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Campuses can use technology to implement universal design in instruction and learning, with benefits for all students.

Harnessing the Potential of Technology to Support the Academic Success of Diverse Students

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Higher education administrators are well aware of the time, energy, and resources devoted to programs on their campus that have been designed to enhance the retention and success of diverse students. Similarly, administrators recognize the rapid rate of change in the technology marketplace and the significant costs associated with acquiring, implementing, and maintaining educational technologies required to keep a college or university up to date. However, unless technology is a personal passion of the higher education administrator, it is difficult to properly evaluate the latest widget from new tools that have significant potential for enhancing academic success. Seldom do we examine the nexus of technology and its potential role for fostering academic success for students in the bottom 50th percentile.

The purpose of this chapter is to introduce administrators to the principles of universal design (UD) for learning. The goal is to explain how UD principles can be implemented using technology, in ways that will explicitly target the special needs of learners with disabilities, but will offer educational benefit to all students. The value of this approach is that busy administrators will be able to articulate a clear philosophy regarding the alignment of technology in postsecondary education and improved student outcomes; “check point” questions at the end of each subsection can further assist in clarifying individual and campus philosophies. On a practical level, readers will learn about resources, strategies, and tools that will support faculty and students in building academic success.

Recognizing Academic Diversity

American classrooms at every level of education are more diverse than ever before (Gebeloff, Evans, and Scheinkman 2010). However, few teachers and professors are adequately prepared to effectively teach diverse learners. As a result, we tend to play “Mirror, Mirror on the Wall—Who Is the Best Teacher of Them All?” Rather than look at all of our students, we tend to think about our best students and walk away from the mirror with great satisfaction. Since our teaching prowess was just verified, we believe that the chronic underachievement of students in the bottom 50th percentile is not our problem. Those students should be required to take remedial classes, go to the tutoring center, visit the writing center, or be referred to the disability student services office. After all, we are great teachers.

Unless professors and administrators understand that academic diversity is a characteristic, not a flaw, of every classroom, campuses will continue to devote significant resources to providing remedial support services and individual disability accommodations. Arguably, current student support services are not effective when we see poor retention rates, high dropout rates, low graduation rates, and excessive time for degree completion within subgroups of diverse students (e.g., students of color and students with disabilities) (Hurst and Smerdon 2000; U.S. Government Accountability Office 2009). Undoubtedly, the student success initiatives currently being implemented on campuses are explicitly designed to address one or more of the statistics associated with academic failure.

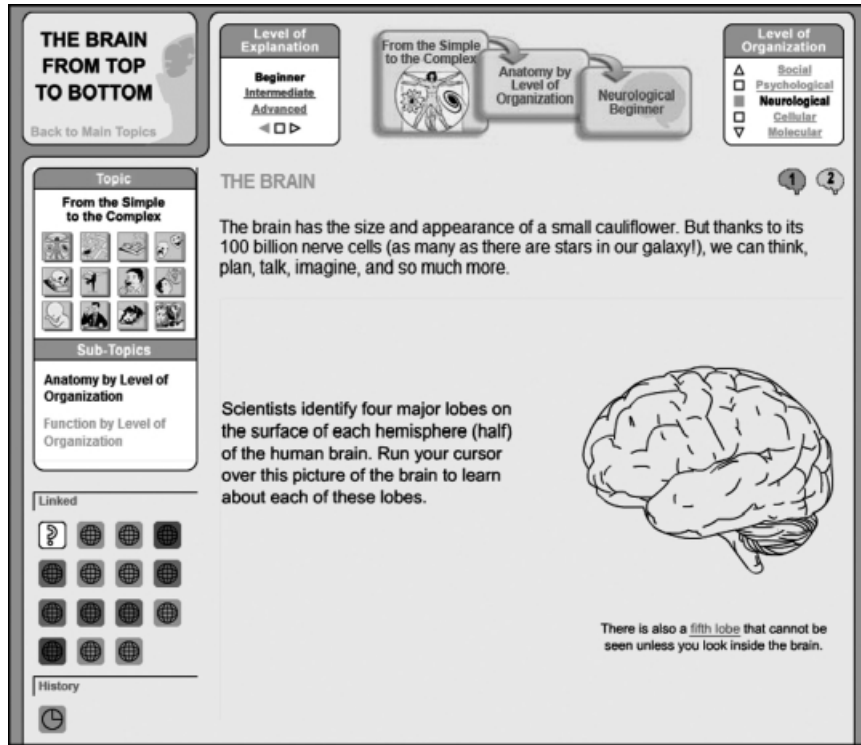
Efforts to enhance the success of twenty-first-century learners will require a fundamental shift in thinking about, and responding to, learner differences. Rose and Meyer (2002) argue that we should not think about students as being disabled, but rather consider the curriculum disabled, as it poses barriers to access, engagement, and success. Tomlinson (2004) recommends thinking about learning differences as a Mobius strip: a continuum of knowledge and skills with no clear demarcation on the journey from the starting point as novice and the end point as expert. McLeskey and Waldon (2007) suggest that classrooms must be places where differences are ordinary. In most classrooms, the acceptable range of learner variance is very narrow, and differences outside of this band are considered problems for someone else to deal with.

Checkpoint. Is academic diversity a condition to be remediated or celebrated? When students struggle in a course, what does this signify? To what extent should every class be explicitly designed to support students with diverse interests, background knowledge, and skills?

Responding to Academic Diversity by Proactively Valuing Differences

If we begin with the premise that every classroom is composed of diverse learners, we start from a different point than traditional instruction, where

Figure 4.1. Screen Print of the Website “The Brain”
(at <http://thebrain.mcgill.ca>).



content is the exclusive focus. Rather, we begin to think about how we can support diverse learners before they have a chance to fail. This mind-set establishes the need for technology, since digital media offers flexibility and tools not available with traditional instructional tools of chalkboards, textbooks, paper, and pencils. Indeed, technology is essential for supporting the academic success of diverse learners.

In a traditional classroom that relies primarily on a printed textbook, diverse students may encounter a variety of problems in accessing and understanding the information. In this case, they must seek out campus support services. However, when the instructional needs of diverse students are considered as a curricular design principle, course content can be created in a digital environment, with a wide variety of supports built in that can be used by all learners. Advances in technology afford new opportunities to abandon the mistaken assumption about curriculum design that one size fits all.

Consider the example of a page from the website “The Brain,” as shown in Figure 4.1. This web page contains basic facts about the brain and its anatomy, with a simple line drawing of a brain. The same information could

be presented in a textbook. However, fixed print could pose a barrier for students who are blind or have low vision because they may have difficulty in reading the text. With digital text, all learners can read and manipulate the text to enhance learning. Any student can use browser controls (e.g., view, zoom in/out) to adjust the size of the text and images on a web page. If students are unable to read a section of text, they can highlight the text, copy it, and then paste it into a web-based text-to-speech program like Vozme (<http://www.vozme.com>) to listen to information they cannot read independently. Because this site was created at McGill University, where a majority of students speak French, the entire site is available in both English and French. In addition, the site uses a design principle known as *tiering*, where the text is available at three levels (beginner, intermediate, and expert) to allow students to access the information that is appropriate for their understanding.

Checkpoint. If we truly understand diversity and value learner differences, what should be different about the classroom and instruction, before the students arrive? How can we use our knowledge of student differences and instructional challenges to design learning environments and materials in ways that provide support to all students before anyone fails?

New Insights About Teaching and Learning from Universal Design Theory

Recent advances in cognitive psychology have enhanced our understanding of how the brain works (Bransford, Brown, and Cocking 2000; Jensen 2009; van Gog et al. 2005) and have important implications for the design of twenty-first-century learning materials and environments. These advances have informed the development of a philosophy about universal design for learning. Universal design for learning proactively values learner differences by embedding supports required by some students into learning materials and environments, so all students can use them as needed (Pisha and Coyne 2001; Rose and Meyer 2002; Scott, McGuire, and Shaw 2003). Educators who use this philosophy seek to move beyond the one-size-fits-all paradigm, considering how to provide instruction that allows for three principles of universal design for learning (UDL): multiple means of representing curricular information (e.g., text, video, audio, multimedia), multiple means of expressing what one has learned, and multiple means of engaging in the learning tasks (Rose and Meyer 2002).

One of the key tools for implementing a universal design for learning philosophy involves recognizing the value of digital media. Digital media offers flexibility that is not found in print. Whereas printed text is fixed (size, color, spacing), the physical appearance of digital text can be altered by the user, converted from text to audio, and translated from one language to another. Other supports (e.g., definitions, hints, how-to guides) and scaffolds (i.e., avatar coaches) can also be embedded in digital text to support

diverse learners. As a result, technology is deemed to be essential in supporting UDL (Edyburn 2010).

One of the primary factors contributing to technology's application of the UDL principle of engagement involves the interactive nature of technology. Completing math problems on the computer, with feedback, is far superior to completing the same problems on paper, turning the assignment in to the professor, and waiting two to five days for feedback on one's performance. Additionally, interactive digital learning materials provide significant opportunities for choice, personalization, and just-in-time support. The research on the development of expertise is very clear: repeated engagement, over time, with tasks of increasing difficulty, is the recipe for fostering high levels of expertise (Bransford, Brown, and Cocking 2000; Hattie 2009). UDL offers a framework for engaging diverse learners in deeper and more meaningful learning.

Campuses are encouraged to develop diversity blueprints or campus diversity assessments. That is, how do we understand the important ways that students are different (e.g., background knowledge, writing skills)? Thinking about each of these factors as a continuum provides a mechanism for differentiating and planning supports. Then, how can this blueprint be used to develop universal design strategies that ensure that these differences are valued and supported? Aligning technology initiatives with the diversity blueprint will be a significant step toward investing in academic success.

Checkpoint. Educators and administrators frequently make assumptions that all learners learn like they do. As a result, we are often surprised when students struggle to be successful in the classroom. How can we facilitate discussions about recent advances in the learning sciences, to create instructional environments and materials that proactively value academic diversity and engage students in developing high levels of expertise? How can we help faculty move away from goals of covering the curriculum and toward goals of teaching for understanding?

Applications of Technology

Surveys of technology trends in higher education routinely identify the ever-shifting focus on what is new (Johnson, Levine, and Smith 2009). Higher education administrators frequently receive proposals about the need to acquire the latest technologies (e.g., iPads, e-book readers, cloud computing, digital whiteboards, 1-1 laptop initiatives). However, these proposals are usually based on the needs of early adopters to have the latest technologies. Administrators should challenge the early adopters who advance these proposals to explicitly define how diverse students, including students with disabilities, will benefit from these technological innovations. We must be cautious when adopting technologies without a clear understanding of their value for learning. Unfortunately, purchasing more digital whiteboards is not likely to have the same impact as purchasing netbooks. Therefore,

administrators are advised to encourage initiatives on the learning side of the teaching and learning equation.

When faculty members provide readings in multiple formats (e.g., print, PDF, HTML), we see evidence of enhanced access to the curriculum. When students are taught to use the AutoSummary feature in Microsoft Word to create summaries of challenging readings, we see evidence of enhanced engagement and outcomes as a result of their efforts to alter the challenge level. When faculty members use tic-tac-toe grids to provide their students with choices for completing a learning assignment, we see evidence of enhanced engagement. When faculty members make assignments that require collaborative writing using Google Docs (<http://docs.google.com>) or Zoho Writer (<http://writer.zoho.com/>), we are able to collect local evidence of enhanced engagement and outcome.

Checkpoint. Many campus administrators are responsible for approving technology requests that are prepared simply to remain cutting edge. Such initiatives will facilitate change in the academic performance of diverse students. In what ways can administrators use the acquisition of technology as a core strategy for supporting the academic success of diverse students? Given a choice between investments in technology that enhances teaching, and investments in technology that enhances learning, preference must be given to the latter.

Leadership and Action Planning

Few postsecondary institutions have a vision for deploying technology in ways that work toward reducing achievement gaps. As a result, higher education administrators are encouraged to consider top-down, bottom-up, and policy change strategies that align technology with institutional initiatives for enhancing the academic success of diverse learners.

Top-down change strategies are necessary in defining the mission and core values of learning organizations (Senge et al. 2000). Therefore, attention should also be devoted to technology supports that are provided outside of the classroom. For example, web-based forms such as Ask a Librarian allow students to seek help whenever and wherever they need it. Likewise, online writing labs (OWLs) can offer resources, guidance, and support for students as they write class papers. Students who need specialized technology tools, like scan-and-read systems, should be able to access free assistive technology (see, e.g., <http://www.rsc-ne-scotland.ac.uk/eduapps/help.php>) through campus technology services (Houchins 2001). As many campuses expand their online course offerings, they are recognizing the need to consolidate and improve the profile of online campus support services.

Administrators must also create a culture that facilitates bottom-up change. That is, how will faculty and staff have the resources to enhance the success of diverse learners? Workshops on universal design for learning will facilitate this conversation and subsequent skill development (Izzo, Murray,

and Novak 2008). Course improvement minigrants will provide faculty with the incentive and time to learn new tools and integrate UD for learning strategies in their courses. In addition, faculty should be challenged to use basic research designs (e.g., pre-post, single subject) to collect evidence about how the instructional innovations affect student learning.

An important tool for higher education administrators is policy change. When institutional policies prevent faculty from installing software on a campus computer, or locked ports prevent students from using accessibility software on their USB drives, it is clear that the institution is confused about whether security is more important than student learning. The policy message must be clear: all campus technology efforts must focus on fostering higher levels of student learning.

Checkpoint. What does a higher education administrator need to know and do, relative to using technology, to support diverse students? One critical action is to advocate for the alignment of technology and improved student outcomes. Universal design for learning provides a framework for proactively valuing academic diversity by explicitly targeting the special needs of diverse learners, while offering educational benefit to all students. Finally, administrators need to employ top-down change strategies, facilitate bottom-up change strategies, and utilize policy change as a means of making differences ordinary.

Summary

Whereas campus administrators are faced with relentless demands to acquire new technologies as a means of keeping up with all that the marketplace has to offer, it is necessary to align technology acquisition with institutional goals and activities for enhancing retention, reducing time to degree completion, and raising graduation rates. Universal design for learning (UDL) offers theory and practice principles for designing learning environments and materials where supports are embedded to support learning for all students. Administrators are encouraged to use top-down, bottom-up, and policy change strategies to utilize the latest advances in the learning sciences to inform the acquisition and deployment of technologies. Such efforts must be considered strategic investments in the success of all students.

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