

COURSE BLOGS AND THE IPHONE: APPLICATIONS AT ALL LEVELS OF UNDERGRADUATE MATHEMATICS

DR. JOHN EHRKE

DEPARTMENT OF MATHEMATICS
ABILENE CHRISTIAN UNIVERSITY
ACU BOX 28012
ABILENE, TX 79699-8012

john.ehrke@acu.edu

1. INTRODUCTION

As the calendar is poised to turn the page on the first decade of the new millennium it could be argued that educational practices have changed more dramatically over the last decade than over any other decade in history, especially in mathematics. At the heart of this change is a shift from teaching to learning. Where educational practices of the past were teacher-centric, focusing on the instructor as the primary source of information, today's practices seek to empower the learner. While we view universities, and more specifically, the classroom as a place of learning, the emergence of mobile learning and the accessibility of mobile devices today means the "learner" no longer has to go to any single place "to learn", but rather the learner can literally take hold of his/her learning anytime, anywhere. From this point of view the teacher's role in the learning process has changed from not only being a disseminator of information, but a facilitator of learning as well.

So the question becomes: Given the technology of today, what tools help instructors best facilitate student learning? The ACU mobile learning initiative began as an outgrowth of people on campus asking this very question, and over the last two years after distributing iPhones to over half of the student body and a significant percentage of the faculty, we are in a unique position to report on the various projects occurring across campus. Implemented within the last year our course blog system has proven to be an asset that has garnered the attention of both student and faculty alike. In this paper, we will look at the course blog's impact upon a mobile learning environment in four specific areas: (1) as a tool for delivering rich and exciting mathematical content, (2) as a key foundational component of a mobile learning environment, (3) as a collaborative tool, and (4) as a tool for assessing student learning.

2. COURSE BLOG AS A CONTENT DELIVERY TOOL

The course blog isn't exactly new on the educational scene, but a blogging system that leverages the mobile learning infrastructure—in our eyes—qualifies as an emerging and potentially, innovative component of a robust educational experience. In other words, it is built on a foundation of familiar information technologies, but it extends these technologies—and emerging new ones—to emphasize interactivity over mere content delivery. [1] One of

the main goals in implementing the course blog system on campus was to provide faculty and students with a mobile friendly means of exchanging ideas and content in a structured and secure manner.

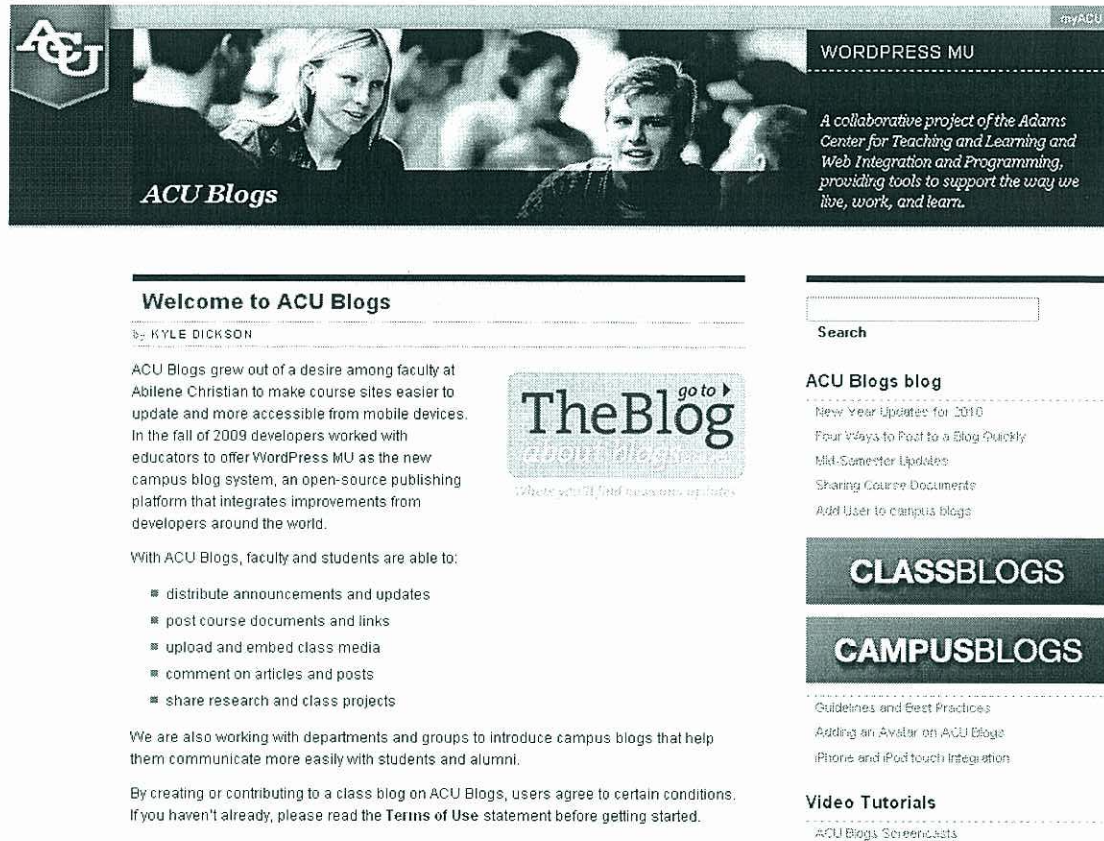


FIGURE 1. ACU Course Blog Layout

Over the past year I have utilized a course blog in four classes across seven sections with approximately 200 students. The course blog has been invaluable as a content delivery tool and has hosted a variety of applications over this time, including but not limited to, (1) screencasting videos, (2) podcasting audio files, (3) flash tutorials, (4) .pdf files, (5) beamer presentations, (6) MapleCasts, (7) course postings, (8) student postings and comments, and (9) resource links. In some ways, we have come to think of the course blog as a one-stop shopping center for everything the student needs in the course. Let me take this opportunity to further explain some of the diverse content types we can make available to our students.

Screencasts: While not as widely used as the more familiar term podcasting, screen casts—narrated videos depicting screen capture—are a powerful means of accelerating the learning curve for students in a variety of settings. In an introductory quantitative reasoning course, screencasts utilizing Ti-84 Smartview allow instructors to

demonstrate a variety of calculator applications in a relaxed, familiar setting similar to the classroom. The primary advantage of screencasting over the classroom though is that students are free to pause and rewind the material at their own pace. In our discrete mathematics course, majors are introduced to writing proofs and we encourage students to learn \LaTeX as a part of this process. Having a video of the instructor walking students through the creation of the preamble of .tex document greatly lessens the burden on the professor to answer questions during class time. Finally, in a junior or senior level differential equations course, where the careful analysis of models is required, exposure to a computer algebra system like Maple greatly enhances the course material. The ability to provide students with a walk through of the ideas taught in lecture that day from a radically different perspective in Maple only facilitates a faster assimilation of the material. Infact, this spring students in the ODE's course are being expected to produce their own Maple screencasts, shortened to MapleCasts, as part of an ongoing semester project. Students are encouraged to use the on-campus digital media center for support in creating their screencasts, but given that they've been exposed to this medium by their instructor all semester long, the quality and learning curve required to create such objects is greatly enhanced. For more information on the digital media center, check out www.acu.edu/dmc.

Homework Videos: If I were to take a quick poll of the top ten student comments during office hours, the phrase "I understand it when I get to class, but when I get home I don't know how to do anything," is probably at, or near, the top. Mathematics at all levels suffers from this inability to translate classroom learning to retention. Some of the most well-received content on the course blogs has been short 3-5 minute narrated video walkthroughs of problems similar to those assigned on the homework to help students over the hump in getting started on their homework. Using an HD USB webcam in a fashion similar to a document camera and recording myself performing the homework with audio has been a student favorite each and every semester. The best thing about this content: extremely easy to create.

Flash Tutorials: One of the areas I have experimented with recently are flash tutorials for working with the Ti series of calculators. Students in our general education mathematics course have the ability to actually interact with these tutorials by pressing the correct buttons (flash hotspots built in over the top of a Ti-84 screen capture) to move through a given application. Student response has been mixed as to whether students prefer video tutorials or the flash tutorials, but in the end not every student learns the same and there are students who benefit from both. One downside to this content is the fact that to date, the iPhone does not support flash. Hopefully this will be added soon.

Course Posts: In many ways the course blog functions as a mobile learning management system (LMS) like Blackboard, and this is not to be taken for granted since several popular LMS's have not fully committed to releasing mobile compatible products. Since implementing the course blog system, one of the things I've noticed is a dramatic increase in student emails. For the most part, gone are the days of answering the same question across multiple emails since I can quickly and easily

(from my own email should I choose) post due dates, test dates, lecture summaries, and various other informational items for students. In fact, my stock response of late has been check the course blog. After the first few weeks, students realize just how important the course blog is to keeping up with the day to day activities of the course.

3. COURSE BLOG AS A MOBILE LEARNING DEVICE

This report would be somewhat incomplete without acknowledging the role the course blog system has played as a key component of our mobile learning process. In terms of classroom use students often find that in-class assignments are listed on the course blog. This serves two purposes. First, students are encouraged to comment on in-class assignments should they have a question or something to add to the discussion. This gives other students, who often have the same questions, a place to go back and review the day's activity including comments which raise questions (and hopefully answers) from other students. Secondly, it imposes a level of organization upon the class structure. For those students who struggle with organizational skills (not a small number I might add) this has proved invaluable. This feature has been very popular among students in our "workshop" general education courses, which employ a four day a week schedule where two days a week are devoted to recitation. These recitation days serve as a perfect springboard for interjecting the use of the course blog.



FIGURE 2. Mobile Course Blog Layout

As commented upon earlier perhaps the single biggest impact the course blog system has on our mobile learning environment is a one stop shopping center for content and discussion with a decidedly mobile slant. The figure above shows the layout students experience as a

part of the course blog mobile site adapted from the Wordpress blog hosting system. It is not uncommon to see students checking the blog on their iPhone or utilizing the blog's RSS feed to be alerted of new posts immediately.

Academic institutions benefit from mobile learning in many ways: just-in-time/just-enough content delivery, integration with social networking tools and learning management systems, assessment tools, increased efficiency in the use of time as well as in productivity, and reduced/eliminated barriers to learning. [2] In total, the course blog system acts as a glue to hold together all the facets of mobile learning we are working to cultivate.

4. COURSE BLOG AS A COOPERATIVE LEARNING TOOL

The interactivity the course blog affords allows an instructor to design and implement unique group projects at a higher level of efficacy than is often realized. Groups submitting work can place the work on the course blog and receive comments and reviews not only from the instructor, but from peers in other groups as well. This is especially useful when applied to group projects sharing a common theme with slight variations from group to group.

For example, students in our differential equations class are organized into groups to work on a semester long modeling project. This year's project asked students to track the evolution of the mixing problem over the course of the semester. This was a common theme among all the groups. Each group though had to research and adapt the simplistic models we used in the course to a model for cleaning up lake pollution in a unique way. One group had to adapt the model to a seasonal flow rate, while another group focused on seasonal pollution concentrations. By presenting their findings over the course of the semester each group strengthened the other group's presentations primarily through the interaction of the course blog.

On a completely separate note, the flexible nature of the course blog has allowed us to create blogs for a variety of uses. One could create a blog for their Pi Mu Epsilon chapter, and add members, control content, or announce events similar to what can be done on a Facebook page, but in a controlled, moderated environment. We are currently in the process of creating a "course blog" to house all the information—photos, announcements, documents—associated with our math club. This type of tool has the ability to bring any group on campus, not just groups within the classroom, closer in a way that fosters more meaningful discussion and enhances learning and cooperation.

5. COURSE BLOG AS AN ASSESSMENT TOOL

How do you assess student learning in a blog environment? This is an easy question to pose, but hard to nail down any concrete answer for what is considered a best practice. Do you give students credit for making an informed, directed comment, or does the student have to initiate a post? Or for that matter, what constitutes an effective post? I must admit by some of the standards I would want my students to aspire to in post authoring I, myself, have fallen short. But this isn't necessarily unusual. A blog by its very nature is highly informal. Imposing structure on a student body that is used to texts and tweets is somewhat problematic. So where does this leave us? The following is an example of the

type of assessment tool which holds promise in this platform.

Pinpointing Fallacies in Proofs: One way to use the course blog to not only enhance student learning but assess that learning is to place erroneous proofs (like those from a discrete mathematics or analysis) course on a blog and invite students to pick apart the argument or improve the argument. This leads to competition among students to be the first to respond and exceptional responses or alternate proofs have been a by product. This same technique can be applied to incorrect student work (posted anonymously of course) so that a student can have the benefit of seeing his/her peer's responses to guide them.

Graded blog posts and comments will be graded according to the following criteria. For each criterion, I will assign the number which best describes the work. Please note that even numbers can be used to show that the work shows qualities of both neighboring categories.

_____ 1. Contribution to Discussion ($33\frac{1}{3}\%$)

2	4	6	8	10
Work contributed little to nothing to the ongoing discussion. Work might have even served to derail the discussion.		Work reflects upon previous discussion and either organizes the discussion or restates the problem in an effective manner. Work adds understanding to the problem, but does not extend or completely solve the problem.		Superior response which not only reflects on previous discussion but extends the discussion in a way that is unique and thought provoking.

_____ 2. Delivery ($33\frac{1}{3}\%$)

1	2	3	4	5
Poorly identified target audience. Post is informal and incoherent.		Quality of work meets expectations. Work seems reasonably polished with enthusiastic supporting points. Minimal grammatical or spelling errors. Work connects with the audience on some level.		Quality of work exceeds expectations. Work is extremely polished and poignant. No grammatical or spelling errors. Reader is engrossed in the subject matter.

_____ 3. Mathematical Content ($33\frac{1}{3}\%$)

1	2	3	4	5
Mathematical statements are inaccurate. Examples or problems not explained clearly. Too much or too little justification of mathematical statements. Inconsistent use or ineffective use of notation.		Mathematical statements are mostly accurate. Some examples or problems are not explained clearly. Most justification of mathematical statements are appropriate. Mostly consistent and effective in use of notation.		Mathematical statements are accurate. Examples and problems are explained clearly. Appropriate justification of mathematical statements. Consistent and effective use of notation.

6. CONCLUSION

The course blog is simply one component developed in conjunction with a much larger mobile learning initiative. We agree that an iterative approach to development is best, and developing learning materials specifically for mobile learning is better than re-using materials developed for delivery to a PC. [3] Specific to mathematics the course blog holds untapped potential for delivering highly technical content in a manageable user-friendly format. From screencasting Maple code, to developing web-based mobile calculator tutorials, or implementing a blogging component to your course, the course blog is an integral piece of the mobile learning initiative currently in full swing at Abilene Christian University.

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