The 360° Model for Transforming Teaching and Learning with Technology

Focusing technology initiatives on learning while aligning them with the institutional mission can transform teaching and learning

By **Dennis A. Trinkle**

Over the past decade, many colleges and universities have invested heavily in information technology in the belief that it would enhance learning and enrich the student experience. Several recent high-profile reports and articles, however, argue that most investments in technology have not paid off. In their study "Thwarted Innovation: What Happened to e-Learning and Why," Robert Zemsky of the University of Pennsylvania and William Massy of Stanford University argued that the proliferation of technology has done little to improve teaching or learning at most colleges and universities.[1] Others have pushed the criticism further, arguing that technology has actually hurt teaching and learning in many courses.

Part of the reason for this pattern of failed investments is the absence of positive role models and clear best practices. Amidst the many stories about promising opportunities or the failures of promise, few concrete models have been offered for how technology can positively enhance teaching and learning. This absence of highly visible successes and best practices increases the sense of frustration and concern and leaves institutions without a lodestar.

Some institutions, however, have approached technology carefully and strategically and are successfully transforming teaching and learning. DePauw University in Greencastle, Indiana, offers one story of success. Several years ago, DePauw faculty, students, and staff recognized the potential of technology to enrich learning and grasped that DePauw's historic mission as a liberal arts college required graduating students prepared to succeed and thrive in a broadly digital culture. Consequently, DePauw established the goal of becoming a national model for using technology

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to enhance liberal arts education and to enrich the college experience.

To set the right philosophical and procedural frame, DePauw named its initiatives 361° to capture the goal of preparing students for every path of life after graduation (the 360 degrees) and to create new paths (the additional degree of leadership and innovation). From the beginning, the programs focused on alignment with the institution's historic culture, values, and mission—a dedication to effective teaching and learning and to a liberal arts education designed to prepare students for life's work. There would be no technology for technology's sake at DePauw.

Over the past four years, the 361° programs have done much to extend, enliven, and enhance teaching and learning at DePauw. To borrow the words of one recent graduate, DePauw's initiatives "have fostered

student and faculty use of, and facility with, computers and other digital technologies to develop the skills and languages needed to learn, live, and work in an increasingly technological world." In recognition of its successes, DePauw received the 2004 EDUCAUSE Award for Systemic Progress in Teaching and Learning, and the university was recently named the Third Most Connected University in the country by Forbes.com.

Why have DePauw's technology initiatives and programs succeeded, while some other institutions' investments seem to have fallen short? No one recipe will match every institution's culture and resources, and DePauw's model represents only one of many successful approaches, but 10 simple factors offer a well-established list of best practices (see the sidebar).

Put Learning First

The most important reason DePauw's initiatives have succeeded is the unswerving focus on learning outcomes. DePauw's IT professionals do not encourage using a particular technology because it is new, trendy, or exciting. A technology may be exciting and innovative, but DePauw IT staff do not start with a hammer and look for a nail to drive. Rather, they ask—and encourage faculty members and students to ask—questions such as: What are your learning goals and outcomes? What problems are you trying to solve? What do you wish you could accomplish? What is currently frustrating you? By comparison with institutions that have invested in technology and then tried to generate usage, DePauw works in the other direction, from learning outcomes through pedagogy to technology.

Align IT with Institutional Mission and Culture

DePauw has attained success by focusing only on those technologies that align with the institution's mission and goals. All technology planning is tightly linked to the institutional strategic planning and budgeting processes, and DePauw's technology initiatives are a key objective in the university's overall strategic plan.[2] This tight linkage guides decision making. For example, DePauw recognizes that a fundamental value of residential liberal arts education is close, frequent, and active face-to-face interaction among faculty, students, and staff. High-tech educational strategies for DePauw will succeed only if that interaction remains "high touch." Thus, DePauw has not invested in distance learning. DePauw does invest in technologies that allow instructors to extend the classroom and to connect the 94 percent of time students spend outside the classroom to the learning process, but the university has not poured funds into distance learning facilities or into technologies that would undercut university values and strengths. By contrast, many institutions with unsuccessful investments seem to have adopted technologies blindly, paying little attention to the types of pedagogical practices that they reinforce or the employee skills and talents needed to make them succeed.

Technology Fluency Is the New Liberal Art

Aligning information technology with DePauw's institutional mission and goals led naturally to considering technology fluency a liberal art. The original liberal arts core was conceived as those areas of knowledge thought to be essential to a well-rounded individual and to meaningful, life-long engagement in the world. Liberal arts education today retains this focus on equipping students for any path after graduation and for successfully understanding and engaging their society and culture. In this context, clearly technology fluency must be approached as a liberal art rather than a professional skill or craft. Thinking about technology as a liberal art immediately raises three important recognitions that have encouraged DePauw's successes:

- *As a liberal art, technology must be taught at the level of critical thinking and reasoning.*

Many institutions have focused on skills training, rather than high-order fluencies and habits of mind, at the core of their IT initiatives. Unfortunately, this low-level framework makes it difficult to approach technology fluencies appropriately. For example, in a liberal arts context, an instructor might appropriately teach or deconstruct a principle of visual design. Focusing on teaching how to add a background color to a PowerPoint slide would not be an appropriate instructional moment, however, and the danger of starting low is that it becomes difficult to raise students' attention to the higher-level themes. Thus, a consistent message at DePauw is to focus on the higher-level fluencies, not specific skills and software applications.

- *As a liberal art, technology fluency needs to be broadly integrated into the college curriculum and experience.*

Considering technology fluency as a liberal art has also discouraged DePauw

10 Key Factors for Success

1. Put learning first.
2. Align IT with institutional mission and culture.
3. Technology fluency is the new liberal art.
4. Invest more in people and support than in hardware and software.
5. Good enough is good enough.
6. Support sustainable technologies.
7. Actively involve students.
8. Collaboration is essential.
9. Use technology to remove barriers.
10. Design space to enhance learning and build community.

from following the practice of many institutions that have added stand-alone technology fluency courses. If technology fluency comprises a body of fluencies that all students should master, such as information and multimedia literacy, then these fluencies must be addressed and practiced pervasively. This pervasive approach builds in many learning points and more authentic understandings that students are likely to retain. Evidence from learning research also shows clearly that students learn best through applied learning.[3] Theory connected to practice leads to better learning.

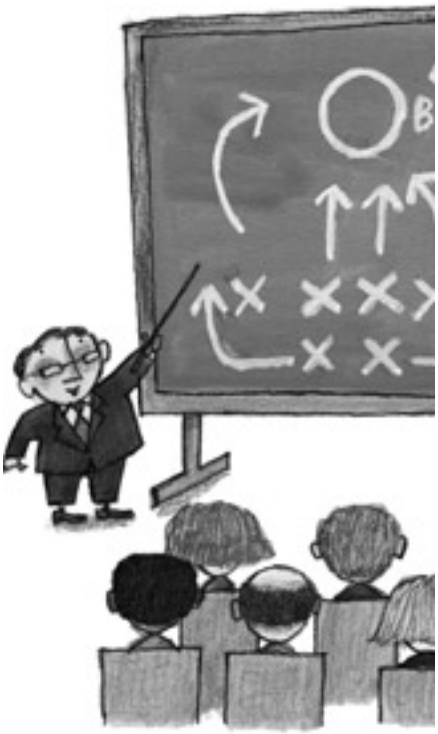
- *As a liberal art, technology should be treated beyond the academic program. Liberal arts schools have long had a mission to shape the whole person—mind, body, and spirit.*

A well-rounded, engaged citizen of the twenty-first century will grapple with many technology-related issues that span the college experience. In the broadest sense, students today need to learn how to approach computing in a healthy manner. Issues such as managing information overload, understanding intellectual property and ethics, following good ergonomic practices, and handling security and privacy well will be central to a long and happy life for students, faculty, and staff alike. Institutions that achieve the greatest success will approach technology in a comprehensive manner that addresses such topics.

Invest in People and Support

Information technology professionals have an axiom that "an unsupported technology is an unused technology." In a recent article for *The Chronicle of Higher Education* titled "When Good Technology Means Bad Teaching," Jeffrey Young made the case that a poorly supported technology is actually worse than no technology at all.[4] He argued that giving teachers technology without training has often done more harm than good to teaching and learning. This is undoubtedly true.

Many colleges and universities have used the field-of-dreams investment model with technology. They have created wonderful technology classrooms, implemented sophisticated course management systems, and added extraordinary digital collections to their libraries. Then, they have stepped back, waited, and watched for innovation and improved learning. Unfortunately, with technology one cannot just build it and expect faculty members and students to come.



A talented group of instructional technology professionals and advanced students also works closely with faculty to help them achieve their course goals

A central catalyst for DePauw's success is investing heavily to provide faculty and students with the support and training they need to learn and use technology effectively. This traces back to alignment. DePauw has a long history of investing deeply in faculty development, and the university offers one of the strongest faculty development programs in the country. To help faculty members develop the comfort and proficiency with technology needed to enrich their teaching and scholarship, the university provides various forms of release time from teaching to projects, stipends to permit a focus on course transformation, and workshops and other events that model best practices. A talented group of instructional technology professionals and advanced students also works closely with faculty to help them achieve their course goals.

These instructional technologists, who work as part of a team called FITS (Faculty Instructional Technology Support), assist faculty in enhancing their teaching and their students' learning through technology.[5] FITS is primarily concerned with the pedagogical applications of technology. FITS initiatives include providing individual consulting to faculty developing technological applications for their classes; fostering collaboration across disciplines and divisions; training and mentoring students who work with FITS to provide support to faculty; offering summer, winter term, and regular semester workshops and forums; meeting with departments, especially during curricular and program reviews, to discuss their use of technology; and assisting departments in developing a comprehensive plan for incorporating technology into their curricula. FITS staff meet faculty at their level of comfort and skill.

The university provides equally extensive support to students. Through DePauw's START (Student Technology Assessment, Resources, and Training) co-curricular program, students can get hands-on help with technology skills or mentoring on high-level digital fluencies. DePauw's student tutors allow faculty to shift skills training outside of classroom hours and to provide students with additional mentoring on digital fluencies such as multimedia graphic design.[6] START workshops cover such topics as general computing concepts, information literacy, word processing, presentations, spreadsheets, database management,

and Web authoring. One-on-one assistance is also available from START's highly trained student consultants to help students learn an application or complete a class project that requires technology.

It is also essential that appropriate support be provided to guarantee that the technologies that faculty, staff, and students depend on work as often as possible. If you do not have confidence that a technology will work when you need it to, you are not likely to use it for teaching. Unfortunately, some institutions constrain costs by providing only a bare-bones staff to help resolve technical problems and repair equipment. DePauw has increased success and faculty use by doing the opposite. Technologies fail, and systems are not yet at the level of reliability needed for optimal teaching and learning (which ultimately require as close to 100 percent reliability as possible), but DePauw invests to provide a level of support and reliability that helps to minimize problems and build confidence.[7]

Collectively, this level of support helps faculty and students feel more comfortable with new technologies. Two of the greatest barriers to success are the absence of time to incorporate technology and the fear that a new technology will reduce one's effectiveness. Providing broad and well-conceived support is key to overcoming both barriers.

Good Enough Is Good Enough

At the time DePauw announced its goal of becoming a national model in the use of technology to enhance liberal arts education, it lagged most of its peers in technical support, resources, and infrastructure. Faculty, staff, student, and administrative leaders recognized that DePauw would have to find cost-effective approaches to achieve high-impact results. No small liberal arts college could win a technology arms race. Indeed, given the pace and range of technical innovation today, no institution can be at the cutting edge in every area or adopt every technology. Yet, many institutions pour funds down a black hole trying to implement the latest technologies, rather than focusing on getting value out of the technologies in which they have already invested.[8]

DePauw adopted a strategy that again traces to alignment—be innovative in the *use* of technology rather than on the cutting-edge in purchasing new technologies. DePauw's approach to technology is backed by solid learning research, which shows that "good enough is good enough."[9] Recent research demonstrates that to successfully improve teaching and learning, a technology only needs to be good enough to clearly convey information. Universities do not need to compete with Disney or Pixar on polish and sophistication.

This is especially true initially. Like Lord Acton, who died with the history of Britain still in his head unwritten, many institutions have failed to progress or achieve impact because they fall victim to analysis paralysis or the quest for perfection. To enhance teaching and learning with technology requires taking calculated risks by developing rapid prototypes or by conducting limited pilot tests. It is not wise to adopt an untested technology without clear objectives, but if you have clear objectives, it is okay to test and use an imperfect technology. DePauw has achieved success this way. DePauw invests in people, so technologies are well supported, and faculty, students, and staff can focus on pedagogical innovation and informed experiments.

Support Sustainable Technologies

The focus on alignment and learning has led DePauw to approach technologies in a strategic manner that employs solid project-management techniques. This is essential. Far too many institutions pay no initial attention to sustainability, process, or fit, and they wind up with technologies they cannot support. Such a "culture of random acts of progress" results in many aborted efforts and wasted dollars, but the highest cost comes from lost hours and dampened enthusiasm.

Given the pace of change, many technologies will become obsolete despite the best planning and preparation. The most successful institutions adopt clear strategies focused on learning (or other defined outcomes) and pursue those strategies with clear processes and project planning that enables sustainability and supportability. Although unplanned discovery and innovation are important in institutional evolution, random progress alone is never strategic. To move an institution forward requires a systemic approach: Alignment + Process + Project Planning = Excellence.

Actively Involve Students

Many faculty and IT professionals are wary of relying upon students to accomplish vital tasks. Yet, many students arrive on campus today with high levels of technical proficiency. These students often do not have equal interpersonal, project management, and advanced skills initially,[10] but with appropriate training and mentoring, they can contribute at the level of professional staff members. Students also bring a nearly boundless supply of energy and new ideas about how to enhance teaching and learning.

To create the right instructional and mentoring framework for getting students actively involved, DePauw started a selective program called ITAP (Information Technology Associates Program). ITAP provides special opportunities for approximately 160 DePauw students to develop advanced skills in a wide range of information technologies. ITAP students have rich opportunities for learning and mastery in areas such as digital video production, Web site design, online research, information analysis with spreadsheets and databases, and networking. Students selected for the program spend an average of eight to ten hours per week in internship and training activities.

During their first year, ITAP students participate as Apprentices in four six-week rotations with leading campus IT groups, such as Information Services and the Web Team. In year two, they participate as Associates in semester- or year-long on-campus internships, working closely with faculty members and IT professionals. In their

third year, ITAP students may serve a semester-long, IT-related, off-campus internship; while on campus, they work on more advanced projects. ITAP seniors work on the most important and sophisticated technology projects on campus and serve as trainers and leaders for other ITAP participants.

ITAP students work as professional staff members in every academic and administrative department, and they permit DePauw to accomplish a far broader and higher-quality scope of technology projects and initiatives than possible with only professional staff. No small institution could afford the level of professional staff required to match the impact of the ITAP program at DePauw. ITAP students are compensated at $7.50 per hour for their work, and they work an average of 10 hours per week during the academic year. In addition, 361° hires 40 students during the summer months to work in the Information Services department full time. ITAP students gain hands-on, real-world experience in a close mentoring environment, and, according to recent employers, they graduate with the equivalent of five years of work experience.

Collaboration Is Essential

Research and teaching used to rest primarily on the work of the individual scholar-teacher. Today, however, many research projects and teaching methods are too complex for a single individual. Teams and collaboration underpin many types of research, particularly in the sciences and professions. Many new modes of technology-enhanced teaching also are most effective when undertaken by teams. At DePauw, the encouragement of collaboration and team approaches has been important in successfully enriching teaching and learning with technology.

Teams take many forms at DePauw. Various faculty development and grant programs support interdisciplinary and collaborative approaches to teaching and research. Through ITAP, students, faculty, and staff collaborate to pursue instructional technology projects. Teams of librarians and instructional technologists collaborate to support information fluency and digital repository projects, and technology staff collaborate across areas of specialization to complete sophisticated projects such as interactive course management tools or simulations. Collaboration is an established cultural value at DePauw, and it has played a key role in the success of technology initiatives.[11]

Teams and collaboration underpin many types of research, particularly in the sciences and professions

Perhaps the strongest success stories about the value of teamwork come from DePauw's FITS group. Each year, FITS identifies several Faculty Transformative Course Enhancement Projects to support with a development team made up of a FITS staff member, a faculty peer mentor, and FITS/ITAP student assistants. The objective for these projects is a substantial rethinking of how teaching and learning goals might be better met through creative uses of technology. These project teams have experienced exceptional success in transforming courses from Introduction to Chinese Culture to Microeconomics to Music Theory. Participants often explicitly attribute much of the success to the team approach. Anne Harris, an assistant professor of art at DePauw, captured the effective power of these teams when she remarked that faculty members often begin working with FITS "with only hopes and dreams, but by the end, … they have transformed their courses."

Use Technology to Remove Barriers

When used most successfully, technology is not only subordinate to learning, it is invisible. The most effective technologies are transparent. A student studying inorganic chemistry should be thinking about the science, not about tools for engaging or visualizing the science.

Frustrated with the clumsiness and opacity of existing technology, DePauw's faculty, staff, and students collaborated to develop tools to transform teaching and learning. One of the best examples is DyKnow, an electronic collaboration suite initially developed at DePauw over the past decade by David Berque, an associate professor of computer science, with about 20 undergraduate student research assistants. The system is now available as a much-extended commercial package. As Berque noted, DyKnow does electronically what teachers and students used to do with chalk, paper, and pencils. With an electronic whiteboard mounted at the front of the classroom and pen-based tablet monitors at each student's desk, all of the professor's prepared class materials, as well as in-class notes written by hand on the screen, Web content, and other multimedia objects, are automatically transferred to the students' electronic notebooks. As students annotate their notes, the instructor can also retrieve individual student work and share it

with the classroom to spark collaboration and active learning. Students are empowered to lead class in real time from their seats, and they can "play" all the class sessions back outside of class to review and better understand processes and how each final result unfolded.

Berque created DyKnow to solve a major problem that has challenged teachers for decades: "In a traditional classroom, I'd be writing information at one end of the blackboard, and when I looked at the class, they were still copying notes from the other end of the blackboard instead of listening to what I was saying." With DyKnow, according to Berque,

> *Students can devote more time to thinking about the topic the professor is covering and engage in class discussion and analysis. That enhances the learning experience for the students. I believe it makes the educational process more personal rather than less personal. The system is designed to enhance the way students interact with the teacher, and with other students, during class. It is not a matter of students interacting with the software. Rather they are using the software to facilitate interactions with other people. The fact that the system allows the instructor to share student work with the rest of the class, in turn, encourages a dialog among students in the class.*

The effectiveness of DyKnow is supported by the rapid rise in its use. Berque piloted a precursor system in one of his computer science courses in 2000. In 2004–2005, 11 instructors used DyKnow in 40 courses ranging from economics to Asian languages to music. A specialized version of Dy Know has also proved highly valuable as an adaptive technology for the visually challenged. Student course evaluations regularly indicate that many students perceive that they learn better when DyKnow is integrated effectively in their courses.[12]

With DyKnow, the technology removes barriers to learning and helps connect instructor and students in active, engaged learning. This is the goal for all technology at DePauw.

Design Space for Learning and Community

A final reason that DePauw's technology initiatives have succeeded so well involves space. Over the past several years, DePauw has had the opportunity to construct several new buildings and to refresh several others. This opportunity to redesign and re-imagine campus learning spaces allowed the university to think about how space and design could leverage new technology to foster collaboration and active learning.

In facilities such as the new Julian Science and Mathematics Center and the new Peeler Art Center, DePauw has created spaces that are highly modular and flexible. To guide planning and architecture, DePauw built a prototype classroom and used it for a year to test which features and configurations would enhance teaching and learning and which would hinder it. As a result of this careful study, instructional rooms and public areas now offer multiple configurations to match a group dynamic or learning style.

Pervasive wireless connections linked to rich digital library collections and course management tools allow students to access course resources wherever and whenever they need them. And, the creation of many departmental suites and public commons encourage students to work closely with their faculty and peers. The goal is space that facilitates any mode of learning and hinders none. Again, technology is not in the forefront. The focus is on designing technology facilities so that the technology is transparent and on using technology to create facilities that increase learning.[12]

Pulling It All Together

DePauw's success factors for transforming teaching and learning with technology are not complex. Pulled together by an exceptional constellation of students, faculty, staff, and administrators, these factors have created a powerful formula for success. Gary Lemon, a professor of economics at DePauw, captured the impact of DePauw's 361°. Speaking of his experience using DyKnow in his courses, he said, "I was a dinosaur in the classroom, but now I am a dynamo." His students agree. One recently remarked, "I used to struggle in economics courses, but Dr. Lemon's use of DyKnow has helped me to understand in ways that I never could before."

When transparent, well-supported technology focused on learning aligns and integrates with an institution's mission, teaching and learning are transformed. DePauw's successes show that failures are not inevitable and that investments need not be wasted. Success is a matter of approach, priorities, and process, effectively applied. *e*

Endnotes

1. R. Zemsky and W. F. Massy, *Thwarted Innovation: What Happened to e-Learning and Why*, a final report for the Weatherstation Project of the Learning Alliance at the University of Pennsylvania in cooperation with the Thomson Corporation, June 2004, p. 51; <http://www.irhe.upenn.edu/Docs/Jun2004/ThwartedInnovation.pdf> (accessed August 3, 2005).
2. For a detailed account of the DePauw technology strategic planning process, see C. P. Korman and D. Trinkle, "Designing IT Strategic Planning for the Smaller Institution," in *Leadership, Higher Education, and the Information Age*, C. E. Regenstein and B. Dewey, eds. (New York: Neal-Schuman, 2003), pp. 11–38.
3. See J. D. Bransford et al., *How People, Learn: Brain, Mind, Experience, and School*, (Washington, D.C.: National Academy Press, 2000), <http://www.nap.edu/openbook/0309065577/html/index.html> (accessed August 3, 2005); and G. Kuh et al., *Student Success in College: Creating Conditions that Matter* (Washington, D.C.: American Association for Higher Education, 2005).
4. J. Young, "When Good Technology Means Bad Teaching," *Chronicle of Higher Education*, November 12, 2004; and D. Carnevale, "Report Says Educational Technology Has Failed to Deliver on Its Promises," *Chronicle of Higher Education*, July 2, 2004.
5. For more on DePauw's Faculty Instructional Technology Support program, see <http://www.depauw.edu/univ/fits/index.asp> and <http://www.depauw.edu/it/361> (accessed August 3, 2005).
6. For additional information about DePauw's Student Technology Assessment, Resources, and Training pro-

gram, see <http://www.depauw.edu/it/START/>.

7. To provide context for DePauw's level of success given its investments in support staff and programs, consider two key service and performance benchmarks tracked for quality assurance—technology classroom problem resolution time and system uptime. Technology classroom support is the top priority for the Information Services Help Desk and Media and User Services Team, and they presently average a 10-minute or less resolution time for 95 percent of technology classroom issues. The annual uptime metric for all systems is 99.79 percent. According to *Network World* ("Management Strategies: How to Quantify Downtime," *Network World*, January 5, 2004, p. 41), the average national corporate system uptime is 99 percent, with 99.5 percent characterized as better than average and 99.999 percent characterized as best in class.
8. The comments about investments and frustrations are based upon informal polling of the IT leaders who attended the Change Leadership Constituent Group Meeting at the EDUCAUSE 2004 Annual Meeting in Denver, Colorado.
9. See, for example, R. E. Mayer, *Multimedia Learning* (Cambridge, U.K.: Cambridge University Press, 2001).
10. Many students arrive on campus having achieved a greater comfort level with technology than have the faculty who will teach them. Much as with writing skills, however, students usually need to develop and refine their proficiency with technology tools to attain an advanced skill level.
11. The culture of collaboration and the construction of communities of practice and learning communities at DePauw has been strongly influenced by the work of Etienne Wenger, John Seely Brown, and the EDUCAUSE National Learning Infrastructure Initiative (NLII, now the EDUCAUSE Learning Initiative, ELI), investigations of practice communities. For more information, see E. Wenger, *Communities of Practice: Learning, Meaning, and Identity* (Cambridge, U.K.: Cambridge University Press, 1999); J. S. Brown and P. Duguid, *The Social Life of Information* (Cambridge, Mass.: Harvard University Press, 2002); and the ELI Web site at <http://www.educause.edu/eli>.
12. To determine the effectiveness of DyKnow, the Computer Science department recently conducted a survey of 120 computer science majors and minors who have used DyKnow for their courses. Eighty-one students completed the survey. Survey participants had taken a total of 399 computer science courses using DyKnow compared to 78 computer science courses without DyKnow. The participants had also collectively taken 21 economics courses using DyKnow, 4 Japanese courses, 1 communications course, and 6 English courses using the system. Thus, the number of enrollments in DyKnow courses totaled 431. Twenty-six students (32 percent) had learned about DyKnow while they were prospective students. Of these students, 20 (77 percent) reported that DyKnow had a positive influence on their decision to attend DePauw. Seventy-four percent of the participants reported that they wished that DyKnow was used in a class that did not use it. Only 5 students (6 percent) answered "yes" when asked if they ever wished DyKnow had not been used in a class that did use it. Ninety-five percent of the students indicated that the system is of at least moderate value for "enhancing their understanding of material and concepts as they are presented in class," 100 percent said the system is of at least moderate value for "providing them with an accurate set of notes," and 92 percent said the system is of at least moderate value for "doing in-class exercises to practice with content." When asked to react to the statement "Overall, DyKnow has had a positive impact on what I have learned as a Computer Science major or minor," 59 students (73 percent) said "strongly agree," while 20 students (25 percent) said "agree somewhat."
13. For an introduction to the wide literature on learning space design, see the EDUCAUSE Resource Center, <http://www.educause.edu/LearningSpaceDesign/645?Parent_ID=696>.

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