Going Green: Managing a Paperless Classroom

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The LMS (learning management system) at many schools for delivering, tracking and managing education relies on TEL (technology-enhanced learning), what Nichols called "pedagogy empowered by digital technology" (Nichols, 2008). It includes the "paperless classroom" in traditional (not online) classes in which faculty and students exchange information and assignments electronically. The paperless non-online classroom pedagogy is designed to improve the efficiency of the learning experience, to contribute to asynchronous learning and to help students develop the electronic skills and competencies they will need in the post-graduate private sector while contributing to the sustainability efforts of the university. The main objective of this paper is to provide a framework for managing a paperless classroom, including best practices, pedagogical issues and the "how-do-I" suggestions.

Keywords: learning, technology, pedagogy

Introduction

There are a number of practical and educational reasons for online education, including the cost of education, and the orientation of the students and faculty to and experience in using the Internet. This has led to TEL (technology-enhanced learning), what Nichols called "pedagogy empowered by digital technology" (Nichols, 2008). TEL includes hybrid classes in which faculty and students not only meet in the traditional classroom environment, but also exchange information and assignments electronically. Online classes rely completely on the latter exchange process.

The paperless classroom is a hybrid class which uses no paper handouts or tests. It is designed to: (1) improve the efficiency of the learning experience; (2) facilitate asynchronous learning; (3) help students develop the virtual environment skills and competencies they will need in the post-graduate private sector; and (4) contribute to the sustainability efforts of the university.

Improving the Learning Experience

The paperless classroom facilitates an andragogical approach to education which is more suitable for college-age learning than traditional educational pedagogy. In the latter, teaching is focused on transmitting contents. Andragogy's objective is the learning and is focused on facilitating the acquisition of the contents (Batson, 2008).

Andragogy makes the following assumptions about the design of learning: (1) Adults need to know why they need to learn something; (2) Adults need to learn experientially; (3) Adults approach learning as problem-solving; and (4) Adults learn best when the topic is of immediate value. By comparison, pedagogy,

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commonly called teacher-directed instruction, assigns students a submissive role in the learning process requiring obedience to the teachers' instructions. A pedagogical learning approach promotes dependency on the instructor in the belief that learners need to know only what the teacher teaches them (Knowles, 1984).

In practical terms, andragogy means that instruction for adults needs to focus more on the process and less on the content being taught. Strategies, such as case studies, role-playing, simulations and self-evaluation are the most useful. Instructors adopt a role of facilitator or resource rather than the lecturer or grader.

Knowles (1984) proposed five principles of andragogy:

(1) There is a need to explain the reason why specific things are being taught, e.g., certain commands, functions, operations, etc.;

(2) Instruction should be task-oriented instead of memorization—Learning activities should be in the context of common tasks to be performed;

(3) Instruction should take into account the wide range of different backgrounds of learners;

(4) Learning materials and activities should allow for different levels/types of previous experience with computers;

(5) Since adults are self-directed, instruction should allow learners to discover things for themselves, providing guidance and help when mistakes are made.

Facilitating Asynchronous Learning

A paperless classroom allows students access to course contents 24 (hours a day)/7 (days a week)/365 (days a year) from anywhere in the world, which facilitates self-paced learning. "Asynchronous ('anytime' rather than the same time) online interaction leads to new paradigms for teaching and learning. Overall, faculty reported a change in their teaching persona, towards more precision in their presentation of materials and instructions, combined with a shift to a more socratic pedagogy, emphasizing multi-logues with students" (Nancy Walters Coppola, 2001).

Developing Virtual Environment Skills

According to bnet.com, the world's mobile workforce will be numbered as nearly 1.2 billion by 2013 (Ryan, 2010). "Mobile workers are those who work at least 10 hours per week away from home and from their main place of work, e.g., on business trips, in the field, travelling or on customers' premises, and (who) use online computer connections when doing so" (Chrissafis, 2000). Adaptability, communication, planning, organization and relationship-building are key competencies required for effective mobile working (A study: Understanding & managing the mobile workforce, 2007, p. 3). These competencies can be developed and/or strengthened in a paperless classroom.

Contribution to Sustainability

The Brundtland Report defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Our common future, 1987). "Sustainability requires careful use of our resources, including water, air, energy, biodiversity, soil, etc., so they will be in adequate supply for the foreseeable future" (About the Center for Sustainability, n. d.).

Taking the paper as an example (These estimates are based on averages across over the authors' collective 40 years of teaching),

(1) 50 syllabi $\times$ 5 duplex sheets = 250 sheets = 0.5 reams of paper $\times$ 4 classes = $\sum$ 2 reams of paper;

(2) 50 tests $\times$ 4 tests/semester $\times$ 5 duplex sheets = 1000 sheets = 2 reams $\times$ 4 classes = $\sum$ 8 reams of paper;

(3) 50 misc. handouts (quizzes, worksheets, etc.) $\times$ 5/semester $\times$ 1 duplex sheet = 250 sheets = 0.5 reams $\times$ 4 classes = $\sum$ 2 reams of paper;

(4) 50 written assignments handed in $\times$ 2/semester $\times$ 4 duplex sheets $\times$ 4 classes = 1600 sheets $\sum$ 3.2 reams of paper.

The total is 15.2 reams of paper for one class, which are 1.52 cartons of paper per class. If we multiply that times 10 faculty members teaching four classes in a semester in a department, we will get the result of 15.2 cartons of paper.

While the proportion of institutions that see online education as a critical component of their long-term strategy appears to have reached a plateau over the past several years, public institutions (74%) believe that online is critical for their long-term strategy (Allen & Seaman, 2010, p. 2).

Paperless Classroom Pedagogy

TEL is most effective when a LMS (learning management system) for delivering, tracking and managing education is available. A major benefit is the ability to virtually adapt to the learning environment in real time, making adjustments and changes to calendar, content, assignments, assessments, etc., without having to generate hard-copy paper replacements for paper already distributed.

Class Management: Foundation

There are seven key tools for managing an effective paperless classroom which are usually provided with an LMS: (1) syllabus; (2) class calendar; (3) course content; (4) assignments; (5) assessments; (6) interactive tools including student messaging, discussions, announcements, note taking; and (7) tracking and report generation.

The basic objective of the syllabus and calendar is to provide students with an unambiguous projected roadmap as to how the class will be conducted, what learning activities there will be, when and how they will be assessed and the grading rubric.

The course content tool provides the digital files to support the learning content. A more important tool is the textbook's Website, which typically provides students with not only digital content in the form of text and PowerPoint files, but practice quizzes, exercises, group projects and external resources, to name a few.

The assignments and assessments tools allow the posting of digital replacements for the traditional paper used for those activities.

The interactive tools support the learning process.

The tracking and report generation functions allow the professor to see, by a specified date range, an overview of general student LMS activity; how often LMS tools are used; an overview of the pages or tools most frequently used as course entry and exit points; an overview of the files viewed most frequently; and a detailed summary of activity information for individual students.

The latter is extremely useful to validate or invalidate a student's claims that "the system" prevented her/him from accessing a tool or submitting an assignment.

It is important that all tools be accurate and integrated before the start of the semester. Mistakes, hiccups and glitches allow students to scapegoat the paperless environment for poor performance too easily.

Class Management: Implementation

It is important not to make assumptions about students' comfort with and expertise in computers, the Internet or the LMS system. It is helpful to assess students' self-perceptions of their skill levels with all the

three to determine what kind of training or remediation may be required so that they are comfortable with the concept and reality of the paperless classroom.

Screening questions include:

(1) Off-campus Internet access (circle one): Unlimited, Sporadic, Limited, Very Limited and None;

(2) Computer literacy (circle one): None, Novice, Average, Experienced;

(3) LMS experience (circle one): None, Novice, Average, Experienced;

(4) Library search engine literacy: None, Novice, Average, Experienced;

(5) I have accounts with the following (check all which apply): Instant messaging sites (list), Social networking sites (list);

(6) (Check one) I have a blog or I blog frequently.

These data provide additional information about electronic channels which could be used for the paperless classroom and how to balance project teams in terms of expertise.

An LMS tutorial was designed with the LMS administrator and made available on the LMS site. Completion of the self-paced tutorial was required by the first or second class to assure that students had basic expertise in participating in the paperless classroom and to deter or deflect future statements blaming late or missed assignments on technical naïveté.

The LMS system should be used by the professor to support the in-class face-to-face interaction. Bringing hard copy materials to class to support lectures or other learning activities weakens the intent of the paperless class.

The professor has to be consistent and timely in accessing and evaluating assignments, responding to discussions and providing feedback. Assignments submitted electronically need to be returned in an electronic format and feedbacks for LMS tests needs to be provided through the system. Requiring students to complete paper assignments or tests in the classroom subverts the basic intent of the paperless class.

Students have to take ownership of accessing the LMS class site, tools, calendar, for participating in discussions and for recognizing and meeting deadlines. That requires a consistent commitment on the part of the professor not to spoon-feed the students with information or data which is available on the class LMS site. When a student asks when an assignment is due or where the material is located, the response should be to direct the student to the calendar or to research the site to find the answer. Students should learn that this is not an arrogant response or an unwillingness to be engaging, but is no less a student's responsibility than keeping track of paper handouts.

Other Insights

While managing the paperless classroom is greatly facilitated by the availability of a LMS for delivering, tracking and managing education relies on TEL, there are other options which utilize the resources and tools of the Internet when an LMS is not available.

We use gmail.com, for example, for the submission of quizzes and other Internet assignments which are outside of the LMS, since LMS systems are typically closed. This account is also useful for setting up surrogate LMS tools. When LMS was not available, a class website was established at a nominal cost as a subordinate site on the professors' personal website.

Conclusions and Learning Implications

The benefits of a paperless classroom are: (1) improvement of the efficiency of the learning experience; (2) facilitation of asynchronous learning; (3) helping students develop the virtual environment skills and

competencies they will need in the post-graduate private sector; and (4) contributing to the sustainability efforts of the university. The traditional paper-dependent learning experience and subsequent paper trails are replaced with a more efficient electronic creation, file storage and maintenance, and exchange of information and feedbacks. Learning performance is more easily assessed and recorded, which permits quicker evaluation of the effectiveness of specific learning activities. As a result, documentation of the assurance of learning is greatly facilitated.

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