# OPTIMIZING
## TECHNOLOGY'S
# PROMISE

Brenda J. Allen

n 1989, I was recruited to the University of Colorado Boulder as a "twofer."[1] Because I am black and female, they could count me in two categories of diversity. This mattered because the university was striving to increase numbers of diverse faculty. At that time, I had been teaching a course, Computers and Society, at Howard University in Washington, D.C. The course was designed to help students understand the growing role and potential impact of computers in the world. I also was completing my dissertation in organizational communication studies. My research centered on how organizations adopt new computer-mediated communication technologies, specifically a brand-new technology known as *electronic mail*. I came to Colorado to teach and to continue my research in that area.

However, not long after I arrived, I became intrigued by campus dynamics related to identity, especially in terms of race and gender. Within a few years, I changed my research focus to social identity, which has remained my primary area of scholarship and teaching. Back then, I hoped to combine my original interest in technology with issues of diversity. I even described myself as a 21st-century organizational communication scholar who looks at two significant issues facing future organizations: diversity and technology. I did not follow through on that vision. However, I expanded the scope of diversity to encompass not only gender and race but also categories such as ethnicity, social class, sexuality, ability status, nationality, age, and the intersections of all of these, with a focus on equity in higher education. I have maintained my interest in information and communication technology. In fact, I'm usually the first (and often the only member of the leadership team on my campus) to adopt the latest device or app for professional and personal use.

So I am pleased to return here to the idea of exploring diversity and technology by considering this guiding question: How can we optimize the promise of technology in service to an increasingly diverse society? More specifically, what are implications of that promise for using technology for teaching and learning? Although these questions matter for higher education around the world, I will concentrate on implications for the United States.

Let's clarify our terms. First, *optimize* means to make something as effective, perfect, or useful as possible. Next, how do we define *technology*? Etymologically, the word *technology* is from the Greek *tekhnologia*: "the systematic treatment of an art, craft, or technique." In this sense, technology concerns the ways in which we systematically engage with the world. When I was teaching the computers and society course, I relied on a definition from media theorist Marshall McLuhan, who said: "I think of technologies as extensions of our own bodies, of our own faculties—whether of clothing, housing, and more familiar kinds of technologies like wheels, stirrups, and

such, extensions of the various parts of the body. The need to amplify the human powers in order to cope with various environments brings on these extensions, whether of tools or furniture. These amplifications of our powers, sorts of deification of man, I think of as technologies."[2] Thinking of technologies as extensions and amplifications of our powers has intriguing implications for how we use them for teaching and learning. For instance, from whose bodies and whose faculties do technologies tend to extend, and what powers do we strive to amplify? Although McLuhan's definition encompasses a wide range of possibilities, we will concentrate on information and computer technology.
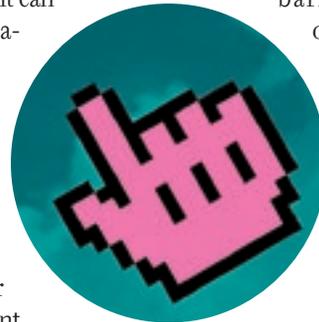
## Promises, Promises

To optimize the promise of technology for teaching and learning, we need to specify what we think it can do. Considering implications for diversity, I'm reminded of the words of American theologian Richard Shaull. In the foreword to Paulo Freire's book *Pedagogy of the Oppressed*, Shaull wrote: "Education either functions as an instrument which is used to facilitate integration of the younger generation into the logic of the present system and bring about conformity to it, or it becomes 'the practice of freedom,' the means by which men and women deal critically and creatively with reality and discover how to participate in the transformation of their world."[3]

To achieve the latter, we can use technology to democratize education, personalize pedagogy, authorize and equip students to control their own learning, move our schools and our educa-



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tional systems out of the Industrial Age, prepare students for an increasingly multicultural world, and improve efficiency in teaching and learning. Moreover, because technology can provide access to more information and more data than ever before, it shows promise for removing boundaries and providing access to growth and learning for literally everyone. As Jamie Lathan (dean of distance education and external programs at the North Carolina School of Science and Mathematics, a magnet school in Durham) observed, technology "makes learning and teaching more flexible and accommodating and makes up for deficiencies in the society."[4]

## Barriers

To attain the promises of technology cited above, we must hurdle many barriers, especially barriers of access. For instance, Jan van Dijk framed access as a multifaceted concept that includes four types of access: motivation; physical and material; digital skills; and, usage. Whether or not someone is *motivated* to access technology depends on variables such as amount of time to engage with technology, technical knowledge, financial resources, cultural norms, and social relationships or networks that encourage or discourage use. *Physical and material* access refers to literal access to technology. Categories of *digital skills* include operational, formal, informational, content-creation, and strategic. *Usage* comprises amount and variety of use. Van Dijk notes that although motivation and physical access have increased in developed countries, digital skills vary widely, as do types and amount of usage. He describes a persistent and

growing digital divide that consists of "increasingly complex social, economic, and cultural differentiation" with detrimental implications for members of underrepresented groups (e.g., those in a lower social class, racial-ethnic minorities, and immigrants).[5]

Distinctions in access and the digital divide are particularly relevant to a prevailing attitude among some educators, those who refer to students' constant use of technology without knowing what they are using, how they are using it, or how well they are using it. This point is further exemplified in "Digital Literacy in 2015," which states that although one in four millennials want to improve their digital literacy, 37% view the Internet as "scary"—a higher percentage than respondents ages 35 and over.[6]

In addition, access assumes that a person not only knows a technology (and what it offers) exists but also has the propensity and the curiosity to discover and use the technology wisely. This is again pertinent to some educators who may resist adopting technology for teaching and learning based on limited or dated information about that technology. In addition, some of them seem to dismiss students' use of certain technologies without experiencing those technologies for themselves. As an example, during a recent weeklong faculty seminar, one of the younger participants persuaded me to download *Pokémon Go*. I loved it, and I was surprised when I realized it has potential for teaching and learning (e.g., to learn about historic landmarks). I was pleased to learn that some educators are exploring how to use this game to enhance their teaching.[7]

## Challenges/Opportunities

Now that we have considered some of the barriers related to optimizing technology's promise, let's delve into challenges and opportunities related to diversity in higher education.

*Diversity Matters in Higher Education*
Institutions of higher education are increasingly addressing diversity as an ethical imperative to provide access for traditionally disenfranchised groups and to be more inclusive. They often aim to hire more faculty and staff from underrepresented groups and to prepare all students to be educated global citizens who can interact effectively in multicultural contexts. Some of them recognize and seek the bottom-line benefits of diverse workforces and student bodies: enhanced productivity, creativity, innovation, loyalty, and improved morale. Thus, diversity has also become an economic imperative and an economic asset in higher education.

Many institutions are implementing programs designed to foster success for diverse students. An example is the Equity Scorecard approach, which invites institutions to take responsibility for racial-ethnic differences in students' performance in core courses such as writing and math by applying proven practices that include helping faculty and staff to examine and revise their instructional and academic support practices.[8] Colleges and universities are also trying to be proactive about social, legal, and political issues such as race-based college admissions policies, immigration debates, same-sex marriage laws, police shootings of African Americans, transgender rights, Islamophobia, and domestic and international acts of terror, as well as a rise in student protests about these matters.

A growing body of research provides direction for meeting these and other challenges. Promising practices include crafting and executing strategic plans to build institutional capacity for diversity. This approach advocates framing diversity as an institutional priority and cultivating inclusive learning and work environments for *all* faculty, staff, and students. It also advises providing professional development to faculty and staff on topics such as implicit bias, which can have negative implications for members of underrepresented groups. To facilitate these processes and practices, many institutions are creating or reassigning diversity officer positions in executive-level roles.[9]

Diversity also has a bearing on other, related developments in higher education. For example, a *Chronicle of Higher Education* report entitled *2026, The Decade Ahead* notes a surge in college/university enrollment over the past four decades, due largely to perceptions that a degree is a ticket to financial success and that the country needs to be more educated. The report notes that the rising costs of higher education may prohibit certain students from attending college.[10] Moreover, even when students gain access, their likelihood of graduation varies according to race and socioeconomic status. Although college graduation rates in the United States have risen overall, with 40% of the population ages 25 to 64 having a degree, the rate is 27% for blacks and 20% for Hispanics.[11] Additionally, a 44 percentage point gap exists between wealthy students and poor students who earn bachelor's degrees.[12] And, numbers of college/university dropouts have increased.[13] These achievement gaps lead to earning gaps with grim implications for the ability of the United States to prosper and to be competitive globally. These statistics reveal a widening gap between the haves and the have-nots in the United States, as further seen in

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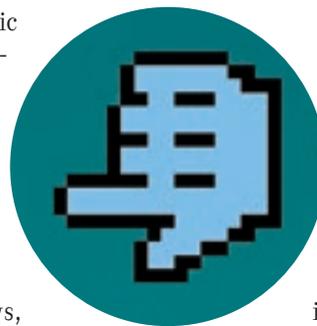
demographics related to students and faculty.

## Students Today and Tomorrow

The main market for college/university applicants continues to be 18- to 22-year-olds. However, that is changing as more working adults enter higher education. In addition, the racial-ethnic composition of prospective students is shifting. By 2020, "more than half of the nation's children are expected to be part of a minority race or ethnic group," according to the U.S. Census Bureau, referring to children under the age of 18.[14] 2026, *The Decade Ahead* foretells a U.S. regional supply-demand mismatch, characterized by areas in which numbers will decrease significantly while other areas can expect more growth. The area of the country projected to witness the most growth is the South—especially Texas. This projection is significant because of the high number of Latino/Latina students in that region. Drops in numbers of students in other areas of the country also are tied to race. In places where the number of white students is declining, institutions accustomed to mainly white applicants will no longer have that deep pool from which to draw.[15] Moreover, due to racial differences in high school graduation-attainment rates, a higher proportion of students of color than white students will not even be eligible for college. In Colorado, for example, high school graduation-attainment rates are 83% for whites, 70% for African Americans, and 65% for Hispanics.[16]

Although forecasts about student diversity in higher education usually emphasize a "new majority" of persons of color in the United States, we also should be mindful of other demographics, including the growing numbers of veterans, students with disabilities who have received mainstream K-12 education, international students, and immigrants (documented and undocumented) who aspire to attend college. Also, many students will be the first in their family to seek a college degree.

Thus, the pool of prospective students will probably become progressively more diverse.

## Faculty Today and Tomorrow

The professoriate is graying. At many institutions, baby boomers (born between 1946 and 1964) compose 25% of tenure-track faculty, and many are approaching the age of 70.[17] Most of these older tenured faculty (like me) are staying on the job. Because many of these faculty members have been at their institutions for a long time, their salary affects the overall salary pool, thereby forcing institutions to rely more heavily on non-tenure-track faculty, who are paid less. Almost 50% of faculty are non-tenure-track and part-time, leading to a bifurcation in which older faculty are mostly tenured and younger faculty are part-time and not on the tenure track. Tenure-track faculty now make up less than one-third of the faculty; in 1969, they accounted for 80%.[18]

In addition to age, faculty members' race matters. In fall 2013, of all full-time faculty in degree-granting postsecondary institutions, 79% were white (43% white males and 35% white females), 10% were Asian/Pacific Islander, 6% were black, and 5% were Hispanic. Among full-time professors, 84% were white (58% were white males and 26% were white females), 9% were Asian/Pacific Islander, 4% were black, and 3% were Hispanic.[19] As these statistics imply, gender differences also count. For example, women and underrepresented minorities are disproportionately represented in non-tenure-track roles.[20] Moreover, similar race and gender disparities exist within the ranks of higher education IT staff and leadership.[21]

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## The Status Quo

The preceding discussion about diversity in higher education has powerful implications for how we might optimize the promise of technology in service to an increasingly diverse society (and therefore student body). In addition to contrasts between generations, we must attend to glaring racial-ethnic differences between prospective students, as well as race, ethnicity, gender, age, and rank distinctions among faculty. These differences are significant to how we recruit, retain, teach, evaluate, mentor, and advise students. Moreover, they can impact the future of the professoriate. We should strive to cultivate the next generation of faculty among the richly diverse group of students who will be entering our colleges and universities. Their interest in such a career path will depend on how responsive faculty in all ranks seem to be to their needs and identities and on how attractive the role seems to be. We also should be aware of differences in technology experiences and expectations between and among faculty and students as implied in van Dijk's model of access. If we don't know what to look for and think about, we might maintain the status quo.
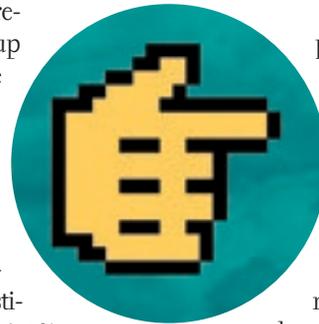
## Trends

Examining trends in technology provides additional guidance for how we might proceed. Massive Open Online Courses (MOOCs) are an important development in higher education. Although they have not drawn students away from traditional institutions (as anticipated), they seem to have affected

faculty approaches to teaching and learning. As some faculty implemented MOOCs, they began to reflect on *how* they teach. Edward Maloney, executive director of Georgetown University's Center for New Designs in Learning and Scholarship, notes: "The MOOC momentum pushed people to think about teaching in ways they hadn't before. That's a huge shift."[22] Consequently, some institutions are experimenting with teaching strategies such as fewer lectures and shorter blocks of discussion time. They also are working with "flipped classrooms," which use technology to move "the more passive elements of learning (watching a lecture, reading a chapter, etc.) outside of the classroom, so that more class time is available for interactive, hands-on learning." In addition, they are applying technology to collect, track, and aggregate real-time data about students' learning and about how students interact with classroom technology.[23]

A MOOC example that informs this discussion is the Global Freshman Academy at Arizona State University. Last year, they partnered with edX to allow students to try out college with limited risk. They offer online freshman-year MOOCs available worldwide, with no admissions process, for full university credit. Students pay and apply for credit after they successfully complete classes. Although this approach could widen the gap between wealthy and low-income students, it also might bolster the confidence of low income and first-generation students. Also of note, this program is using adaptive learning software in its introductory college algebra course—the

first time that product has been used for a MOOC.[24]

The *NMC Horizon Report: 2016 Higher Education Edition* describes a variety of other ways that institutions are employing new technologies in teaching and learning. It discusses key trends accelerating technology adoption, significant challenges impeding technology adoption, and important developments. Although I can discern implications among all of these for valuing diversity, a few are especially noteworthy. One key trend for 2016 is "rethinking how institutions work," which stems from the premise that higher education is undergoing a long-term transformation. Contending that traditional systems may be inefficient for nontraditional students, one feature of this trend is to explore alternative modes of delivery and credentialing to adjust to students' diverse needs. Institutions are experimenting with emerging models like hybrid learning and competency-based education.[25]

Among challenges, the need to improve digital literacy stands out. The report notes that this new category of competence is "affecting how colleges and universities address literacy issues in their curriculum objectives and teacher training programs." It echoes an earlier point that although students may seem more digitally literate than their predecessors because they have been entrenched in technology-rich contexts, research reveals that they may not be as confident in using technology in higher education contexts. To address digital literacy effectively, institutions will need to consider the heterogeneity of students and faculty as

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implied in the demographics cited earlier. Another interesting development is BYOD (Bring Your Own Device, also referred to as BYOT, or Bring Your Own Technology): staff, students, and faculty bring their own laptops, smartphones, tablets, or other portable devices (e.g., smartwatches, wearable devices, and smart objects) with them to their learning or work environments.[26] The report also cites new pedagogies and active learning models that promote hands-on and student-centered experiences that also use technologies with which students are familiar. For example, marketing students at Indiana University used Instagram for campaign projects, and San Jose State University collaborated with Facebook to expose young women to computer science.[27]

Colleges and universities also are implementing new models for faculty engagement with teaching and learning technology. *2026, The Decade* Ahead describes a design-build approach in which a faculty member works with an instructional designer, citing it as one of the hottest jobs in higher education today.[28]

Another trend in technology use in higher education involves big data analytics—that is, examining huge data sets to discover patterns, correlations, client preferences, and other useful information. Georgia State University is applying big data analytics to help its diverse student body. Of its 32,000-plus students, 56% receive federal Pell Grants, 60% are nonwhite, and 30% are the first in their family to attend college.[29] The institution has striven to create a "culture where numbers matter," using data to advance student success. It has developed sixteen programs focused on student retention and graduation. This collaborative effort has helped the university "better serve individuals straying from the track to graduation. By directing more resources to students in the 'murky middle'—not just those at the top or bottom of their class—they've created a more strategic advising program, significantly narrowed the achievement
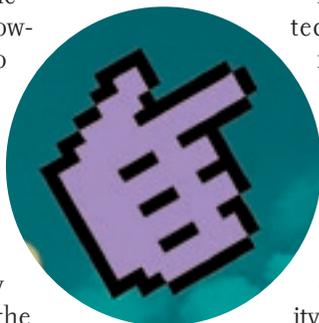
gap, and improved graduation rates." The initiative has yielded impressive economic consequences: the institution saves $3,000,000 for every 1% improvement in retention rate.[30]

## Recommendations

Now that I have shared selected information and insights in response to our guiding question—"How can we optimize the promise of technology in service to an increasingly diverse society?"—I will conclude with recommendations for institutions and individuals.

*Institutional-Level Recommendations*
My primary recommendation is for offices that are responsible for separate areas of diversity, teaching and learning technologies, and faculty development within their institutions to work with one another. They should compare, contrast, and converge processes, principles, and practices to develop and implement resources, policies, student-centered initiatives, and professional development opportunities for faculty and staff. For example, to develop resources for digital literacy for faculty, staff, and students, they might incorporate best practices based on knowledge about cultural and generational differences in learning styles combined with insights from van Dijk's model of technology access.

Institutions also need to develop and implement strategic plans for (1) enhancing diversity and (2) being proactive in applying technology for teaching and learning. The latter might be included in a digital strategic plan that includes other aspects of technology use within the institution. These strategic plans should incorporate data-driven approaches such as big data analytics and the Equity Scorecard. They should provide resources and reward faculty and staff to engage in capacity-building efforts while also holding them accountable (e.g., through merit evaluations). In addition, these plans should offer training to faculty and staff on topics such as how to disrupt implicit biases that may influence hiring decisions, how they interact with students and

colleagues, as well as their decisions about how and whether or not to use teaching and learning technologies. Regarding diversity and education, institutions should infuse diversity throughout the curriculum, rather than limiting learning about diversity to single courses. They also should encourage and value research that advances knowledge and practice related to diversity as well as teaching and learning technologies. These ideas stem from research about utilizing an organizational development framework to transform higher education.[31]

Institutions also should develop partnerships with edtech companies for mutually beneficial purposes. Companies can consult with administrators and faculty to discern how the companies can help them to accomplish relevant strategic priorities. Institutions can also collaborate with edtech companies to develop recruiting processes (e.g., internships or experiential learning) that can result in diversifying the companies' workforces. Given current and projected demographics, to be competitive, edtech companies need "to understand the challenges and opportunities of a diverse student body, and part of that understanding is a commitment to inclusive hiring and leadership development."[32] Furthermore, referring to McLuhan's notion of technology as extensions, this strategy might help edtech companies to develop products and content that incorporate perspectives and preferences of underrepresented groups rather than those of persons who have dissimilar backgrounds.

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> **To optimize the promise of technology in service to an increasingly diverse society, we will need to prepare all faculty and staff to be proactive in both areas—technology and diversity—separately and combined.**



and staff to be proactive in both areas—technology and diversity—separately and combined. Institutions should provide professional development that helps faculty effectively use the growing array of technologies to teach students from diverse backgrounds. Faculty also deserve professional development that will help them improve their teaching skills to be more inclusive and culturally responsive. In an ideal situation, they will have opportunities to delve into both topics simultaneously. Non-tenure-track faculty should be included in these endeavors, not only because they are providing a high percentage of teaching service, but also since they tend to be more diverse than tenured faculty. Consequently, they may offer important insights on inclusive practices. Moreover, staff (including high-level administrators) also should receive professional development in both areas as relevant to their roles. Finally, institutions should encourage and incentivize research projects that help to advance knowledge and practices about teaching and learning technology and diversity, separately and combined.

At CU Denver, Margaret Wood, director of the Center for Faculty Development, and I have established a partnership to provide faculty with professional development related to diversity and inclusion. In addition, Wood plans to appoint a teaching fellow from the School of Education and Human Development to focus on inclusive teaching and learning, beginning with two half-day sessions in October; these sessions will help faculty to develop concrete strategies for inclusive teaching through classroom practices, course design, and both formal
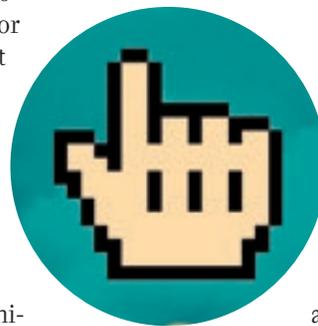
and informal interactions with students. The center is also offering numerous "Appy Hour" workshops on using contemporary technology, including Snapchat, Jing, Snagit, and ThingLink, for teaching and learning. Thanks to what I've learned recently about technology and diversity, I will ask Wood to collaborate with me on developing resources that focus on both topics. I also will invite colleagues from our Office of Information Technology to join us. In addition, I plan to actively involve students in these and other endeavors.

To achieve the ambitious goals implied in these recommendations, institutions should invite students' input, solicit their feedback, and empower them to initiate change. For example, due in part to affirming relationships between student leaders and members of the chancellor's cabinet, our Student Government Association submitted a resolution last year to our faculty assembly that cited students' need for a comprehensive understanding of diversity issues as well as gaining a tangible competitive advantage as leaders within their professions. They requested that all faculty receive professional development to help them engage effectively and humanely with our diverse student body and to better prepare students for an increasingly multicultural world.

### Individual-Level Recommendations

For institutional initiatives and strategies to succeed, individual faculty and staff must do their part. Moreover, individuals should not wait for the institution to try to effect change. In case you have not considered or are not engaged in any of the following, I invite you to consider these recommendations. Focus on the "learning" part of teaching and learning. Learn about promising practices and new teaching and learning technologies. Also, try to be familiar with the types of technologies that students at your institution tend to use socially and for educational purposes. If you are a faculty member, ask students about the technologies they use, and invite them to co-create learning experiences using those technologies. After all, if you don't know what a technology is all about, you can't critique or judge it appropriately, nor can you make informed decisions about how to use it for teaching and learning. If you are an innovator or early adopter of technology, share your insights with your colleagues.

Learn about diversity demographics at your institution and in your area. Become more committed to acknowledging, appreciating, and advancing diversity in all aspects of your role. Work within your spheres of influence to help your department and your institution attain the promise of diversity. Request or offer professional development and resources to build capacity for diversity, including methods for creating more inclusive and respectful workplaces. Such environments will enhance the likelihood of reaping the benefits of diversity.

## Conclusion

I encourage you to work toward achieving Shaull's vision of education as "'the practice of freedom,' the means by which men and women deal critically and creatively with reality and discover how to participate in the transformation of their world."[33] Become more thoughtful, more heartfelt, and more committed in terms of what you have to offer and what we have to gain. Let's take action to optimize the promise of technology in service to an increasingly diverse society for the betterment of higher education and student success, the betterment of our own quality of work-life, and therefore the betterment of the world at large.  ■

### Notes

This article is an extended version of the keynote address delivered at the Colorado Learning and Teaching with Technology (COLTT) Conference, August 3, 2016.

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