IMPLEMENTING THE SEVEN PRINCIPLES: Technology as Lever

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In March 1987, the AAHE Bulletin first published "Seven Principles for Good Practice
in Undergraduate Education." With support from Lilly Endowment, that document
was followed by a Seven Principles Faculty Inventory and an Institutional Inventory
(Johnson Foundation, 1989) and by a Student Inventory (1990). The Principles,
created by Art Chickering and Zelda Gamson with help from higher education
colleagues, AAHE (http://www.aahe.org/), and the Education Commission of the
States, with support from the Johnson Foundation, distilled findings from decades of
research on the undergraduate experience.

Several hundred thousand copies of the Principles and Inventories have been
distributed on two- and four-year campuses in the United States and Canada.
(Copies are available at cost from the Seven Principles Resource Center, Winona
State University, PO Box 5838, Winona, MN 55987-5838; ph 507/457-5020.) — Eds.

Since the Seven Principles of Good Practice were created in 1987, new
communication and information technologies have become major resources for
teaching and learning in higher education. If the power of the new technologies is to
be fully realized, they should be employed in ways consistent with the Seven
Principles. Such technologies are tools with multiple capabilities; it is misleading to
make assertions like "Microcomputers will empower students" because that is only
one way in which computers might be used.

Any given instructional strategy can be supported by a number of contrasting
technologies (old and new); just as any given technology might support different
instructional strategies. But for any given instructional strategy, some technologies
are better than others: Better to turn a screw with a screwdriver than a hammer — a
dime may also do the trick, but a screwdriver is usually better.

This essay, then, describes some of the most cost-effective and appropriate ways to
use computers, video, and telecommunications technologies to advance the Seven
Principles.

1. Good Practice Encourages Contacts Between Students and Faculty
*Frequent student-faculty contact in and out of class is a most important factor in
student motivation and involvement. Faculty concern helps students get through
rough times and keep on working. Knowing a few faculty members well enhances
students' intellectual commitment and encourages them to think about their own
values and plans.*

Communication technologies that increase access to faculty members, help them share useful resources, and provide for joint problem solving and shared learning can usefully augment face-to-face contact in and outside of class meetings. By putting in place a more "distant" source of information and guidance for students, such technologies can strengthen faculty interactions with all students, but especially with shy students who are reluctant to ask questions or challenge the teacher directly. It is often easier to discuss values and personal concerns in writing than orally, since inadvertent or ambiguous nonverbal signals are not so dominant. As the number of commuting part-time students and adult learners increases, technologies provide opportunities for interaction not possible when students come to class and leave soon afterward to meet work or family responsibilities.

The biggest success story in this realm has been that of time-delayed (asynchronous) communication. Traditionally, time-delayed communication took place in education through the exchange of homework, either in class or by mail (for more distant learners). Such time-delayed exchange was often a rather impoverished form of conversation, typically limited to three conversational turns:

1. The instructor poses a question (a task).
2. The student responds (with homework).
3. The instructor responds some time later with comments and a grade.

The conversation often ends there; by the time the grade or comment is received, the course and student are off on new topics.

Now, however, electronic mail, computer conferencing, and the World Wide Web increase opportunities for students and faculty to converse and exchange work much more speedily than before, and more thoughtfully and "safely" than when confronting each other in a classroom or faculty office. Total communication increases and, for many students, the result seems more intimate, protected, and convenient than the more intimidating demands of face-to-face communication with faculty.

Professor Norman Coombs reports that, after twelve years of teaching black history at the Rochester Institute of Technology, the first time he used email was the first time a student asked what he, a white man, was doing teaching black history. The literature is full of stories of students from different cultures opening up in and out of class when email became available. Communication also is eased when student or instructor (or both) is not a native speaker of English; each party can take a bit more time to interpret what has been said and compose a response. With the new media, participation and contribution from diverse students become more equitable and widespread.

2. Good Practice Develops Reciprocity and Cooperation Among Students
Learning is enhanced when it is more like a team effort than a solo race. Good learning, like good work, is collaborative and social, not competitive and isolated. Working with others often increases involvement in learning. Sharing one's ideas and responding to others' improves thinking and deepens understanding.

The increased opportunities for interaction with faculty noted above apply equally to communication with fellow students. Study groups, collaborative learning, group

problem solving, and discussion of assignments can all be dramatically strengthened through communication tools that facilitate such activity.

The extent to which computer-based tools encourage spontaneous student collaboration was one of the earliest surprises about computers. A clear advantage of email for today's busy commuting students is that it opens up communication among classmates even when they are not physically together.

For example: One of us, attempting to learn to navigate the Web, took a course taught entirely by a combination of televised class sessions (seen live or taped) and by work on a course Web page. The hundred students in the course included persons in Germany and the Washington, DC, area.

Learning teams helped themselves "learn the plumbing" and solve problems. These team members never met face-to-face. But they completed and exchanged Myers-Briggs Type Inventories, surveys of their prior experience and level of computer expertise, and brief personal introductions. This material helped teammates size one another up initially; team interactions then built working relationships and encouraged acquaintanceship. This kind of "collaborative learning" would be all but impossible without the presence of the media we were learning about and with.

3. Good Practice Uses Active Learning Techniques
Learning is not a spectator sport. Students do not learn much just sitting in classes listening to teachers, memorizing prepackaged assignments, and spitting out answers. They must talk about what they are learning, write reflectively about it, relate it to past experiences, and apply it to their daily lives. They must make what they learn part of themselves.

The range of technologies that encourage active learning is staggering. Many fall into one of three categories: tools and resources for learning by doing, time-delayed exchange, and real-time conversation. Today, all three usually can be supported with "worldware" (http://www.learner.org/edtech/rscheval/vvs.html), i.e., software (such as word processors) originally developed for other purposes but now used for instruction, too.

We've already discussed communication tools, so here we will focus on learning by doing. Apprentice-like learning has been supported by many traditional technologies: research libraries, laboratories, art and architectural studios, athletic fields. Newer technologies now can enrich and expand these opportunities. For example:

- Supporting apprentice-like activities in fields that themselves require the use of technology as a tool, such as statistical research and computer-based music, or use of the Internet to gather information not available in the local library.
- Simulating techniques that do not themselves require computers, such as helping chemistry students develop and practice research skills in "dry" simulated laboratories before they use the riskier, more expensive real equipment.
- Helping students develop insight. For example, students can be asked to design a radio antenna. Simulation software displays not only their design but the ordinarily invisible electromagnetic waves the antenna would emit. Students change their designs and instantly see resulting changes in the

waves. The aim of this exercise is not to design antennae but to build deeper understanding of electromagnetism.

4. Good Practice Gives Prompt Feedback

Knowing what you know and don't know focuses your learning. In getting started, students need help in assessing their existing knowledge and competence. Then, in classes, students need frequent opportunities to perform and receive feedback on their performance. At various points during college, and at its end, students need chances to reflect on what they have learned, what they still need to know, and how they might assess themselves.

The ways in which new technologies can provide feedback are many — sometimes obvious, sometimes more subtle. We already have talked about the use of email for supporting person-to-person feedback, for example, and the feedback inherent in simulations. Computers also have a growing role in recording and analyzing personal and professional performances. Teachers can use technology to provide critical observations for an apprentice; for example, video to help a novice teacher, actor, or athlete critique his or her own performance. Faculty (or other students) can react to a writer's draft using the "hidden text" option available in word processors: Turned on, the "hidden" comments spring up; turned off, the comments recede and the writer's prized work is again free of "red ink."

As we move toward portfolio evaluation strategies, computers can provide rich storage and easy access to student products and performances. Computers can keep track of early efforts, so instructors and students can see the extent to which later efforts demonstrate gains in knowledge, competence, or other valued outcomes. Performances that are time-consuming and expensive to record and evaluate — such as leadership skills, group process management, or multicultural interactions — can be elicited and stored, not only for ongoing critique but also as a record of growing capacity.

5. Good Practice Emphasizes Time on Task

Time plus energy equals learning. Learning to use one's time well is critical for students and professionals alike. Allocating realistic amounts of time means effective learning for students and effective teaching for faculty.

New technologies can dramatically improve time on task for students and faculty members. Some years ago a faculty member told one of us that he used technology to "steal students' beer time," attracting them to work on course projects instead of goofing off. Technology also can increase time on task by making studying more efficient. Teaching strategies that help students learn at home or work can save hours otherwise spent commuting to and from campus, finding parking places, and so on. Time efficiency also increases when interactions between teacher and students, and among students, fit busy work and home schedules. And students and faculty alike make better use of time when they can get access to important resources for learning without trudging to the library, flipping through card files, scanning microfilm and microfiche, and scrounging the reference room.

For faculty members interested in classroom research, computers can record student participation and interaction and help document student time on task, especially as related to student performance.

6. Good Practice Communicates High Expectations
Expect more and you will get it. High expectations are important for everyone — for the poorly prepared, for those unwilling to exert themselves, and for the bright and well motivated. Expecting students to perform well becomes a self-fulfilling prophecy.

New technologies can communicate high expectations explicitly and efficiently. Significant real-life problems, conflicting perspectives, or paradoxical data sets can set powerful learning challenges that drive students to not only acquire information but sharpen their cognitive skills of analysis, synthesis, application, and evaluation.

Many faculty report that students feel stimulated by knowing their finished work will be "published" on the World Wide Web. With technology, criteria for evaluating products and performances can be more clearly articulated by the teacher, or generated collaboratively with students. General criteria can be illustrated with samples of excellent, average, mediocre, and faulty performance. These samples can be shared and modified easily. They provide a basis for peer evaluation, so learning teams can help everyone succeed.

7. Good Practice Respects Diverse Talents and Ways of Learning
Many roads lead to learning. Different students bring different talents and styles to college. Brilliant students in a seminar might be all thumbs in a lab or studio; students rich in hands-on experience may not do so well with theory. Students need opportunities to show their talents and learn in ways that work for them. Then they can be pushed to learn in new ways that do not come so easily.

Technological resources can ask for different methods of learning through powerful visuals and well-organized print; through direct, vicarious, and virtual experiences; and through tasks requiring analysis, synthesis, and evaluation, with applications to real-life situations. They can encourage self-reflection and self-evaluation. They can drive collaboration and group problem solving. Technologies can help students learn in ways they find most effective and broaden their repertoires for learning. They can supply structure for students who need it and leave assignments more open-ended for students who don't. Fast, bright students can move quickly through materials they master easily and go on to more difficult tasks; slower students can take more time and get more feedback and direct help from teachers and fellow students. Aided by technologies, students with similar motives and talents can work in cohort study groups without constraints of time and place.

Evaluation and the Seven Principles
How are we to know whether given technologies are as useful in promoting the Seven Principles and learning as this article claims? One approach is to look and see, which is the aim of the "Flashlight Project" (http://www.tltgroup.org/programs/flashlight.html), a three-year effort begun by the Annenberg/CPB Project to develop and share evaluation procedures. The Flashlight Project is developing a suite of evaluation tools that any campus can use to monitor the usefulness of technology in implementing the Seven Principles and the impacts of such changes on learning outcomes (e.g., the student's ability to apply what was learned in the academic program) and on access (e.g., whether hoped-for gains in time on task and retention are saving money for the institution and its funders).

[For more about the Flashlight Program, see Stephen Ehrmann's "Asking the Right Questions: What Does Research Tell Us About Technology and Higher Learning?" (http://www.learner.org/edtech/rscheval/rightquestion.html) in the March/April 1995 *Change*.]

Technology Is Not Enough

The Seven Principles cannot be implemented by technophiles alone, or even by faculty alone. Students need to become familiar with the Principles and be more assertive with respect to their own learning. When confronted with teaching strategies and course requirements that use technologies in ways contrary to the Principles, students should, if possible, move to alternatives that serve them better. If teaching focuses simply on memorizing and regurgitating prepackaged information, whether delivered by a faculty lecture or computer, students should reach for a different course, search out additional resources or complementary experiences, establish their own study groups, or go to the professor for more substantial activities and feedback.

Faculty members who already work with students in ways consistent with the Principles need to be tough-minded about the software- and technology-assisted interactions they create and buy into. They need to eschew materials that are simply didactic, and search instead for those that are interactive, problem oriented, relevant to real-world issues, and that evoke student motivation.

Institutional policies concerning learning resources and technology support need to give high priority to user-friendly hardware, software, and communication vehicles that help faculty and students use technologies efficiently and effectively. Investments in professional development for faculty members, plus training and computer lab assistance for students, will be necessary if learning potentials are to be realized.

Finally, it is appropriate for legislators and other benefactors to ask whether institutions are striving to improve educational practice consistent with the Seven Principles. Much depends on the answer.

Note: This article draws on Arthur Chickering's participation in "The Future of Face-to-Face and Distance Learning in Post-Secondary Education," a workgroup chaired by W.L. Renwick as part of a larger effort examining The Future of Post-Secondary Education and the Role of Information and Communication Technology: A Clarifying Report, carried out by the Center for Educational Research and Innovation, Organization for Economic Cooperation and Development. Paris: 1993, 1994.

The Flashlight Program is now a part of the non-profit Teaching, Learning, and Technology Group (http://www.tltgroup.org/default.htm). The TLT Group provides a range of services to help faculty, their institutions, and their programs make more sensible use of technology. About 250 colleges, universities, state boards, and multi-institution projects now subscribe to TLT Group tools or services.

New Ideas, and Additional Reading

Stephen C. Ehrmann
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Since 1996, when Art Chickering and I wrote the preceding article, much has changed but much has remained the same. For example, offerings in distance education have exploded. However, these same seven principles, and these seven kinds of technology use, seem equally important for all kinds of learners (and faculty) in all kinds of situations. Whether students come to campus every day or not at all, for example, student interaction can be increased and improved by some of the same online approaches. [The Web sites on The Seven Principles change frequently. Ted Panitz (tpanitz@capecod.net), a professor of mathematics and engineering at Cape Cod Community College, has launched a website that lists online resources related to the seven principles (http://home.capecod.net/~tpanitz/seven.html). Or you can do a Web search on "seven principles" and "Chickering" to look for recent materials.]

My colleague Steve Gilbert has pointed out another way to array these practices for advancing the seven principles: by how hard or easy they are for faculty to learn quickly and for the institution to support. He has spotlighted *low threshold activities*: uses of technology that are (for that faculty member in that institution at that time) quite easy to learn (in seconds or minutes) and easy for the institution to support (even if all faculty want to use technology in that way.) This Web page (http://www.tltgroup.org/LTAs/Overview.htm) contains a growing list of references and materials about such activities. We may soon begin development of a library of low threshold activities for each of the seven principles and, if so, we'll need your help, so watch this space!

Not all important uses of technology are low threshold for the institution or the faculty. Some are quite promising but require substantial reorganization and rethinking of faculty roles. Some of these ideas require major change in the organization of individual courses (e.g., the BioCalc course for teaching calculus to biology students at the University of Illinois, Urbana Champaign (http://www.wcer.wisc.edu/nise/cl1/ilt/case/uiuc/uiuc.htm)). Others, even more ambitious, are conscious efforts to change a major, a whole institution, or a system. Examples include distance learning programs, problem-based learning for a whole major, institution-wide efforts to improve information literacy and skills of inquiry, and redesign of large enrollment courses to improve learning and control costs per student. Technology advocates have been promising for many decades that such major improvements were imminent. Although some of these ideas have succeeded and have made permanent, national changes in higher learning, too many others have flowered briefly and withered, or never flowered at all. Often the very technology that helped spark interest in these ideas was blamed some years later as inadequate, and the reason the innovation had failed. In "Using Technology to Make Large-Scale Improvements in The Outcomes of Higher Education: Learning From Past Mistakes"
(http://www.tltgroup.org/resources/Visions/Improving_Outcomes.html), I suggested that we've failed repeatedly because we've made the same mistakes repeatedly, in the 1970s, 1980s, 1990s, and today. It's time to learn from those errors. This article draws on past experience to suggest a five part strategy for using technology to make valuable, large scale, lasting improvements in who can learn and what they have learned by the time they complete a program in higher education.

Is it true that research has never proved that technology improves learning?   I tried to summarize some of the findings that have had the greatest influence on my own thinking in the 1995 article, " Asking the Right Questions: What Does Research Tell Us About Technology and Higher Learning?"
(http://www.learner.org/edtech/rscheval/rightquestion.html) in *Change*. The Magazine of Higher Learning, XXVII:2 (March/April), pp. 20-27. This essay gives a brief overview of the evaluation literature on teaching, learning, technology and costs.

Are there articles or web sites that have proven valuable to you and your colleagues that should be added to this list of resources? Please e-mail me at Ehrmann@tltgroup.org, your suggestions and explain the value of the resource. I'll add the best of them to this article (which is currently drawing about 1500 visitors a month).

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