

TWITTER-ING MATHEMATICS

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Devon Glenn's February 16, 2012 article on SocialTimes and Shea Bennett's February 17, 2012 article on Mediabistro, both using the infographic *The History Of Social Media (1978-2012)* produced by MarketingDirecto.com¹ credit the birth of social media to "computer hobbyists" Ward Christensen and Randy Sues who created a computer bulletin board system in 1978 and the creation of the Mosaic web browser by students at University of Illinois at Urbana-Champaign in 1993. Anthony Curtis' *The Brief History of Social Media*² includes the these events as well as the creation of the Usenet bulletin board connecting Duke University and University of North Carolina in 1979, all of which he classifies as "before the dawn", and he identifies the creation of GeoCities in 1994 as "the dawning" of social media. With the creation of online services such as Prodigy, CompuServe, AOL, and others as well as the more than 200 web servers online by 1993, the popularity of the Internet grew, and starting with GeoCities in 1993, AOL Instant Messenger in 1997, Friends Reunited and Blogger in 1998, the masses were online sharing their lives on web sites, communicating, finding lost friends, and sharing their thoughts and opinions. After that came the "friending" sites such as Friendster in 2000, MySpace in 2002, and Facebook in 2003 as well as the professional equivalent, LinkedIn, in 2003.

Twitter, launched July 15, 2006, had 1.3 million registered users by March 2008 and has continued to grow, garnering 6 million registered users as of April 2009, 105 million registered users as of April 2010, 145 million registered users as of September 2010, and 200 million registered users as of September 2011, 100 million of whom log in once per month and 50 million of whom log in once per day. Twitter has been among the top twenty social networking sites (SNS) since December 2008 and has been the second most popular SNS, according to the eBizMBA³ monthly list of the fifteen most popular social networking sites, since June 2011.

For *the world UNPLUGGED* Study, conducted at a dozen universities worldwide (the University of Maryland, College Park and Hofstra University in the United States; Pontificia Universidad Católica Argentina in Buenos Aires, Argentina; Pontificia Universidad Católica de Chile in Santiago, Chile; Chongqing University in Mainland China; the Chinese University of Hong Kong and Hong Kong Shue Yan University in Hong Kong, China; the American University of Beirut in Lebanon; Universidad

¹ http://www.mediabistro.com/alltwitter/social-media-history_b18776 and http://socialtimes.com/the-history-of-social-media-from-1978-2012-infographic_b89811

² <http://www.uncp.edu/home/acurtis/NewMedia/SocialMedia/SocialMediaHistory.html>

³ <http://www.ebizmba.com/articles/social-networking-websites>

Iberoamericana in Mexico City, Mexico; University of St. Cyril and Methodius in Trnava, Slovakia; Makerere University in Kampala, Uganda; and Bournemouth University, Dorset in the United Kingdom) between September 2010 and December 2010, nearly 1000 university students age 17 years and older (42% of whom were 19 – 20 years old) were asked "to find a 24-hour period during which you can pledge to give up all media: no Internet, no newspapers or magazines, no TV, no mobile phones, no iPod, no music, no movies, no Facebook, Playstation, video games, etc." and to write at least 300 words about their experiences after completing the 24-hour period. The instructions given to the students included the following regarding the comments to make about their reactions to their media-free 24-hour period:

In your comments, you may want to reflect on the following questions: What about your day was different in terms of logistics? Did you feel any psychological effects? Were you surprised either by how hard or how easy it was? What does your experience say about you, about our society and about how you — and everyone around you — use media? If you find that you are tied to media, what about those in our society who are not connected? Is there something they're missing? Is there something you're missing out on by being so surrounded by media?⁴

Emotional responses reported by participants include references to and feelings of failure, boredom, confusion, distress, and isolation due to their lack of connectedness during the 24-hour period and likening their use of media to addiction as well as their considering the benefits of "unplugging"⁵. This study, although not involving a representative sample⁶ of the students at the universities participating in the study, highlights students' attachment to and even dependence on media. Among the conclusions of the study are the statements,

Young people around the world care most about whatever latest hardware or app can connect them most quickly to the people they most value. The students may have settled in for the foreseeable future with familiar social networks (Facebook, Twitter), they may have definite preferences about their favorite brands of phones (Blackberry v. iPhone), but the next "better" thing will get quickly picked up by the early adopters, and either steal market share or entirely displace older tools and technologies.⁷

and

⁴ <http://theworldunplugged.wordpress.com/about/>

⁵ <http://theworldunplugged.wordpress.com/emotion/>, <http://theworldunplugged.wordpress.com/about/comparison-charts-of-reactions/>, poster of some student responses at <http://theworldunplugged.files.wordpress.com/2010/12/addiction-grid-new.pdf>

⁶ <http://theworldunplugged.wordpress.com/about/>

⁷ <http://theworldunplugged.wordpress.com/addictions/conclusions/>

These savvy digital natives already rattle off an arms-length list of communication platforms and tools they use now to connect to friends: e.g. Facebook, QQ, RenRen, Weibo, Twitter, Skype Chat, Windows Live Messenger/MSN and BBM's – not to mention MMOGs [massively multiplayer online games]. And many students casually mention that they maintain connections on a handful of these simultaneously, noting in passing that the friends they have on Facebook are a slightly different group than those they text, and that those they text are somewhat distinct from the group they call. Then there are the people they email for work or school, who are separate from the set of friends they Skype Chat. Students consider and sort through all these permutations automatically, but the implications are real for how they construct their social networks and shape their personal “brand” identities.⁸

Accounts such as these should concern parents, K-12 teachers and administrators, and college/university faculty and administration since this heavy use of media (Internet, email, social networks, and gaming, in particular) consumes a great deal of time each day⁹: students need to learn to use technology and media rather than be used, even controlled, by it, and they need to learn to set goals as well as learn to prioritize education, work, and social life in order to achieve their goals. Taking advantage of students' attraction to media and social media, in particular, provides opportunities for dialog with students regarding social media's proper use and goal-setting while providing opportunities for student interaction – student-student interaction and student-instructor interaction – in addition to openings for creative engagement with course material. These together with a meet-them-where-they-are mindset prompt me to use social media, in particular Twitter, as a tool in teaching mathematics.

So, you may wonder why I choose to use Twitter as opposed to Facebook, the most popular social networking site¹⁰. Since protecting my students' privacy and providing a secure, respectful, nurturing learning environment are important to me, I find Facebook's frequent changes to security settings to be problematic, even disturbing. These security changes, eight during the eighteen months prior to Rob Waugh's November 3, 2011 article¹¹ on MainOnline, include providing third-party access to profile data (March 2010), posting users' locations (August 2010), allowing third parties to access users' email, address, and telephone information (January 2011), providing open access to “friending” history (October 2010), automatic tagging (June 2011), and assorted settings and menu/control changes (May 2010, October 2010, and August 2011); yet another change to privacy settings was reported on the television news on March 23, 2012. Statements by Facebook representatives that such changes are at the request of users and “All of our changes have been designed to give people more control over what they share

⁸ <http://theworldunplugged.wordpress.com/addictions/conclusions/>

⁹ <http://theworldunplugged.wordpress.com/about/comparison-charts-of-reactions/>

¹⁰ <http://www.ebizmba.com/articles/social-networking-websites>

¹¹ <http://www.dailymail.co.uk/sciencetech/article-2057000/Half-Facebook-users-sites-snooping-policies-site-changes-privacy-rules-EIGHT-times-years.html>

and make it easier for them to understand who can see their content across Facebook .”¹² do little to inspire my confidence in light of the many complaints that these *unannounced* changes have prompted. Although Twitter experiences technical difficulties from time to time, most recently on June 21, 2012¹³, Twitter has not changed user account security settings like Facebook. Thus, Twitter’s respect for users’ account setting together with the 140-character per Tweet limit make Twitter my choice.

Tweets, with their 140-character limit, must be short and direct – to the point. Since I require use of appropriate, meaningful language and correct terminology for course discussions and problem solving as well as for assignments, quizzes, and examinations, I require the same for myself in all Tweets. In addition, my Tweets set an example for my students in that I use correct grammar and terminology, avoid typos, and I use clear communication without meaningless texting abbreviations; students should learn and hone these skills during college. The character limitation provides a nice challenge for the creation of comprehensible Tweets about course material.

I use Tweets to encourage and facilitate class preparation and participation. Tweets can serve as points to ponder and serve to emphasize that time on task, that is, doing course readings and practice exercises, help them to make sense of and apply course concepts and methods. Tweets provide additional opportunities for considering course material through direct statements about course topics or questions designed to help them to consider course concepts. Tweets also provide students additional preparation time to help them to process course material with extended response-time which is helpful to students who have difficulty answering questions on-the-spot during classes. In addition to the extended reply-time, Tweets provide opportunity for continued thought, analysis, and reflection as well as added time for preparing response or counterpoint. Since Tweets are written, they can be read and reread as needed, a benefit for students with learning disabilities and those who are not native English speakers, and such Tweets become tools for review prior to quizzes and examinations. I have encouraged students to take advantage of Tweets as study tools as they are useful for creating flash cards for studying and reviewing course material.

Since student engagement is affected more by the students’ connections with course material than with their personal connections with the instructor or with each other, it is important for students to understand how course concepts, topics and methods are relevant to their programs of study, interests, and possible future careers. Tweets containing open-ended questions and points-to-ponder provide opportunities for divergent learning as well as differing responses based on programs of study and interests. In successive courses such as consecutive algebra courses to Precalculus, introductory and intermediate Statistics courses, and the Calculus sequence, these Tweets are useful for helping students to discern associations between the levels of related topics and connections among topics and facilitate understanding of the development of linked

¹² <http://www.dailymail.co.uk/sciencetech/article-2057000/Half-Facebook-users-sites-snooping-policies-site-changes-privacy-rules-EIGHT-times-years.html>

¹³ <http://www.bbc.co.uk/news/technology-18541129>

concepts. Such Tweets can be useful for helping students to understand influences of disciplines as well as afford openings for discussion of applications of course material. These discussions facilitate deep learning, further inquiry, and consideration of links between disciplines leading to reflection on applications related to student interests.

Math-anxious students consider mathematics to be difficult to learn and view it as a source of confusion. The limited size of Tweets supports the creation of accessible “servings” of concepts and methods that can be used to form a foundation on which to build understanding and develop comfort with learning mathematics. Sequential Tweets are useful for guiding students through ideas related to applying course material as well as highlighting relationships among associated concepts.

Tweets offer occasions for learning that continue outside the classroom environment. They can be used to encourage reflection, thoughtful examination of course material, and reconsideration of student effort leading students to become more aware of their studies as well as to take more interest in and more responsibility for their own learning. Thus, invitations for further contemplation of course material via Tweets can lead students to refine their thinking and to active learning, enabling students to get more out of in-class discussions and problem solving.

Unique to my use of Twitter is that I do not “follow” my students. I respect the privacy of my students, and to “follow” them on Twitter would be to invade their private lives. The use of social media as a learning tool should not encroach on the areas that students view as personal as to do so would foster view of the instructor as a parent or as an out-of-place acquaintance (neither of which they need) rather than as a guide and mentor. Students respond with gratitude and comments of relief when I inform them that I do not “follow” them on Twitter, some mentioning that there is information that they post on social media that they would not want their instructors to view. Valuing the students’ personal boundaries is important, not only in demonstrating the instructor’s respect for the student but also for creating and maintaining a trusting student-instructor relationship. Without this trust, students, especially those who are math-anxious and those who have had negative experiences in mathematics classes in the past, are wary of an instructor’s offers for help with course material and they may be distant or disengaged during class. Therefore, my statements regarding respecting their privacy and not invading their “space” afford my students the assurance that they need while opening them to the use of the Twitter environment for their study of mathematics and setting up the necessary trusting relationship.

I have used Twitter in my introductory statistics courses, in face-to-face Day Division sections and online sections for the Division of Graduate and Continuing Education, and multivariable calculus courses. For each course, I use a separate profile for which the Twitter username and picture corresponds to the course; Twitter does not limit the number of profiles that you can create but each profile must have a unique, verifiable email address. The use of unique usernames allows me to send Tweets that are appropriate for each course type and course group. I set each account profile so that the

Tweets that I send are private (referred to as protected on Twitter), only received by those who I approve as “followers”. At the beginning of the semester, students email their Twitter usernames so that I can approve their requests to “follow” as well as recognize them on Twitter; students use a variety of usernames, many of which I would not recognize as belonging to any of them by name without this email. Protecting my Tweets guarantees that only members of each class receive my Tweets. Students comment that the protected Tweets and environment privacy are comforting when they feel insecure about their mathematical ability, and they mention that they feel safe from the judgment of outsiders. Prior to examinations, review, reminder, and encouragement Tweets are posted to help students as they study. Thus, all my Tweets are related to the course and course material, and none are frivolous.

Twitter is simple to use with a wealth of support¹⁴ information. The Twitter basics¹⁵ in the Help Center provides information to enable new users to create¹⁶ an account and to get started¹⁷ using Twitter. Among other things, the Twitter Help Center provides information on setting up and customizing profiles, about the different types of Tweets, how to “follow” and be “followed”, how to Tweet, reply, reTweet, and delete Tweets, how to find and block people on Twitter, how to post links, pictures, and videos, and how to use hashtags¹⁸ (# symbol) as well as how to create and use Twitter lists¹⁹. This abundance of information made it easy to learn about Twitter, decide how I wanted to use Twitter, and to quickly implement the use of Twitter in my classes. The ease with which “followers” can be removed (blocked) at the end of a course and Tweets deleted makes Twitter a wonderful environment for frequent course use.

The benefits of using Twitter in my classes are not limited to my students learning mathematics. They have the opportunity to view technology and media as for more than communication with friends and entertainment. Using Twitter as an educational tool enables students to view technology, even social media, as a malleable device for sharing and using information. In addition, they learn that technology and media are what you make of them and they continue to change. Learning to use technology helps students to develop the skills that will enable them to employ and master new technologies as they arise in the future. Providing students with the opportunity to use technology and, in particular the “toys” that they enjoy such as smartphones and tablets via social media with which they are familiar makes disciplines with which they struggle such as mathematics less threatening and more accessible.

¹⁴ <https://support.twitter.com/>

¹⁵ <https://support.twitter.com/groups/31-twitter-basics#>

¹⁶ <https://support.twitter.com/groups/31-twitter-basics/topics/104-welcome-to-twitter-support/articles/100990-how-to-sign-up-on-twitter#>

¹⁷ <https://support.twitter.com/groups/31-twitter-basics/topics/104-welcome-to-twitter-support/articles/215585-twitter-101-how-should-i-get-started-using-twitter#>

¹⁸ <https://support.twitter.com/groups/31-twitter-basics/topics/109-tweets-messages/articles/49309-what-are-hashtags-symbols>

¹⁹ <https://support.twitter.com/groups/31-twitter-basics/topics/111-features/articles/76460-how-to-use-twitter-lists#>

Course use of Twitter builds a learning community and supports involvement in learning. The simplicity of 140-character Tweets encourages interactions between course meetings – both student-student interactions and student-instructor interactions – and these interactions may be by phone, online, or in person. While students may refer to the use of Twitter in courses as “cool”, awesome, or fun, they realize that its true purpose is to make the course material more accessible and to help them to feel more comfortable forming and asking questions, exploring course topics, and applying course material. With this increased comfort comes more connection with course material as well as interactions that utilize the differences and strengths of class members, leading to more discussion, additional inquiry and exploration, and facilitate deep learning.

You may find the following articles interesting to read and the videos to which hyperlinks are provided beneficial to watch.

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Junco, Rey (2011). *SXSWi Using Twitter to Improve College Student Engagement* (5 parts)

Part 1: <http://www.youtube.com/watch?v=mgS5rR1o72E&feature=plcp>

Part 2: <http://www.youtube.com/watch?v=EgQJqZI6s9o&feature=plcp>

Part 3: <http://www.youtube.com/watch?v=DI9g94Xg7yc&feature=plcp>

Part 4: <http://www.youtube.com/watch?v=xw6rsOiuEfU&feature=plcp>

Part 5: <http://www.youtube.com/watch?v=XaeJiHQIaag&feature=plcp>