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Blogs Hit Classroom: Students Start Reading

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Abstract: A professor and student have a conversation about using blogs as part of a mathematics class. The goals of using a blog include giving students a motivation to read ahead in their textbooks, providing another means of communication between students and the professor, and creating a space for students to write about mathematics. The article also poses behind-the-scenes technical questions to be considered in selecting and implementing blogging software.

Keywords: Blog, technology, Real Analysis, reading the textbook, discussing mathematics, writing about mathematics

INTRODUCTION

Recently some upper-level Bates College mathematics classes began to incorporate blogs. Goals of using blogs included getting students to read ahead of class and fostering better student-student and student-professor communication. On both counts, we feel the blogs have been initially successful, and we plan to continue using them.

Bates is a small liberal arts college with approximately 1700 students on campus each semester. Upper-level mathematics class sizes are small, typically between five and fifteen, and all majors take Real Analysis and Abstract Algebra. As a prerequisite to these, majors take a course we colloquially call Math Camp. This course is an introduction to proofs, and students in it learn to use LaTeX for typesetting mathematics. Class sizes and LaTeX practice made it relatively easy for students to start typing about mathematics in a blog.

So... what is a blog? How exactly can a blog become a central part of a mathematics course? What technical details might you need to start your own class blog? A mathematics professor, Meredith, and

one of the inaugural blog students, Ben, had a recent conversation discussing these very topics.

WHAT IS A BLOG?

Ben, Monday, 1:10p.m. We have to do WHAT?
Meredith, Monday, 1:58p.m. Yes, OK, that was pretty much what students said on the first day of class. Ben, how much did you know about blogs before this class?
Ben, Monday, 2:45p.m. Well, a student in another class I took had done a project on blogs. But I didn't remember much about them, or even what "blog" meant....
Meredith, Monday, 2:57p.m. "Blog" is short for weblog. I had seen some of them online, staying very close to the idea of a log. One example was travelers posting their day-to-day experiences on their weblog, rather than writing separate letters to several people. Then all their friends and family had a central location where they could read about the trip.
Ben, Monday, 3:12p.m. Oh neat... I had seen those too!
Meredith, Monday, 4:55p.m. But later versions seem to have people posting personal commentaries on all sorts of topics, and readers can post their comments. I liked the idea of a website with a specific theme where many people could share their ideas, moving from individual comments to a more collective feel.
Ben, Monday, 10:55p.m. Yeah, my girlfriend used a blog in her French class. But I never would have expected we would use one in a math class.

USING A BLOG IN A MATH COURSE

Meredith, Tuesday, 8:02a.m. I have to give credit where credit is due. I hadn't thought of using a blog in a math class either! I got the idea after talking to a grad school friend, Patrick Bahls, who was going to use one for his inquiry-based learning Linear Algebra class. His blog [3] and ours are very different. He went to a website, Blogger [2], where you can set up your own blog. Then anyone, anywhere, could read the blog and post comments to it.
Ben, Tuesday, 10:13a.m. I'm not sure I would have liked that as much. For ours, only the people in our class could read and post so I didn't have to worry about looking like a fool to the world. This was important since we had to post twice a week.
Meredith, Tuesday, 11:49a.m. You know, I've been to a lot of conference talks on getting students to read the textbook, or getting

students to discuss and write about mathematics. When I started thinking about blogs, I realized they could help with both. I was also about to teach Real Analysis. These students have little to no trouble typing comments and questions about mathematics: most of these topics can be described with just words and the students know LaTeX for when symbols are required. This is also an upperclass course with complicated subject matter, and having students experience each topic several times - reading about it, blogging about it, discussing it in class, doing homework on it - helps with understanding.

Ben, Tuesday, 1:07p.m. That's really a double point. Not only were we blogging about it - which was one more interaction with the material - but because we had to blog, we also *had* to read ahead. This was the first time I really read the book for class. I mean, a math class... I've read books for other classes. Even though it seemed like a pain to some classmates at the beginning of the semester, by the end we all agreed that it really made us do the reading.

Meredith, Tuesday, 1:20p.m. Since it was a success, the Abstract Algebra class the next semester also used a blog.

Ben, Tuesday, 1:32p.m. So if another professor used it, it must be really easy to set up!

SETUP NITTY GRITTY

Meredith, Tuesday, 1:40p.m. Yes! In fact, I asked Ellen Anderson, the tech person who helped me set up the blog at Bates, to help us come up with advice for other faculty who might want to try this. She's our guest blogger today. :-) I started by asking her how Bates chose Drupal [4], the software we used....

Ellen, Tuesday, 2:28p.m. There are numerous software packages, both commercial and open-source, that broadly fulfill the requirements for an academic weblog. In our small-college environment, we chose to concentrate on open-source software in order to minimize licensing costs and maximize possible customization. The main contenders were Moodle, Drupal, Joomla, and Wordpress.

We chose Drupal for its ease of user management, its highly detailed and flexible permissions structure, and the ready availability of dozens of user-contributed modules for customizing the blog's functionality. Because it is written in PHP, a relatively well-known and comparatively easy coding language, we could pledge the talents of a number of our tech staff to its development.

We preferred how Drupal handles the creation of discrete subgroups of users. Drupal, unlike Wordpress, is intended for use as a

multi-user blog and has a beautiful taxonomy structure that allows for very rapid sorting of content by keyword, user, etc.

In particular, Drupal appealed for its rich administrative interface, which allows the professor and/or teaching assistant as much (or as little) control over blog management as they desire.

Meredith, Tuesday, 2:45p.m. I liked that I could decide in advance, for example, that students could go back and delete their own posts, but they couldn't delete (accidentally, of course!) what each other wrote. Also, in the section of the blog where students had to post about the day's reading, I was the only person who could start a topic. For example, a topic would be "For Tuesday, September 12" and all the questions and comments for that day's reading would follow. However, in the blog's discussion forum, students were allowed to start their own topics.

Ben, Tuesday, 3:20p.m. Oh!?! What did you have to tell the tech people so they could set up the blog?

Meredith, Tuesday, 3:51p.m. Let's see.... The size of class is important, to see how feasible different blog elements will be. Ellen also asked if there might be individuals or groups using separate discussion boards or requiring private blogging space. We talked about how to write mathematics online, and initially students just used LaTeX code, but now Bates has downloaded a module/plug-in called DruTeX [5] so we can get LaTeX symbols directly into the blog. Next, Ellen wanted to know what course materials I might want to distribute (or what materials students would be posting) on the blog so she could make sure the different file formats were compatible. Last, were there any privacy concerns? Blog posts could be public or various levels of private, for example, restricted to campus or just to registered users. I could also allow students to use either their own names or pseudonyms.

Ben, Tuesday, 4:17p.m. So, Meredith, that's what you were thinking about, but Ellen, what did you need to consider in order to decide which software to bring to campus?

Ellen, Tuesday, 4:59p.m. I would say four things.

1.) Authentication: should the blog be tied into a college authentication (i.e., log-in) scheme, or freestanding? Can the blog be set up to automatically access registration data (e.g., who's in each class)?

2.) Integration: does the college run a comprehensive Course Management System (CMS) that offers a blogging feature? Do you need separate blogging software like Drupal? (Bates has a CMS with blogging capability, but Drupal offers different features, so our faculty can choose based on their needs.)

3.) Security: how locked down should the server be? Is a firewall necessary?

4.) Student Privacy: what are your college's specific guidelines regarding online content creation and the use of student names/pictures?

HOW WE USED THE BLOG

Ben, Wednesday, 9:02a.m. So with the blog all set up on the first day, it was easy to use.

Meredith, Wednesday, 9:33a.m. You probably remember, posting questions and comments became part of your grade for the course. As long as you posted once on each reading assignment, you earned full credit.

Ben, Wednesday, 9:41a.m. Well, as long as we followed the rules. We had to make sure that we didn't copy anyone else's question. On the plus side, if we couldn't come up with a question, we could comment on something that we found interesting or exciting.

Meredith, Wednesday, 11:11a.m. You just had to make it clear that you had done the reading and found something original to say about it.

Ben, Wednesday, 11:48a.m. Another part of the grade was that we had to grade each other's papers and post the solution on the blog. We typed it up in LaTeX and then posted the PDF file. It was as easy as posting an attachment to an email.

Meredith, Wednesday, 1:01p.m. I used that to make sure that there was a good solution available to everyone on those exercises and that the grader had a valid understanding of the exercise - even though they were grading papers that might have been done in very different ways!

Ben, Wednesday, 1:09p.m. The blog was also a great way to start talking about the material before class, so that when class started, the discussion spilled over.

Meredith, Wednesday, 2:45p.m. So did the jokes! :-) And based on the questions everyone asked, I was able to frame the entire

in-class discussion just about every day. I knew whether I needed to spend extra time on a specific theorem, or new notation, or whatever other part of the section the most questions came from.
Ben, Wednesday, 3:05p.m. Like for example, if we needed to see a concept visually, we could ask you to draw the picture on the board.
Meredith, Wednesday, 3:59p.m. Speaking of examples, we probably have specific examples from our blog that represent some of what we've been talking about.

EXAMPLES FROM THE ACTUAL BLOG
Meredith, Thursday, 7:30a.m. Here was the very first blog entry. It set the tone for the whole semester.

> "Okay, so one way to describe the Real Numbers is to say it's the rationals plus all the little gaps. The book then goes on to say that there is a way of explaining this.
>
> So here is my question. First, how does all of this talk of upper/lower bounds connect to the Real numbers? It mentioned at the end that any bounded set must have a least upper bound, but the Reals are not bounded. Maybe we're just talking about any contained set in the Reals? Is it implying that the gaps in the rationals would be at the end of the intervals?"

Meredith, Thursday, 8:12a.m. And here were some of the questions of the sort that we were talking about in terms of framing the in-class discussion. (I haven't edited them, by the way, so the wording and spelling come directly from the students.)

> "I was with the Bolzano-Weierstrass Theorem Proof until it began talking about the constructing the closed interval and then selecting the limit as a result of the Nested Interval Property. How do we know the Nested Interval Property shows we actually have a limit?"

> "What is up with the funky notation in proof of theorem 3.2.3?"

> "I was confused about uniformly continuous. What is the difference between the c in the definition for continuous and the y in this definition. Can you give an example of a function that is uniformly continuous."

> "I was just wondering if we could have a congrete example of a series of functions converging to another function. While looking through the chapter I found they talked about such a sequence f_ n, but they never gave an example. I tried to come up with my own, but I found that, like several of my classmates, that I had no good, concrete idea of what that ment. Also...has anyone noticed that the time posted is an hour off. I think this blog missed daylight savings time. :) "

Ben, Thursday, 11:44a.m. As you can see, it got pretty laid-back on the blog. This was useful if we couldn't come up with a question because then we could just make a statement, like this next one.

> "I like how we now have new ways to prove that a sequence converges without having to know the actual limit. It makes sense that if a sequence converges it has to be a cauchy sequence because the numbers would be getting closer together as the approach the limit."

Meredith, Thursday, 2:45p.m. And I really liked when one student would answer another's question, or would try to. Here are two cases of that.

> Q: "In Example 2.4.4, i'm confused why it says the sequence of partial sums is increasing, but the values are in fact getting smaller...?? And if that is in fact what the book meant, how can this be true??"
>
> A: "In response to [that] question I think they are saying that the summation of the series is increasing because all of the terms are positive and you are adding them together. It doesn't matter that the terms are getting smaller the farther you go in the series."
>
> Q: "I do not understand where they come up with the statement [f(b)-f(a)]g'(c)=[g(b)-g(a)]f'(c) to even apply the Mean Value Theorem to."
>
> A: "if you look at page 137 right at the begining of the section, you'll see that they have f '(c)=[f(b)-f(a)] / [a-b] for at least one point c\in(a,b). So, the statement [f(b)-f(a)]g'(c)=[g(b)-g(a)]f'(c) originally comes from the statement f'(c)g'(c) = g'(c)f'(c). Just in case it's not completely clear how you get from f'(c)g'(c) =

> g'(c)f'(c) to [f(b)-f(a)]g'(c)=[g(b)-g(a)]f'(c) , here's the logic: f'(c)g'(c) = g'(c)f'(c) => [f(b)-f(a)] / [a-b] g'(c) = [g(b)-g(a)] / [a-b] f'(c) => [f(b)-f(a)]g'(c)=[g(b)-g(a)]f'(c) VOILA!"

Ben, Thursday, 3:34p.m. That last one was a great example of how we were able to type out our math questions fairly easily, using LaTeX language in place of a symbol if we ever needed to. Even though it didn't come out all typeset and pretty on the screen, we could re-translate each others' typed-out LaTeX and understand it.

And the blog wasn't just used for educational purposes either. There was entertainment....

> "Q: How does one insult a mathematician? A: You say: 'Your brain is smaller than any epsilon>0!' "

> "A French mathematician's pick up line: 'Voulez vous Cauchy avec moi?' "

> "mathematicians never die; they just lose some of their functions"

> "$\sim$(real analysis)= fake acceptance"

> "so calculus isn't a sham!?"

Meredith, Wednesday, 4:58p.m. ... and who can forget Chuck Norris day! Students were looking up Chuck Norris math-related jokes online.

> "Chuck Norris knows the last digit of pi..."

> "Chuck Norris counted to infinity...twice"

> "Chuck Norris can divide by 0"

> "when chuck norris divides there are no remainders"

AFTERTHOUGHTS

Ben, Friday, 8:00a.m. All joking aside, did you enjoy using the blog as part of the class?

Meredith, Friday, 8:31a.m. Yes! It was great. I thought I had a much better connection to how much students understood and what they needed to spend more time on. The blog was also a different way of communicating with students, so I was able to get some insight into the thoughts of students who were very quiet during class. One more thing: there's a danger when you're teaching a course that you'll think some topic or notation is easy to understand, and then you don't spend time (or enough time) on it in class. Hearing everyone's questions before I led a day's lesson helped me to re-focus my attention on the topics students needed to hear about the most.
Ben, Friday, 9:12a.m. Writing the questions was good too. I really liked the fact that we were expected to have questions because it kept me from getting overwhelmed with new material. When I ran into something I didn't understand, I knew that it wasn't that I was a moron; it was just that I was reading it for the first time, and I *should* have questions on it.
Meredith, Friday, 9:56a.m. Definitely. And what do you think about students this year actually being able to produce LaTeX symbols directly in the blog?
Ben, Friday, 10:15a.m. No way! :-) Why didn't we have that? We would type everything as text, like in the examples above, and we just sort of knew how to reverse-translate the math text that other students had posted. Or we would produce an entire LaTeX file on our own, and convert it to a PDF on our own, and post that as an attachment.
Meredith, Friday, 10:44a.m. True - and it was nice that your class knew how to do all that. Now, with DruTeX [5] downloaded, students type in LaTeX math commands (between dollar signs, of course!) as part of their post, and when they click "Submit", the mathematical symbols automatically appear on-screen. So now students don't have to do all that extra work of creating a PDF in order to see mathematical symbols online.
Ben, Friday, 10:49a.m. Nice...
Meredith, Friday, 11:11a.m. Absolutely. Another smaller difference is with the separate Discussions section to the blog. I originally added it, thinking that students in the class could initiate separate conversations, maybe about working through homework exercises. Your class didn't use it, ever. The students now are actually using it, though rarely.
Ben, Friday, 11:56a.m. Well yeah, we worked on homework in the same computer lab at the same time, so we didn't need to use that.

However, I could see at a bigger university where that component might be used more.

Meredith, Friday, 1:12p.m. I agree. I wondered about the Discussions page even when I set it up, but since it was the first time I used a blog in class, I thought I'd have that option available and see how things went. (I'm also glad I kept it to try again.) Luckily, you were all good about working together and coming to see me at my office with homework questions. And the class size was ideal for using the blog: there were ten of you, each posting twice a week, so before each class I had no more than ten entries to read.

Ben, Friday, 1:53p.m. Another good thing was the book. It had short sections, so reading a section before class wasn't overwhelming. It was also really easy to read (for a math book, ha ha ha).

Meredith, Friday, 2:45p.m. I'm glad you thought so. I asked a lot of people in choosing the book [1], plus I found a great review of it online [6]. Having a readable book really made the blogging experiment work out.

Ben, Friday, 3:27p.m. Well, it was an honor to serve as your blog guinea pig. :)

Meredith, Friday, 4:00p.m. I appreciated it. I thought you, and the class, did well with the blog. And thanks for the conversation!

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BIOGRAPHICAL SKETCHES

Meredith L. Greer is an Assistant Professor of Mathematics at Bates College. She received her BA from the University of Delaware and her MS and PhD from Vanderbilt University. Her research focus is mathematical biology and she is active in the Society for Mathematical Biology. She also enjoys the opportunities of teaching at a small liberal arts college, from researching with students to creating and teaching a class on roller coasters (complete with field trip!).

Benjamin Reed is expecting to receive his BS in Mathematics from Bates College in Spring 2008. He will also complete a secondary concentration (what many colleges call a minor) in Asian Studies. He recently returned from one semester of study in Edinburgh, Scotland. He is on the Math Council, tutors in the Math Workshop, and worked as a teaching assistant in the inaugural year of the new Hughes Summer Scholars program at Bates.