Teacher Tweets Improve Achievement for Eighth Grade Science Students

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ABSTRACT

In the Digital Age teachers have fallen far behind the technical skills of their "digital native" students. The implementation of technology as a tool for classroom communication is foreign for most teachers, but highly preferred by students. While teenagers are using Facebook, Twitter, and other social networks to communicate, teachers continue to respond through face-to-face conversations, telephone calls, and email messaging. Twitter, a platform for short message service text, is an online social network site that allows users to send and receive messages using 140 characters or less called Tweets. To analyze the relationship of the teacher's use of Twitter with student academic achievement, a correlation study conducted by Bess collected data from two matched samples of eighth grade science students: one utilizing Twitter and one not utilizing Twitter to reinforce classroom instruction. Two tests matching the science standards were given to both samples of students. The results of the tests were used as primary data. The findings suggested a positive correlation between the use of Twitter and student performance on the standardized tests. Implications for this study indicate that young teenagers may prefer Twitter as a mode of communication with their teacher, resulting in higher academic achievement in a middle school science class.

Keywords: Educational technology, Twitter, Communication, Social networking, Academic achievement.

1. INTRODUCTION

To effectively educate the youth of today teachers must interact using the modes of communication embraced by their students. While calls by middle school students on mobile phones have dropped significantly, short message service (SMS) or off-line texts have increased tenfold and are currently the preferred mode of teen communication. "It seems that today's students don't resemble the students our educational system was designed to teach" (Prensky, 2001, p. 1) [12]. Prensky observed differences in brain activity and in brain functioning resulting from the influx of technology available to the current generation. "Our students think and process information fundamentally differently from their predecessors." (p. 1). Luckina et al. (2009) [8] found roughly six out of ten middle school students use social networking sites at least two times a week and that social networking sites serve as an integral mode of communication for middle school students. Lee and Spires (2009) [6] investigated teaching and learning in the middle level using a survey to study the current impacts of technology on 4,000 students in North Carolina. The study indicated that 73% of those middle school students used a cell phone on a daily basis. It was also found that 55% of these teens reported using social networking sites.

Lei found that "using technology for social-communication purposes had a positive influence on student grade point average (GPA). Although this influence was not statistically significant, an effect size of 0.21 on GPA was noteworthy compared with a possible 0.33–0.50 effect size gain on student performance…" (pp. 9-10) [7].

Digital immigrants, named for those who didn't grow up with technology, make up the majority of teachers in today's educational institutions (Prensky, 2001) [12]. Digital immigrants teaching the digital native population, named for the students who grew up with technology, creates an interesting problem for classroom communication. Greenhow (2009) states, "One reason Web 2.0 technologies such as online social networking are not widely integrated in K-12 and postsecondary education is the lack of modeling by educators" (p. 2) [3]. O'Hanlon (2007) [11] investigated the problem of bridging the gap between the digital natives and digital immigrants. Many teachers reported that their fears quickly dissipated once they saw the strengths of utilizing these social networking sites with their students. Teachers' readiness and willingness directly affected their use or lack thereof of technology (Inan & Lowther, 2009) [5].

2. RESEARCH STUDY

This research was conducted by California State University San Marcos Master's candidate Corey Bess in collaboration with his committee chair, Dr. Carol Van Vooren. The setting for this study was a middle school built in 1964 in Southern California. In Figure 1.1, the demographics of the 86 eighth grade science students show that two-thirds were from middle-class White families, with Hispanic students composing about one-fifth of the participants, and a variety of other ethnicities were included on a smaller scale. The students volunteered to participate in the study, with 43 students agreeing to create a profile on Twitter and follow Mr. Bess (Sample A), and 43 students declining to use Twitter (Sample B). Between the two samples, an even distribution of girls and boys, students from socio-economically disadvantaged (SED) homes, and gifted and talented students (GATE) participated in the study. The samples had a slight difference in numbers of English learners (EL) and special education (Sped Ed) children (Figure 1.2). Because the sample was a convenience sample, it may not have been representative

of the general school population, so general inferences must be made with caution [1].

Figure 1.1
Ethnicity of the participants

All participants (N= 86)

- White
- Hispanic
- African American
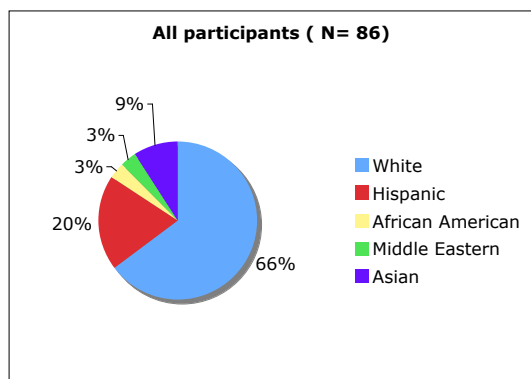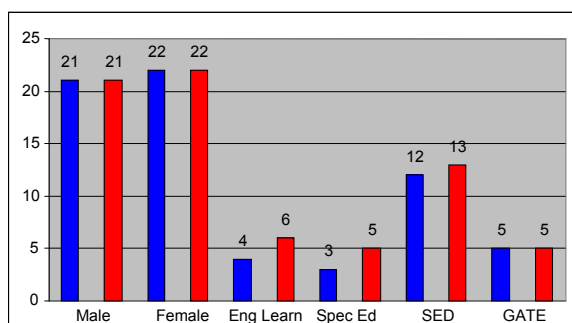- Middle Eastern
- Asian

9%
3%
3%
20%
66%

Figure 1.2
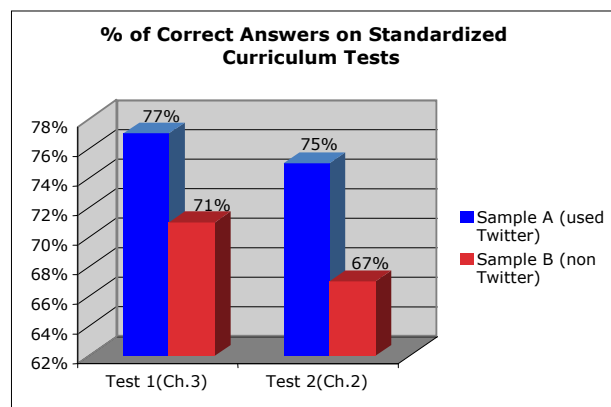Sample A (blue) and B (red) demographic characteristics

After the student groups were determined and the parents were informed and signed permission slips, the students received training with the teacher on the etiquette required to use Twitter. With all the necessary cautions in place, including developing a memorandum of understanding with the district, the study was launched. Bess sent out four to five Tweets per week after school hours to the Sample A participants, reaching most of the students via short text messages. The main purpose of these tests was to remind students about homework assignments and test deadlines. He also sent links based on the information covered in class. The same information was given in class and written on the classroom white board. Students completed in-class assignments, homework, and participated in class discussions apart from the Twitter communication. Typical Tweets sent by Bess to his students were, "Here is a direct link to your HW: http://bit.ly/9mR6f1" and "Test tomorrow on states of matter, changes of state, and the laws of gases. Study guide is attached to the assignment ow.ly/1r5VJ4 :)" [1].

In addition, during the four weeks of the study, the students took two publisher-developed tests based on the California Science Standards. The data from the results of the two standardized curriculum tests were collected and analyzed using a sample t-test, which examined the significance of the data and compared it to the null hypothesis. The null hypothesis stated: There is no association between the use of Twitter and the success of students' performance on the two tests given. The two tests were analyzed separately.

The first test measured the students' understanding of the science standards focusing on states of matter and physical and chemical changes in matter. Sample A earned a raw mean score of 17.74 points out of a total of 23. The participants of Sample A earned an average of 77% correct on test # 1. Sample B earned a raw mean score of 16.23 points out of 23. The participants in Sample B earned an average of 71% correct (Figure 1.3). The results of the sample t-test were; $T = 1.9968$, $p = 0.02479$, $df = 73.0839$. The statistical analysis suggests rejecting the null hypothesis at the 0.05 significance level. The statistical data suggested there is a correlation between the use of Twitter and students performance on this particular standardized curriculum test.

The second test measured the students' knowledge of the science standards and focused on the properties of matter, specifically physical and chemical reactions. Sample A earned a raw mean score of 25.44 of 34 points possible. Sample A averaged 75% while Sample B earned a raw mean score of 21.08 of 34 possible points. Sample B averaged 67% on the chapter 2 test (Figure 1.3). The sample t-test results are $T = 2.1665$, $p = .01662$, $df = 80.4287$. The statistical analysis suggests rejecting the null hypothesis at the 0.05 significance level. Statistically significant evidence led to a conclusion that the mean second test scores of those who used Twitter was greater than those who did not use Twitter. The statistical data suggested there is a strong correlation between the use of Twitter and students performance on this particular standardized curriculum assessment.

Figure 1.3
Summary of student test results

% of Correct Answers on Standardized Curriculum Tests

- Sample A (used Twitter)
- Sample B (non Twitter)

77%
71%
75%
67%

Test 1(Ch.3)   Test 2(Ch.2)

From the data collected the researchers found a significant correlation between the use of Twitter and student performance on both standardized tests given to the students which contributed to the overall academic performance of the students who utilized Twitter. Student improvement on academic tests is the principal purpose of the use of Twitter in Bess' class, but other unintended benefits were discovered through this study [1]. These benefits included a student introduction to the ethics of online communication, teacher professional development in the use of emerging technologies, and the development of a community of learners through expanded tools of communication.

3. OTHER TWITTER IMPLICATIONS FOR SCHOOLS

Ethical use of technology: Another positive aspect of incorporating a technology such as Twitter within education is the opportunity to model for and educate students on the ethical responsibility of using social networking and short message system text technology. Current technology in education offers the students a forum to use such tools properly as they communicate with each other, their parents, and their teachers. Gallon (2010) stated, "We need to educate our children about media behavior, much as we have always educated children about other social behaviors" (p. 1) [2]. Multiple drawbacks have been identified when Twitter is not used carefully for the right purposes (Grosseck and Holotescu, 2008). Some of the drawbacks include, making teachers "on call" 24 hrs a day, the spreading of rumors, opening students to spam, inhibiting students' educational writing due to the maximum of 140-character limit, and causing technology addiction. Grosseck and Holotescu (2008) believe all of these drawbacks can be avoided if the use of Twitter is carefully implemented within the population of potential users. Grosseck and Holotescu (2008) concluded, "Twitter proved to be an effective tool for professional development and for collaboration with students…and models good pedagogy responsive to students' learning needs" (p. 10) [4].

Professional Development: Because the use of Twitter is certainly a new endeavor, to adjust to the change initiative teachers will need support from their school site and administration. Van Vooren (2005) [13] found that teachers adapt to change more readily when they can see it successfully used in a similar setting. Teachers need to understand the fast-paced nature of the world of technology. Mostly due to market forces, new technology comes and goes very quickly. As soon as one technology is implemented, another is sure to become obsolete. Teachers will need to be guided and coached on how to use social networking sites in order to fully utilize and integrate the technology into their classroom. They also need information to teach technology etiquette, design lessons that embed technology, and obtain resources to evaluate their own technology progress. The opportunity to bring faculty and staff together as a professional learning community to use new formats of technology, including social networking media such as Twitter, will increase the efficacy of teacher performance in the implementation of technology in the classroom and in life. Van Vooren's (2010) [14] research on change theory indicates that site based leadership who provide constant mentoring and support in technology for digital immigrant teachers will greatly enhance the success of student outcomes.

Community of Learners: Twitter used in the classroom has been found to increase the sense of community, foster the use of writing as a fun activity, serve as a tool for assessing opinion, provide an engaging educational experience, change the dynamic of a classroom, improve communication, allow teachers to post notes and other links, and encourage all students to have a voice (Grosseck and Holotescu, 2008) [4]. The digital learning community follows the students outside of school, and strengthens the ties students have with their teachers and peers. "Students are getting the idea that their community of learners can extend far beyond the classroom" (Messner, K., 2009, p. 5) [9].

4. CONCLUSION

According to Prensky (2001) a divide exists between those who have grown up with technology at their fingertips (digital natives) and those who have had to learn to adapt to technology (digital immigrants). This divide is not only found in the social functioning of generations but in the ways in which the brain functions. The largest divide between digital natives and digital immigrants is communication technology. "The single biggest problem facing education today is that our digital immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language" (Prensky, 2001 p.2) [12]. The Bess study (2010) investigated the use of teacher guided Twitter as an academic tool and found that students using Twitter had improved test scores over students who did not use teacher-initiated Twitter. In addition, Bess found that bringing Twitter into the classroom increased the student use of social networking etiquette, broadened teacher professional development, and created a new community of learners. The following conclusions were developed by Bess:

1. Students are open to and comfortable with the use of SMS (off-line) text messaging.
2. Teachers are lacking in their understanding of the use of technology, specifically the use of social networking in education.
3. The use of SMS text messaging presents an opportunity for teachers to communicate with students about content in general, as well as specific essential pieces of content.
4. Previous studies have not been done to show the direct effects of the use of social networking on student performance [1].

The classroom world of today's students has a great divide between technology savvy students and their teachers. Ample research has shown that in order to learn, middle school students need to be actively engaged in the teaching and learning process. If teachers are not interested in learning and adapting to the newfound technologies that abound in their student's lives, they will never be able to fully succeed in teaching those students (Lee & Spires, 2009) [6]. It is evident that today's students are highly fluent with the use of current technologies, and are willing to adapt and change to newer technologies. It is also apparent that teachers, for the most part in today's generation, are finding it very difficult to adopt and adapt these new tools for use within their pedagogy, curriculum, and classroom. While advancement is slowly restructuring today's classrooms with infrastructure needed to fully utilize technology, teachers are not always adapting (Inan & Lowther, 2009) [5]. Teachers who have begun to use the tools needed to truly communicate with and teach their students, as in this research study, have found positive academic results.

5. RECOMMENDATIONS

Teachers of the future must be more flexible and adaptive with technology understanding and use. They also must be aware of technology tools that are considered to be native to their students. With this in mind, administrators and teacher leaders must develop pedagogical knowledge to train and improve student and teacher use and understanding of current technologies, as well as technologies yet to be developed. Our students anticipate the future technologies; teachers and

administrators must be willing to share their excitement and willingness to learn.

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