



# Report

## **The Perfect E-Storm** *emerging technology, enormous learner demand, enhanced pedagogy, and erased budgets*

### **Part 2: Storms #3 and #4**

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# **The Perfect E-Storm: emerging technology, enormous learner demand, enhanced pedagogy, and erased budgets**

## **Abstract**

*This is part 2 of 'The Perfect E-Storm'. Many demands are currently placed on online learning in higher education. While we may not realize it, we have entered the perfect electric storm, where technology, the art of teaching, and the needs of learners are converging. As such, this paper explores dozens of emerging learning technologies that are generating waves of new opportunities in online learning environments. In addition, this manuscript reviews trends in online enrolments, programs, and degrees in colleges and universities in the United States and around the world. To help create engaging content, pedagogical activities are outlined for synchronous and asynchronous learning with estimates of the degree of instructor risk and time as well as technological cost. Such activities focus on experiences that are rich in collaboration, interaction, and motivation. Finally, in the fourth storm, budgetary cutbacks are discussed which are restricting how colleges and universities can respond to these emerging technologies, enormous learner demands, and enhancements in pedagogy. These lean fiscal times are forcing institutions of higher learning to explore innovative projects and partnerships, including open source software solutions. Throughout the document, recent survey data projecting the future of online learning in higher education is presented. Due to its length the Observatory has published this report in two parts. 'The Perfect E-Storm, Part 1' includes Storm #1 and #2 (published week of June 21, 2004), while 'The Perfect E-Storm, Part 2' includes Storm #3 and #4 and concluding remarks (published week of June 28, 2004). Both parts are published under the same title and include the full set of references at the end of the document. Part 2 begins at Section 4.*

## **4 Enhanced Pedagogy (Storm #3)**

The third storm is perhaps the most important one. Not surprisingly, most online learning tools have been developed during the past decade. Their focus is typically on recording and facilitating student enrolments and reporting progress and completions, not on engaging learners in rich, interactive experiences. Instead of a learning focus, online learning systems are set up to warehouse students online. Even in this age of learner-centred learning (Bonk, Wisner, & Lee, 2003; Stephenson, 2001), course management systems are promoted as ways to "manage" learners. The fact that there is no public outcry is alarming.

What can be done? Well, of course, there could be mass protests from students, faculty members, and staff. UCLA experienced such demonstrations against online learning when their humanities faculty members were forced to post their syllabi online in the late 1990s (Young, 1998). While some faculty members welcomed the online syllabus project, others refused to participate. At the same time, some UCLA students led protest marches since they were upset with being charged a fee for the posting of online syllabi. The key problem seemed to be the top down approach to the implementation of e-learning changes. Organisational change requires member voice and initiative. While riddled with many initial problems, these unpopular tactics jumpstarted UCLA into a leadership position in the online teaching and learning spectrum. Today, the Humanities E-Campus at UCLA not only has many syllabi posted to the Internet, it offers fully online courses and programs.

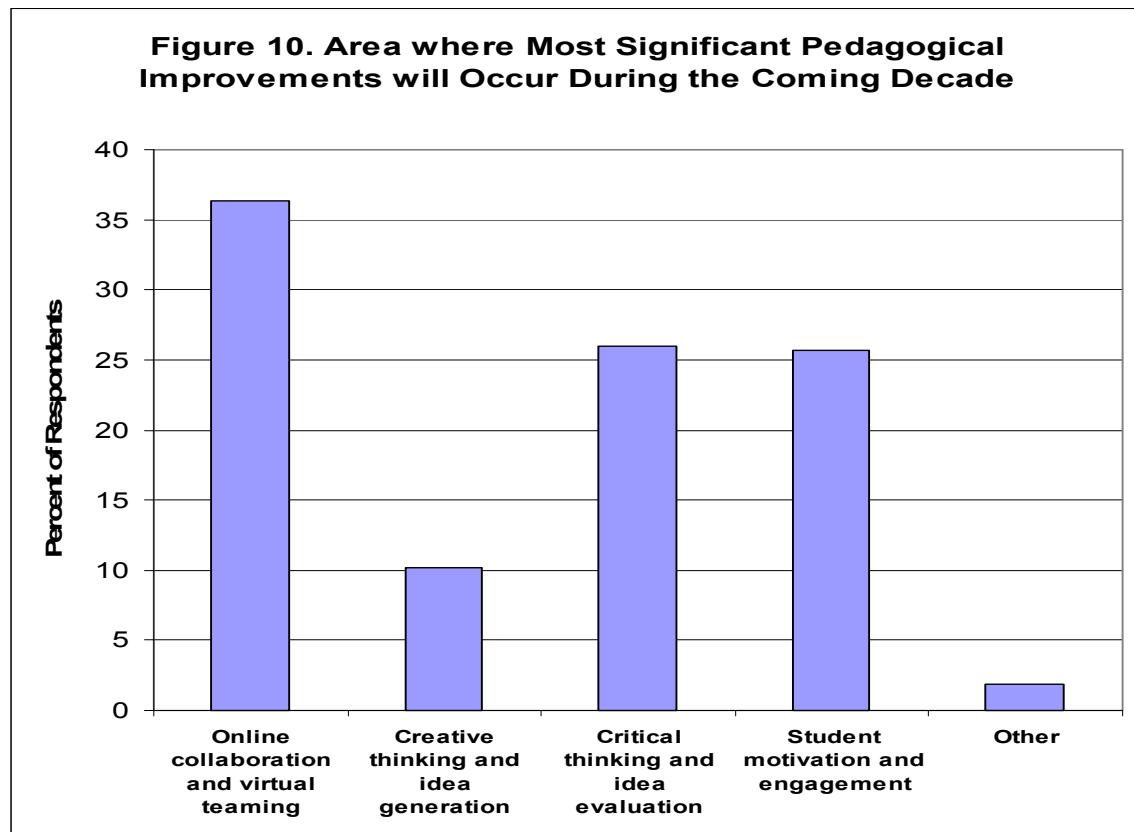
During the past decade, colleges and universities in the United States have been making a more concerted effort to promote the use of technology in teaching and learning (DeLacey & Leonard, 2002). As online learning environments take centre stage, those who push ahead might be intrinsically rewarded by the chance to try their pedagogical ideas out, while those in the following wave are provided with internal and external training opportunities. There is a need to know how to build effective

interaction, collaboration, and engagement with online learning technologies that foster two-way, not just one-way, interactions. There is a movement from technologies that attempt to replicate a teacher-centred past to those that nurture a learner-centred present or future. Instead of technologies that manage online learners, there is a focus on facilitating and scaffolding them to peak learning experiences (Dennen, 2001; Salmon, 2000). In effect, instead of a focus on shovelware, there is an emphasis on mindware (Bonk & Dennen, 1999; Oliver & McLoughlin, 1999). While this shifting in emphasis is occurring, there are concerns about student online participation, attrition, and engagement. Part of the problem is that there simply is a lack of sophisticated tools for online learning.

From a motivational standpoint, online learning is stagnant. Instead of protesting the situation, online instructors need to focus on how to foster interactive and collaborative tasks and events within this particular generation of online learning tools. There is a need to train instructors how to use the technologies that their colleges and universities have acquired as well as how to work around these primitive technologies to embed rich and engaging online activities and experiences.

#### 4.1 Survey of Pedagogies Impacting Online Learning.

Data from people surveyed from MERLOT, the WLH, and WCET, mentioned in Storm #1, indicate that the situation may improve in the coming decade. As Figure 10 shows, more than one-third of the 562 survey respondents anticipated that virtual teaming and collaboration would show the most improvements. One-fourth of them felt that the main inroads would be made in tools for critical thinking and idea evaluation, and another quarter thought it would be in tools for student motivation and engagement. Unfortunately, only one in 10 thought that creative thinking and idea generation would be sparked online.



As Bonk and Dennen (2003) point out, there is a need for motivationally engaging content. They note that in traditional classrooms, effective instructors create a supportive but challenging environment, project enthusiasm and intensity, provide choice, create short-term goals, and offer immediate feedback on performance (Pintrich & Schunk, 1996; Reeve, 1996; Stipek, 1998). Perhaps most importantly,

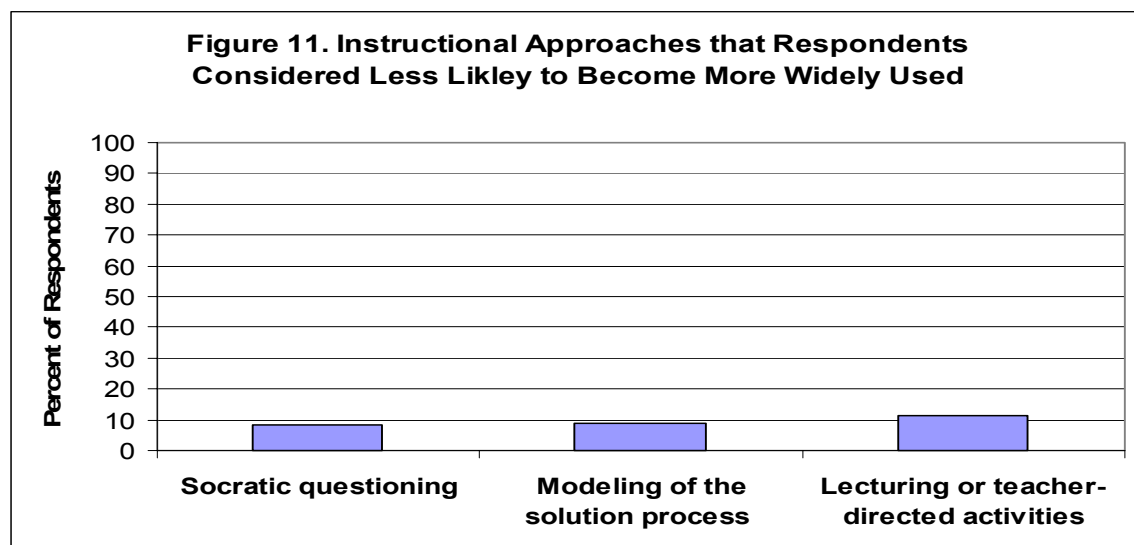
instructors might create a positive tone and psychologically safe learning environment. Online instructors might do this by having students use or manipulate real world content. Using a problem-based learning approach, they may create final products for a real-world entity or solve real world problems. During such a project, students could interact with experts and community leaders online or engage in online conflict with their peers in debate or role-play activities. Their completed assignments might be displayed in an online project gallery or studio. The hope is that students will receive immediate, genuine, and specific feedback on their work from peers, instructors, and external examiners.

Instructors might also attempt to motivate learners by offering choice and flexibility in the assignments. Just how much control do students have over their own learning? Effective online instructors might also target student curiosity and novelty by embedding a variety of activities, utilising at least some activities that can only be accomplished online, and allowing students some control or self-direction over their own learning (Stephenson, 2001). While instructors might provide many options and foster student self-control over their own learning, assignment templates and scaffolded guidance help focus student learning paths.

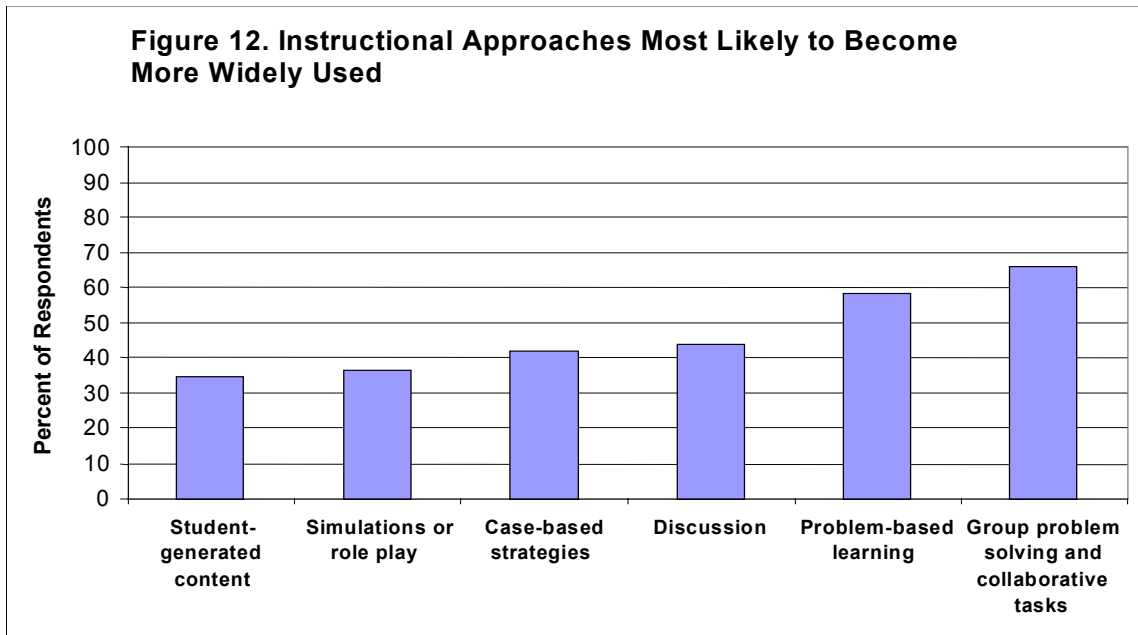
Peers are a key factor in the effectiveness of an online environment. Students might engage in conflict resolution activities online as well as react to the ideas or projects of their peers. For example, critical friend or Web buddy activities online might provide students with a partner to run ideas by.

Online learning experts believe that online learning courses should have activities that are relevant, interactive, project-based, collaborative, and provide learners with some choice and control over their learning (Partlow, 2001). Unfortunately, such interactive courses are rare. Cummings, Bonk, and Jacobs' (2002) analysis of syllabi posted to the WLH found that they lacked innovation and failed to take advantage of interactive aspects of the Web. Similarly, in Lazenby's (2003) exploration of technological and educational innovation at a virtual campus in South Africa, she found a heavy emphasis on lecture and testing, instead of learner-centred instruction rich in knowledge construction, collaborative learning, high level discussions, and intrinsic motivation.

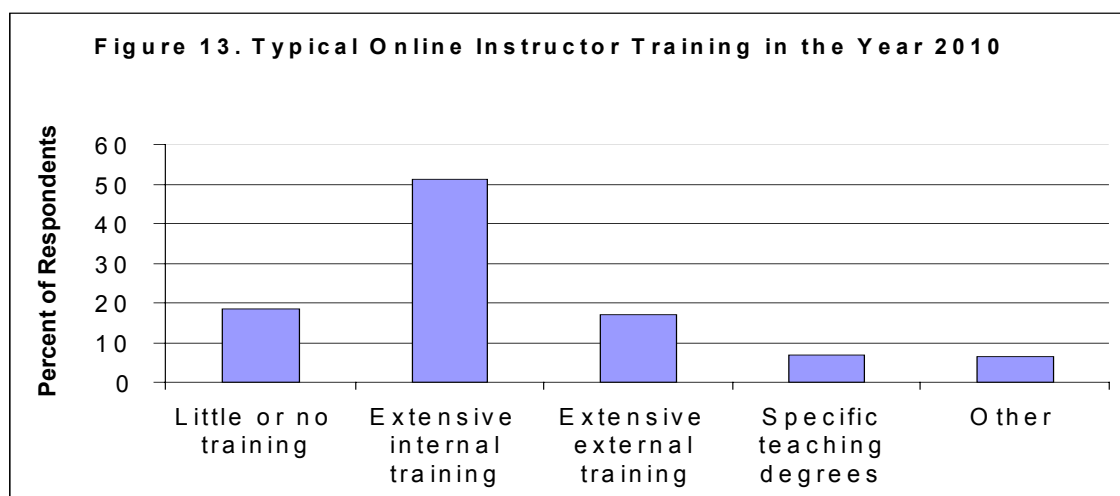
Despite those findings, when asked about instructional approaches that would be more widely used online in the next decade, respondents to the future of e-learning survey rated learner-centred practices higher than teacher-centred ones. As shown in Figure 11, Socratic questioning, modeling, and lecturing were deemed less likely to be used online than more student-centred techniques. Apparently, these popular face-to-face teaching approaches are not as useful online.



Instead of instructor-centred practices, respondents favoured student-centred teaching practices such as group problem solving and collaborative tasks, problem-based learning, discussion, case-based strategies, simulations or role play, and student-generated content. As shown in Figure 12, such strategies were selected as the key online methods of the coming decade by thirty percent or more of the respondents. Coaching or mentoring (29.9 percent), guided learning (28.3 percent), and student exploratory or discovery learning (27 percent) were also rated highly. These three strategies are consistent with the emphasis on giving students some control over their learning online and providing them with guidance where appropriate.



Most of those teaching in online programs and courses probably have never received much formal training. When respondents were asked what skills were needed to teach online in the year 2010, the two most valued skills were those related to course design and online facilitation or moderation. Interestingly, receiving lower ratings were the ability to lecture and subject matter expertise, though they were still deemed important. This meshes with the findings presented earlier that skills in facilitating learning are crucial to online instructors. When asked where typical online instructors in the year 2010 would be trained to teach, more than half indicated that such training would be handled internally (see Figure 13). Some contended that such training would come from external certificates or online teaching degrees. And nearly one in five predicted that there would be no training at all.



Instead of internal training within a particular university, it might be coordinated regionally or by an educational partner. For example, a partnership was formed between the University of Illinois and 48 community colleges in Illinois. A key result of that partnership was the creation of the Illinois Online Network (ION) which was charged with the professional development of online instructors (see <http://illinois.online.uillinois.edu>). Professional development in ION takes place through online courses, summer workshops, online teaching resources, and face-to-face training (Varvel et al., 2003).

Those seeking additional credentials can obtain a Master Online Teacher (MOT) certificate from ION. The program is made up of a set of four core online courses plus one elective course and a supervised practicum. To date, 99 teachers have completed the MOT program. In this program, participants can learn about the role of faculty and students in online classes, effective communication and teaching methods, the technologies for delivering online courses, and assessment and evaluation options. Naturally, all the courses in the MOT program are online. According to recent research from Varvel et al. (2003), ION courses and resources have had a positive impact on faculty confidence as well as their satisfaction teaching online courses.

Another leader in professional development for teaching in online environments is the Technical and Further Education (TAFE) system in New South Wales (NSW) (see [www.tafensw.edu.au](http://www.tafensw.edu.au)). With their massive enrolments of 460,000 students supported by 15,000 full- and part-time staff, it is the largest vocational education system in the southern hemisphere. In May 2004, TAFE NSW completed a five year multi-million dollar project to support and guide students electronically wherever they were located: home, work, learning institution, etc. (see <http://pdnonline.tafensw.edu.au/online-resources/projects/onlinstr.htm> and <http://tafeconnectsampler.tafensw.edu.au/home.htm>).

According to Greg Webb, Project Manager, TAFE Online Professional Development Project (personal communication, June 8, 2004), extensive professional development was provided in this project for course developers, instructors, managers, librarians, and trainers. To help those teaching as well as those supporting instruction online, Webb and his colleagues have developed short courses for teaching online, managing online learning, and instructional design. In addition, TAFE has established a popular and thoughtfully designed graduate certificate in facilitating and managing e-learning (FAME). And to further support those teaching online, TAFE has developed online instructor communities. Webb pointed out that in June 2004 individual institutes took over responsibility for their own professional development for online teaching and learning.

#### **4.2 Pedagogical Ideas for Synchronous and Asynchronous Online Courses.**

Even with the exemplary programs from ION and TAFE, many online classes continue to suffer from a shovelware mentality (i.e., what was done face-to-face, can be shovelled to the Web). Nevertheless, there are many promising opportunities to develop online learning modules, courses, and programs rich with interesting and engaging pedagogy. Before deciding on potential uses, any online activity might be evaluated on a number of scales or continuums. For instance, there are frameworks for critical and creative thinking activities and collaborative learning online (Bonk & Reynolds, 1997) as well as motivating online learners (Bonk & Dennen, 2003; Dennen & Bonk, in press).

This document builds on those previous frameworks by providing a number of pedagogical ideas for both synchronous and asynchronous instruction (see Table 1 and Table 2). Names and descriptions of at least 15 online activities are provided for each type of learning, asynchronous and synchronous. Of course, many ideas presented here overlap the two mediums. In addition, Tables 1 and 2 suggest the level of instructional risk, amount of instructor time, and technology-related costs associated with each method. However, the actual technology costs will depend on multiple factors including the prevailing technological infrastructure, the location, time of day, competence of technical support staff, and the technological familiarity of the users.

**Table 1 Fifteen Synchronous Activities for Online Learning Environments and Associated Risk, Time, and Costs.**

<b>Synchronous Instruction</b>				
Activity	Description	Instructor Risk	Instructor Time	Technology Cost
1. Quick Poll or Surveys	During a synchronous class or presentation, post a question or issue for students to respond to. This fosters student interaction, voice, and choice within the class.	Low	Low	Low to High
2. Guest Expert Chats (open or moderated)	Guests from outside of the class (e.g., authors of a book, conference keynotes, experts from the community, professionals in the field) are invited to join students for a discussion during a particular period of time. Typically, the guest answers learner questions (preset or spontaneous), although the guest may be asked to comment on work the class has already completed.	Medium	Low	Low
3. Online Séance or Role Play	Students might engage in an online activity wherein they assume identities of famous people from the field or discipline that have passed away. The instructor might ask each student to read books and articles from one of these individuals and make contributions to the online discussions as if they were the person they selected. Alternatively, the instructor might assign learners a role or personality to play such as optimist, pessimist, journalist, coach, sage, etc. Or students might be assigned the role of a famous person in society to assume such as Kant, Nietzsche, Anna Feud, Mother Teresa, Sir Edmund Hillary, etc.	High	Medium	Low to Medium
4. Brainstorming Ideas	Have students brainstorm ideas in a chat room and then post their ideas to the Web. Brainstorming might also be used to foster ideas for a writing assignment.	Low	Low	Low to Medium
5. Team or Group Meetings and Reflections	Have teams meet in a synchronous chat room or group collaboration tool to discuss plans.	Low	Medium	Low to High
6. Panel of Experts or Press Conference	Hold an online panel or symposia of student experts at the end of the semester after they deeply research a topic. Or have students vote on a set of outside experts they would like	Medium	Medium	Medium

	to invite for an online panel discussion or symposia and then invite these individuals. Hold event and then debrief.			
7. Webinars, Webcasts, or Online Lectures	Use synchronous conferencing systems or tools, video streaming technology, or IP-based videoconferencing for real-time lecture with questions from remotely located students or participants.	High	Medium	High
8. Synchronous Quizzes	Have students sign up to meet with the instructor online for a quiz or other form of assessment. Depth and breadth of student knowledge can be quickly explored.	High	High	Low
9. Breakout Discussions or Activities	Students move from a large group chat to distinct breakout rooms or groups based on interest or activity.	Medium	High	Low to Medium
10. Virtual Conference Attendance	Students virtually attend a conference in a field and reflect and report on it.	Medium	Medium	Low to High
11. Transcript Archives and Reviews	Students review chat transcripts archived by the system or posted automatically. Instructor asks students to look for key concepts or processes in the transcripts.	Low	Medium	Low
12. Language Learning and Practice	Language instructor might use a chat session to analyse documents in that language; or, explore grammar, spelling, or vocabulary. Students might also practice pronunciation of words online with headsets and microphones.	Medium	Medium	Low to High
13. Debriefing Exercises	Could be used for one-to-one tutoring or management of students who were totally off task on an assignment. Might also be used for whole group discussion and reflection after a pinnacle class event.	Low	Medium	Low
14. Cross-class Collaboration and Team Teaching	Students engage in real-time chat, online audioconference, synchronous Web conference, or IP-based videoconference. Activity is arranged for students to get to know each other.	High	High	High
15. Virtual Office Hours	Instructor posts time when he/she will be available to answer student questions. If many students attend, assign time slots for individual attention.	Low	Medium	Low



**Table 2 Fifteen Asynchronous Activities for Online Learning Environments and Associated Risk, Time, and Costs.**

<b>Asynchronous Instruction</b>				
Activity	Description	Instructor Risk	Instructor Time	Technology Cost
1. Ice Breakers: Eight Nouns Activity and Coffee House Expectations	Ask students to introduce themselves using eight nouns and then explain why they choose each noun. Have them respond to peers with whom they have common interests or experiences. Or have everyone post 2-3 expectations for the course in café or coffee house. The instructor responds to these expectations.	Medium	Medium	Low
2. Class Discussions and Reflections	Assign a designated “starter” who reads ahead and starts discussion. At the end of the unit or week, the “wrapper” (and perhaps the teacher) summarizes what was discussed; others participate.	Medium	High	Low
3. Web Resource Explorations, Reviews, and Recommendations	Have students suggest Web links for the class and also require them to rate or rank those suggested by their peers.	Low	Medium	Low
4. Field Experiences, Internships, and Sharing Perspectives	Have students observe situations in their field or discipline during internship or job experiences and reflect on how these experiences relate to current course material. Instructors might post issues or questions for student reaction.	Medium	Medium	Medium
5. Case Learning	Place a set number of cases on the Web and link to a bulletin board system or conferencing tool for students to discuss. These cases can be used as collaborative quizzes that instructors and students from other universities or institutions can use. Or have students post their own cases or problems to solve based on field experiences, internships, or prior jobs. Always require students to post responses to a set number of peers after posting a case or case response.	Medium	Medium	Medium
6. Critical Friend and Web Buddy Activities	Assign everyone a partner to comment on his or her work (privately or publicly) and generally help each other out during the semester. Online peer support might include providing peer	Medium	Medium	Low

	feedback on self-tests and assignments, analysing and critiquing ideas, and reminding each other of assignments and due dates.			
7. Just in Time Teaching and Just in Time Syllabus	Have course lectures wrapped around weekly online activities and quizzes. Change the online activities as well as live lectures based on online student performance or responses. Or change syllabus based on current news and events.	High	Medium	Medium
8. Task Choice or Options	Examples of student choice or options include listing discussion topics and having students vote on them, giving options regarding articles to read each week, and embedding task options for different learning styles.	High	Medium	Low
9. Anonymous Suggestion Box	Students post anonymous course suggestions to password protected area. The instructor reads and reflects on it and later posts a response to all students.	High	Medium	Low
10. Online Scavenger Hunts	Send students on an online scavenger hunt. Such a technique is a useful way to acclimate them to online resources and technologies as well as the content of the class. An option is to have students generate scavenger hunts for their peers for bonus points.	Medium	Medium	Low
11. Online Simulations and Games	Students conduct experiments or hands-on activity in a virtual world (e.g., frog dissection) before attempting them in the real world.	Medium	Medium	Medium to High
12. Video Papers	Students write a paper accompanied by a digital movie and perhaps other supporting materials such as PowerPoint slides and Web resources.	Medium	Medium	Medium to High
13. Online Portfolios and Galleries of Student Work	Post student individual work or group projects to the Web and have expert panels, practitioners, or community members evaluate them. Perhaps have student work posted to the Web as a classroom legacy or archival record to display course expectations to future students.	High	Medium	Medium to High

14. Reflective Writing (minute papers, diaries, and blogs)	Students reflect on course activities, lectures, readings, and/or field or internship observations in a private online journal, discussion forum, bulletin board, or personal blog. Instructors and peers provide feedback.	Medium	High	Medium
15. Online Debates (E-bates)	Assign two students a pro side and two students a con side and debate an issue electronically and then switch roles and come to compromise. Perhaps require them to post a reflection on the compromise positions of 1-2 other groups. Alternatively, have students post debate or hot topics based on the readings.	Medium	Medium	Low to Medium

As shown above, there clearly are a plethora of strategies and activities that can enhance an online module, course, or program. These 30 activities are just a few examples of the pedagogical possibilities of online learning. Instead of the 15 synchronous and 15 asynchronous activities noted above, the same activities could be sorted into activities for specific thinking skills, motivational principles, or levels of interaction (Bonk & Dennen, 2003; Bonk & Reynolds, 1997). The key issue, however, is that college instructors, instructional designers, and administrators must begin to think about the opportunities for active learning within their online courses.

Ratings for risk, time, and cost are highly subjective and could be approached from different vantage points. In addition to instructor risk, online methods might be rated for the degree of institutional and student risk. When this occurs, instructors might be cautioned by their institutions before using activities with potentially high risks, hidden costs, and unfavourable outcomes.

When the pedagogical opportunities are better understood by online instructors as well as those thinking about teaching online, the pedagogical floodgates will open. Of course, online students--the ultimate customers of this new delivery mechanism--should demand no less. And when the pedagogical activities begin to employ many of the learning technologies mentioned in Storm #1, there will be more exciting and engaging online learning, beckoning even more learners to sign up for online courses. When active learning pedagogies are more fully developed and tested for just a few of the dozens of educational technologies emerging today, we will surely see a monsoon of innovation and experimentation in online learning.

It certainly is a bit ironic that higher education is faced with widespread belt tightening and budgetary cutbacks just when there are exciting technologies and engaging pedagogies emerging in online learning as well as skyrocketing learner demand for online courses. This paper now discusses this fourth and final e-storm: erased budgets.

## 5 Erased Budgets (Storm #4)

These are certainly interesting times in higher education. There are dozens of technologies that can impact teaching and learning; especially in online environments. At the same time, there are great demands being placed on these technologies as thousands of students enrol in online classes at different colleges and universities around the globe. And, as the last storm highlights, there are certainly many ways to make online instruction a unique and engaging experience. Unfortunately, while the menu of online options is expanding and those signing up to take a bite is rising, there are increasing budgetary concerns and restrictions.

The Center for the Study of Education Policy reports an average budget reduction in 2004 across all 50 states of 2.1 percent or more than US\$60 billion dollars (Palmer, 2004). Higher education cuts are so severe that universities in the U.S. are being asked to give money back to states (Finke, 2004). Similar financial problems exist in New Zealand, Hong Kong, Australia, and many parts of Europe. Lambert (2004) argues that significant financial shortcomings are impacting the quality of higher education throughout Europe.

For those in the online learning world, this financial crisis is both an opportunity and a threat. In terms of threats, there is increasing pressure for accountability and holding down costs while simultaneously increasing accessibility for students (Ehrmann, 1995; Oliver, 2003). In addition, there may be unrealistic expectations and overblown research disappointments that cause administrators and politicians to search elsewhere for educational solutions. At the same time, online learning might help administrators cost justify online learning decisions due to savings related to brick and mortar, course development, travel, and staffing. In fact, the Pew Grant Program in Course Redesign funded a number of colleges and universities in the redesign of large enrolment introductory courses using technology (Twigg, 2003). The goal of these technology-enhanced redesigned courses and online curricula was greater interactivity and effectiveness as well as significant cost reductions.

As alluded to above, budgets in many of the same states and countries that showed significant expansion in online learning programs are also in the midst of a budgetary crisis (Johnson, Lav, & Ribeiro, 2003; Van Harken, 2003). Pratt (2003) notes that the budget cuts at the University of Wisconsin, University of Virginia, and University of Minnesota each exceeded US\$30 million in 2002, while, in Missouri, the reduction was 19 percent of the previous budget. California, a state which by itself has a US\$14 billion budget deficit, recently elected Arnold Schwarzenegger as governor to replace the recalled former governor, Gray Davis. In just a few months since stepping into office, Governor Schwarzenegger has proposed freezing enrolments at state universities, redirecting freshmen to community colleges, raising tuition, significantly reducing college and university budgets, eliminating important outreach funding for college preparation to elementary and secondary schools, and reducing Cal State grant awards (Hebel, 2004). Among the recommended cuts is a five year old outreach program providing advanced placement, honours, and college preparatory courses to more than 5,000 high school students using distance education technologies, mainly in low-income parts of the state (Carnevale, 2004). In April 2004, such proposals prompted a protest of thousands students and faculty members, especially from community colleges.

Unfortunately, this crisis in education is predicted by some to continue throughout the coming decade (Jones, 2003). Worse still, there are extensive technology-related cutbacks in higher education as well as in primary and secondary education. For instance, educational technology funding in the State of Missouri has been cut from US\$15 million in 1994 to US\$7.8 million in 2002 to zero in 2003 (e-School News, 2003). Across 31 states surveyed by eSchool News, the average state educational technology budget for K-12 schools was slashed from nearly US\$14 million in 2002 to US\$10.4 million in 2003. Even in the fast-growing State of Nevada, there was no money for educational technology in 2002 and 2003 (though that has changed in 2004). In Michigan, plans for US\$22 million in state support for laptop and handheld computing have been curtailed due to a US\$900 million deficit, though some federal funds will still help fund part of this project.

The technology funding situation is not much better in higher education. For example, more than forty percent of the participants in a recent campus computing project survey reported budget cuts in academic computing areas (The Campus Computing Project, 2003). This study included 559 individuals from both two- and four-year colleges and universities. In comparison, in the 2001 campus computing survey, just 18 percent of participating institutions reported budget cutbacks. As a sign of how significant this situation is, nearly one-third of the survey participants reported mid-year cutbacks. Those in public institutions were much more likely to report cuts than those in private colleges and universities. Not too surprisingly, any new monies for technology seem to be earmarked for information technology security areas, not for innovative pedagogical tools for e-learning.

### 5.1 Open Source Software and Other Options.

These times of significant budgetary constraint are certainly encouraging technology administrators in higher education settings to look at their options. One popular alternative is open source software. For instance, Indiana University is working with MIT, Stanford University, and the University of Michigan to spearhead the development of open source course management and assessment tools. This consortium of prominent U.S. universities is also developing a research support and collaboration system, an enterprise services-based portal, and other related tools.

The name for this project is "Sakai" (Wheeler, 2004a) (see [www.sakaiproject.org](http://www.sakaiproject.org)). During a two-year span, each of these four key partner institutions is providing over \$1 million per year to develop and support this project. In addition, monies for the Sakai project have been received from the Andrew W. Mellon and William and Flora Hewlett Foundations; the latter for Sakai's extension to meet the unique needs of community colleges. Like Indiana University, the other three main partners are heavily involved in various online learning initiatives and understand the impact of economies of scale and cross-institutional collaboration.

The initial release of Sakai courseware is underway at the time of this writing (summer of 2004). However, the first year at IU will be used primarily for beta testing and system improvements. The Sakai courseware will compete with course management systems from Blackboard, WebCT, and eCollege. Eventually anyone will be able to utilise this code for commercial gain or educational needs. In fact, there is an Educational Partners Program for early access to applications developed in Sakai as well as avenues for training, sharing best practices, developer training, and access to strategic briefings of partners. Sakai partner costs are US\$10,000 per year for three years for most institutions, though those with fall enrolments of under 3,000 students will receive a fifty percent fee reduction. Early partners include Cornell, Princeton, Yale, Carnegie Mellon, Harvard, Northwestern, and Columbia University as well as many smaller universities and community colleges (see [www.sakaiproject.org/press/sepp\\_press.html](http://www.sakaiproject.org/press/sepp_press.html)). Beyond the U.S., the University of Cape Town and other universities in the United Kingdom, Australia, and Spain have been added or are in the process of joining. According to Brad Wheeler, Associate Vice President for Research and Academic Computing and Dean of IT at IU (personal communication, June 5, 2004), what seems essential here is that the favourable economics of the Sakai project, in terms of the costs of information technologies, will benefit higher education institutions in numerous ways. For instance, it should revolutionise the sharing of IT-enabled pedagogical innovations.

Another open source courseware package is called Moodle. Moodle has experienced substantial growth during 2003 and 2004. It is now available in 40 different languages (e.g., Arabic, Chinese, Danish, Finnish, Greek, Portuguese, Spanish, and English). As of June, 2004, there were nearly more than 1,400 sites from 85 different countries which had registered with Moodle (<http://moodle.org/sites/>). These download sites included colleges and universities, e-learning institutes, and even elementary and secondary schools. Such impressive numbers indicate that there is a growing niche for innovative and cost effective online learning technologies.

The primary developer of Moodle is Martin Dougiamas from Perth, Australia. At the Moodle Web site, Dougiamas argues that, unlike other course management systems, Moodle has an explicitly stated social constructivist pedagogy underlying the system. In effect, Dougiamas believes in learners as doers who construct and negotiate knowledge both individually and as members of virtual teams. This social constructivist framework is in sharp contrast to the shovelling of content to the Web and passive learning that most institutions have subsidised during the past decade with course "management" systems.

According to Dougiamas (personal communication, June 7, 2004), Moodle has many social constructivist components. For instance, the forums are "sticky" wherein the users posting will receive email notifications of forum posts intended to entice them into the discussion. In addition, the screens have reminders to read all postings carefully as well as content ratings intended to promote reflection on the degree of 'connectedness' of the knowledge posted. Other tools such as student constructed

glossaries with automatic Web links builds on this social constructivist framework. Similarly, Moodle embeds personal journals where students can reflect on ideas and teachers can scaffold student thinking. In addition, Moodle allows for the automatic linking of materials. Nevertheless there are no research studies on Moodle, as of yet, to support Dougiamas' social constructivist contentions.

A free tool that is not a full course management system but remains highly popular for blended courses that rely on discussion is the *Internet Classroom Assistant* (ICA) from Nicenet (<http://nicenet.org>). The ICA includes tools for asynchronous discussion, Web link sharing, internal email, assignment posting, and document posting. In addition, the course creator can access class rosters and a set of class administration tools (e.g., to set conferencing preferences, delete specific users from a class). ICA tools are quite limited in terms of graphics and the ability to maintain document formatting, however. For simple article discussion or communication, the ICA is quite handy. A class can be created in just a few minutes. Since 1998, nearly 650,000 people have used the ICA. During the month of May, 2004, there were more than 40,000 users of more than 7,000 classes in Nicenet. Importantly, Nicenet has recently become a non-profit organisation, thereby allowing donations to be tax deductible.

These are just three examples of higher education alternatives to standard courseware products. Wheeler (2004b) argues that the collaborative and innovative nature of higher education institutions has fuelled the recent growth of open source software for digital portfolios, university portals, course management systems, and assessment engines. Sakai and Moodle are just initial signposts of this trend. While Linux and Apache may have led the open source movement for general infrastructure, today open source software is flourishing in higher education learning environments. Such trends toward sharing content and software are found in online courses and course materials. MIT, for instance, is making all their courses available to the world in the OpenCourseWare project (Olsen, 2002; see <http://ocw.mit.edu/index.html>). As of June, 2004, 700 courses from 33 different disciplines were publicly available online.

Perhaps more importantly, MIT is coordinating the Open Knowledge Initiative (OKI) (see <http://web.mit.edu/oki>); a partnership of highly prestigious universities (e.g., MIT, Cambridge, IU, Dartmouth, Stanford, etc.) to support the creation of standards for educational software compatibility and interoperability across institutions, as well as other innovative learning technology in higher education (Atwood, 2003/2004). According to Brad Wheeler (personal communication, June 14, 2004):

OKI is best understood like Lego toy building blocks that snap together in layers. On the bottom layer, a university could choose any hardware, database, or approaches to authentication that seem best to them. On the top layer, programmers can write software that simply asks "Who is this user?" or "Where is that data?" without concern for the local IT choices. OKI provides the layer in the middle that connects the local choices to the application software. This means that software written at one university can travel easily to other universities with little modification. We call this "code mobility" and it is an essential part of improving the cost of IT for higher education.

Clearly the OKI project has implications for higher education officials struggling with these lean fiscal times that unfortunately have hit during a period of escalating online enrolments.

As this fourth storm makes apparent, operating budgets in most higher education institutions are not flush at the moment. Such times do not bode well for experimentation with educational technology or pedagogy. It is hard to know how to handle this fourth storm confronting e-education. Should it (i.e., reduced budgets) be confronted directly or should one hide? If the wrong choice is made, can the boat be quickly turned around without capsizing it? Hopefully, some of the information in this report will help in making critical online learning decisions.

## **6 Summary of Survey Findings**

As online teaching and learning has exploded during the past few years, there have been many questions raised about the effectiveness of online learning compared to other teaching practices and delivery systems. Where is synchronous learning effective? What about asynchronous? How effective is blended learning? How can online retention rates be increased? What about course completion rates? What obstacles and barriers do online instructors and students face? Just who is making the decisions regarding online teaching and learning?

It is difficult to find answers to these questions since most online learning research to date is suspect, though there are a few studies that show distinct benefits of learning online (Olson & Wisher, 2002; White Paper from Jones International University, 2002). Bonk (2001) reported on both the problems early Web adopters face online (poor quality materials and courseware, lack of administrative support, constant student demands, etc.) as well as the joys they experience (e.g., ease of access and use, unique cross cultural mentoring, inter-university collaboration and pooling of resources, etc.). To help those teaching online, Blackboard and the National Education Association recommend 24 benchmarks for success in online course design and delivery as well as faculty, student, and institutional support (Phipps & Merisotis, 2000). Similarly, the Alfred P. Sloan Foundation authored a report with five key pillars for quality online education, namely, learning effectiveness, student satisfaction, faculty satisfaction, cost effectiveness, and access (Lorenzo & Moore, 2002).

Along these same lines, the survey research results presented in this document provide some insight into the present and future state of online learning. They indicate that during the coming decade, the most important skills of an online instructor will be how to moderate or facilitate learning (Salmon, 2000) and how to develop online courses. Other key skills, of course, are subject matter expertise, counselling or advising skills, and online lecturing or instruction skills. Online collaboration, case learning, and problem-based learning were the preferred methods of the online instructor, with few simply relying on lectures, modelling, or Socratic instruction. Apparently, many traditional forms of instruction will not work online.

Interestingly, most view the potential of the Web in the coming years as a tool for virtual teaming or collaboration, critical thinking, and enhanced student engagement, instead of as an opportunity for student idea generation and expression of creativity. While the focus on critical thinking and evaluation is positive, the survey respondents failed to see the many opportunities to foster student generative thinking online. Clearly, the Web can be used by learners to brainstorm, make Webs of their ideas, and display original thoughts. In addition, it is likely that the Web will offer more hands-on simulations and lab experiments where online learners wrestle with authentic data and immediately see the results of their decisions and actions. Given these findings, it seems that there will soon be a shift in focus from the Web as a technology to the Web as a pedagogical tool. Instructors can no longer ignore the vast pedagogical possibilities that the Web offers. Now is the time to build and trial pedagogical courseware.

From an administrative standpoint, there is also a trend toward more online certification and recertification programs as well as associate degrees during the coming decade, not necessarily an explosion of online undergraduate and master's programs. And the emphasis will be on blended learning, combining face-to-face with online offerings, instead of fully online courses. In fact, the vast majority of courses in higher education will undoubtedly have some Web component by the end of the decade. Of course, instructors will need extensive training to ensure that their courses and programs fully take advantage of it.

## **7 The Perfect E-Storm Revisited**

As stated earlier, the four e-storms, emerging technologies, enormous learner demands, enhanced pedagogy, and eroded budgets, combine to create the perfect e-storm. Clearly there is a need to experiment with new technologies for learning and share insights gained; in spite of the fact that

financial resources are currently quite limited in higher education. It also seems likely that the demand from current and potential online learners will continue to escalate, even while colleges and universities are dealing with these financial constraints and fashioning effective models for virtual campuses, programs, and courses. In coming decades, those reading documents from this era may wonder how online learning courses and programs expanded so rapidly when there was scant information about the impact. Perhaps, many are happy navigating this perfect e-storm since there are so many possibilities. Unlike most other technologies, the Web offers instructional opportunities for self-directed learning, expert feedback, the sharing of multiple perspectives, interactive discussion, and inventive role play that were only hinted at with previous educational technologies.

Those in the trenches of online teaching and learning already hear the storms brewing. Instead of being fearful, they are exhilarated by the sounds. As the survey data reported here indicate, they are aware that facilitators and moderators of learning fare better online than those who continue to use a didactic, lecture-based approach. They also realise there is an opportunity to design rich and engaging content and activities no matter what constraints or limitations exist in the online learning courseware or institutional infrastructure. And for those in countries or institutions that have yet to provide the necessary infrastructure or support, there are low cost, low risk, and low time solutions that have extremely high payoffs. However, experiencing such an e-learning trifecta will depend on the specifics of one's situation.

The issues are complex. If pedagogies and technologies are effectively matched the concerns are less about student retention and course completion, and more about facilitating student engagement in a community of learners. This engagement could extend learning to the edge of one's competencies and, more generally, foster a passion for lifelong learning. While instructors and students may sometimes be deluged with an endless series of interesting choices and opportunities, online pedagogy is not the only concern or hurdle. Technologies for teaching and learning will continue to emerge and evolve to enhance instruction. While wireless technologies will continue to explode in college campuses, any of the other technologies mentioned in Storm #1 (e.g., electronic books, blogs, digital libraries, simulation, etc.) may find substantive use in online learning environments. The wealth of emerging technologies and mounting demands from learners makes it vital for online instructors and institutions to track and experiment with them.

Each day online pedagogy and innovative technology confront online instructors and support staff from many directions. At the same time, they face increasingly challenging demands from current and potential students. Eventually, online learners will demand more rich, engaging, and relevant content and activities than what is available today. Ironically, student enrolments continue to multiply despite courses that generally lack interactivity. While increased investment might be made to build more robust online courses, addressing multiple student needs, the opposite trend is in fact the reality. Perhaps these evaporating budgets will damage what little innovation there is. Or perhaps it will force even greater creativity as programs and departments make due with less.

As these four storms collide, they create the perfect e-storm. When this occurs, many instructors, students, colleges, and universities will be swept away and drowned. Others will make the necessary adjustments to ride the storm out. And still others will be out ahead of the storm and lead the way toward revolutionary learning environments that simultaneously take advantage of the emerging technologies and innovative pedagogies. For those in the latter group, a cloudburst of opportunities for teaching online should appear. And when instructors begin designing online courses that better integrate emerging learning technologies with engaging pedagogy, innovative ideas will be flooding higher education. Let the hurricane season begin!

**Note : See the Observatory's Monthly Report 'The Perfect Storm, Part 1' for Storm #1 and #2 (published week of June 21, 2004).**



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