional guidance through highly structured tasks and timely feedback. Instruction is said to fit the student's needs and to provide scaffolding and support at unprecedented levels of resolution. The third vision, which we term the *epistemic-engagement view,* sees the potential of online education in environments that foster the epistemic and discursive practices typical of disciplinary communities by

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providing a wide range of opportunities for intellectual engagement and interaction. The emphasis here is on the variety of learning experiences and the versatility of instructional settings.

These visions are not mutually exclusive, although they are often aligned with scholarly traditions that take opposing sides in pedagogical debate. In the following sections, we explore these views in greater detail.

The Presentational View: The Promise of Multimedia Environments

In hindsight, the history of distance education can be seen as a progression toward modes of instruction that are presentationally as versatile as classroom teaching, from the epistolary nature of correspondence study and the orality of radio instruction to the greatly enhanced representational capabilities of educational television. Cuban (1986) has shown that at every step of this technological path, there was the promise of a greater closeness to the classroom. With the development of computer-assisted instruction and the spread of the Internet, distance education is now well into the reality of multimedia learning. Online instructional explanations rely on text, but they can also make use of voiceover, pictures, dynamic visual representations, and movies. The outcome is instructional materials that not only convey information in multiple ways but also may be more appealing to students than printed materials.

The idea that the value of online instructional materials depends on their rather profuse use of multimedia resources is grounded on two rationales. The first is that the learning of challenging disciplinary domains is facilitated when abstract concepts are turned into visual representations. As it happens, a wealth of cognitive and educational research supports the favorable effect of multiple visual representations in the learning and understanding of complex concepts (Seufert, 2003; Larkin & Simon, 1987; Tabachnek & Simon, 1998; Tsui & Treagust, 2003). However, empirical research also suggests that it is not simply a matter of the more, the better. For example, Mayer (2001) has shown that under some conditions multimedia presentations can actually hinder learning, as when visualization focuses on irrelevant content and detail. Online materials may also include representations that are transparent to the expert eye, yet intractable to students (either because the representation is too complex or because it is opaque with respect to critical features). Seen in this way, the net effect of visual representations on learning is not a function of their raw frequency or of their aesthetic attributes but rather of their conceptual transparency and instructional relevance.

The second rationale for the use of multimedia concerns the restitution of the classroom experience. Classroom explanations are not only rich in representational formats (e.g., text, graphics, notational systems) but also embodied in unique ways. In the classroom, explanations are punctuated by gestural language and have a voice and a temperament. In addition to information, teachers convey perspectives on their disciplines and give away hints about the relative significance of topics and ideas. As might be expected, this embodiment is as much epistemic as it is motivational.

Multimedia presentations help restore to distance education the vividness of face-to-face instruction by allowing personalization of what otherwise would be pure content. By setting the goal of creative and enticing online education, the presentational view aims to bridge the historical divide between the dynamism of face-to-face education and the aridity of instructional materials in the tradition of

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textbook writing and programmed instruction. Democratization in this context requires delivering instruction that is no less compelling or motivating than its campus counterparts. The concern, however, is a certain naiveté about the efficacy of multimedia presentations at the expense of carefully crafted explanations and opportunities for practice.

Its advantages notwithstanding, educators need to be aware of some limitations of the presentational view. In particular, designers need to be cautious about what the philosopher of science Marcello Pera (1994) called the Myth of the Immaculate Perception, in which the perceptual origin of knowledge is deemed unproblematic because knowledge follows inevitably from visual or otherwise sensible evidence. In this myth, representations and visualizations are mistakenly construed as self-efficacious devices. In reality, static or dynamic representations are meant to support explanations, not replace them. In that sense, no amount of visualization can compensate for a thoughtful explication of concepts, processes, and procedures against the backdrop of conceptual principles.

The idea that the effectiveness of teaching lies in the presentational attributes of instructional explanations is not new. If anything, it is entrenched in much of the empirical research on the effects of media on learning (Cuban, 1986; Russell, 1999). Although production costs can be considerable, online technologies have allowed us, for the first time, to deliver low-cost multimedia environments that rival the presentational richness of classroom instruction. For distance education, such environments constitute a significant leap forward, but also a source of concern if presentational attributes are isolated from the other variables that determine the quality of instructional explanations.

The Performance-Tutoring View: The Promise of Intelligent Tutoring Systems

The performance-tutoring view emerges from the prolific research tradition on intelligent tutoring systems. In this vision, computers embody *representational, processing,* and *tracing* capabilities (Corbett, Koedinger, & Anderson, 1997; Larkin & Chabay, 1992; Mayer, 2001). Representational capabilities allow computers to code and manipulate information in various modalities (e.g., text, video, graphics, audio). Information can then be displayed and organized in ways that maximize learnability and that mirror the uses of knowledge representations in particular subject matters. Processing capabilities allow computers to operate on representations, to support correct representations of dynamic situations (simulations), and to offer students varying degrees of control over the outcome of a program. Processing capabilities enable interaction—that is, reciprocal action between the user and the program—allowing the user to operate on given representational configurations and the program to provide adaptive responses. Thus computers recreate complex problem-solving tasks, emulating and supporting critical features of pedagogical exchanges between students and teachers. Finally, tracing capabilities allow computers to keep records of students' online behavior and hence to provide just-in-time interventions and feedback to faculty and designers.

Intelligent tutoring systems (ITS) take this set of affordances to their most sophisticated expression. Although not originally developed for online environments, intelligent tutoring systems attempt to automate some of the advantages of human tutoring (see Corbett et al., 1997, for a caveat on this aim). Intelligent tutoring systems are constructed on the basis of general learning principles (Corbett

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& Anderson, 1992; Corbett et al., 1997; Lajoie, 2000; Larkin & Chabay, 1992; Ohlsson, 1986; Shute, 1993). They involve a performance model (usually expressed as a production system or set of rules that encode behavior), which is in turn capable of performing the tasks the students are learning to perform. Intelligent tutoring systems then compare the students' behavior with the actions prescribed by the model and provide feedback as to the course of action that the students should take at any given moment. Seen this way, when used as cognitive tools and enabled with tutoring capabilities, computers have the potential of providing students with a rich variety of information resources, with varying degrees of control over their learning processes and goals, and with guidance over their decisions about how to achieve those goals. In other words, intelligent tutoring systems provide adaptive scaffolding to students, by providing feedback and suggesting possible courses of action in the context of problem solving.

Intelligent tutoring systems are designed on a series of related premises. First of these is that meaningful learning occurs best when learners engage in problem solving activities and "learn by doing" (Zhu & Simon, 1987). Problem solving sets goals for the acquisition of declarative and procedural knowledge, requires learners to integrate knowledge, and provides opportunities for practice. A second premise is that meaningful learning is enhanced when instruction adapts in a timely manner to the needs of individual learners—that is, when the feedback given to learners is crafted on the basis of their behavior and a model of their knowledge base (Corbett et al., 1997; Corbett & Anderson, 1992; Miller, Lehman, & Koedinger, 1999; Shute, 1993; Swaak, Joolingen, & Jong, 1998; VanLehn, in press). Finally, intelligent tutoring systems and computer-assisted instruction are predicated on the idea that most teachers, given the scope and heterogeneity of their tasks, are unable to provide such a rapid and individualized critical assistance to their students in the classroom.

The view of online education that emerges from these premises is one in which courses provide, at a minimum, text-based instructional explanations coupled with problem-solving and practice environments with varying degrees of student control and feedback. In a more sophisticated fashion, online courses incorporate intelligent tutoring systems that make individualized instruction a reality beyond the rare and expensive settings of one-to-one tutoring.

A number of advantages are associated with the performance-tutoring view of online instruction described above. First, there is an increase in student-content interaction—that is, in the opportunities given to students to operate on models and representations in ways that allow them to try out hypotheses and gain knowledge of results. The emphasis on problem solving, the use of dynamic representations, and the regular provision of feedback can transform passive learning experiences into active experiences. Seen through the lens of the democratization of quality education, these new possibilities constitute a significant advance relative not only to traditional distance education but also to campus education that fails, as is frequently the case, to provide students with opportunities for active learning.

A second advantage of the performance-tutoring view of online education lies in its contribution to the individualization of education, an ideal that has been elusive to distance education since the early days of correspondence study. Individualization involves the adaptation of teaching to the cognitive needs of individual students—that is, the crafting of learning opportunities (e.g., problem sets, explanations, feedback) vis-à-vis the students' prior knowledge and history of performance.

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Unlike one-to-one correspondence study, however, individualization in online education can now be informed by theories of cognition that provide the means to specify models of the students' behavior and underlying cognitive processes.

Finally, we turn to the advantages accrued by faculty members involved in the development or implementation of stand-alone online courseware. Online initiatives that embody the ideals of ITS may lead eventually to a reexamination and transformation of their teaching practices. When faculty members participate in the design of interactive online environments, the nature of otherwise taken-for-granted pedagogical interactions can come into focus. In that sense, online environments constitute exemplars of teaching practices that can be inspected, evaluated, and used to support faculty development (Leinhardt & Larreamendy-Joerns, 2003). When online environments are used to deliver content and to scaffold the acquisition of problem-solving skills, contact time with students may be transformed to serve alternative educational purposes. We do not have conclusive evidence in tertiary education, but the research in primary and secondary education (Corbett et al., 1997; Lovett & Greenhouse, 2000; Mandinach & Cline, 2000; Schofield, Evans-Rhodes, & Huber, 1990) suggests that, as a consequence of the implementation of computer-assisted instruction and intelligent tutor systems, classrooms may become "more student centered, with teachers naturally shifting away from traditional roles as lecturers and disciplinarians, and embracing roles as facilitators and mentors engaged in shared problem solving with students" (Derry & Lajoie, 1993, p. 3).

In spite of the significant contributions of the performance-tutoring view, a vision of online education that aims to mirror the interactional density and degree of individualization characterized by tutorial teaching is not without concerns. We focus on two issues—feasibility and intellectual breadth—with the understanding that they apply to the current state of programming technologies and the development of theorization in the joint field of cognitive science and education.

The first concern is the short- and middle-term feasibility of meeting the growing demand for online courses through the incorporation of sophisticated intelligent tutoring systems. The development of effective interactive learning environments is costly and requires considerable expertise in programming and cognitive task analysis. Murray (1999) has given an estimate of 300 hours of development time per hour of online instruction using traditional computer-assisted instruction (CAI); the ITS/CAI productivity ratio thus is 300:1. Murray suggests a solution involving the development of authoring tools that may ease the degree of technical expertise required for software development (for one example, see Koedinger, Aleven, & Heffernan, 2003). In addition, if the aggregate costs of research, software development, evaluation, and sustainability are factored in, the development of CAI coupled with ITS becomes prohibitively expensive, except for institutions that possess accumulated experience in the field.

Apart from technical and economic feasibility issues, there are concerns about the flexibility or the intellectual breadth of current intelligent tutoring systems. Flexibility refers to the extent to which tutoring systems can be successfully implemented in a variety of subject domains, as well as the degree to which they can support forms of learning and instruction that are at variance both with the subject matters in the ITS tradition and the cognitive principles that guide the design of existing tutoring systems. For example, a longstanding criticism (Glaser & Bassok, 1989; Ohlsson, 1990, 1995) is that fine-grained descriptions and cognitive models

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of problem solving are currently available only for procedural domains (e.g., algebra, geometry, and elementary physics) and not for domains that require deep conceptual understanding (e.g., evolutionary biology, political science, and history) or that cannot be appropriately expressed in terms of production rules. This limitation may reduce learning opportunities in online courses to domains that are currently tractable from a cognitive science perspective. However, it may be less an irreparable flaw of the psychological theory underlying ITS than a research challenge to be solved in the years to come.

Intelligent tutoring systems also embody a pedagogical philosophy that favors a componential view of learning, according to which learning proceeds from the simple to the complex through the incremental acquisition of declarative knowledge and production rules. While this view is consistent with some understanding of the process of skill acquisition, its use as the guiding principle of instructional design may lead to instructional sequences that neither engage students nor initiate them into the variety and intricate weave of intellectual moves within a discipline. This componential view of learning and its corresponding sequential view of teaching seem to be at odds with instructional explanations by expert teachers in classroom contexts, which often are multilayered and uneven and expose students head-on to complexity in the domain in ways that are tractable and motivating (Leinhardt & Steele, 2005; Schoenfeld, 1998). Because the excellent teacher engages in this uneven, nonsequential set of actions, he or she often makes links above or below the grain size of most of the instructional work. If intelligent tutoring systems are to recreate these and other critical features of successful teaching, new ways to capture the rhetorical and explanatory variability of disciplines need to be developed. Otherwise, designers of tutoring systems may severely limit students' depth and breadth of understanding.

Concerns also exist about the extent to which intelligent tutoring systems can build on the dynamic social features of learning, particularly in the case of standalone online courseware. Educational research over the last two decades has consistently indicated that learning is more of a communal act than cognitive models suggest (Greeno, 1997; Lave & Wenger, 1991). Learning is social not simply because of the incidental fact that it occurs in collaborative or cooperative contexts but also because it is a property of adaptive social organizations (Resnick & Williams, 1996) that enables individuals to become members of a community of practice (Lave, 1997; Lave & Wenger, 1991). From this perspective, learning is less a matter of knowledge acquisition and more a fundamental process of forging an identity and becoming a member of a community of practice through active participation (Kirshner & Whitson, 1998; Packer & Goicoechea, 2000; Wenger, 1998).

Seen this way, the challenge to online education is formidable. At a minimum, it requires designers to develop online environments where students can "work together on problems, pose problems to each other, and critique each others' solutions" (Katz & Lesgold, 1993, p. 299). Some researchers of intelligent tutoring systems have attempted to simulate learning companions that play the role of "friendly troublemakers" (Aimeur, Frasson, & Dufort, 2000), while others have designed learning tasks that require students to contest and complement solutions and claims previously offered by other learners or problem solvers (Katz & Lesgold, 1993). Many of these challenges are now being addressed by novel experiences and research in online education (Hiltz & Goldman, 2005).

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The Epistemic-Engagement View

While the performance-tutoring view of online instruction pursues a vision of individualized education and learning environments tailored to students' changing needs, the epistemic-engagement view takes on the vision of knowledge and learning as practices both within the structure of a domain and within a disciplinary community. The concept of practice within a domain is close to Joseph Schwab's (1962) idea that knowledge rests not on facts or isolated skills but on principles of inquiry. In this view, learning a discipline implies coming to understand not only its substantive structure (i.e., facts, concepts, theories), but also its syntax—that is, the questions that guide inquiry, the tools that allow inferences and interconnections, and the actions and principles (rules) that validate knowledge.

In this view, learners do not first understand concepts or develop a set of isolated skills and then confront scenarios requiring applicability. Rather, they are given opportunities for participatory practice and, as competencies develop, they seek and obtain supporting skills and concepts. Thus, from the very onset of learning, the learner engages in questioning, makes connections, draws inferences, and validates knowledge. The epistemic-engagement stance at the college level is best exemplified by the Research Experiences for Undergraduates (REU) programs, sponsored by the National Science Foundation: Each summer, thousands of undergraduates in various sciences connect with research laboratories and engage in the practice of science—not getting coffee for scientists, not running summary statistics for the real researchers, but conducting genuine research.

As these experiences suggest, disciplinary practices are not merely epistemic games. They are also social acts and exist in discourse. In the context of social interaction, concepts are reshaped into negotiated meanings, data into shared referents, questions into common goals, explanations into arguments, and representations into rhetorical devices. In this view, language and discourse are neither external to knowledge nor second-level effects of conceptual or procedural learning. On the contrary, they are essential aspects of knowing a domain.

Although the full version of this vision is not yet visible in online education, some of its principles have been invoked as rationales for the development of computer-assisted instruction that relies on problem-based learning (Hmelo, 2004; Hmelo & Day, 1999) and for the supplemental use in courseware of asynchronous learning networks (Bonk & King, 1998; Palloff & Pratt, 1999). Problem-based instruction provides students with guided experience in learning through solving complex, real-world problems. In doing so, it helps students to construct a flexible knowledge base that is organized around meaningful queries, develop problem-solving skills, and become effective collaborators (Barrows, 2000; Hmelo, 2004). Emphasis is placed on the authenticity of problems—that is, on practices that mirror those of disciplinary professionals and that draw on issues that are meaningful both to the domain and to the students' lives. The commitment to problem complexity is uncompromising, yet enacted in a way that is tractable for students through a variety of instructional supports.

In turn, as Bonk and Cunningham (1998) underscore, there is consistency between asynchronous learning networks and socio-constructivist and sociocultural theories of learning, two conceptual perspectives that are close to the vision of knowledge as epistemic and discursive practice. In Bonk and Cunningham's view, asynchronous networks favor learning as a collaborative process that proceeds

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through social dialogue, scaffolding, and negotiation of meaning. Social interaction (i.e., student-student, student-teacher), more than student-content interaction, is viewed then as the privileged occasion for instruction because it sets the conditions for cognitive conflict to occur and provides students with opportunities to engage in negotiation of meaning and argumentation. Online environments that incorporate computer-mediated communication through synchronous or asynchronous networks allow students to engage in argumentative practices (Cohen & Scardamalia, 1998; Duffy, Dueber, & Hawley, 1998; Hiltz & Goldman, 2005; Hoadley & Pea, 2002; Scardamalia & Bereiter, 1993, 1994). Given that the conversational contributions are written, that online posting is sequential, and that there are traceable records of the conversation flow, these environments provide learners with wait-time and, consequently, encourage reflective learning in both on-task and post-task interactions (Hara, Bonk, & Angeli, 2000; Hara & Kling, 1999; Tolmie & Boyle, 2000).

There is need, however, for a caveat on online education as epistemic engagement. Our view of online education integrates a vision of knowledge as practice and of learning as emerging participation in a disciplinary community. We admit that such a vision is hard to fulfill, even in the context of classroom instruction under the most favorable conditions, because it requires us to go beyond viewing the teacher as a transmitter of information and the student as a passive recipient of knowledge. That is why we raise a warning flag about the tendency in the literature on online learning to deem social interaction as an instructional precept that requires no further explication and that constitutes by itself a guarantee of learning and community building. Despite the accumulation of research on classroom discourse over the past 25 years (Burbules & Bruce, 2001; Cazden, 1986), the mechanisms responsible for learning in the context of instructional dialogues remain at best underspecified and certainly a matter for empirical and theoretical research. We know, however, that reflective learning and co-construction of knowledge are not an inevitable consequence of allowing students to interact with each other (Henri, 1995; Hiltz & Goldman, 2005; Hoadley, 2004; Picciano, 2002; Tolmie & Boyle, 2000).

We also know that successfully orchestrating a dialogue demands fairly sophisticated skills. Conversational contributions need to be simultaneously parsed according to their disciplinary value, their location within the chain of collective argumentation, their relevance to the instructional goals, and their role as indicators of the student's ongoing understanding. The outcome of this complex appraisal is a sense of the amount and quality of the guidance that specific contributions and the conversation as a whole require to support learning. In the absence of this sense, as Henri (1995) cautions, the patterns of participation may fall back to the traditional IRE (Initiation-Response-Evaluation) pattern, and threaded discussions may become little more than erratic exchanges where the frequency and length of participation are taken as reliable proxies for the quality of interaction as a whole.

Thus the moral of this argument is simple: Although online learning environments that allow for social interaction constitute a remarkable advance, they should not be construed as inevitably conducive to learning solely because student-student and student-instructor exchanges take place. Nor should they be understood as obviously consistent with a vision of knowledge as practice or with efforts to nurture communities of practice.

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How online education can be designed to nurture the epistemic and discursive practices of disciplinary domains remains an open question. Problem-based learning and asynchronous learning networks hint at possible solutions. Yet, despite the challenges involved in its implementation, the epistemic-engagement vision reminds us that if online distance education is to come close to the ideals of liberal arts education and democratization, instruction should aim to introduce students to the deep issues of the disciplines in a way that is productive and generative. The design of online environments should be primarily dictated by an understanding of the epistemic and discursive practices that constitute disciplinary communities, and not by pedagogical considerations and technologies that short-circuit the engagement of students.

Social and Organizational Issues

In the background of the discussions of instructional constraints and affordances of diverging approaches to online education, voices of caution can be heard regarding the threat of online initiatives to the very existence and successful functioning of the cultural institutions that traditionally have harbored the ideals of liberal arts education (Blasi & Heinecke, 2000; Brantlinger, 2003; Ess, 2003; Feenberg, 1999; Jaffee, 1998; Margolis, 2000; Noble, 1998; Sumner, 2000; University of Illinois Faculty Seminar, 1999).

Critics claim that while online education increases educational coverage significantly, it may ultimately make college instruction a market commodity in ways that are detrimental both for student learning and for the values of liberal arts education. Some foreseeable implications of this commodification are the disenfranchisement of faculty within institutions of higher education and the prevalence of noncollegial forms of academic administration. For example, courseware developed by faculty as a result of their personal interest in teaching and technology can become marketable products over which faculty may have, in the end, little or no control. Likewise, institutions can adopt courseware primarily on financial grounds, rather than for pedagogical reasons, in which case administrators may have the last call in decisions regarding academic matters. Finally, because of the adoption of ready-made courseware, faculty may become implementers rather than curriculum generators (Jaffee, 1998).

The commodification argument illustrates the enduring public perception of scaled-up distance initiatives as threatening to quality higher education, particularly in institutions that advance teaching at the expense of research. It also constitutes a modern reminder of the risks of compromising traditional mechanisms of academic control in favor of mass production of courseware and financial sustainability. Most important, it is a cautionary note about the implications of divorcing the processes of course design from the processes of instructional enactment or implementation, a divorce that takes the experience of actual teachers and students out of the design loop.

However, these critiques of stand-alone online education have been criticized in turn for their harsh criticism of university administrators, their lack of empirical support for claims concerning the pedagogical ineffectiveness of technology, and their failure to recognize online technologies as valuable resources not only to improve instruction but also to support faculty development (DeLong, 1998; White, 1999).

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Another concern is the digital divide that may be associated with the development and use of online materials and curricula. The term "digital divide" refers to the socioeconomic inequalities between communities that have access to computers, Internet connections, and information technologies and communities that do not (Compaine, 2001; Crampton, 2004; Norris, 2001). It is true that limited access to information technologies by specific student communities (e.g., communities in underfunded colleges, in developing countries, and in underdeveloped or impoverished regions of the United States) curtails the scope and reach of online initiatives. However, a divide can also exist between academic communities in terms of their ability to undertake online initiatives. The development of quality online materials requires considerable resources, financial and otherwise, from technological infrastructure (e.g., broadband Internet connections and servers) to expertise in pedagogy, computer science, and programming. Thus, although the delivery of materials over the Internet may be relatively economical (compared with the production and delivery of printed materials), the startup and maintenance costs of sophisticated online environments can be prohibitively expensive. This situation may lead to a concentration or monopoly of curriculum development within a few powerful institutions, thus reducing the diversity of perspectives and solutions to educational problems.

Going the Distance to the Future: Avoiding Pitfalls and Meeting the Promises

With processing power growing rapidly and networked communication increasing its efficiency and becoming more ubiquitous, we can only speculate about what innovations in online education will be made in the years to come and how college education will look in a few generations. However, the indeterminacy of future online education and of human-computer interfaces and learning environments can be attenuated if we envision the current landscape of online education as both a ground for technological and pedagogical innovation and a reenactment of historical promises and concerns about distance education.

If one looks at the promises and challenges of online education with an eye to the history of distance initiatives, it is apparent that the current scene of online education is a pentimento of social and educational ideals. The newer overpaintings correspond to innovations and new challenges, such as the capability of online architectures to collect real-time data on student online behavior, the use of online asynchronous networks to mitigate the isolation of distance learners, and the rapid obsolescence of instructional software. The earlier but still-present motifs and themes, the underpaintings that reappear, are the pitfalls and possibilities shared by online and distance education. They concern primarily the spirit that drives initiatives and the general conditions in which they are conceived, developed, and sustained. In this final section, we underscore the issues that we deem critical if online education is indeed to go the distance.

Avoiding Pitfalls

Away From Mainstream Academia

In our view, the major threat to successful college online education is the divorce of instructional design and implementation from mainstream academics—that is, from scholars who have both the institutional conditions and intellectual capital to thrive on critical conversations about their disciplines and what it takes

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to learn them. A deep involvement of mainstream faculty in the design process, not simply as occasional critics, is a crucial condition for the development of online courses that are intellectually challenging, that provide students with opportunities to engage in authentic disciplinary practices, and that convey the nuances and excitement of a domain. In the absence of the scholars' expertise and sense of the discipline, online courses may become didactic oversimplifications of the subject matter or may map the domain inappropriately. No amount of technological flair can compensate for an ill-conceived online learning environment.

This potential divorce has historical precedents and institutional overtones. College distance education grew from the university extension movement, which although in its aims was an essential component of the university's mission, was organizationally positioned at the periphery of mainstream campus activities or the university proper. This marginal location, in addition to the scaling up of distance programs, contributed to the separation of the extension and mainstream professoriates and to the increasing disengagement of the latter from the design and enactment of distance courses.

In contemporary online education, this separation can recur because of financial constraints, because initiatives are marginal to the faculty's core activities, or because overreliance on technical knowledge (e.g., computer programming) effectively transfers the control of pedagogical decisions to programmers. The distinction between university extension and university proper, as well as the division of labor within online initiatives, are predictable effects of growing organizational complexity and task diversification. However, these distinctions can become problematic if no actions are taken to encourage faculty members to view themselves as the owners of online distance courses and the courses themselves as markers of their excellence in teaching. At the institutional level, such actions may include securing core faculty members' real ownership of their authored online courseware, providing recognition to tenure-stream faculty for high-level participation in and community building around online initiatives, setting equivalent academic expectations for distance and on-campus online courseware, holding back pressures involved in scaling up, and paying faculty commensurately for the immense amount of time it takes to produce these courses and run them.

The Trap of "As Good As"

A second pitfall lies in the nature of the benchmarks against which the quality of online education is to be evaluated. There is agreement that online education should abide by the same standards as traditional classroom instruction. Given the historical precedence of classroom learning over distance education, such an equation seems only reasonable. But caution needs to be exercised in regarding the college classroom, without additional qualifications, as a benchmark for quality. The fact that in the literature no significant differences are reported between student performances in online and classroom environments can be interpreted in multiple ways: first, as evidence that online and in-classroom instruction are of equivalent quality, or that at least no harm is done in using online instruction; second, as evidence of the lack of innovation and pedagogical edge of online initiatives; and finally, as evidence of comparable mediocrity. The interpretation one adopts depends on what kind of classroom experience one has in mind (e.g., soporific, lecture-based courses; stimulating, senior-level discussion seminars; eventful lecture series by distin-

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guished scholars). In this context, it becomes apparent that empirical contrasts without serious inquiry into the degree to which learning outcomes and assessment tools reflect what is valued in the disciplines may lead to a self-indulgent sense of achievement, or to a replication of what is wrong or at least limited. We agree with Twigg (2001, 2002) that online teaching must aim to improve student learning, so that the relevant issue becomes not "what is as good as" but "what is better."

Lure of Success

A final pitfall we emphasize is what we call the lure of success—that is, when paradigms, instructional strategies, and artifacts that have been successful in the past are overused in the effort to define potential innovative educational experiences. With that approach, the "real and proven" come to define the "possible and provable." Historically, this was the case in programmed instruction. Programmed instruction is a self-paced educational technique in which content is presented in logical sequence, repetition is emphasized, and immediate feedback is given after the learner's responses. Programmed instruction was particularly effective in skill acquisition tasks. Yet, after its documented success in simple skills, it was generalized to other learning domains in a way that often disregarded the structure of the subject matter and the psychology of the learner. Advocates overlooked the fact that, as any other instructional intervention, programmed instruction fulfilled a specific vision of the learner, of what it means to know, and of what it takes to learn. Thus, in a way, success bred homogeneity at the expense of difference and variation.

A comparable situation may arise if successful implementations in computer-mediated learning and online instruction—ranging from tutoring systems to applets and from hypertext to evaluation through multiple-choice questions—are used not as artifacts to support learning but rather as templates that the subject matter must fit. Used in this manner, these tools lose their instrumental function and become yardsticks for what is teachable and learnable. Potential consequences are the exclusion of subject matters not amenable to well-proven technology and the impoverishment of the domain to fit technological capabilities. Against this homogenization, we underscore the value of diversity in subject matters, technological means, learning styles, and implementation scenarios (e.g., stand-alone, blended instruction, synchronous online teaching). It is this variability that ultimately will allow online instruction to meet the expectations of a student population as diverse as that in traditional higher education.

Meeting the Promises

The Haunting Vision of Ramanujan

Educators often say that they are in the business of changing lives, and they do, indeed, change lives. But how educational experiences reroute personal trajectories often depends on unanticipated events and circumstances. All that educators can do is provide opportunities for learning and hope for the best. Yet expectations vary greatly as to the effects of educational enterprises. Online education inherited from distance education the ideals of democratization and openness, two ideals that stand as a heavy burden atop more limited goals such as learning effectiveness. How we construe these ideals determines the extent to which online education can meet its promises.

In a radical sense, democratization entails empowerment and transformation. It is the vision inspired by Srinivasa Aiyangar Ramanujan, the great self-taught

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Hindu mathematician, who at the age of 16 read G. S. Carr's book "Synopsis of Elementary Results in Pure Mathematics" (1886/1970), a compendium of theorems and demonstrations aimed at helping English college students prepare for the Tripos examination (a final examination for the B.A. degree at Cambridge University). Ramanujan, who had already shown mathematical skills, worked his way through Carr's book and used it as a point of entry to a discipline in which he would become a major player (Kanigel, 1991). Ramanujan's story is one of marginality (he grew up in a poor village 100 miles from Madras, with limited educational opportunities) but also one of access and empowerment. Yet, setting aside his exceptionality, his story is not unlike that of Anna Ticknor's students or that of thousands of individuals, in conditions of social or geographical marginality, who have benefited from quality distance education and from access to empowering educational materials. It is true that self-teaching does not constitute distance education in the proper sense. It is also true there is much serendipity and romanticism in this view of democratization and openness. However, online initiatives should not underestimate the profound effects that are produced when knowledge is made accessible.

The promise of democratization and openness can also become a reality when online instruction (particularly of the stand-alone variety) is used to support students who need additional learning opportunities to keep on track. In this view, online instruction plays an auxiliary role to traditional education, yet one that can make the difference between dropping out and staying on course. Online instruction as an auxiliary to traditional classroom education can also be helpful to faculty members in institutions of higher education with limited resources. Such faculty members can benefit from online education that makes accessible novel ways of considering and teaching subject matter.

However, whether we expect the outcomes of online initiatives to be major turning points or minute improvements in learning, the ideals of democratization and openness imply a dialogic dimension, which may draw on online technology that supports interaction. Democratization does not amount simply to granting access, if we understand access as a one-way action, analogous to what some faculty do when they dispose of books they no longer want by putting them on a table located in the department's hallway for students to take. Democratization requires offering institutions to engage in and support meaningful dialogues with users (both students and faculty) in a way that promotes community and encourages participation. This responsiveness to the audience and willingness to participate in extended dialogues about the discipline and the nature of student learning make a difference between democratization efforts and the distribution of a commodity in a business model. Thus, in a way, we come full circle with Ramanujan, whose life would have been quite different had G. H. Hardy, the Cambridge mathematician to whom Ramanujan wrote after initiating himself in the workings of mathematics, been insensitive to the effects of the knowledge that members of his own disciplinary community had disseminated (Kanigel, 1991).

Reconsidering the Privacy of Teaching

New technology in education is often used as an excuse to revisit pedagogical actions (Cuban, 1986). Online technology is no exception; what is controversial is whether online platforms allow us to revisit teaching in productive and innovative

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ways. We contend that one of the most important promises of online education is not so much in the quality of the resulting products as in how online environments allow educators who develop courseware to enhance the status of their pedagogical practice.

On the one hand, the design process requires professors to render explicit accounts of pedagogical moves and assumptions that pass unnoticed in day-to-day teaching practice but that are worth reenacting in online environments. These pedagogical elements include, among other things, the faculty members' conception of the discipline and the learner, the varieties of student-teacher interaction that they believe are conducive to learning, their use of disciplinary and pedagogical representations, and their take on student assessment. Descriptions of these matters not only constitute the input for the computer modeling of teaching practices but also may lead faculty to a systematic inquiry about the teaching of their discipline and the role of teaching in the advancement of their disciplinary scholarship. This set of reflective practices is what Herbert Simon, in his talk "Need Teaching Be a Loner's Sport?" (1996), referred to as "learning about teaching" and "learning from teaching," respectively.

On the other hand, online education may contribute to making teaching a public and collegial activity. The design of online environments usually is a team effort that brings together different although complementary competences. Decisions about what is desirable and feasible pedagogically and technologically are made through conversation and debate. Furthermore, the resulting product (i.e., the courseware) becomes a permanent record of teaching, one that is open to public scrutiny and critique. Thus online initiatives contribute in Shulman's sense (2004) to making teaching a community property.

It is clear that the ultimate potential of online technology to enrich higher education resides less in the technology itself than in the practices and discourses that it prompts individually and institutionally. Faculty members are often drawn to online education just for the fun of it, as a way to shake up pedagogical routines or add enjoyment to their daily activities. In a sense, it is not unlike the interest in writing as an intellectual and compassionate activity that inspired some of the earliest correspondence instructors. Yet artifacts and tools are not innocuous. They bring about change. How significant this change is depends on the practices and discourses that give artifacts and tools their purpose and meaning.

Online education may fail to go the distance of our expectations if, instead of being a new venue of scholarly work for mainstream academics, it becomes a second-class form of education (i.e., one suitable for others but not for ourselves). It may also fail to go the distance if technological solutions and pedagogical perspectives are imposed at the expense of diversity and variation. Finally, it may fall short of our expectations if, instead of aiming at the improvement of learning, it simply reproduces present educational deficiencies.

Online education may well go the distance and beyond, if it reduces educational inequality by providing wide access to enticing learning opportunities in a way that is mindful of students' individual differences and the nature of the subject matter. Online education may also play a decisive role in the development of the scholarship of teaching in higher education by granting visibility to teaching and making it a collegial activity. If these promises are met, then perhaps online education will become a meaningful experience for students and faculty alike.

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Note

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