No Teacher Left Behind:
How to Teach with Technology

A three-phase program taught veteran and novice instructors how to effectively integrate technology into lesson plans
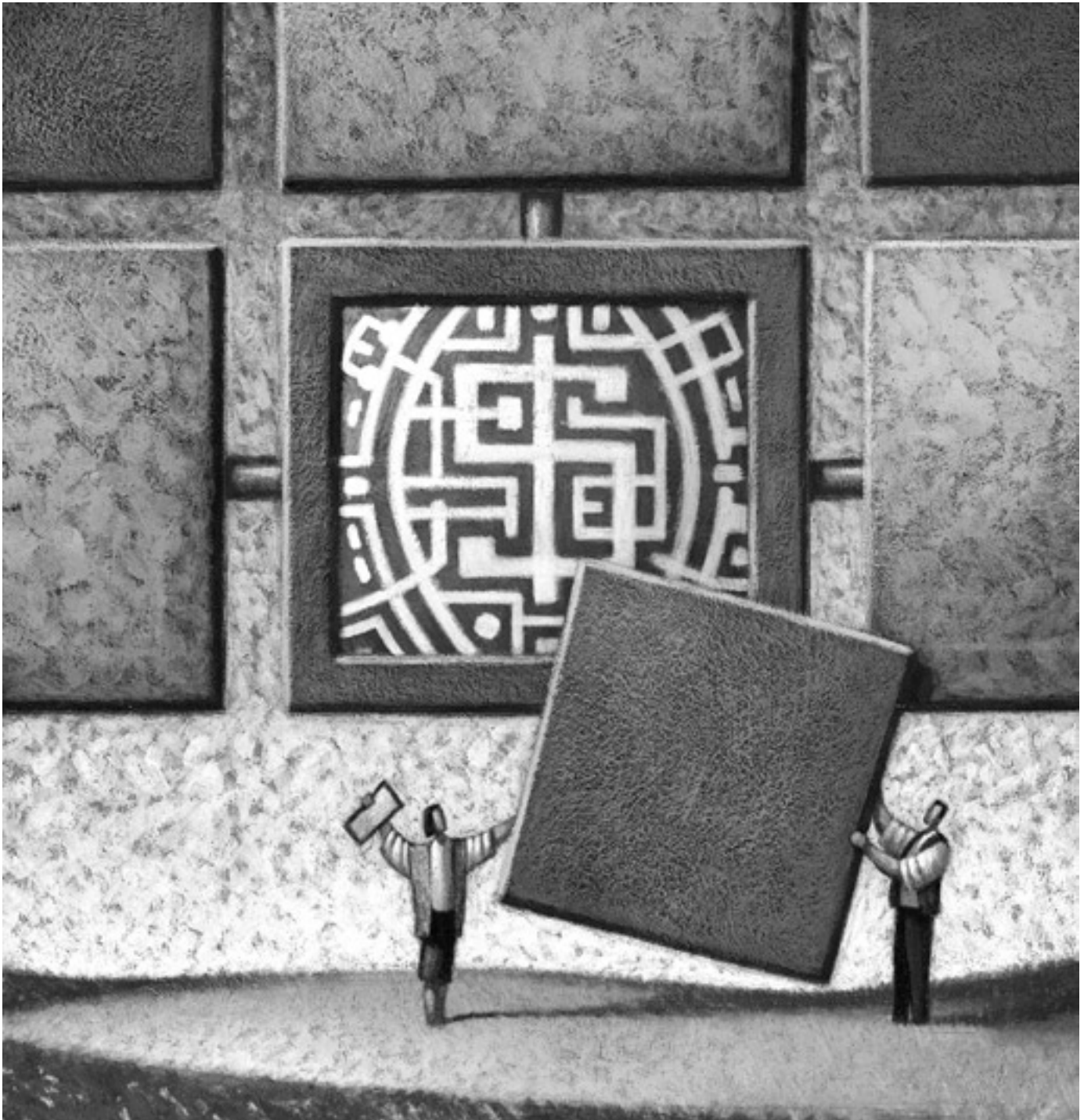
By **Jamie Efaw**

With the infusion of technology into all aspects of daily life, students are becoming more and more adept at using technology as an educational resource. Many faculty, however, are not keeping pace with their students. Additionally, faculty feel increasingly unprepared to integrate technology into the classroom.[1] "Little has been done to prepare reluctant technology users for the networked computers flooding into their rooms," according to Jamie McKenzie, editor of the Web-based journal *From Now On*.[2] Many institutions of higher learner now offer technology courses to faculty to bridge this gap, helping them master the intricacies of PowerPoint or learn to post materials in a course management system. These courses help to an extent, but classes in using technology do not prepare faculty to effectively incorporate technology into their teaching.[3]

At the United States Military Academy at West Point, we have had the luxury of operating in a technology-rich, standardized environment since the mid-1980s. This has enabled us to develop slowly in our understanding and use of technology for instruction. Nevertheless, the faculty development issue is probably the most challenging and one that the academy's Department of Behavioral Sciences and Leadership has addressed during the past three years. We believe that our experience offers an instructive model for faculty development in incorporating technology into the classroom. This article provides an overview of a three-phase program that when implemented will assist both veteran and novice instructors in incorporating available technology into the classroom to achieve a richer educational experience for students. This article highlights the practical steps that nearly any department can adopt (or adapt) to get a program running at its own institution.

Background

West Point first issued desktop computers to cadets in 1986, and soon the faculty and cadets were networked on a common platform. Thanks to the military focus on standardization, we've never had the problem of incompatible formats, and we immediately benefited from the enhanced communication between instructors and students via e-mail. The introduction of the Web challenged us to create online learning environments where cadets could find additional resources for specific courses. The plethora of Web resources led us to adopt a course management system, mainly to provide a portal for students to ease their transition into our technology-

rich environment. Nevertheless, when West Point replaced standard desktop computers with laptops beginning in 2002 (with a complete wireless network already in place), departments puzzled over how to best incorporate student computers into the classroom—if at all.

Many universities have struggled with the infusion of technology into the classroom, and we are no different.

Our perpetually optimistic, in-house technology gurus had advised us that the laptop would "bring the classroom back to the barracks" and thus facilitate cadet class preparation. What we found was that the laptop brought the barracks into the classroom and tended to facilitate distractions. That is, the cadets had materials from all their classes, plus personal files, on their laptops and could

work on other classes or e-mail their friends during any class. Initially it seemed as though the laptop brought more problems than benefits, and some instructors banned computers in class. As George Kuh, a professor at Indiana University and director of the National Survey of Student Engagement, observed during an interview, technology can be a double-edged sword.[4]

Although we tried to prepare for the influx of laptops, our department was no more successful than others. At West Point, the majority of the military faculty members are on a three-year rotation, which means that a substantial number of new instructors arrive each year. Our departments typically experience a "30 percent turnover of instructors each year, which necessitates a systematic and integrative approach that ensures new instructors are prepared to teach."[5] Due to this turnover, individual academic departments conduct faculty development workshops in the summer to introduce arriving faculty to the institution, their department, and the process of teaching undergraduates.

During the annual summer training for new faculty in 2002, the veteran instructors of the general psychology course tried to prepare both themselves and the new instructors for the laptops that would arrive with the freshmen, all of whom take this core course. The attempt was a resounding failure—primarily because no one had prior experience incorporating laptop technology into the teaching process, and we had no one to provide a model for us. Additionally, faculty resisted allowing students to bring this technology into class. As one instructor exclaimed, "That thing is not coming into my classroom!"

It is never easy to change the way you teach. West Point was not alone in facing these problems, however. During this same period, the Office of Social and Economic Data Analysis reported that at least 50 percent of instructors identified themselves as educational technology novices, and only 42 percent felt prepared to use technology in the classroom.[6]

Before the second semester started in 2003, we asked for instructor volunteers to incorporate laptop computers into their classroom work and teaching strategy. Four of the ten general psychology course instructors volunteered. The resulting quasi-experimental study revealed that the integration of laptop computers and the associated technology could significantly improve student learning.[7] Students of instructors who integrated laptop computers into their classroom strategies scored significantly higher on all graded examinations than students of instructors who used traditional instructional and note-taking methods. Additionally, we assessed students' attitudes through end-of-course surveys and found that the students of instructors who incorporated laptop technology into coursework rated their motivation and interest in the course, instructor efficiency, and their own learning significantly higher than did students in more traditional classrooms.

With the lessons learned and techniques discovered from this experience, we incorporated our newfound knowledge, along with other faculty development principles, into a program that both encourages and equips faculty to use technology in teaching. Instructors who complete this program have shown significant improvement in integrating technology into the classroom: A survey asked new instructors "To what extent do you feel prepared to integrate new technology (e.g., laptop computers) into classroom activities?" They responded with an average of 2.25 on a five-point Likert-type scale ranging from "Not prepared" to "Well prepared." After completing the program, the same instructors responded with a 4.5 ($p < .001$).

The academy's introductory psychology course is now in its third year of integrating technology. Our experience shows that a three-phase process accomplishes faculty development most effectively. The three phases are learning, practice and feedback, and continued development.

Learning

The first phase encompasses training in available technology, classroom modeling of the technology, learning how to encourage student participation, and initial feedback from experienced instructors.

Technology Training

The first key is to develop the faculty's comfort level with technology. We focus on that at the beginning of our summer faculty development workshop. On average, four new instructors arrive each summer and take part in the workshop; adding the veteran instructors, the typical class size is between eight and twelve instructors. In a survey, Abbott and Farris found this to be the optimal class size when learning new concepts and skill sets such as teaching with technology.[8]

While we realize that our summer workshops are unique, workshops in how to use basic technology are usually well received by faculty. Any institution launching similar training could probably enroll a significant number. One of the biggest obstacles is the negative attitude of some faculty toward having technology in the classroom. Abbot and Farris found that faculty had a more positive attitude toward computers after receiving introductory training on their uses and capabilities.[9] Additionally, Zhao et al. found that to successfully implement technological innovations, faculty need to know how to use the appropriate applications.[10]

In accordance with this research, before starting classroom modeling or sessions on how to teach in the faculty development workshops, all incoming instructors receive training on the basics of using a computer; an explanation of programs, applications, and technology available for use; and an orientation to the typical classroom. It is important that the new instructors feel comfortable with technology before trying to incorporate it into a lesson plan.

Unfortunately, if technologists lead the introduction to technology, the faculty experience often ends with a basic comfort level in the mechanics. The key to our development program is that it resides in the domain of faculty colleagues, and the secret weapon is the core faculty who have already experimented with and learned how to use technology in the classroom. The second element of the learning phase requires the presence of this core group.

Classroom Modeling and Participation

Several studies[11] have shown two key elements to successful infusion of technology:
- Observing other faculty while they use technology applications in the classroom in interesting ways.

■ Actually completing assignments and engaging in course activities that require technology skills.

To capitalize on these principles, at the beginning of the faculty development workshops, veteran instructors teach "model classes" in the same manner that they would teach during the academic year. Other veteran instructors and all new instructors serve as the "students." The veteran instructors model many different methods of effectively integrating technology in the classroom during a typical lesson. Different instructors model different classes and various ways to integrate available technology. This allows the new instructors to see different teaching styles, as well as several innovative methods of using and integrating technology.

Veteran instructors model typical problems and questions that arise in the classroom as a result of using technology, while simultaneously providing the new instructors with virtually the same classroom experience as the learners. Not only do the new instructors have a chance to observe classroom-tested teaching and technology techniques, but the student role forces them to actively engage with technology in order to complete the homework assignments and classroom activities. In fact, the national accreditation guidelines call for "students [to] complete a sequence of courses or field experiences, which allows them to understand technology as it relates to the subjects that they plan to teach."[12] By observing new techniques while experiencing the struggles of a student, the new instructors can garner new teaching methods and observe their effectiveness first-hand.

Feedback

At the end of every teaching session by the veteran instructor, the faculty member modeling the lesson discusses the teaching strategy used and challenges faced. The new and veteran instructors then give candid feedback on what they observed as the strengths and weaknesses of the lesson. This collegial method of discussion and feedback benefits both the instructor modeling the lesson and the new instructors

Each new instructor is paired with a veteran mentor who has experience teaching with technology; the mentor assists the new instructor with lesson preparation and provides insight and feedback

observing. Means and Olson found that teachers need this honest feedback on the strength and weakness of the lesson when developing lessons involving technology.[13] Accordingly, in our faculty development workshop, after "playing the student" for several lessons and having observed various teaching and technology integration techniques, the new instructors have the chance to practice these teaching techniques by presenting selected course lessons. These practice sessions form the core of Phase Two.

Practice and Feedback

The second phase of the program involves setting aside time in the new instructors' schedules for designing and practicing lessons; mentoring by experienced faculty; videotaping practice sessions; encouraging reflection among the

new instructors; and providing feedback on their efforts.

We incorporate several components into our new instructors' practice teaching to "set them up for success." First, time in the daily schedule is set aside specifically for design and practice of lessons incorporating technology, following the findings of Means and Olsen.[14] Second, in preparation for this teaching experience, each new instructor is paired with a veteran mentor who has experience teaching with technology. The mentor assists the new instructor with lesson preparation and provides insight and feedback.

Zhao et al. found that colleagues who mentor instructors through their efforts support the successful implementation of technology.[15] The mentoring is not a senior-subordinate relationship or an evaluative relationship but rather an advisory one. The mentor provides the new instructor with an additional resource with whom to talk, reflect, brainstorm, or simply ask questions.

Finally, all new instructors' practice teaching sessions are videotaped. The National Research Council found that time to reflect and analyze is critical in incorporating any new teaching technique.[16] Accordingly, special time is allocated in the schedule before and after every practice teaching session. The new instructor may view the videotape alone or with a mentor and spend that time reflecting on past teaching experiences or upcoming ones.

At the conclusion of a practice teaching session, the new instructors conduct the same review as the veteran instructors did—explaining the teaching strategy, what they felt went well, and what they could improve. Similarly, the "students" in the class give the new instructor feedback on the lesson's strengths and weaknesses. As one new instructor observed, "The best part was learning alternate ways of presenting the information that I had just taught. It was really fresh in my mind, and I really valued the feedback on the other ways [to teach] that I may not have considered."

Although the faculty development workshop is designed to introduce new

faculty members to the process of teaching with technology, the model would be equally effective with more experienced faculty members. The key is to develop their comfort with the mechanics of technology use, supported by a core instructional group experienced in using technology. Equally valuable, our department conducts the faculty development workshop with a focus on the department's core courses. This discipline-specific experience is more beneficial than participation in centralized workshops within an institution. The English professor watching a mechanical engineer show how she uses technology in her teaching might feel more inhibited than inspired, whereas seeing how a colleague uses technology effectively in the same discipline would more likely encourage the professor to adopt similar strategies. This concept underpins the third phase of the program—continued development through workshops, discussion, and mentorship within the department throughout the school year.

Continued Development

After new instructors have completed the formal summer developmental workshop, several activities and programs ensure continued development and integration of technology in the classroom and teaching repertoire. This approach follows Cradler and Cradler's finding that although one-time workshops help instructors incorporate and integrate technology, it takes a long-term program for true effectiveness—continued development, training, and mentorship are essential.[17] As Clark and Solomon noted, "Transfer is somewhat more likely as a consequence of prolonged, continuous, and intensive application of newly developed skill and knowledge. . ."[18] We try to incorporate this long-term vision by implementing programs to continue technology integration training for all faculty members.

Mentorship and Classroom Observation

Within the departmental group of general psychology instructors, we also incorporate several programs and

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ideas to encourage implementation of new technology in the classroom. First, we continue the mentorship program through the first semester. The mentor with whom the new instructor established a relationship during the summer continues to be available for advice on technology and teaching throughout the following semester. One new instructor noted that she would not get so tense and frustrated when trying to incorporate technology if she had someone sitting beside her helping whenever she made a mistake.[19] A mentor offers this personalization, accessibility, and feedback. Second, we establish a schedule of classroom observations. Every instructor is observed by another general psychology instructor at some time during the semester to get constructive feedback.

Sharing Forums

Lastly, the program incorporates several forums in which all instructors can share ideas, lessons learned, and successes.

Weekly Discussions. Becker and Riel found that instructors who collaborate with other faculty demonstrate exemplary use of computers and instructional practices.[20] Every week all general psychology instructors meet to discuss the course. As part of this meeting, each instructor shares any technology activity that proved useful, did not work, or worked but with glitches. We can share great ideas with one another and at the same time warn of dangers and pitfalls encountered when using a particular application or Web site.

Shared E-Files. Another great technique for sharing ideas is a common network file. We maintain an electronic file that all instructors can access and encourage them to place on it any interesting Web sites, video clips, classroom activities, and learning games that can be used to teach a lesson. Usually application of the resource is obvious; however, if not, a simple explanation is put in the file as well. This method is a great way to build resources for current and future faculty. For a particular lesson, an instructor can usually go into the file and find five or six technological applications. For example, an instructor consulting the lesson folder on "stress" would find several video clips illustrating different types of stress, Web links to news articles on stress and reducing stress, and online assessments to determine whether an individual is a Type A or a Type B personality.

E-Mail. Often great ideas or technological applications are discovered the day of, or a few days prior to, teaching a lesson. For these quick-response situations, we simply use an e-mail distribution list. For example, the following e-mail went out to all General Psychology instructors from a fellow instructor:

Folks,
APA has recently launched a new website designed to highlight the application of psychological research to everyday life. I haven't checked it out fully, but there are obvious links to what we discuss in PL100 (e.g., there is a report under the topic of "Improving Human Performance" on the role of sleep). http://www.psychologymatters.org/
Margie

The Web site referenced would then be added to the common network file referred to earlier.

Institutional Programs

In addition to supporting ongoing development within the department, the institution should signal its commitment to the use of technology for instruction with centralized activities. For example, at West Point, the Center

for Teaching Excellence offers the TAL-ENT program (Teaching And Learning Effectively using New Technology), which provides a forum for discussing common issues as well as a means for fostering communication among departments about using technology for learning. The TALENT brownbag series is a monthly, academy-wide, hour-long exchange of ideas about teaching with new technology. Generally an individual or team will present what they are doing in the classroom in a particular discipline.

The sharing and talk across disciplines about what works and what does not is a valuable tool for continuing education. The center does not attempt basic development of faculty in using technology for instruction, however. In our experience, such development is most successful within the individual academic departments.

Discussion

To assess the effectiveness of our program, we sought feedback from faculty who completed the program as well as from students who had been taught by these instructors. The results indicate that when instructors participated in the three-phase program designed to help show them how to integrate technology into the lesson plan, both the student and the instructor had a richer, fuller classroom experience.

Faculty Feedback

We asked instructors to reflect on the program after they had taught a year incorporating the tips and techniques they had learned. Specifically, we asked three questions with responses based on a five-point Likert-type scale.

The first question asked, "In your year of teaching following the FDW [faculty development workshop], to what extent do you feel you had been prepared to integrate the available technology into your classroom?" Instructors responded on a range from "Not Prepared" to "Well Prepared" with an average rating of 4.4.

The second statement, "The techniques I learned during FDW for integrating technology into the classroom

made me a better instructor," yielded responses on a scale from "Strongly Disagree" to Strongly Agree" with an average rating of 4.0.

The third statement, "The techniques I learned during FDW for integrating technology into the classroom made for a more satisfying and rich teaching experience," drew responses on a scale from "Strongly Disagree" to Strongly Agree" with an average of 4.5.

This feedback makes it evident that the program met the stated goal of helping faculty members integrate the available technology into the classroom. As one instructor summarized,

The instruction on the implementation of technology within the classroom (e.g., Blackboard, Internet links, audio/visual equipment) set the stage for my ability to use as much, or as little, as I wanted. It definitely has its advantages, particularly in being able to distribute supplemental material or to provide students additional learning experiences. It certainly opens the door for much more interactive aspects.

Student Feedback

It seems obvious that faculty who participated in this program would find it worthwhile. How would faculty participation affect students, though? As cited previously, studies show that student learning improves as a result of incorporating technology, but we wondered what West Point students actually thought about the experience. So we asked them.

Student feedback on academy-wide end-of-course surveys completes the picture of the program's effectiveness. The following sample comments came from students taught by instructors who completed the program. In response to the open-ended question from instructors, "What is one thing that I do well in the classroom that you would like me to continue doing?" students often highlighted the use of technology. For example,

I believe that you make great use of all the technology around you. At my previous college, my instructors

did not know how to operate the same type of equipment, but you do a quality job of combining our course objectives with the technology around you.

Another student advised,

I would continue to use media and Internet resources and games to explain the information and give us a context to put it into. The movies allow us to watch the information in action and then analyze it. The Internet articles and games allow us to actually apply what we have learned and see how well we know the information.

In response to "What is the best thing about this course?" students consistently commented on the interactive atmosphere that technology encourages and the excitement that technology lent to the course material. Sample comments included

I like how it is fun and the lessons are exciting and not dull and lecturish. The PowerPoint presentations and the clips to demonstrate the things we learned in class are great.

From another student,

The best thing about PL100 is the teaching method used by the professor. The classroom is equipped with interactive teaching equipment and the powerpoint organized the material into categories making them easy to learn. I feel I get more out of the actual class than any other class.

According to another,

It is excellent that there are always games, activities, and videos to help tie lessons together instead of just simply taking notes and listening to lectures.

One student commented, "I like the digital videos and the external links on Blackboard." A last comment sums up the student attitudes nicely:

The best thing about this course is that it is very interesting and interactive. Because of this, I am able to retain information longer and I am more willing to learn the information and work hard.

Conclusion

Integrating technology into the classroom can be a daunting task. As McNeirney acknowledged, however, technologically savvy instructors must model instructional methods and activities "which help future teachers understand that technology-based instruction is no longer an option. It is a requirement."[21] Ouzts and Palombo echoed with nearly identical sentiments when they proclaimed, "Restructuring the curriculum to incorporate technology is no longer a trend but a requirement."[22]

The advantages of using technology in the classroom range from a decrease in the educator's workload to an increase in student learning, motivation, and knowledge of tools and skills necessary to become lifelong learners in the age of technology. To achieve this, educators must step out of the comfort of the traditional classroom and step into the sometimes intimidating technology-enhanced classroom.

A good faculty development program will ease this transition. From our experience as a department, we believe an effective program should include

- peer-to-peer training on available technology;
- modeling of successful classroom techniques by more experienced instructors within the discipline;
- support, accessibility, and feedback from a trusted mentor; and
- established forums and mechanisms, both within departments as well as school-wide, that enable all faculty members to share ideas and continue development.

An insatiable learner his entire life, Abraham Lincoln once remarked,

> The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. As our case is new, so we must think anew and act anew.[23]

Simply put, the world around us continues to evolve at an immeasurable pace. While the tried-and-true practices of traditional lecture-style approaches to teaching feel safe and comfortable, we may actually be doing a disservice to our technologically advanced students. Rather than being intimidated by the available technological advances in our field, we owe it both to ourselves as instructors and to our students to incorporate these changes into our everyday practices. *e*

Endnotes

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