How Social Presence on Twitter Impacts Student Engagement and Learning

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Abstract

Teenagers are using social media platforms like Facebook, Instagram, Snapchat, and Twitter for personal use. Little research, however, on how these tools can be integrated into classrooms for teaching and learning purposes at the elementary and secondary school levels. The purpose of this study was to explore how social presence on Twitter can impact student engagement and learning in a Grade 8 mathematics classroom during an instructional unit on data management and probability. The conceptual framework for this study was based on social presence theory consisting of three categories (i.e., affective, interactive, and cohesive). This study was conducted over a 4-week period in a Canadian province and participants consisted of 6 students and their classroom teacher. Findings indicate that Twitter is a valuable tool for the teaching and learning of mathematical concepts.
Background

The ways teenagers engage and communicate have evolved due to access to mobile phones and the evolution of social media platforms like Facebook, Instagram, Twitter, and Snapchat. Approximately 88% of adolescents own or have access to a cell phone, thus providing them with the ability to access these platforms (Lenhart, 2015). Teenagers who own or have access to a cell phone, use texting as their primary means of communicating with their friends, whereas adolescents who do not have access to a mobile phone, use social media to engage with their peers via their laptops, desktop computers, and game consoles (Anderson, 2015). Although Facebook remains the most popular platform among teenagers aged 13-17 (71%), Instagram (52%), Snapchat (41%), and Twitter (33%) are also being used by this age group (Lenhart, 2015). As adolescents get older, their use of Twitter increases; 21% of teenagers 13-14 years old use this site while 42% of teenagers ages 15-17 use Twitter to communicate with their friends (Lenhart, 2015).

Rheingold (2009) argues that the integration of social media in education, like Twitter, allow students to take ownership and responsibility for their learning. Rheingold also states that for social media use in education to be successful and useful, educators must engage in professional development and be permitted to use social media in unique and creative ways, such as connecting with other professionals from the field, learning from others, and using global issues for learning. Marshall McLuhan (1964) used the term "global village" to describe a series of networks in which the world could be connected in order that events in one part of the world could be shared with individuals in another part of the world. Twitter, is one example, where people can share and discover what is happening across the globe related to news, entertainment, and sports.

Although adolescents are using social media tools for personal communication and individual use, the incorporation of these platforms for learning is still in its infancy in education. The majority of the research has been conducted in higher education institutions (i.e., colleges and universities); very little research exists that explores the impact of social media use for teaching and learning at elementary and secondary school levels. This study, therefore, explores the use of Twitter in a Grade 8 mathematics classroom during an instructional unit on Data Management and Probability.

Literature Review

The review of the literature demonstrates that Twitter can be used for teaching and learning in a variety of ways such as increasing engagement, improving communication skills, meeting course objectives, learning another language, and building a sense of community in the classroom. Elavsky, Mislan, and Elavsky (2011) examined the use of Twitter in a university Media and Democracy course and found that 78.2% of students found Twitter to enhance their engagement in the course. However, Jacquemin, Smelser, and Bernot. (2014), explored the use of Twitter in university level biology courses and found that 67% of students did not see Twitter as a useful tool in the classroom.

Andrade, Castro, and Ferreira (2012) explored the integration of Twitter in a masters' level class in Portugal and found that students were involved in answering questions, posting comments, and discussing the issues presented by their professor. Gunuc, Misirli, and Odabasi (2013) examined perceptions of Grade 7 students use of Twitter as a communication tool and
found that 67% of students did not view Twitter as a valuable tool for communication and learning because they were also not using it for personal and social communication.

Domizi (2013) explored the use of Twitter to build community in a pedagogy design class and found that students felt more connected to each other because of Twitter use, therefore, they felt more comfortable voicing their opinions and sharing information. During an eight week practicum, pre-service teachers engaged in Twitter and Wright (2010) discovered these teacher candidates felt a sense of community was built due to the use of Twitter. The pre-service teachers were not only grateful to receive encouraging messages from their peers when they were facing challenges during their practicum but they also welcomed reading about the experiences of others. Wright also found that the teachers reflective practices improved; they were not only reflecting on what they were doing but why they were doing it.

Tanner, Hartsell, and Starrett (2013) investigated the use of Twitter in an algebra college course and found that students enrolled in this course scored higher across three exams compared to other algebra classes that did not use Twitter because when students encountered challenges during homework completion, they would take a picture of their work and send a tweet to their instructor who then responded with suggestions and different strategies. Furthermore, students started to respond to each other's questions and challenges in understanding algebraic concepts and therefore, students became the teacher, helping their peers and themselves in consolidating their learning.

Lomicka and Lord (2012) investigated the use of Twitter in an intermediate university level French course in which students were communicating with each and native French speakers in French and found that students recognized that Twitter is a valuable tool to learn the French language and culture. Castrillo de Laretta-Azelain (2013) explored the use of Twitter amongst Spanish speaking students in a German language course and found that approximately 72% of students found Twitter to be an important tool to improve their written communication skills in German. A review of the literature, therefore, revealed a gap in terms of how Twitter is used in elementary school settings.

**Conceptual Framework**

Social presence theory, first developed by Short, Williams, and Christie (1976), was used as the conceptual framework for this study. The term "social presence" is used when describing how engaged individuals are when they are interacting through a communication medium (Short, Williams, and Christie, 1976). For example, a podcast is considered to have low social presence (i.e., audio) while a Google Hangout has a high social presence (i.e., video). Rourke, Anderson, Garrison, and Archer (2001) identified three categories related to social presence: (a) affective, (b) interactive, and (c) cohesive. The affective category relates to the use of humor, emotions, and emojis. The interactive component is defined by responding to others, asking questions, and communicating agreement and the cohesive category includes the use of names, pronouns, and salutations. Therefore, social presence theory formed the foundation of this study and the findings were interpreted through the three categories as identified by Rourke et al. (2001).
Methodology

The purpose of this qualitative case study was to explore how social presence on Twitter impacts students engagement and learning in a mathematics classroom. The integration of Twitter in elementary education is a relatively new phenomenon and according to Creswell (2009) a qualitative approach should be used to develop a deeper understanding of a new phenomenon. Merriam (2009) and Yin (2009) also posited that qualitative research should be conducted to describe a phenomenon because it provides a rich detailed description of said phenomenon. An embedded single case study design was selected to align with the purpose of the study. Creswell (2007) defined a case study as a research design that involves, "an issue explored through one or more cases within a bounded system" (p. 73). In this study, the case was a Grade 8 mathematics course and the embedded unit of analysis was an instructional unit on Data Management and Probability (Vohra, 2016). According to Merriam (2009) a case study design requires data collection from a variety of sources such as interviews, questionnaires, survey, and electronic communication. For this study, data was collected from student and teacher interviews, student and teacher questionnaires, course objectives, and student and teacher tweets.

The following research questions were developed based on the case study design.

Central Research Question

How does social presence on Twitter impact student engagement and learning when a mathematics teacher integrates this social media tool into mathematics instruction?

Related Research Questions

1. How does a teacher use Twitter to help students improve their learning in mathematics?
2. How does a teacher perceive the value of students using Twitter to improve their learning in mathematics?
3. How do students perceive the value of using Twitter to improve their learning in mathematics?
4. How do documents and artifacts such as tweets and problem solving notebooks support student learning in mathematics?

This study was conducted in a school district in a province in Canada over a 4 week period. Participants included six Grade 8 students enrolled in a Grade 8 mathematics course and the classroom teacher. According to Merriam (2009), this sample size was justified because the purpose of qualitative research is to provide a rich thick description of the phenomenon. I designed two instruments for this study; an oral questionnaire for the teacher and student interviews, and a written questionnaire for the teacher and student reflection journals (Vohra, 2016). For the interviews, a semi-structured format with open ended questions was used and interviews were conducted in a conference room to ensure privacy (Vohra, 2016). The written questionnaire consisted of three questions each for both the teacher and students and was completed once a week via a private blogging platform. Course objectives for the mathematics
course were collected and student and teacher tweets were collected once a week. Both the oral
and written questionnaires aligned with the research questions (Vohra, 2016).

Data was analyzed at two levels. At the first level, data was coded and categorized from
each data source (Vohra, 2016). This coded data was analyzed by using the constant comparative
method as suggested by Merriam (2009) to construct categories (Vohra, 2016). For the document
and artifact analysis, a content analysis was conducted. At the second level, data categorized
across all data sources were analysed in order to establish themes and discrepant data. These
emerging themes and discrepant data shaped the key findings of the study and were analyzed
according to the research questions; the findings were interpreted through social presence theory
(Vohra, 2016).

Results

The findings for the related research questions are presented first since the central
research question consists of a synthesis of all the findings. In relation to the first research
question, the key finding was that the teacher used a variety of strategies to support student
learning of data management concepts such as posting daily word problems, asking probing
questions, providing feedback, posting videos and visuals, and answering student questions. For
example, the teacher posted her lessons on Twitter for students to refer to later as well as asking
probing questions such as "How would you make this graph bias?" and "What makes you think
this?" to further their learning (Vohra, 2016).

In terms of the second related research question, findings indicated the teacher found
Twitter to be a valuable tool for learning because students were building community, assuming
the role of the teacher, reflecting on their learning, and sharing resources (e.g., videos and
visuals). The teacher stated how students took on the role of the teacher, responding to the
questions and challenges posted by their peers on Twitter. Consequently, the teacher found the
number of tweets she had to respond to decreased because students were teaching each other.
Additionally, the teacher discovered that students who do not usually work together in class were
now collaborating because they were interacting on Twitter after school (Vohra, 2016).

Results for the third related research question indicated that the majority of students
found Twitter to be a helpful tool for their learning because they were collaborating on group
assignments outside of school, observing the different strategies used by their classmates to solve
problems, answering probing questions, receiving timely feedback, reflecting on their learning,
and sharing resources in the form of videos and visuals from classroom lessons. English
Language Learners (ESL) indicated they felt more comfortable participating through Twitter as
opposed to the classroom because they did not have to worry about spelling and grammar.
Students also identified their learning was enhanced because classmates were posting YouTube
videos to increase their understanding of concepts like central tendency and misleading graphs.
One student, however, did not find Twitter to be a valuable tool because he identified his
learning style did not suit the use of this platform. He believed he learned best in face-to-face
situations with the support of his teacher and peers (Vohra, 2016).

In relation to the fourth related research question, the teacher used ministry objectives
related to the mathematics course to align her lessons to support student learning. In terms of the
artifacts, findings indicated that tweets supported student learning of data management concepts
because students were answering word problems, working together on group projects, posting
videos and visuals, responding to teacher questions and feedback, and exploring the different strategies in solving word problems (Vohra, 2016).

The results from Andrade et al. (2012), Domizi (2013), Elavsky et al. (2011) and Tanner et al. (2013) support the findings from this study that Twitter is useful to build community, engagement, and learning. Therefore, the data supports the key findings in terms of the central research question that social presence on Twitter had a positive impact on student engagement and learning in a mathematics classroom (Vohra, 2016).

**Interpretation of Findings**

All three categories of social presence theory (i.e., affective, interactive, and cohesive) were present demonstrating that Twitter had a high degree of social presence. The teacher and students used emojis and hashtags to convey their feelings about the data management activities, such as the bar chart and smiling face emojis and hashtags such as #mathisfun and #IGetIt. They also posted visuals of the daily lessons and videos to support and extend their learning of data management concepts such as central tendency and misleading graphs (Vohra, 2016). For the interactive component, students responded to each other's tweets, which consisted of homework questions, challenges encountered, and alternate strategies to answer word problems. This allowed students to reflect on their learning, which allowed them to consolidate their learning of data management concepts. There were several occasions when one tweet led to multiple students communicating with each other under one thread, resulting in a network of students learning together (Vohra, 2016). Students also expressed their appreciation to each other and their teacher on Twitter with the assistance they received with their schoolwork. Due to this, the teacher found students who usually do not work together in class were now working together in the classroom due to their interactions on Twitter. Furthermore, students took on the role of the teacher because they answered each other's questions before the teacher had the opportunity to respond. The cohesive component was evident as students referred to each other by name as well as using pronouns such as "you", "she" and "we". Therefore, all three categories of social presence theory were present, indicating that Twitter had a positive impact on student engagement and learning (Vohra, 2016).

**Implications**

The results of this study have several implications for social change. One contribution is enhancing knowledge about how technology tools can impact teaching and learning in education. A tool such as Twitter allows every student to have a voice compared to the classroom where only a few students regularly participate in the classroom since not everybody is comfortable voicing their thoughts in class (Vohra, 2016). Everyone can contribute to a conversation on Twitter leading to a variety of perspectives and opinions that can be analyzed and discussed to enhance learning.

The second implication is enhancing effective teaching practices in mathematics education. Students can communicate with each other after school hours, collaborate on projects, ask questions, seek clarification, reflect on their learning, and receive feedback in order to support their learning. Because students were able to view the work of all their peers on Twitter as opposed to only their group members in class, they were exposed to a variety of strategies and thinking, which developed their understanding of mathematical concepts. Additionally, students
were supporting each other in their learning because they were helping each other with homework and participating in discussion threads about sample size, bias, and central tendency. Hence, students were taking control of their learning and forming relationships online (Vohra, 2016).

The third contribution is related to social change. Twitter encourages students to form a network of learners who not only learn from each other but also from Twitter itself such as using hashtags to conduct research and seeking out professionals according to their subject discipline (Vohra, 2016). Therefore, students can not only communicate with each other but also interact with professionals from the field; asking questions and consolidating their learning, thereby creating an effective personal learning network that spans the globe. With so much information available to us because of technology, Twitter affords the opportunity for students to discuss, synthesize, brainstorm and exchange ideas in order to create solutions and make sense of information.

**Future Research**

One recommendation for future research is to replicate this study over a longer period of time and using more than one instructional unit in mathematics. A 4-week instructional unit on data management might not represent students’ experiences with using Twitter, therefore, conducting a longer study with multiple mathematics concepts might yield different results. Another recommendation is to conduct this research at a different time of the year. This study was conducted near the end of the school year, where students are busy with graduation preparation, final assessments, and preparing for their summer. The timing of the study could have impacted the results, therefore, the use of Twitter could be explored starting at the beginning of the school year. A third recommendation would be to explore how student self-reflection and self-assessment is impacted by the use of Twitter; the results of this study indicated that students were reflecting on their learning when they saw the different ways in which their peers solved problems and when they encountered challenges with data management concepts as reflected in their tweets. Therefore, exploring student self-assessment and self-reflection could be a possible focus for future study. An additional recommendation would be to investigate the impact of Twitter on classroom community building. The teacher and students reported they felt classroom climate was enhanced because of their online interactions; students who normally did not communicate with each other were now interacting because of their use of Twitter. Hence, exploring the use of Twitter and its impact on classroom climate would be beneficial. Finally, this study was conducted in a location where the socioeconomic status is mid-to high-level; repeating this study in a location where students are from a low socioeconomic status in order to determine if results would be similar would be useful (Vohra, 2016).

**Conclusion**

The results of this study provide additional proof that social media tools like Twitter can positively impact student learning and engagement. Twitter affords students the ability to build relationships through communicating, collaborating, and interacting with each other online. Furthermore, social media platforms allow every student to have a voice, which includes ESL students and students who are reluctant to participate in a face-to-face classroom. Even though technology has been a focus in recent years in education, social media has not been integrated
into teaching and learning even though adolescents are using these platforms for social and personal use. Education and teachers need to embrace these tools for teaching and learning due to their popularity among teenagers so that these students can build their learning networks, enhance classroom community, and communicate and reflect on their learning.
References


