Chapter 22
Facebook as an Educational Environment for Mathematics Learning

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ABSTRACT

In this chapter, the authors describe four successful experiments in using social networking sites (Facebook and Edmodo) in mathematics teaching and learning, where this use depended on populating the sites with historical mathematicians and/or mathematical phenomena. They describe two models of using social networking sites in mathematics education, as well as the phases of working mathematically with students when implementing each model. The authors emphasize the use of social talk as the first step to involve students with the learning of mathematics, as well as moving to cultural talk as a bridge between the social talk and the mathematical discourse. The experience in the four experiments indicates that social networking sites invite student collaboration, as well as encourage their learning actions and interactions. Teacher's or moderator's sensitivity is a very important factor for the success of the experiment, especially when young students are involved. Other factors which influenced the success of students' learning in social networking sites were the features of the social networking site, the properties of the inter-disciplinary phenomenon or the mathematics produced by the historical mathematicians, the background of the learners, and the activities of the moderator.

INTRODUCTION

Web 2.0 tools have been suggested for some years now for social life, communication, and work in various disciplines, especially in education (Alexander, 2006; Glogoff, 2005; Pempek, Yevdokiya & Calvert, 2009). Some of these tools are: Wikis, blogs, Facebook, Twitter, Second Life, Wiggio, etc. Researchers have studied the wikis' use in education more than any other Web 2.0 tool or social networking site (Daher, 2010; Daher, 2011; Forte & Bruckman, 2007; Grant, 2006). Here we

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are concerned with the use of social networking sites in education, and specifically Facebook and Edmodo in mathematics education.

Our concern with Facebook and Edmodo originates from the popularity of these sites among students and, at the same time, the beginning of their use as educational tools. This beginning indicates that these sites have the potential to motivate students to engage more actively in their learning through utilizing the sites' various technical options. The most important of these options are the sites' communication tools, for example, the chat, email, comments and 'likes' in Facebook. These options and potential meet the requirement of the National Science Teachers Association (2003) in the standards for science teacher preparation that science teachers should attempt to guide their students' learning by encouraging their conversations about scientific ideas. The communication tools of the social networking sites can help build a learning environment rich with students' conversation and discussions, and thus fruitful for building the scientific knowledge of students. Schroeder and Greenbowe (2009) say that one goal of the NSTA requirement is to help students articulate how they know, what they know, and how their knowledge connects to larger ideas, other domains, and the world beyond the classroom. These ideas were behind our intention to experience social networking sites, in our pre-service teachers' preparation. We intended that our pre-service teachers enrich their knowledge about mathematics, historical mathematicians and mathematical phenomena, concepts and procedures through conversing and discussing a phenomenon and the concepts and procedures associated with it, and through solving mathematical problems related to the phenomenon. This intention agrees with Smith and Peterson (2007) who describe knowledge as constructed not in the individual vacuum, but in the communication and exchanges enabled in social networks.

BACKGROUND

Recently researchers attempted to use the Facebook environment to enable collaborative learning (English & Duncan-Howell, 2008), as well as to treat content knowledge in different disciplines (Schroeder and Greenbowe, 2009; Selwyn, 2007). English & Duncan-Howell (2008) reported that pre-service teachers used Facebook during their teaching practicum placements to facilitate mutual support, encouragement and the sharing of stories and anecdotes. Using Facebook enabled the pre-service teachers to direct their learning through creating, sharing and commenting on others' contributions, and by allowing them to choose from multiple forms of support. Further, Facebook environment enabled collaboration as the pre-service teachers assisted each other, shared digital artifacts and exchanged constructive feedback. These reports encouraged us to attempt using Facebook for mathematics education through students' collaboration and social work.

Schroeder and Greenbowe (2009) describe an experiment that involved using Facebook as an additional tool for their university students' learning. They point at the Facebook feature of enabling the upload of images to have an impact on their students' learning. Their students responded to comments, explanations, or observations with relevant diagrams, figures, or other graphics, while the instructors used the image uploading to draw chemical structures or step-by-step reaction mechanisms, as well as to post spectral data that could be used to discuss questions posted earlier. Another Facebook feature used was the 'Post Item' feature which was utilized mostly by the instructors to post Internet links of relevant Web sites.

Selwyn (2007) analyzed the content of Facebook pages of all undergraduate students who were studying at the School of Social Sciences in Coalsville University during the 2006/7 academic year. He found that when the education-related postings were analyzed, five main themes emerged from the data: