EXPLORING THE UTILITY OF MICROBLOGGING AS A TOOL FOR FORMAL CONTENT-BASED LEARNING IN THE COMMUNITY COLLEGE HISTORY CLASSROOM

by

Jeffrey W. Freels

A Dissertation
Submitted to the
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of
Doctor of Philosophy
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Dedication

This is dedicated to my wife Kelly, who challenges me to be my best self every day, and my two boys Ethan and Andrew.

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I would not have made it this far without the loving support of my wife, Kelly. Her understanding, patience, and support have made all of this possible. Dr. Kelly Schrum has been an invaluable mentor and colleague throughout much of my program at George Mason University. She always asked important questions and remained relentlessly positive throughout this process. Drs. Lesley Smith, Gary Galluzzo, and John O'Connor were helpful and inspiring as teachers and members of my program and dissertation committees. Finally, I would like to thank Carolyn Hoffman and Darlene Antezana, my mentors and supervisors for the past eight years. They inspired and challenged me to become a better educator.

Table of Contents

List of Tables

Abstract

EXPLORING THE UTILITY OF MICROBLOGGING AS A TOOL FOR FORMAL CONTENT-BASED LEARNING IN THE COMMUNITY COLLEGE HISTORY CLASSROOM

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George Mason University, 2015

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The emergence of social media technologies (SMT) as important features of life in the twenty-first century has aroused the curiosity of teachers and scholars in higher education and given rise to numerous experiments using SMT as tools of instruction in college and university classrooms. A body of research has emerged from those experiments which suggests that SMT may be useful in promoting student learning and improving academic outcomes. However, as of yet the evidence from that research is scant and inconclusive. The study described here was designed to contribute to that body of research by investigating whether or not requiring students to use a microblog–Twitter in this case—in a community college history course would help students display higher levels of attainment of content-based course learning outcomes on traditional types of assessments. Student activity on Twitter and performance on traditional types of assessments were quantitatively tracked and evaluated according to a number of specialized rubrics, the

results of which were integrated into a series of hierarchical regression analyses. Qualitative data was also collected in the form of open-ended questionnaires in order to provide insight into how students perceived of and used Twitter as an instructional tool. Data obtained through both methodologies were integrated into the final analysis. The results of this study suggest that microblogs can be an effective platform for teaching and learning when the instructor is experienced in the use of the medium, deliberate in how it is used, and highly engaged during use.

Chapter One

Statement of the Problem

In recent years social media technologies (SMT) have become an integral part of the lives of many Americans. From Facebook, with over 128 million average monthly users in the United States, to Twitter, with over 93 million average monthly users in the U.S., to Pinterest, with close to 54 million average monthly users in the U.S. (Top Sites, 2015), SMT "lie at the heart of how digital technology is used across many aspects of contemporary society" (Selwyn, 2013, p. 105). Given the rapid rise and emergence of SMT as ubiquitous features of life in the twenty-first century (Facebook launched in 2004, Twitter in 2006, Pinterest in 2009), it should not be surprising that SMT have drawn the attention of scholars in higher education. Scholars early on recognized the potential educational benefits to be found from using SMT in the classroom (Baird & Fisher, 2005), especially as it pertained to increasing student engagement (Chen, Lambert, & Guidry, 2010; Joyce & Brown, 2009; Lester & Perini, 2010). However, while the body of evidence and scholarly consensus on this topic indicates that SMT are effective tools for increasing student engagement, the potential connection between classroom usage of SMT and student learning has been explored less comprehensively (Cao, Ajjan, & Hong, 2013; Chen & Bryer, 2012; Conway, 2011; Hew & Cheung, 2013; Veletsianos, Kimmons, & French, 2013). As such, there is scant evidence and little

consensus with regard to whether or not SMT help students learn. The study described in this thesis will attempt to address that question by delving into previously unexplored avenues of inquiry.

Purpose of the Study

The purpose of the exploratory mixed methods study described here was to investigate whether or not requiring students to use a microblog service—Twitter in this case—as a formal learning tool helped students attain the content-based learning outcomes in online and face-to-face (F2F) community college history courses. Quantitative data were collected by evaluating student activity related to the course on Twitter and on more traditional types of assessments and through a survey distributed to participating students in the classes under examination. Qualitative data were collected through anonymous, partially open-ended, electronic questionnaires. The quantitative data were intended to provide evidence of the degree to which variance in student performance on traditional assessments could be explained by variance in student activity on Twitter. The qualitative data were used to get a sense of how students perceived of Twitter as a learning tool and how they used it in the context of the class.

Research Questions

The guiding research question for the quantitative research is:

RQ1: When a microblog is used as an instructional tool in a community college history survey course, do relationships exist between or among student learning outcomes attainment on traditional types of assessments, student learning outcomes attainment on the microblog, and student engagement on the

microblog? What roles do previous experience in using Twitter, level of electronic device ownership, technology self-efficacy, age, gender, ethnicity, English-speaking status, and first-generation college status play in those relationships?

The guiding research question for the qualitative research is:

RQ2: How do students in a community college history survey course that requires the formal use of a microblog make decisions about how to use the medium in the context of the course?

Definition of Terms

Content-based course learning outcomes are outcomes related to the subject matter in the specific history course in which the research described here was conducted. The course covered the colonial and revolutionary periods, early national and Jacksonian period, and the events leading to the Civil War. It is the first course in a two-course sequence in U.S. history. The content-based outcomes are distinguished from skills-based outcomes that represent the skills a student would be expected to acquire in an undergraduate history course (analyze primary sources, identify historical arguments in secondary sources, and construct historical arguments based on evidence). This distinction is made because the manner in which Twitter is used as an instructional tool in the courses being studied is aligned strictly to the content-based outcomes. No attempt was made to assess skills-based outcomes through student activity on Twitter.

Critical thinking is defined along lines developed by Scriven and Paul (1987). According to them, critical thinking is: "self-directed, self-disciplined, self-monitored,

and self-corrective thinking. It presupposes assent to rigorous standards of excellence and mindful command of their use. It entails effective communication and problem solving abilities and a commitment to overcome our native egocentrism and sociocentrism." As applied to the context of this study, some student activity on Twitter will be evaluated for evidence of critical thinking. The criteria used to evaluate student work for critical thinking have been adapted from "College-Wide Grading Standards" from Elder and Paul (2000) and emphasize clarity, precision, reasoning, and depth of insight.

Formal learning is identifiable by the presence of at least one of five characteristics in a learning situation: (a) a prescribed learning framework; (b) an organized learning event or package; (c) the presence of a designated teacher or trainer; (d) the award of a qualification or credit; and (e) the external specification of outcomes (Eraut, 2000). It could be argued that the manner in which the microblog was used in the courses that make up this study fits all of those criteria to some extent. Informal learning likely occurred as a result of students' use of the microblog, but that learning is not the subject of the present study and no attempt was made to measure it.

HootSuite is a social media management platform that supports network integrations for a variety of social networks, including Twitter. HootSuite allows users to view multiple streams of activity from different social networks in one place, as well as to post messages to those various social networks (Anderson Gray, 2012). It was the application software that I used to manage Twitter activity for the classes involved in the study.

Microblog is a digital technology that allows for the posting of "small pieces of digital content—which could be text, pictures, links, short videos, or other media—on the Internet" (EDUCAUSE Learning Initiative, 2009). Twitter is currently the most well-known and oft-used microblog in the United States.

Social media technologies (SMT) are Internet-based applications that that allow users to converse and interact; to create, edit, and share new forms of digital content; and to categorize, label, and recommend existing forms of content (Selwyn, 2011). SMT are distinguished from Web 2.0 applications (e.g., collaboratively-authored projects such as Wikipedia) and user-generated content applications (e.g., blogs or video sharing sites such as YouTube) by the high levels of social presence, media richness, and self-presentation that they engender (Kaplan & Haenlein, 2010). Examples of SMT include, but are not limited to, services such as Facebook, Twitter, Pinterest, Instagram, and Snapchat.

Student engagement was defined by Kuh (Axelson & Flick, 2010) as "the extent to which students take part in educationally effective practices" (p. 40). That definition was applied in this study in that every tweet published by participating students received an "engagement score" based on the type of instructor tweet to which it responded. The design of the courses included in this study ensured that over 99% of published student tweets were written in reply to an instructor tweet. Then, the sum of engagement scores was calculated to obtain each student's overall engagement score on Twitter. Thus, student engagement in the context of this study was operationalized by taking into account the number of tweets that students published and the type of instructor tweets to

which they chose to reply. The types of instructor tweets published in this study are discussed in greater detail in Chapter Four.

Technology self-efficacy is defined by McDonald and Siegall (1992) as "the belief in one's ability to successfully perform a technologically sophisticated new task" (p. 467). Research suggests that there is a positive relationship between attitudes of students towards computers and computer-based instruction and their ability to use technology as a learning tool (Sagin Simsek, 2008). Therefore, students were asked to report on their perceptions of technology in the classroom in a series of questions on a survey at the beginning of the course. Their responses on those questions were used to operationalize the technology self-efficacy variable, a control variable in the final quantitative analysis.

Traditional types of assessment are assessments that might commonly appear in undergraduate history courses. In the case of this thesis, those methods include multiple-choice questions on quizzes or exams, written "identifications" on quizzes that require students to define and identify the historical significance of select historical terms, and written essays that require students to respond to a prompt and craft a historical argument based on evidence from primary and secondary sources.

Twitter is the most widely-used microblog in the United States today (Quantcast, 2014). It is an online social networking platform that "enables users to send and read short 140-character messages" (Wikipedia). User profiles are usually public; anyone in the world can see what a user writes unless they elect to make their profile private. Users subscribe to, or "follow," other users on the service "in order to keep tabs on and converse with specific people" (Nations, n.d.).

A *tweet* is a message sent on Twitter by a registered user using the Twitter website, any compatible mobile application (such as those for smartphones), or by text message. Tweets may have no more than 140 characters, but may contain hyperlinks, pictures, or short videos. All tweets are public unless the user elects to make their profile private.

Purpose and Process

Investigating the potential for microblogs to help students attain content-based course learning outcomes is the core purpose of the study described here. However, as will be discussed in Chapter Two, the body of research that provides insight into the efficacy of microblogs as a teaching and learning tool is sparse. There is slightly more research on the efficacy of SMT use in the college classroom in general, but even that research is limited. In cases where scholars have investigated the possible connection between SMT use and student outcomes, the outcomes piece of that research was exclusively and broadly focused on students' overall grade in a course (Hirsh, 2012; Junco, Elavsky, & Heiberger, 2012). Based on my review of the published literature to date, no scholar has attempted to look more closely at the connection between SMT use and specific course outcomes.

In order to facilitate the study of the connection between SMT use and specific course outcomes, it was necessary to align all course assessments to those outcomes. Further, each of those assessments had to be broken down according to their smallest practical assessment item (SPAI), a technique described by Shanableh (2011). For example, each multiple-choice item and each identification used in this study were

aligned to specific course outcomes regardless of the assessment on which the question was deployed. The result is that most of the assessments in the courses are aligned to multiple course outcomes. This framework allowed for data collection on student course learning outcomes attainment across the entire course and across each individual outcome, which allowed for greater depth of clarity in the data analysis.

Delimitations of the Study

The study was confined to two courses taught by the same instructor during a single semester at one community college. Additionally, the community college at which the courses were offered has a highly unique context in that it is a suburban, predominantly-black institution. That context limits the generalizability of conclusions drawn from the study.

I served as both the instructor for the courses in the study and the primary researcher, which could raise questions about the validity of the study. In anticipating a response to those questions, I identified some strategies to limit the potential for bias. First, I taught online and F2F versions of the course that was part of the study 14 times from the fall 2011 semester to the fall 2014 semester; Twitter was used in half of those courses. Apart from the manner in which I used Twitter, the basic structure of the course and the pedagogical and assessment strategies used did not change substantially over that time. Maintaining consistency in the subject matter and course structure was meant to limit the possibility for bias; I endeavored in every way to ensure that the courses that were part of the study were conducted in the same manner as previous versions. The only aspect of the course that underwent significant changes over time was how Twitter was

used as a learning tool. That was done in order to experiment and test different strategies for using the medium. Another strategy that was used to reduce the risk of bias involved the use of reliability testing in the research design. Items on multiple-choice assessments were subjected to reliability testing before the study took place and efforts were made to ensure that the evaluation of written student coursework, done using rubrics, was consistent with the evaluations of other history instructors. Those strategies will be discussed in greater detail in Chapter Four.

Despite efforts to counter the existence of bias, much of the data used in the final analysis came from my own evaluations of student work in classes in which I was the instructor. This may impact the replicability of the study and the generalizability of the study conclusions.

Limitations of the Study

Enrollment in the two courses that made up this study was open to any student at the community college at which the study took place. That fact impacted the number of potential participants in the study and the character of the students who were eligible to participate. In other words, I had no control over how many students enrolled in the courses that were part of the study or who those students were. There was also no way to control for the number of students who agreed to participate in the study. At the outset of the spring 2015 semester in which the data collection phase of the study took place, 54 students were enrolled in the two classes that made up the study—30 in the F2F section, 24 in the online section. Of those students, 34 agreed to participate in the study, including 24 in the F2F section and 10 in the online section. Three of those students either

withdrew from the class in which they were enrolled or failed to complete enough work for the resulting data to be meaningful. As a result, the number of participating students fell to 31, including 22 students in the F2F class and nine students in the online class. Further, data from one of those students was removed from the final analysis in light of statistical considerations (see Chapter Four for more details). Therefore, the final sample size for the study was 30 students, a somewhat problematic sample size given the quantitative methods used in this study. That fact limits the generalizability of the conclusions drawn from this study.

Despite the efforts made to keep the courses that were part of this study consistent with those from previous terms, another important limitation arose from the fact that the department which oversees the course elected to change the course textbook approximately three months before the study commenced. Previous to the spring 2015 semester in which the study took place, the course structure and the materials developed for this study were developed in connection with the old textbook. The first semester in which the new textbook was deployed was the spring 2015 semester. As a result of that change, a portion of the materials for the two courses under study required revision immediately before the study began, including some of the instructor tweets and assessment materials included in the study. Where changes were made, every effort was made to keep the revised materials as consistent as possible with earlier iterations based on the previous textbook, but in some cases whole tweets, multiple-choice items, or identifications had to be discarded and new ones written. Overall, nine out of 20 identifications required revision, three multiple-choice items out of 50 were replaced by

new items, and eight instructor tweets out of 111 were replaced with new instructor tweets. These changes did not appear to present any problems once the study commenced.

Significance of the Study

The study described here is designed to explore the degree to which requiring students to use a microblog as a formal learning tool in a community college history course might help students demonstrate higher levels of attainment of content-based course learning outcomes on traditional assessments. The combination of steadily growing use of SMT in higher education (Faculty Focus, 2010; Moran, Seaman, & Tinti-Kane, 2012) and a scarcity of research on the impact of SMT on student learning makes this study relevant and timely. In addition, this study was performed within a unique context. It looked at the impact of SMT use on student success in courses at a community college, a hitherto under-explored area of research (Davis, Dell-Amen, Rios-Aguilar, & Gonzalez Canche, 2012). Further, the pedagogical strategy employed for SMT use in this case was unlike anything previously uncovered in the research. In this study Twitter use was mandatory for students, they received a direct grade for their work on Twitter (as opposed to an indirect grade for "participation"), and they used Twitter primarily as a means to answer questions in tweets published by the instructor. Those instructor tweets were carefully designed to guide students toward greater attainment of the content-based learning outcomes. As a result, the conclusions drawn from this study must be carefully qualified, but it will be argued that they provide an important contribution to our

understanding of the connection between the use of SMT and student achievement in the community college history classroom.

Chapter Two

Introduction

The study described in this thesis is predicated on the notion that higher education is going through a period of transformative change. Although there are many factors influencing that change, the manner in which technology is transforming the higher education classroom is the focus of the present study. More specifically, the growing use of social media technologies (SMT) as teaching and learning tools will be explored. In many cases, SMT are being used as innovative platforms for changing how college and university students interact with their instructors, course content, and each other. Yet, despite rising rates of adoption of SMT in college classrooms, research into the efficacy of these technologies as learning tools has not kept up with the demand for evidence to inform instructional practice. In light of the purposes of this study, it may therefore prove valuable to review the state of evidence in the field.

While the present study is focused on the instructional use of Twitter in community college history classrooms, much of the research on SMT in higher education has been directed towards studying the impact of social media more generally. Thus, this literature review will examine that broad body of research, delving into research specifically geared towards the use of microblogs and/or Twitter in college classrooms where appropriate. The perceived affordances, weaknesses, and critiques of SMT in

teaching and learning will be reviewed, followed by a discussion of the state of the research in the field.

The largest section of this chapter will be focused on what the research reveals about the use of SMT in the college classroom. Student perceptions of the instructional use of social media and the impact of using SMT on student engagement and academic outcomes will be covered in that section. The challenges involved with using microblogs in the college classroom, along with lessons and guidelines for using microblogs as an instructional tool, will be reported as well.

This literature review is intended to provide evidence of three themes that appear in the literature on the use of SMT in higher education. First, while the existing research on the use of SMT in general and microblogs in particular does not definitively prove that SMT are desirable or effective instructional tools, it does provide compelling evidence of the efficacy of these technologies as teaching and learning platforms. Second, the effectiveness of SMT in teaching and learning is directly tied to the methods utilized by instructors in mobilizing the chosen technology and as yet, few instructors in higher education are using SMT in such a way as to maximize student benefits. Third, the research methods used in the field up to now have been inadequate to the task of determining whether or not microblogs make for effective learning tools.

Research Procedures

The search for research relevant to the present study has taken place over several years. The research process began when I first decided to use Twitter in my classroom in 2011. Upon making that decision, and for several months after, I conducted occasional

searches for literature using search terms such as “Twitter” or “microblogging” in conjunction with “higher education” in databases such as Education Research Complete and Education Full-Text. I scanned the reference pages of articles that discussed the use of Twitter as an instructional tool for additional works of research. Also, I regularly reviewed journals rich in content in this area—e.g., *British Journal of Educational Technology*, *Computers and Education*, and the *Journal of Computer Assisted Learning* were particularly fruitful—issue by issue for relevant literature.

The next phase of my research began when I started to focus on the instructional use of microblogs as the topic of this dissertation. I conducted keyword searches in Education Research Complete, Google Scholar, EBSCOhost, and Web of Science using “social media,” “Twitter,” or “microblogging” in combination with “higher education” or “learning.” I also continued to review the three journals listed in the preceding paragraph for new articles and used the “Cited by” features in Web of Science and Google Scholar to find articles that cited seminal works, particularly those co-authored by Reynol Junco in 2011 and 2012.

In addition to searches of all of the databases mentioned above, I conducted issue by issue searches of 23 separate journals as well: *Active Learning in Higher Education; American Journal of Distance Education; British Journal of Educational Technology; Computers and Education; Computers in Human Behavior; Distance Education; Educational Technology and Society; Educational Technology Research and Development; European Journal of Open, Distance and E-Learning; Innovations in Education and Teaching International; Instructional Science; Interactive Learning*

Environments; International Journal of Education and Development using Information and Communication Technology; International Journal of Social Media and Interactive Learning Environments; International Review of Research in Open and Distance Learning; Internet and Higher Education; Journal of Asynchronous Learning Networks; Journal of Computer Assisted Learning; Journal of Educational Computing Research; Journal of Educational Technology Systems; Journal of Interactive Learning Research; Journal of Technology and Teacher Education; and *Learning and Instruction*. I scanned reference pages of relevant articles for additional works and I continued to check Google Scholar and Web of Science for articles in which Junco's work was cited.

Once the study commenced, I created Google Scholar Alerts for three different kinds of articles that I considered seminal to the topic. A Google Scholar Alert sends the user an email message whenever an article is published that cites an article selected by the user. One article for which I received alerts was the most recent piece from the foremost scholar in the field (Junco et al., 2012); another had direct relevance to the topic under investigation in the study (Rinaldo, Tapp, & Laverie, 2011); and the last contained a recent literature review of the topic (Gao, Luo, & Zhang, 2012). Those alerts allowed me to stay abreast of the most recent research in the field even as the study was taking place.

Higher Education Context

Innovations in information and communications technology in the last several decades have presented an "open challenge" to the system of higher education as we know it (Amirault & Visser, 2009, p. 64). As such, higher education is experiencing a

period of disruptive transition (Conway, 2011). Increasing demands for accountability and transparency, as well as pressure to improve retention and completion metrics, all while controlling costs in an era of declining external support, have led some to conclude that "radical change" in the "design and delivery of teaching" is needed to address these concerns (Ng'ambi & Bozalek, 2013, p. 531). Conway (2011) has argued that "traditional" models of teaching and learning are obsolete and that a new "socially mediated model" is more appropriate to the demands of the twenty-first century (p. 245). In general, Ng'ambi and Bozalek (2013) argue that using "emerging technologies" in the classroom is one way to address the teaching and learning challenges of the new era, while Conway (2011) makes the case more specifically for SMT as preferred tools.

Ravenscroft, Warburton, Hatzipanagos, and Conole (2012) recognize the potential of SMT for transforming learning in higher education, but call for a more measured approach to their adoption. They contend that the "tradition of learning [in higher education] as a highly structured and organized experience, involving clear levels of authority" is challenged by "the more collaborative, volatile and anarchic nature of the social web" (p. 177). Selwyn (2011) shares the skepticism of Ravenscroft et al. (2012) about SMT and asserts that education is perhaps not changing as much as some would declare, even while discussing at length the potential of SMT for changing the landscape of teaching and learning. Still, neither Selwyn nor Ravenscroft et al. seem to doubt that higher education is in a period of transition. Where these various scholars appear to disagree is the degree to which SMT should be part of the educational landscape in years to come.

Social Media in Higher Education

Growing use of SMT. According to Moran, Seaman, and Tinti-Kane (2012), 33.8% of higher education instructors reported using some kind of SMT in their classes in 2012; of those, 2.7% reported using Twitter in their classes, up from 2% in 2011 (Moran, Seaman, & Tinti-Kane, 2011). Furthermore, a 2010 Faculty Focus survey reported that 34.6% of higher education instructors had used Twitter either sometimes, occasionally, or frequently in their classrooms–up from 27.6% in 2009. While it is peculiar that the two surveys returned such divergent results on the question of how many teachers in higher education are using Twitter in their classrooms, the results nonetheless suggest that the instructional use of microblogs has been rising in recent years.

Statistics aside, there is little doubt that the use of SMT as teaching and learning tools has been a subject of intense interest among higher education scholars in recent years (Davis, Dell-Amen, Rios-Aguilar, & Gonzalez Canche, 2012; McEwan, 2012; Ravenscroft et al., 2012; Rodriguez, 2011; Selwyn, 2011). Faculty members are utilizing SMT in their classrooms to "disseminate information, connect with students, create learning opportunities, and encourage deeper student engagement with course material" (McEwan, 2012, p. 16). Multiple studies have provided evidence that the instructional use of SMT can increase student satisfaction and retention (Brownson, 2014), collaboration (Kassen-Noor, 2012), engagement (Elavsky, 2011), and grades (Junco, Heiberger, & Loken, 2011). In light of such evidence, recent increases in the use of SMT in college classrooms are not surprising.

Reasons for SMT adoption in the higher education classroom. Why are higher education instructors choosing to use SMT in their classrooms? Reasons that appear commonly in the literature often have to do with the perception that SMT enhance interaction and communication in college courses (Andrews, Tynan, & James, 2011) and build rapport between the instructor, students, and content, leading to higher levels of discourse in the classroom (Brownson, 2014). Also, most SMT are "freely accessible, easy to incorporate, and have a minimal learning curve to master" (Rodriguez, 2011, p. 540). Yaros (2012) suggests that SMT "can significantly influence how students perceive and approach their educational environment" because "few, if any other, communication tools appear to simultaneously offer individuals both personal and interpersonal interactivity more than social media" (p. 69). Tay and Allen (2011) contend that the real value of SMT is in their ability to promote active learning and collaboration among students. With regard to microblogs, McEwan (2012) suggests they have particular value because they can facilitate creative assignments, public presentation, and rapid instructor feedback.

Interested in the motivations behind SMT adoption in higher education, a Malaysian scholar in 2013 explored the factors behind both student and instructor adoption of the technologies (Balakrishnan, 2013). In doing so, the authors administered a survey to 455 university students and instructors in Malaysia. Designed to identify factors that affect the adoption of SMT in e-learning in Malaysia, the survey asked respondents specifically about Facebook, Twitter, and YouTube. Instructors were surveyed to gauge the variables that enter into the decision-making process of whether or

not to use SMT in their classrooms; students were surveyed because the researcher was interested in how students use SMT in informal ways to augment their learning. The results were illustrative.

Five factors were revealed as determinants of whether or not a respondent would choose to use SMT in support of teaching and/or learning: These were: academic reasons, convenience, social networking, ease of use, and e-learning perception (p. 7). "Academic reasons" included improved communications and a greater sense of community within the teaching and learning environment. "Convenience" was perceived as an important factor because SMT applications such as Facebook, Twitter, and YouTube are ubiquitous and easy to use. The ease with which users of social networks can productively interact and communicate was of particular importance to the "social networking" variable. "Ease of use" was facilitated by the SMT in question being well-known and oft-used. The "e-learning perception" variable indicated that both instructors and students were dissatisfied with current e-learning platforms, especially learning management systems. In other words, Balakrishnan found that teachers and/or students would be more likely to adopt SMT if they were dissatisfied with their existing e-learning platform and believed that SMT were convenient, easy to use, and potentially useful to their educational goals.

Criticisms of and concerns about SMT as educational tools. The literature on this topic indicates that there are numerous positive reasons explaining why higher education instructors would choose to use SMT in their classrooms. However, critics of SMT in education, and even some proponents who caution that they should be used carefully, have articulated a number of reasons why the promise of SMT may be limited.

One of the most clearly articulated arguments against social media in education was presented by Friesen and Lowe (2012). Proceeding on the assumption that fostering debate and disagreement is one of the core missions of higher education, these scholars question whether or not SMT are capable of providing an appropriate venue for such dialogic exchange. The main source of their skepticism is the fact that most SMT were founded and are maintained on the basis of commerce. Given the nature of the commercial marketplace, the first priority of the companies that run these websites and application technologies is generating revenue and profits, an imperative that is "inseparable from the type of user experience that they provide," according to Friesen and Lowe (p. 184). In short, Friesen and Lowe are concerned that the manner in which users interface with SMT might be manipulated, censored, or controlled in such a way as to stifle possibilities for debate and disagreement. They argue that the interests and priorities of the proprietors of SMT are either indifferent or in opposition to the values inherent to education. While not fully rejecting the instructional use of SMT in higher education, their critique is clearly framed to discourage its use.

Another eloquent critic of the integration of SMT into higher learning is Selwyn (2013). Apparently alarmed by the increasing prominence of social media tools and applications "across all sectors and forms of educational activities" (p. 109), Selwyn argues that educators should be more distrustful of the promise of SMT. He contends that educational technologists have accepted uncritically the perceived benefits of social media use in education despite a dearth of research into those benefits. Among the many arguments he offers against the use of SMT in education, Selwyn claims that SMT are

not as participatory or interactive as many assume, that learning communities that emerge from the use of SMT in the classroom are likely to be transitory, and, echoing Friesen and Lowe's (2011) argument, that users of SMT are apt to be exploited for commercial gain by the owners of the technologies. Finally, he concludes by rebuking educational technologists for being "unwilling or unable to see the recent social turn within digital technology for what it is–that is, an extension of capitalist relations and contemporary consumer society" (p. 124).

A somewhat less polemical critique of SMT in education than those provided by Friesen and Lowe (2012) and Selwyn (2013) may be found in Ravenscroft et al. (2012). While acknowledging that SMT may offer real benefits to teachers and students in higher education, Ravenscroft et al. enjoin educators to "move away from the hype and overblown expectations about social media and learning, and instead adopt a more critical discourse" (p. 178). As part of this move, they call for empirical research into the pedagogical efficacy of SMT and for rethinking strategies of instructional design to meet the challenges of new technology. Other scholars have expressed concern that SMT might be distracting in the higher education classroom (Wakefield, Warren, Alsobrook, & Knight, 2013), that it might lead to blurred lines in the instructor-student relationship (McEwan, 2012), and that it might raise questions regarding fair use, student privacy, or access for those with disabilities (Rodriguez, 2011). Still, all of the scholars mentioned in this paragraph—apart from Friesen, Lowe, and Selwyn—approached the topic of SMT in the higher education classroom from a position that SMT can be used productively. That fact is reflective of the literature on this subject at large.

General Research Commentary

Availability of research on SMT in higher education. One idea upon which there is essentially universal agreement is that the research on the instructional use of SMT is limited. Balakrishnan (2013) contends that little research has been done on how students and college teachers use or respond to SMT in formal academic settings. Veletsianos, Kimmons, and French (2013) assert that empirical research on the instructional use of social networking sites is "scant" (p. 256). Yaros (2012) claims that "systematic research focusing on social media's broader psychological and potentially motivational benefits [in higher education] has been limited" (p. 57). On the subject of how SMT impact learning, Conway (2011) suggests that there are "no agreed answers yet, no certainties, and still much resistance" (p. 246) and Davis et al. (2012) agree that "little is known about the benefits of [SMT] use in postsecondary contexts" (p. 2). More specifically, Cao, Ajjan, and Hong (2013) wrote that "little research has paid close attention to the educational outcomes of social media utilization in college teaching" (p. 581), while Chen and Bryer (2012) confirm that research into how SMT impact student learning in the classroom is limited. Further, a recent literature review by Hew and Cheung (2013) concluded that "actual evidence regarding the impact of Web 2.0 technologies on student learning is as yet fairly weak" (p. 47). An investigation into the assessment of student work on Web 2.0 technologies in the college classroom by Gray, Thompson, Sheard, Clerehan, and Hamilton (2010) found "a paucity of cases which described assessment of student Web 2.0 authoring in higher education in any worthwhile

detail" (p. 112). Finally, West, Moore, and Barry (2015) confirmed that "Twitter has received limited scholarly attention to date" (p. 1).

Research methods in the literature. The research on the use of SMT in higher education might be limited, but it is varied nonetheless; this is also true for the literature on the use of microblogs as learning tools in higher education. Still, given the nascent state of the field it should not be surprising that case studies appear most commonly in the literature. In this instance, a case study is defined as a report on how one SMT was used in one classroom over one semester or less. In some cases empirical data were provided as evidence of the impact of using the SMT in that classroom; in others the authors merely presented their perceptions of how it impacted their students. A significant number of case studies are descriptive in nature and offer only the author's thoughts and perceptions on the use of a particular tool. Fewer provide some manner of quantitative or qualitative data to support their claims, but the utility of that data is often limited by the highly specific context in which the data was obtained.

Including case studies, the most common research methods that appear in the literature are quantitatively oriented. Among those, surveys make up a sizeable majority of the data collection methods used by scholars in the field. Very few made any attempt to investigate the relationship between student use of SMT in the classroom and academic outcomes apart from asking students about their perceptions of that relationship on a survey. When scholars did examine outcomes it was almost always operationalized through self-reported final course grades. One study explored the connection between student use of Twitter and student performance on a small number of individual

assignments (Kassens-Noor, 2012), another compared the number of course-relevant tweets that students published to their final grade in the class (West et al., 2015), and a third operationalized learning outcomes through survey results, students' final course grades, and the results of a very short multiple-choice assessment (Clarke & Nelson, 2012). No studies were found that looked beyond students' self-reported learning gains for a correlation between the use of SMT and the attainment of specific course learning outcomes. Content analysis of student work on Twitter was a method used in a number of studies, but that content analysis was almost always quantitative (e.g., counting the number of student tweets or broad categorization of tweets based on the type of communication it represented). In the few cases where qualitative analysis of student work on Twitter took place it was focused on examining student tweets for evidence of how students used Twitter to interact and/or engage. In no cases were student tweets evaluated for evidence of student attainment of course learning outcomes. Mixed methods appear somewhat commonly in the literature, but almost always in the form of a survey accompanied by content analysis, interviews, or focus groups.

With regard to the populations studied in the literature, students were overwhelmingly the most frequent subject groups in the research. Surveys of student engagement appear most often (usually adapted from or added to the National Survey of Student Engagement), but surveys of student perceptions of social media as a classroom tool were used regularly as well. When faculty members were the subject of the research, interviews were overwhelmingly the method that was utilized by scholars. In only two cases were surveys of faculty on their perceptions of SMT as learning tools conducted; in

one of those cases only public administration faculty members were surveyed and the results were not reported but were used to inform qualitative study using interviews (Chen & Bryer, 2012).

Problems with existing research. Despite a consistent refrain in the literature on the lack of research on the instructional use of SMT in higher education, a sizeable but incomplete body of literature has emerged. For example, Davis et al. (2012) concludes that most of the research on the use of SMT in higher education has been focused on four-year colleges and universities and that research on the connection between SMT usage and academic performance is scarce. Everson, Gundlach, and Miller (2013) observe that most of the literature on SMT in the higher education classroom, and on Twitter in particular, is descriptive rather than empirical. In a wide-ranging literature review on the use of SMT in higher education, Tess (2013) supports that conclusion and notes that "most of the existing research on the utility and effectiveness of social media in the higher education class is limited to self-reported data (e.g., surveys, questionnaires) and content analyses" (p. A60).

With regard to the mobilization of microblogs in instructional contexts, Gao et al. (2012) reported extensively on the subject. Beginning from the observation that research on educational microblogging is diverse but limited, Gao et al. set out to uncover the tenor of the research on the subject. Confining their analysis to empirical studies of learning efficiency, learning outcomes, convenience, and/or motivation from 2008-2011, the researchers analyzed 21 papers that discussed microblogging in higher education. The papers contained research in a variety of disciplines, though language studies and

instructional technology/design made up 10 out of 21 cases. Most of the studies they analyzed looked at three types of data: "number of microblogging posts, content of posts, and survey or interview responses" (p. 788). Gao et al. identified three findings that consistently appeared in the literature: (1) microblogs can encourage the formation of learning communities; (2) they tend to increase participation, collaboration, and engagement; and (3) microblogs can encourage reflective thinking. Summaries of challenges to using microblogs and suggestions for practice were discussed as well.

Gao et al. (2012) conclude their literature review on microblogging in higher education by pointing out weaknesses in the body of research they analyzed and offering suggestions for future research. First, they argue that most of the studies they examined were conducted over too limited a period of time—a few weeks in most cases—and suggest that future studies be conducted over longer periods of time. Additionally, they were critical of the fact that few of the studies provided detailed information on "participants and settings, implementation procedures, or types of data collected and analyzed" (p. 793) and even fewer performed any reliability analysis for content analysis and/or survey instruments. Finally, Gao et al. were critical of the fact that many of the studies they examined relied on participants' self-report in the form of one-time interviews or surveys at the end of the intervention. They close by suggesting that experimental and developmental studies are needed to more fully address the myriad questions that exist around the use of microblogs in higher education.

Research on the Use of SMT in Higher Education

General research on SMT. Though focused on the use of technology in a general way, Chen, Lambert, and Guidry (2010) used "hierarchical linear modeling and multiple regressions to investigate the impact of Web-based learning technology on student engagement and self-reported learning outcomes in face-to-face and online learning environments" (p. 1222). The data used in this study came from 17,819 respondents to the 2008 administration of the National Survey of Student Engagement. In short, the results of this study suggest that there is a positive relationship between the use of Web-based learning technology and student engagement and desirable learning outcomes. They also found that students who use Web and Internet technologies are more likely to exhibit higher order thinking skills, reflective learning, and integrative learning in their studies. However, despite the implications of these findings for the instructional use of SMT, the survey that produced the data set did not specifically ask respondents about their use of SMT or whether they had ever used SMT in a classroom context.

Chen and Bryer (2012) used data generated from a national survey of public administration faculty in 2010 to construct a qualitative study of that same population. They then conducted semi-structured interviews with eight faculty members of varying ranks from institutions around the United States. In those interviews the researchers asked about the social media tools used by the participants in their classrooms, including how they formally integrate those tools and their strategies for using them effectively (or not). Echoing much of the research in this area, participants reported that SMT "facilitated a strong sense of community" in classes where the tools were used (p. 94).

However, only one participant reported that he/she had been successful in integrating SMT formally into a class (LinkedIn, in that case). All reported success in using them informally with students outside of class for knowledge sharing and networking. Few had an assessment strategy specifically geared towards the use of SMT; where there was an assessment strategy it was usually focused on formative assessment. While all of the participants reported positive attitudes towards the potential of SMT in instruction, nothing reported by Chen and Bryer suggests that any of the participants in their study were using the technologies in any systematic or empirical way. In sum, the social media strategies highlighted in this study came across as exploratory and experimental.

Views of students on SMT in the classroom. Student views of SMT in the classroom were the subject of research presented by Taylor, King, and Nelson (2012). They used the university email system at Jacksonville State University, a public four-year institution in Jacksonville, Alabama, to invite 8,486 students at that institution to respond to an 18-question survey; 1,376 students ended up responding, a response rate of 16.2%. Frequencies, correlations, and *t*-tests were used to analyze the data, but the researchers did not provide a reliability analysis of their instrument. Results of the survey indicated that SMT were little used in the classrooms of those surveyed, though most students reported being open to some moderate use of SMT in their learning. Respondents were more neutral on the question of whether or not they believed that SMT improved their learning. Pluralities indicated that SMT would be "motivating" and "an asset" to their courses (p. 33). Despite these findings, there are numerous issues with the study as presented. In particular, self-selection bias in the survey sample is a serious validity threat

and the authors provided no way to judge the reliability of the survey instrument itself. Furthermore, survey respondents were asked their perceptions of SMT in the classroom while simultaneously reporting little exposure to SMT in their classrooms, which calls into question the validity of their perceptions as they pertain to the study. To be fair, Taylor et al. do not make any bold claims based on this study and their conclusions are measured, but this study should not be considered strong evidence with regard to social media use in the college classroom.

Zeng, Hall, and Jackson Pitts (2011) argue that "some students are positive about the potential for education-related use of social media" (p. 117) and assert that teachers are not keeping up with student demand for SMT usage in their classrooms. The attitude that college teachers should interact with contemporary students across media to which they are accustomed is strongly reflected in the piece. They discuss the various affordances and challenges involved in using social media in the college classroom and conclude by calling for increased faculty engagement with SMT and increased institutional support for such efforts. While the piece is more descriptive than empirical in nature, it makes a reasonably convincing argument that using SMT in the classroom has the potential to lead to greater academic outcomes.

Neier and Zayer (2015) provide further evidence of students' positive attitudes towards SMT in the college classroom. In a mixed methods study, 273 undergraduates in a marketing course were surveyed about their perceptions of various social media platforms, including Twitter, and 13 of those students were selected for more focused in-depth interviews. Neier and Zayer found that students were "motivated to use social

media in the classroom because it aligns with their desire to be interactive" (p. 8) and uncovered a belief that "instructors who use social media in the classroom are considered innovative and at times, more sensitive to students' needs" (p. 9).

Baldwin (2012) goes even further than Zeng et al. (2012) and Neier and Zayer (2015) by claiming boldly that college students "not only expect to find the latest technology available in universities to support them in their learning, on and off campus, but they also expect to find it in every single classroom across the curriculum" (p. 3). That claim is supported by the results of a study from Helou, Ab.Rahim, and Oye (2012) in which they surveyed 320 Malaysian computer science and information systems undergraduates; a majority reported a belief that using SMT in the classroom would positively impact their academic performance. Still, results such as these might be expected from the technologically-inclined students that were surveyed in this case. Baldwin's (2012) claim is supported more convincingly by a study from Jahan and Ahmed (2012) in which 224 Bangladeshi undergraduates from a variety of disciplines were surveyed on their attitudes towards social networking sites (SNS) in the classroom. They conclude that "students … are keen on using SNS in academic-related work" and that "students are interested in using social network sites to support their educational goals" (p. 243-244). A qualitative study of Australian undergraduates conducted by Andrews et al. (2011) found that "interaction and connectedness" were very important to their participants, who also expressed disappointment with the lack and/or quality of connectedness in some of their courses.

A well-done targeted study that examined the attitudes of college students in one online and two face-to-face (F2F) courses—one of the F2F courses was graduate level, the others were upper-level undergraduate courses—towards Facebook and Twitter as formal learning tools was conducted by Wakefield et al. (2013). They used a multiphase, mixed methods design that included a mix of surveys, interviews, and content analysis of written reflections from students on their use of Facebook and Twitter for class; 43 students participated in all. Use of both mediums was required in all three of the courses under investigation. The results of the study suggest that participants felt positively about the use of SMT in the classroom and that they found it academically beneficial. In particular, those effects were heightened when the student had previous experience using the SMT in question. A case can certainly be made that a significant number of contemporary college students are willing and/or eager to use SMT in their classrooms and that there are benefits to their doing so.

SMT and student engagement. Where empirical research has been done on the instructional use of SMT in college classrooms, one finding has consistently emerged: using SMT, especially microblogs, in the classroom leads to higher levels of student engagement. Joyce and Brown (2009) looked at the incipient research on SMT use in the college classroom and concluded that SMT could be used effectively in online classes to build community, potentially lowering dropout rates and improving student outcomes. A similar conclusion was reached by Tarantino, McDonough, and Hua (2013), who observed that "student engagement through social media can increase connections to create a virtual community that leads to better content learning" (p. 3). Chen et al. (2010)

found that the use of learning technology in general was positively related to student engagement. Rutherford (2010) found a "positive correlation between the frequency of student use of social media and their relationship with their peers and instructors as well as how they describe the overall quality of instruction" (p. 710). Finally, Yaros (2012) cites social learning theory as the framework underpinning the supposed utility of SMT as learning tools and speculates that increasing student engagement will facilitate knowledge transfer; he then describes a case study where he deployed Facebook and Twitter in two high-enrollment general education courses at a large public four-year university and provides quantitative data to support the assertion that SMT increase student engagement with and enjoyment of courses.

With regard to the use of microblogs as learning tools, Kassens-Noor (2012) observed that "all instructors who have experimented with Twitter agree that it can have a positive impact on engagement" (p. 12). Junco et al. (2011) conducted an experimental study among 118 first-year pre-health professional majors that explored the connection between student engagement and grades in a one-credit college course utilizing Twitter. Their findings suggest that using Twitter had a positive impact on both student engagement and grades. Junco, Elavsky, and Heiberger investigated those findings more deeply, reporting on them in a seminal piece from 2012.

Using a controlled experimental design that integrated some qualitative content analysis of student tweets, Junco et al. (2012) confirmed that engagement and grades are both boosted by the use of microblogs in the college classroom, especially when the use of the medium is mandated. Sixty-five students in the experimental group were required

to use Twitter as part of a one-credit first-year seminar course for pre-health professional majors; the 53 students who made up the control group were asked to use Ning, "a service that allows users to create their own social networking site" (p. 3), though they were not required to do so. Students received in-class training on the use of both technologies and were surveyed with a 19-item engagement instrument twice, once shortly after the training sessions and once at the end of the course. Course instructors maintained a presence on both platforms and course activity on them happened entirely outside of scheduled class time.

Results of a mixed-effects ANOVA revealed that students in the Twitter group had significantly higher engagement scores at the end of the course and demonstrated significantly higher rates of improvement on their engagement scores from the pretest to the posttest than the students in the control group. An additional mixed-effects ANOVA was used to examine the effect of Twitter use on grades and found that students in the Twitter group had higher overall semester GPAs when controlling for high school GPA. A second phase of the study in which Twitter use was voluntary revealed no significant differences, on either engagement or grades, between students who used the platform and those that did not. The final conclusions drawn by Junco et al. (2012) have been particularly influential in the field. They assert that gains in engagement and grades are most likely to be found when students are required to use Twitter as part of a course and that how instructors use Twitter to engage students is an important factor in promoting gains in engagement and achievement.

Evans (2013) found "a strong relationship between Twitter usage and student engagement" in a quantitative study of 252 first-year undergraduates in a British Business and Management program (p. 12). In a descriptive piece that reports some limited qualitative data, Megele (2014) discussed how Twitter was used in a graduate level course as a learning and assessment tool. Her own reflections on the use of the tool and anonymous feedback provided by participating students both confirmed that Twitter promoted active learning and increased student participation.

Rinaldo et al. (2011) looked at how the use of Twitter across two semesters of an upper-level consumer behavior course impacted student engagement. In order to do so, they performed three separate experiments, using a mix of quantitative and qualitative methods, to test whether or not Twitter was academically beneficial. Using a mix of surveys and focus groups, the researchers found that "regardless of quantity of content of [instructor] tweets, benefits of Twitter use were perceived by the students" (p. 201). Additionally, both the quantitative and qualitative data from the three studies "reveal clear distinctions between those students who used Twitter and those who did not" (p. 201). In other words, most of the students who participated in this study reported that their use of SMT was academically beneficial; those benefits were increased even more by those students who had experience using the media in question, a finding supported by Wakefield et al. (2013).

Why does using SMT in the classroom seem to promote higher levels of engagement? The answer seems to revolve around the phenomenon of instructor presence. More specifically, that "frequent student-faculty contact in and out of classes is

the most important factor in student motivation and involvement" (Chickering & Gamson, 1987). In other words, instructors who use SMT effectively are likely to increase the quantity and quality of their interactions with students, which is likely to make students feel more connected to the course; those feelings of connection could lead to higher levels of engagement and better academic outcomes. There is a body of evidence to support that conclusion, particularly as they pertain to online college courses.

In one of the earliest studies on this question, Dunlap and Lowenthal (2009) investigated how the voluntary use of Twitter in an online instructional design course might impact student engagement and facilitate student learning. Though the resulting article is descriptive rather than empirical in nature, it does report on a number of variables that make microblogs good media for enhancing instructor-student interaction. They argue that instructors can maintain a persistent and easily accessed (by both students and the instructor) presence on a microblog, which makes it a faster and more efficient medium of communication than email or the course learning management system. That affordance made it possible for them to "attend to instructional management issues and students' knowledge building" in real time. Their experience with SMT in this context is a clear example of how SMT can be used to increase instructor presence and instructor-student interaction, though Dunlap and Lowenthal did not report on any outcomes from their study.

An empirical study from 2013 examined in more detail the connection between social presence and student outcomes in online courses (Hostetter). A social presence survey was distributed to participants and participant behavior on course discussion

boards was analyzed using content analysis. The instructor facilitated social presence in the course by providing "prompt and detailed feedback on assignments and [by modeling] social presence in communication with students" (p. 80). In all, 121 students participated in the study. Comparing the results of the survey to the writing exhibited by students on course discussion boards led the author to the conclusion that students who demonstrated higher levels of social presence performed better on course assignments. While this study did not explore the use of SMT as presence-enhancing tools, the principles behind the study are applicable to the context in which SMT are primarily used—i.e., increasing interaction between students and instructor is likely to lead to better outcomes.

In a review of literature on the topic of how presence can be accentuated by the use of SMT in the online classroom, Brownson (2014) states unequivocally "that social presence improves the psychology of interactions in learning and represents a strong predictor of mastering the learning outcomes within an online course" (p. 117). He argues persuasively for the greater usage of SMT tools that increase "just-in-time" interactions between students and between students and their instructors, but asserts that it is not enough to merely use the technologies. Instead, Brownson strongly makes the case that the manner in which instructors use SMT is more important to student success than the fact of merely using it.

SMT and academic outcomes. Despite a compelling body of research on the role that SMT can play in increasing student engagement by enhancing interaction between students and the instructor, research on the connection between SMT use and learning

outcomes has been mixed (Chen et al., 2010). In fact, while acknowledging that increasing student engagement is probably a good thing, Axelson and Flick (2010) assert that it is not altogether certain whether or not higher levels of engagement lead to higher levels of student learning.

Framing their discussion of online teaching around Bain's *What the Best College Teachers Do* (2004), Brinthaupt, Fisher, Gardner, Raffo, and Woodard (2011) discuss the connection between technology, engagement, and positive outcomes in online classes, but conclude that the teacher and the teaching methods he/she uses are more important in promoting desired outcomes than the technology that mediates student learning. The implication of this idea, echoed by Brownson (2014) and supported by research from Junco et al. (2012), is that the teacher, not the technology, is the most important variable in determining whether or not students attain course outcomes. That notion is further supported by Tay and Allen (2011), who state that any affordances that SMT might have for improving academic outcomes have to first be "taken up and activated" (p. 152). In fact, they explicitly argue that:

> It is the particular pedagogic application of social media – not the technology itself – that will lead to a constructivist learning outcome. Whereas social media might afford us possibilities for collaboration, shared content creation, and participation in knowledge building, those possibilities need to be actualised through the effective integration of social media into learning environments. (p. 156)

Hew and Cheung (2013) go further in casting doubt on the role of technology in promoting more positive learning outcomes by concluding that SMT:

> Appear to have a general positive impact on student learning. None of the studies [described here] reported a detrimental or inferior effect on learning. The positive effects are not necessarily attributed to the technologies per se but to how the technologies are used, and how one conceptualizes learning. (p. 47)

Given the paucity of empirical research that investigates whether or not there is a direct relationship between SMT usage and positive outcomes, the observations of Brinthaupt et al. (2011), Tay and Allen (2011), and Hew and Cheung (2013) raise a key question: When it comes to the use of SMT in the classroom, is it the teacher or the tool that has the bigger impact? While the study described in this thesis will not seek to answer that question directly, it is an idea that must inform the research.

To date, studies from Junco et al. (2011) and Junco et al. (2012) provide the most compelling evidence that a connection exists between classroom usage of SMT and student learning, but the findings from those studies are limited by the fact that the authors were unable to determine how much of the variance in student engagement and grades occurred because of student usage of Twitter. West et al. (2015) used a combination of surveys, ANOVA, and multiple regression analysis to test whether or not higher levels of Twitter use among 411 Canadian undergraduates in a marketing course and a fashion course would correlate with higher grades in the class when controlling for previous experience with the technology. The use of Twitter was mandatory in both courses and 10% of students' final grades in each course were obtained through an end-

of-semester reflective paper on which students described their Twitter activity and the personal learning outcomes that resulted from it. Several findings from this study stand out: (1) West et al. found no evidence that experienced Twitter users had any advantages over novices when it came to using the medium or to learning through it; (2) students were "very positive on how the use of Twitter contributes to their learning-related outcomes in the course" (p. 8); (3) that there was a positive and significant relationship between tweeting frequency and course grade for males, whereas the relationship for females was positive but not significant; and (4) "the effectiveness of this teaching and learning approach is highly dependent on the level of comfort and expertise of the instructor" (p. 9). No effort was made by the researchers in this case to test for specific connections between Twitter usage and course content, but their results are nevertheless compelling in terms of the variables related to the present study. Other research in this area often reported mixed findings and/or has significant flaws.

Clarke and Nelson (2012) looked at 84 junior- and senior-level undergraduates in the same marketing course, taught by the same instructor, across two semesters. Students in one course were required to use Twitter over ten weeks, but students in the other course were not. The instructor for the courses was an experienced Twitter user who published 155 tweets during the ten weeks of the semester in which Twitter use was required of students (Clarke and Nelson characterized this as "heavy" Twitter usage, which they defined as six or more instructor tweets per week). Most of the data for the study were collected through an anonymous online end-of-semester survey that measured students' attitudes about the classroom community and pedagogical effectiveness of the

courses, as well as their perceived learning within them. Additional data on learning outcomes was obtained through students' final grades in the course and the results of a five-question multiple-choice assessment. Means, standard deviations, *t* values and *p* values of the study variables were then used to compare the results of the study across the two courses. Students in the course in which Twitter was required reported a "significantly higher sense of classroom community, pedagogical affect, and opinion of the effectiveness of course" (p. 34). Interestingly, while students in the two courses reported no significant difference in perceived learning, the final course grades and results from the five-question multiple-choice assessment "indicate that the students in the Twitter course had higher levels of actual learning compared to the students not using Twitter" (p. 34). As a result, Clarke and Nelson characterize their findings as mixed, though "it seems clear that Twitter was at least partly responsible for supporting overall learning" (p. 35).

Hirsh (2012) used a quantitative quasi-experimental design to investigate whether or not using Twitter informally (students were not required to use the medium and their use of it was not integrated into their course grade) in online community college courses would influence academic performance. The treatment group used Twitter and a comparison group did not. In short, she found that using Twitter boosted student engagement but it had no statistically significant impact on grades. However, Hirsh provided little detailed information with regard to how the instructors who took part in the study actually used Twitter as a learning tool. In fact, one is left with the impression that the instructors using Twitter used it infrequently and almost entirely for publishing

class announcements. As a result, it is not surprising that 93.2% of the participants reported tweeting 10 times or less over the course of the semester in which the study took place. In addition, study participants completed a survey which indicated that students in the treatment group reported no higher levels of interaction with their instructors than students in the comparison group. There is no indication that instructors using the microblog used it very intensively. This study serves as an example of how using SMT in the classroom can boost engagement without necessarily improving student outcomes.

Callaghan and Bower (2012) found that using SMT as learning tools in high school classes could have a demonstrable effect on student learning. The researchers set up secure customized social networks for two high school commerce classes through Ning and required students to interact through those networks; 48 students participated in all. Participants used Ning to chat with each other virtually, post to class discussion forums, share photos, and write blog posts, among other activities. The teacher in Class 1 barely signed onto Ning and interacted very infrequently with students through it; the teacher in Class 2 was extremely active on Ning and interacted with students frequently. As a result, the students in Class 1 used Ning as a medium for student-student and student-instructor interaction far less frequently than their peers in Class 2. In Class 2, the researchers observed that students seemed to be more motivated and engaged than their peers in Class 1 and that they exhibited more of the behaviors that are indicative of self-directed learning. In sum, Callaghan and Bower concluded that "the quality of teacher–student relationships … and the online presence that the teacher exerted in the [social networking site] all correlated with more successful student learning."

Lowe and Laffey (2011) asked 123 students in a postgraduate marketing course to use Twitter voluntarily; their usage was not assessed for grading purposes. Semi-structured interviews with 10 students (five who used Twitter and five who did not) were conducted at the end of the eight-week period in which Twitter was used in the course. Data from the interviews was used to inform the creation and deployment of a survey that was distributed to all study participants. The survey asked respondents to self-report on their relative level of attainment of 46 course learning outcomes. Through the survey, participants reported that using Twitter had a small but significant positive impact on their attainment of 80% of the course outcomes but had no impact on their attainment of the other 20% of course outcomes. However, no effort was made by the researchers to gauge any possible correlation between microblog usage and participant grades and all of the data used in the study were acquired through participant self-report. Additionally, Lowe and Laffey acknowledge that students engaged only passively with the course and each other on Twitter and they made no effort to account for the quantity of tweets from individual students.

Another study that relied upon student self-reports in the use of SMT in the classroom is from Backer (2010). Twelve students in a contemporary tourism issues course for undergraduates majoring in tourism populated the sample for the study. Each was issued a smartphone, asked to use Facebook as a tool for completing a major project that made up a significant portion of each student's grade, and interviewed by the author to test the impact of using smartphones and Facebook on the student learning experience. In the end, "nine out of the 12 students felt that the use of technology had enhanced their

learning experience" (p. 28). Admittedly, the author acknowledges that the scope of the research is highly limited. She was both the instructor and the researcher in this case, which could have biased the data she collected. Also, 12 students in one class at one institution in Australia made up the sample for the study, further limiting the usefulness of the research. Finally, the article's description of the methods by which Facebook was used in the course are indicative of a highly engaged instructor, which could account for the students' apparent enthusiasm for the course and the methods.

One major theme emerges from the literature on this topic: using SMT can increase student engagement with a course, but the teaching methods used by instructors in courses with a SMT component are the most important determinant of whether or not students experience academic gains from that integration. Both logic and the research seem to bear that out. Therefore, if we accept that teaching methods are the main factor in whether or not students experience learning gains from using SMT in their classrooms, then it is essential to investigate what the literature reveals about teaching methods using SMT that have proven to be effective.

Lessons on the effective use of SMT as learning tools. The subject that appears most frequently in the body of literature on the use of SMT as learning tools centers on practical guidelines for using SMT in the classroom. From case studies that describe how SMT were used in one or a few classrooms to literature reviews that report on various pedagogical methods to commentaries and critiques on the affordances and/or disadvantages of SMT as learning tools, a great deal of the available information on this topic is either anecdotal or conjectural in nature. While that information may not be

definitive or conclusive, there is nevertheless much to be learned from the available research on how college instructors might use SMT effectively in their classrooms.

SMT and the principles of instructional design. In an early piece that addresses the potential for SMT to allow for a radical rethinking of how instructors interact with students, Baird and Fisher (2005) claim that the attitude of rising cohorts of learners towards technology necessitates a move towards "a multi-faceted approach that blends current adult learning theory and social technologies" (p. 9-10). To that end, they argue that instructors need to "design courses around the core idea that students are an 'end user' who will be conducting most of their learning outside the traditional classroom" (p. 10). Though Baird and Fisher were writing several years before the major social media networks of today rose to prominence,[1] they correctly anticipated that SMT could make effective learning tools and that using them as such would require a different approach to planning and pedagogy.

More recently, Kassens-Noor (2012) has argued for the inclusion of SMT into classroom pedagogy as a technique for provoking active and informal learning; she used Twitter as a learning tool in a mixed class with both upper-level undergraduates and graduate students. Students were graded for their work on Twitter on one assignment, but they were given the option of whether to use Twitter or not (students who chose not to use Twitter completed their work in a more traditional manner). Kassens-Noor found that

[1] The largest social media network as of the writing of this thesis is Facebook, with close to 129 million average monthly users in the United States (Quantcast, 2015). Facebook launched in 2004, but only had 5.5 million total users by December 2005, according to Facebook's own history. Twitter is the second largest social media network in the U.S. as of this writing with over 93 million average monthly users, but it did not launch until 2006; Pinterest is currently third in size with over 53 million average monthly users, but it did not launch until 2009.

using Twitter fostered "team communication and prolonged interactive engagement" (p. 18), but that its most powerful affordance was found in how it led to knowledge creation among the group of students who chose to use it. However, the article did not report any statistics that might indicate whether the students who used Twitter experienced any greater gains in learning than the students who did not use it.

Overall, the research presented by Kassens-Noor leaves a mixed impression. On one hand, she expresses a belief that Twitter was a valuable learning tool for a particular type of learning (collaborative knowledge creation). On the other, the article does not report whether or not the students who used Twitter performed better in the class (by any metric) than their peers who did not. Also, the article provides no information with regard to how the instructor in the study used or did not use Twitter as a tool of interaction with students; it reads as though the students who used Twitter were asked to use the medium to communicate with each other, but not the instructor. As a result, it is difficult to draw any conclusions from this study about the efficacy of SMT as learning tools. Though Kassens-Noor makes a compelling case for the inclusion of SMT in college classrooms, she provides no empirical evidence that the tools work and offers little guidance in terms of how they might best be used.

Ebner, Lienhardt, Rohs, and Meyer (2010) wanted to explore how microblogs such as Twitter might function as tools for informal, process-oriented learning in a graduate-level business course on new media management. Students were required to use the course microblog over six weeks in order to document their "learning process" (p. 97). Over that time, 11,214 microblog entries from 34 students were tracked and analyzed

to reveal the nature of student communication through the medium. The high volume of microblog entries written by the students led the authors to conclude that informal learning was taking place through the course microblog, but they provide no concrete evidence to support that conclusion. In fact, later in the article, Ebner et al. admits that only 15% of the student-written microblog entries reported on the learning and working processes of the students. Further, they acknowledge that they saw no evidence that students used the medium in a reflective manner or that it contributed significantly to improving student grades. Of course, the microblog in this case was meant to be a communications tool that facilitated informal learning rather than a pedagogical tool that facilitated formal learning, so these results should not be surprising. This signals another case where the manner in which the instructor chose to use a SMT played a significant role in determining its usefulness as a learning tool.

On the question of whether or not teachers should require students to use microblogs in their classrooms, there has actually been very little discussion in the literature on this point, though there is some empirical evidence. Dunlap and Lowenthal (2009) come down firmly on the side of making microblog use voluntary for students, but they do not devote much space to explaining why they hold that position. Gray et al. (2010) express concern that requiring students to use SMT might lead to students spending more time learning to use the technology rather than using the technology for learning; as such, they support the idea that teachers should devote class time to training students in the effective use of technology. Kassens-Noor (2012) seems to argue for giving students a choice of assignments, with Twitter being an integral part of one of the

choices, rather than mandating one kind of assignment using a particular technology, but she offers no rationale for that position. Lin, Hoffman, and Borengasser (2013) provide some evidence that students would prefer that microblog use be mandatory, citing several of the participants in their study who believed that requiring its use would lead to higher levels of student participation and engagement. Students who participated in the studies described by West et al. (2015) and Clarke and Nelson (2012) were required to use Twitter in their courses and those studies found evidence of learning gains as a result. Finally, Junco et al. (2012) reported results from an experimental study in which students who were required to use Twitter in one class experienced significantly higher levels of engagement and higher overall semester grade point averages than students in the control group who were not required to use Twitter.

To investigate whether college teachers who use microblogs are perceived as more credible when they use the medium to communicate innocuous personal information ("social tweets") or when they use it to communicate "scholarly" information, Johnson (2011) distributed surveys to 120 U.S. undergraduates and asked them to view the Twitter feeds of fictional teachers. Forty students each were asked to view the feeds of teachers who posted only social tweets, scholarly tweets, and a mix of the two types. Teachers who posted social tweets in any quantity were found to be more credible and caring by the students. Though the researchers made no attempt to gauge how that perception might affect student learning, the literature they cited makes it clear that the practice of teachers using SMT to post harmless personal information might be conducive to gains in student learning.

Johnson's (2011) findings are consistent with Brownson's (2014) assertion that the effective use of SMT depend on interaction and engagement on the part of the instructor using the medium. Ultimately, what emerges from the literature is that certain design principles are more likely to promote student learning. Namely, requiring students to use SMT as part of their coursework, defining clear expectations for its use and assessment, and maintaining consistent and positive student-instructor interaction are essential to promoting student learning.

Challenges in using SMT in the classroom. "One of the main pitfalls of introducing new technology into the classroom … is the risk of having the technology frustrate the user to the point that it distracts them from their original learning goal" (Baird & Fisher, 2005, p. 17-18). This problem would be likely to arise most frequently when students are unfamiliar with the technology they are being asked to use, when they are reluctant to use it, or when the technology itself is very complex. With regard to Twitter in the classroom, Gao et al. reported in 2012 that the problem of unfamiliarity with the technology was already on the decline. Given Twitter's growth in the intervening period, it is reasonable to assume that it is more well-known and understood now than it was when they made that claim. Still, many scholars have commented on the importance of teachers working with students to help them understand how and why they will be made to use potentially new technologies and to help them acclimate to the norms and functions of them (Brownson, 2014; Everson, Gundlach, & Miller, 2013; Lin et al., 2013; Lowe & Laffey, 2011; Rinaldo et al., 2011). Regardless of how familiar a

technology might be, the practice of providing instruction to students on the use of the technology is consistently recommended in the literature.

Privacy is a major concern as it pertains to the use of SMT in the college classroom (Everson et al., 2013; Lin et al., 2013). In an extensive piece that discusses many of the potential privacy problems that come with using SMT as learning tools, Rodriguez (2011) enjoins teachers to be mindful of their ethical and legal responsibilities. She encourages them to make efforts to protect student data, not draw students into making statements or posting images that might be problematic, include statements in their syllabi about proper conduct on social media platforms, and search for ways to use SMT more securely. Overall, she comes across in favor of using technology as a means for facilitating learning, but advocates for the careful use of that technology. Wakefield et al. (2013) confirm that privacy is a paramount concern of students asked to use social media in their classrooms, although they contend that those concerns are probably less prevalent for students using Twitter than for those using Facebook.

In a related area, McEwan (2012) writes at length about maintaining the professional sanctity of the teacher-student relationship through communications on SMT. While acknowledging that the selective use of SMT by teachers to convey personal information can be effective at building classroom rapport, McEwan also argues cogently for maintaining clear boundaries between teachers and students in the use of SMT. In order to maintain those boundaries, McEwan suggests that teachers select their preferred SMT with great care and thoughtfulness to how students will perceive and use the technology. For example, she distinguishes between “secret” technological spaces on

which students may be reluctant to engage, such as text and instant messaging, as opposed to "publishing" spaces that are generally understood to be available for reading by wider audiences (p. 19). Microblog services such as Twitter are characterized as publishing spaces on which students are likely to be more comfortable sharing. McEwan also urges faculty members using SMT to consider their policies with regard to making connections to students through social networks (e.g., are you willing to accept "friend requests" from students on Facebook?) and in how often they want to make themselves available for communication with students on SMT, coming down firmly on the side of less social interaction outside the classroom and for setting clear policies as far as times when the instructor will or will not be available.

Other concerns about the use of Twitter as a learning tool revolve around the nature of the medium itself. For example, a student and study participant quoted by Rinaldo et al. (2011) indicated that they did not want to use Twitter because they were intimidated by the shorthand of the medium (most prominently, # and @, or the "hashtag" and the "at" symbol). Ebner et al. (2010) expressed concern that the 140-character limit inherent to Twitter would pose challenges to learners "because it requires the ability to focus and express oneself explicitly" (p. 792). Kassens-Noor (2012) argues that Twitter is not conducive to critical thinking or self-reflection because of the strict character limit. It is clear that any teacher attempting to use Twitter must take into account these issues when using the platform for teaching and learning.

Using microblogs in the classroom. The literature on this topic abounds with advice for teachers looking to use microblogs in their classrooms. Work of this type may

be found across a broad array of media–books, blogs, handbooks from academics and other professionals, and peer-reviewed articles. This section of this thesis will focus on the themes that have appeared most often in the literature and the resources that have been most helpful to me as my use of Twitter in the classroom has evolved.

Dunlap and Lowenthal (2009) were among the first to offer practical advice to teachers looking to use Twitter in their classrooms. The main pieces of advice they offer include: making the use of Twitter relevant to students; establishing clear expectations for participation; teachers modelling effective Twitter use; and building student work on Twitter into assessment. As far as making Twitter relevant, Dunlap and Lowenthal discuss its use as an informal platform of communication—students were not required to use it and were not graded on it in the classes that made up their case study. Instead, they attempted to educate students on the affordances of Twitter for collaborative learning and used student tweets as starting points for in-class discussions, thus establishing its relevance. With regard to setting expectations, they argue merely for making it clear to students exactly when and how they are expected to use the medium and if/how they will be evaluated on it. They argue that teachers using Twitter should make a practice of communicating expectations through the tweets they publish. Finally, Dunlap and Lowenthal (2009) encourage teachers to use microblogs as a tool of informal assessment by allowing students to use the medium as a research resource and by evaluating them on how effectively they did so.

An extensive handbook-style publication from 2011 is still one of the best available resources on using Twitter in the classroom. Published by the London School of

Economics and Political Science and authored by Mollett, Moran, and Dunleavy (2011), *Using Twitter in university research, teaching and impact activities* provides a great deal of useful information for Twitter academics. The single most important tip that I gleaned from this publication is the idea that teachers using Twitter should have a dedicated Twitter account for every class in which they use the medium and that that dedicated account should be named according to the name of the course. The authors also encourage teachers using Twitter to emphasize a conversational style in their interactions with students and to look to questions and issues raised on Twitter as material for initiating classroom discussions.

In a series of blog posts on *ProfHacker*, the collaboratively authored blog on teaching and technology sponsored by *The Chronicle of Higher Education*, Sample (2010a, 2010b) wrote about what he perceived to be the affordances of Twitter and how he made use of the medium in his classrooms. Contrary to those who express concern that Twitter's 140-character limit might be counter-productive to helping students express themselves critically and reflectively, Sample argues that the character limit might actually make students more reflective. As far as practical tips for teaching with Twitter, Sample provides many. He asserts that teachers should provide explicit instructions for how students can access the class's Twitter activity and expectations for their use of the medium. On the question of how often students should be required to tweet, Sample encourages teachers to answer that question for themselves in the context of their teaching and learning goals. Finally, he makes it clear that he believes student work on microblogs should be relatively "low-stakes." By that he means that expectations should

not be too restrictive and that student work on Twitter should not be a major portion of their grade in a course.

After discussing the success he had in using Twitter as a learning tool in his literature courses, Jones (2011) reiterates several of the principles for using Twitter that have already appeared in this review. Specifically, Jones echoes Mollett et al. (2011) when he advocates for teachers having Twitter accounts dedicated to their teaching and for teachers encouraging students to set up dedicated Twitter accounts for classes using the medium. Jones concurs with Sample (2010b) that setting clear expectations for students in classes where Twitter will be used is crucial to its successful use. However, Jones goes beyond the advice offered by others in calling for teachers to use microblogs as tools of positive reinforcement by highlighting particularly insightful student tweets on Twitter and in the classroom. He also suggests using hyperlinks on microblogs to send students interesting and varied media that are relevant to the course. Finally, he advises teachers to use a Twitter client application such as TweetDeck or HootSuite to write and schedule tweets ahead of time (a piece of advice supported by Lowe & Laffey, 2011).

Arguably the most influential study on the use of Twitter in the college classroom was published by Junco et al. (2012). Seeking to uncover the effective elements that are part of a college course involving Twitter, the researchers used a controlled experimental design on 118 undergraduates in a first-year seminar course for pre-health professional majors. Students in the control group did not use Twitter while those in the experimental group did. The results of this study are compelling and suggest that there are "three effective elements of integrating Twitter into college courses that can be considered best

practices" (p. 12). These are: requiring students to use Twitter, integrating Twitter into the course in educationally relevant ways, and maintaining a relatively high level of faculty engagement on the platform. The authors argue that using Twitter according to those guidelines will increase the likelihood that students will derive academic benefit from the medium.

While Mollett et al. (2011), Sample (2010a, 2010b), Jones (2011), and Junco et al. (2012) discuss the things teachers should do when teaching with Twitter, Everson et al. (2013) delves more closely into the subject of what teachers should not do. Specifically, they urge teachers using SMT to initiate conversations with their students about online privacy, posting content responsibly, and about the kinds of data that the owners of third-party software applications (such as Facebook and Twitter) collect from users of those applications. Like McEwan (2012), Everson et al. (2013) write about the power relationships between teachers and students and the need to consider that dynamic when forming policies about using social media (i.e., is it ethical to make students "follow" you on Twitter or "friend" you on Facebook? Is there a way around those concerns?). They also discuss the necessity of finding ways to track and archive student work on SMT (especially Twitter), particularly in cases where student work on the platform is to be graded.

Much of the literature on microblogs in the college classroom echoes the points made in the preceding examples. However, some scholars have provided other small pieces of advice that are worth mentioning here. Lowe and Laffey (2011) urge teachers using Twitter to beware of "information overload" by over-tweeting; they recommend no

more than five tweets per week (p. 189). Also, they argue that teachers should keep their tweets closely aligned to the curriculum on a week-by-week basis, which is consistent with other scholars who recommend keeping the use of Twitter educationally relevant. Hosterman (2011) writes about his success using Twitter as a media rich tool that can push diverse content to students such as video, audio, images, and interactive web content. Brownson (2014) counsels teachers who are thinking about using microblogs in their classrooms to conduct a small scale "beta test" before mobilizing the tool more fully (p. 116). During the testing period, teachers should elicit student feedback and take note of problems that arise so that more precise instruction can be provided to students when the testing period is complete and the tool is mobilized more fully.

SMT as tools of assessment. Formal research into the use of SMT as tools of assessment in higher education is sparser than research on the general use of SMT in the college classroom. Further, when the topic of student assessment using SMT is mentioned in the literature it is often discussed in a general or theoretical way and no scholars have attempted to explore the role that microblogs might specifically play in assessment.

Looking closely at the difficulties involved in using technology to assess student work, Kruger-Ross and Farwell (2013) call for a complete rethinking of how technology can be used in assessment. Without offering any concrete solutions to this problem, they argue that:

> Educators need to confront their assumptions regarding how students are assessed and what exactly learning, and perhaps, teaching looks like. In confronting these

> assumptions, it becomes clear that a new and better way of assessing learning with technology is needed. (p. 297)

They are skeptical that conventional methods of assessment can or should be applied to the assessment of student work on technological platforms. Kruger-Ross and Farwell's work in this context is theoretical in nature, but it does raise some important questions about the role of technology in education.

With regard to assessment in the college history classroom, Pace (2011) expresses frustration that the history discipline has lacked consensus on that which constitutes learning and blames that lack of consensus for a dearth of critical research on assessment in the field. He laments a lack of clear standards for teachers to apply in crafting assessments and calls for a conversation within the discipline on "finding new criteria for defining the basic operations needed for success in history classrooms and for evaluating student mastery of these skills" (p. 109). While Pace does not mention the potential role that technology might play in the assessment of history in the twenty-first century, his call for creative and varied types of assessment in the history classroom leave open the possibility for experimentation with such technologies.

Interesting ideas about using technology generally to generate "outcome-based student grades" are offered by Shanableh (2011). Though the author does not make reference to SMT as assessment tools, he instead discusses his thoughts on how to use technology to create an intricate assessment system that aligns to the learning outcomes of a course. In this system, students are required to complete work through a variety of assessment methods and the components of each method are broken down according to

the smallest practical assessment item (SPAI). For example, each question on a multiple-choice assessment would make up one SPAI. Each SPAI is then aligned to one of the course learning outcomes. In that way every discrete activity in the course becomes a singular assessment of the course outcome to which it aligns. The instructor then uses a spreadsheet to record student performance on every SPAI on each of the course assignments as the course progresses. In this manner instructors can ensure that all course outcomes are being assessed according to their relative importance to the course and can measure the degree to which students are attaining those outcomes.

In a descriptive piece that provides a reasonably extensive literature review on the topic, Gray et al. (2010) confirm the lack of research in the field and report on the challenges involved with assessing student work through SMT (p. 112). Beginning from the assumption that student work on SMT is "substantially different from traditional forms of assessable student work," the authors seek to correct the "underdeveloped" state of scholarship in this area because they feel it is "impeding higher education innovation" (p. 106). They argue that the heightened speed, ubiquity, and openness of student content creation enabled by SMT demand focused strategies that are adapted from the realm of traditional assessment methods. Unfortunately, their findings suggest that SMT are not being used extensively as vehicles for student assessment except in a manner that might be characterized as "low stakes" (p. 112). Nevertheless, Gray et al. were able to report on some cases in which principles of good practice in conventional assessment were being applied. The piece had nothing to say about assessment of student work on microblogs.

When Chen and Bryer (2012) asked public administration faculty about their assessment strategies for student work on social media, few reported having any developed strategy. Instead, what they reported was that they were using SMT in "largely informal, open, and self-regulated" ways. Only two out of eight interviewees required their students to use SMT as part of a formal assessment strategy and neither of those performed any qualitative evaluation of student work on their platform of choice (in one case students received credit merely for completing the assignment, in the other students were graded on a reflective piece that encapsulated their use of a particular SMT). In the remainder of the cases described in the study social media was used as an informal tool of assessment from which no substantial data was collected.

Backer (2010) wanted to see if Facebook was an appropriate vehicle for student assessment in a tourism course. The author provided few details on the structure of the assessment, but students were asked to visit a major tourist attraction in Victoria, Australia, and to use Facebook as a medium for posting thoughts about and images of the attraction within the framework of the course text. As previously reported, the research was extremely limited in scope, but the results indicated that students were mostly enthusiastic about using Facebook in such a manner. However, Backer provides no indication of how students were evaluated on their work on Facebook. The study reports only on student perceptions of the technology, not on how it worked as a tool of assessment.

Kumar and Kenney (2012) recently presented on the challenges perceived by and strategies used by 12 educational technology faculty members and eight instructors

across a variety of disciplines using social media in their classrooms.[2] Interviews with the participants revealed that, similar to Chen and Bryer (2012), most faculty members used social media as a tool for informal, formative assessment. Nine of the participants used explicit criteria to evaluate student work on SMT, most often through rubrics that measured timeliness and the number of student posts, quality of peer interaction, or the degree to which student writing integrated readings and/or course resources. Self-ratings and reflection writing assignments were used in some cases. The importance of transparency and flexibility in assessment strategies emerged as a theme in the research as well.

Brown (2013) also commented on the difficulties involved in using Twitter as a tool of student assessment. Though he did not use Twitter as a tool of formal assessment in his student affairs course, he connects the importance of pedagogy to assessment when he writes that "the way an instructor uses technology in the classroom largely determines to what extent student evaluation is possible" (p. 6). That said, he also asserts his skepticism that SMT can be assessed appropriately when he states that "student outcomes derived from social media use are more likely to be dispersed throughout the course rather than as discrete measurable outcomes in and of themselves" (p. 6).

[2] Unfortunately, all that could be obtained from this presentation was a PowerPoint file that contained a broad outline of the researchers' findings; attempts to obtain more detailed results were not answered.

Chapter Three

I first began to experiment with Twitter in the classroom in fall 2011 after reading a short piece in the *New York Times* entitled "Teaching to the Text Message" (Selsberg, 2011). The main idea articulated in the piece is that, while writing long-form essays should remain an important part of the assessment process in higher education, there should perhaps also be a place reserved for teaching students how to write effectively in shorter frames. Inspired by that idea, I started by using Twitter in one class in the fall 2011 semester. My own impressions of the experiment, along with the informal feedback I received from students in the class, encouraged me to continue using Twitter. I have used it in at least one class per semester ever since.

As noted above, I first used Twitter in a class in the fall 2011 semester. From then to the fall 2014 semester (the semester immediately preceding the one in which the study took place), I used Twitter as a teaching and learning tool in 10 classes—five online, one hybrid, and four F2F classes. The subject matter for seven of those classes was U.S. history through the Civil War; the subject of the other three classes was post-Civil War U.S. history. In that same period I was the instructor for 21 classes in which Twitter was not used—15 online classes and six F2F. On two occasions before this study I formally surveyed students in online classes on their perceptions of Twitter as a learning platform and a plurality of respondents on both surveys indicated that they found it to be a

valuable part of the course. Students in my F2F classes using Twitter also consistently reported that they found Twitter to be a useful learning tool in both informal conversations and on formal student evaluations. My use of Twitter as a teaching and learning tool was further encouraged by the grading trends I observed in the classes in which it was used.

Table 1

Student Performance in my Classes from Fall 2011 to Fall 2014

Class Type	*N*	Pass Rate	Fail Rate	Withdrawal Rate
Online Class using Twitter	141	47.6%	18.4%	34.0%
Online Class without Twitter	392	43.1%	34.2%	22.7%
F2F Class with Twitter	116	63.8%	25.0%	11.2%
F2F Class without Twitter	181	60.8%	26.5%	12.7%

Note. Pass Rate = the percentage of students who were issued a grade of A, B, or C. Fail Rate = the percentage of students who were issued a grade of D or F. Withdrawal Rate = the percentage of students who withdrew or were dropped from the class.

As Table 1 shows, classes using Twitter from the fall 2011 semester to the fall 2014 semester experienced higher pass rates (defined as the percentage of students who were issued a grade of A, B, or C) and lower fail rates (defined as the percentage of students who were issued a grade of D or F) than students in classes that did not use Twitter. Additionally, students in the F2F classes using Twitter withdrew or were

dropped from the course at lower rates than students in F2F classes that did not use Twitter. Unexpectedly, students in online courses using Twitter withdrew or were dropped from the course at significantly higher rates than students in online courses that did not use Twitter. I have no concrete data to explain the higher withdrawal rates in online classes using Twitter, but it is reasonable to assume that at least some of those students withdrew from the course because Twitter was a required part of it. After all, a small minority of students surveyed in previous years and as part of this study expressed dissatisfaction with the fact that Twitter was a required part of their course. It is unlikely that those dissatisfied students contributed to the high withdrawal rates as the surveys they completed were administered near the end of the courses in which they were enrolled, but the mere presence of them suggests that there could have been other dissatisfied students who withdrew.

Despite my presentation of the above grade data here, I am reticent about using it to draw conclusions about the efficacy of microblogs as learning platforms. The manner in which Twitter was used as a teaching and learning tool in classes of mine from fall 2011 to fall 2014 diverged from one semester to the next, especially in the first few semesters in which I used it. It took some time for me to reach a point where I was comfortable with the medium and how I was deploying it in my classes. For example, in the first few semesters I did not provide students in online classes with much guidance in terms of how to use Twitter for the class (now I have a video that introduces them to it). Also, early on the section of the syllabus that covers how students are expected to use Twitter was much sparser than it became later and the grading system I used for

evaluating student work on Twitter changed significantly. Finally, there was one semester where I used Twitter in three classes—two online and one F2F—and the resulting workload was a difficult to manage. Consequently, I was not able to meaningfully interact with students on Twitter as often as I would have preferred in that semester. However, I learned from those early missteps and have reached a point where I am confident that the mode in which I used microblogging as a learning tool in this study was manageable and effective.

The manner in which I have used microblogs as instructional tools in my classes has evolved over time based on my experience with the medium and as research has emerged on its use in college classrooms (Chapter Four contains a detailed description of exactly how Twitter was used in the courses that were part of this study). Two practices that I adopted from the beginning were requiring students to use Twitter and making it a discretely graded part of the course, decisions influenced in no small part by the work of Junco et al. (2011). Junco et al. (2012) concluded that requiring students to use Twitter in a course can lead to an increase in student engagement and grades when instructors engage regularly with students on the medium. Therefore, I still require students to use Twitter and grade them on their work on there in courses where it is mobilized. This study is intended to uncover whether or not that requirement is academically beneficial.

From the outset I used the microblog as a tool to encourage students to write more clearly and concisely and as a way to encourage deeper engagement with the course. I also made it a priority to interact with every student in a course with Twitter at least once per week, though I regularly interact with some students more frequently. The decision to

use the platform as an interactive medium for instructor-student engagement flowed naturally from my overarching goal of encouraging students to engage more deeply with the course. The literature overwhelmingly supports this practice (Brinthaupt et al., 2011; Brownson, 2014; Callaghan & Bower, 2012; Hew & Cheung, 2013; Junco et al., 2012; Tay & Allen, 2011). Dunlap and Lowenthal (2009) and Lin et al. (2013) argue that teachers should model effective communications strategies in their own use of Twitter. As such, my writing style on Twitter avoids the use of slang and abbreviations (a particularly common attribute of microblog writing) in favor of clear and concise syntax in structurally sound sentences. Frequent instructor-student interaction through tweets that are grammatically correct and easy to understand is a key part of the pedagogical strategy I employ on Twitter.

A variety of other practices that I use in my classes that have a Twitter component are supported in the research in this area. Gray et al. (2010) encourage instructors using Twitter to provide support and training for students in terms of how they should be using microblogging as part of the class; I spend class time in F2F sections and provide an embedded video to online students in order to help them acclimate to the medium. Those sessions, the video, and a special section of the course syllabus are all designed to communicate clear and explicit expectations to students (Jones, 2011; Sample 2010a, 2010b) and to demonstrate how students can take steps to protect their privacy on Twitter (Everson et al., 2013). In order to remain compliant with federal regulations pertaining to student privacy, students are warned in the syllabus not to use Twitter to publish any information of a personal nature. If they do publish any such information I send them an

email asking them to delete the offending tweet and explaining why it is inadvisable to use Twitter in such a fashion (in practice this rarely happens—students seem to understand that Twitter is not the place for private communications). To promote engagement with the course on Twitter, I take advantage of the media richness afforded by it to promote interesting and varied digital content related to the course in the form of hyperlinks, pictures, and videos (Hosterman, 2012; Jones, 2011). Finally, the Twitter accounts I use in my classrooms are used exclusively for those classes and I encourage students to set up dedicated Twitter accounts for the class, regardless of whether or not they already have a Twitter account (Jones, 2011; Mollett et al., 2011). That practice is designed to alleviate the concerns of students who are reluctant to establish social media connections with their instructor or classmates and to make it easier for me to manage the classroom use of the medium.

Asking students to set up dedicated Twitter accounts for the class, using a dedicated class Twitter account that is distinct from the accounts I use personally and professionally, and providing students with information on how they can protect their privacy on Twitter are all part of efforts to make students feel that Twitter is a safe space for learning and safeguard the integrity of the instructor-student relationship. According to McEwan (2012), college students want the boundaries between themselves and their instructors to be remain "thick" (p. 18); they do not want to feel forced into unwanted social interactions and they do not want the digital spaces they inhabit to be invaded by authority figures. As previously mentioned, McEwan identifies microblogs as "publishing" spaces where students generally feel comfortable interacting with their

instructors, but I still wanted to do everything possible to reassure students of my positive intentions. The Twitter accounts for both classes that were part of this study had usernames that were directly tied to the official course number and the avatar pictures for both accounts were not of me but of important historical figures from the period of time covered in the class. Also, contrary to findings published by Johnson (2011), which found that occasional posting of harmless personal information by instructors on SMT platforms might be conducive to gains in student learning, I did not use the class Twitter accounts in such a manner. The content of instructor tweets was strictly related to the course and the course subject matter.

With regard to the actual content of instructor tweets, I spent a lot of time experimenting in the semesters leading up to the study. I varied the number of instructor tweets I published per day and per week. I tried publishing only advanced types of instructor tweets in some weeks (i.e., tweets such as those of instructor tweet type 3, see Chapter Four for a description of the various tweet types I used in this study) to see if more students would answer them as a result (they did not—in order to avoid more challenging tweets students would go back and answer "easy" instructor tweets that were published earlier in the class even if they had already answered them). In the first two semesters in which I used Twitter I wrote tweets as the class progressed without recording them and without paying attention to how I was tweeting. It was only later when I went back to perform a content analysis on my instructor tweets that I recognized trends in how I tweeted. The trends I identified in that content analysis eventually coalesced into the three instructor tweet types used in this study. The completed content

analysis also gave me an archive of previously used instructor tweets that I used to more systematically plan out my tweet activity in the semesters after I did the analysis. I continued to build on that archive over time. Eventually I had over three hundred instructor tweets from which to choose when it came time to plan this study. I used Google's URL Shortener tool to shorten all of the web link addresses that I used in my tweets so that I could track student clicks on those links (Twitter now has an Analytics tool that makes this easier to do). I then recorded and analyzed that click-through data to get a better sense of which types of links most interested students. All of these activities were part of an ongoing, iterative, experimental process that enabled me to purposefully play with the affordances of microblogs as teaching and learning platforms. The end result of that process is reflected in the teaching methods discussed in this thesis.

Chapter Four

Research Design

This study was completed using a mixed methods design, which "is a procedure for collecting, analyzing, and 'mixing' both quantitative and qualitative methods in a single study … to understand a research problem" (Creswell, 2012, p. 535). The mixed approach was considered appropriate to this topic because both paradigms had the potential to reveal how students used a microblog to attain content-based course learning outcomes in two community college history survey courses: one online, the other face-to-face (F2F). Additionally, mixed methods have been commonly used in the research on this topic (Elavsky, 2011; Kassens-Noor, 2012; Lin, Hoffman, & Borengasser, 2013; Lowe & Laffey, 2011; Hostetter, 2013; Rinaldo, Tapp, & Laverie, 2011; Wakefield, Warren, Alsobrook, & Knight, 2013). As this thesis will show, quantitative methods provided evidence of the degree to which using the microblog impacted student performance on traditional assessments and qualitative methods provided insight into how students used the microblog and their perceptions of it as a learning tool. Given the "extraordinarily complex" nature of educational research, the mixed methods approach allowed for better understanding of this phenomenon (Greene, 2007, p. 20).

In this case, the specific problem that necessitated the use of mixed methods was related to the manner in which students used Twitter in the classes being studied.

Quantitative methods were the primary form of inquiry for this study and were used to test for correlations between student activity on Twitter and student performance on more traditional assessments (defined in this case as multiple-choice assessments, written quizzes on which students identified historical terms, and essays on which students used evidence from primary and secondary sources to construct historical arguments). However, those methods were not capable of revealing how students chose to use the microblog in the class or whether or not they perceived it to be an asset to their learning. In particular, I wondered how students approached completing their work on the microblog and whether they viewed it more as a learning tool or as a course requirement to be completed in the easiest possible fashion. Qualitative methods were considered the most appropriate method of exploring those questions. In effect, this approach combined elements of triangulation and complementarity as articulated by Greene (2007).

According to Greene (2007), "triangulation seeks convergence, corroboration, or correspondence of results from multiple methods" (p. 100). Different methods with different assumptions and different biases are used to investigate a specific phenomenon from multiple perspectives. Ideally, the data gleaned from the two approaches will converge and provide increased confidence to any inferences that might be drawn from the study. As for Greene's conception of complementarity, it is a method that "seeks broader, deeper, and more comprehensive understanding" by tapping into "different facets or dimensions of the same complex phenomenon" (p. 101). As applied to this study, the qualitative side of the research investigated student perceptions of their use of the microblog in order to gain greater insight into its possible efficacy as a tool for

learning. The core concept that was investigated in this study was student learning as measured by attainment of content-based course learning outcomes. In such a framework quantitative methods clearly took precedence and the qualitative methods served in a support capacity, which is consistent with the "embedded design" principles articulated by Plano Clark, Schumacher, West, Edrington, Dunn, Harzstark, Melisko, Rabow, Swift, and Miaskowski (2013).

Mixed methods studies utilizing an embedded design clearly prioritize one method over the other, usually quantitative over qualitative, and the research questions animating those studies are explicitly aligned to one method or the other (Plano Clark et al., 2013). The research questions associated with the secondary method "are described as having lesser priority and addressing different (but related) questions that aim to enhance the implementation or interpretation" of the primary research questions (p. 5). Researchers using embedded designs analyze quantitative and qualitative data separately before integrating the results so that the secondary results inform the primary research questions and results. Though Plano Clark et al. report that some disagreement lingers within the mixed methods community over some of the nuances of the embedded approach, the basic definition is that which is described here. In fact, they state plainly that "the separation of research questions both by priority (i.e., primary and secondary) and by the methodological approach called for by the different questions is a key characteristic that distinguishes the embedded design from other mixed methods approaches" (p. 6). Plano Clark et al.'s definition of embedded design in mixed methods served as the framework for the study described here.

Consonant with the embedded design principle, quantitative and qualitative data were collected simultaneously throughout the research phase of the study. Quantitative data were collected in three ways: through a pre-course survey administered to participating students before each class began (issued in person and on paper to students in the F2F class and over the web using Survey Monkey, an online survey tool, to students in the online class); by recording student performance on a variety of common assignments; and by recording student activity and performance on Twitter. All course activities, both traditional and on Twitter were aligned to each of the three content-based course learning outcomes. The variables that resulted from the quantitative data collection were used to identify the predictive power of each on student attainment of content-based learning outcomes as demonstrated on traditional assessments. Students were also asked to provide qualitative data through two open-ended, web-based questionnaires, hyperlinks for which were sent to students in both classes through Twitter near the beginning and the end of the semester in which the study took place.

Using hierarchical regression analysis, the quantitative data affords a detailed look at student performance across a variety of assessment types, including their work on Twitter. The qualitative data provides understanding in terms of how students chose to use Twitter in the context of the course. The portion of the quantitative data pertaining to student performance on traditional assessments was generated as student work was graded over the course of the semester. The portion of the quantitative data pertaining to student engagement and performance on Twitter was generated once the semester was complete and final grades were submitted. Students' responses to the pre-course survey

and to both questionnaires were collected and reserved by third parties until the data collection phase of the study was complete; responses were forwarded to me after the semester was officially over and all final grades were submitted. Quantitative and qualitative data were processed and analyzed separately. Integrative analysis of resulting data took place after both types of data were analyzed independently.

Variables in the Quantitative Analysis

The research question animating the quantitative phase of this study—" When a microblog is used as an instructional tool in a community college history survey course, do relationships exist between or among student learning outcomes attainment on traditional types of assessments, student learning outcomes attainment on the microblog, and student engagement on the microblog? What roles do previous experience in using Twitter, level of electronic device ownership, technology self-efficacy, age, gender, ethnicity, English-speaking status, and first-generation college status play in those relationships?"—defines clearly the set of variables to be used in this study.

Student learning outcomes attainment on traditional types of assessments (TrOA) was the dependent variable for the quantitative analysis. This variable was obtained by calculating the sum of all data collected from student work on traditional course-based assessments. Throughout the course students were required to answer 50 multiple-choice questions without the benefit of course materials (during proctored quizzes/exams), write 20 "identifications" in which they had to define and identify the historical significance of 20 terms, and write two essays, each in response to a specific prompt, that required

students to make an historical argument based on evidence from primary and secondary sources. Students' grades on those assessments formed the basis of the TrOA variable.

As previously noted, the department that oversees the history course that was part of this study elected to change the required course textbook beginning in the spring 2015 semester. As a result, some changes had to be made to the traditional assessments to accommodate the new textbook. Those changes were quite limited in nature, but should be noted nonetheless: in all nine out of 20 terms on the identification quizzes had to be revised and three multiple-choice items out of 50 were replaced by new items; no changes had to be made to the essay assignments.

Table 2

Distribution of Grading Points per Traditional Assessment Type

Traditional Assessment Type	*N* of items	Points/item	Points/assessment Type
Multiple-choice items	50	2	100
Identifications	20	5	100
Essays	2	50	100

Note. Overall student grades were calculated on a 500-point scale, which means that each of these assessment types constituted 20% of each student's grade.

Each multiple-choice question was worth 2 points, each identification was worth 5 points, and each essay was worth 50 points (see Table 2). Identifications and essays were evaluated according to detailed grading rubrics (see Appendix A). For the multiple-

choice questions, students could earn either 2 points for a correct answer or 0 points for an incorrect answer. They could earn partial credit on the identifications and essays (1-5 points for completed identifications, 10-50 points for completed essays). Therefore, students were able to score up to 100 points on the multiple-choice questions, 100 points on the identifications, and 100 points on the essays, for a maximum possible TrOA score of 300. A TrOA score for each of the three content-based course learning outcomes in the course was also calculated and integrated into the final analysis. Those variables were named TrOA-CLO1, TrOA-CLO2, and TrOA-CLO3.

Student engagement on Twitter (EN) was an independent variable that was calculated through a two-step process. First, an "engagement score" was assigned to each student tweet based on the type of instructor tweet to which it was written in reply (see the sub-heading "Tweet types defined" later in this chapter for a detailed discussion of the three types of instructor tweets); more engagement points were awarded for student replies to more challenging instructor tweets. Next, EN was obtained by calculating the sum of engagement scores for each student's tweets. Two specific types of data were captured by this method: the number of tweets that students published and the types of instructor tweets to which students replied. Given the frequency with which student engagement is discussed in the literature on this topic (Brownson, 2014; Chen, Lambert, and Guidry, 2010; Dunlap & Lowenthal, 2009; Evans, 2013; Hostetter, 2013; Joyce & Brown, 2009; Junco, Elavsky, & Heiberger, 2012; Junco, Heiberger, & Loken, 2011; Rinaldo, Tapp, & Laverie, 2011; Rutherford, 2010; Tarantino, McDonough, & Hua, 2013; Yaros, 2012) and the uncertainty surrounding the connection between engagement

and learning (Axelson & Flick, 2010), it was deemed advisable to control for the influence of student engagement on outcomes attainment on traditional assessments.

The primary manner in which students engaged with the course on Twitter was by replying to tweets published by the instructor (less than 1% of all student tweets were not replies to instructor tweets). I published 10 to 12 instructor tweets per week—well above the six instructor tweets/week threshold for "heavy" instructor engagement identified by Clarke and Nelson (2012)—each one conforming to one of three instructor tweet types and each aligned to one content-based course learning outcome. Each of the instructor tweet types are described in Table 3 and Appendix B contains examples of all three instructor tweet types. Instructor tweet type 1 (ITT1) was the most basic type of instructor tweet in that they asked a question with a precise and clearly identifiable answer. Instructor tweet type 2 (ITT2) was somewhat more challenging in that it asked a question that might require students to conduct some basic analysis and for which there was not necessarily one correct answer. Instructor tweet type 3 (ITT3) was the most challenging type of instructor tweet in that a direct question was almost never asked. Instead, tweets of ITT3 often contained a statement and a hyperlink to a website related to the course material, leaving students free to respond in any manner they chose. Of the 111 course content-related instructor tweets that were published during the data collection phase of the study, 42 were of ITT1, 44 were of ITT2, and 25 were of ITT3 (see Table 4). Rare unsolicited tweets from students (those not written in reply to an instructor tweet constituted less than 1% of the total number of student tweets curated for this study) were scored at a level commensurate with the level of sophistication

demonstrated in the tweet. For example, unsolicited student tweets that published some basic historical fact were treated as having been written in reply to ITT1, unsolicited student tweets that commented on some broader historical theme were treated as having been written in reply to ITT2, and unsolicited student tweets that demonstrated some level of critical thought around a complex historical question were treated as having been written in reply to ITT3.

Student engagement on Twitter (EN) was calculated according to the types of instructor tweets to which students replied. For every reply to ITT1, students received 1 engagement point; for every reply to ITT2, students received 1.25 engagement points; and for every reply to ITT3, students received 1.88 engagement points. Given a baseline of 1 engagement point for student tweets written in reply to ITT1, the engagement points awarded for student replies to ITT2 and ITT3 were derived based on two considerations: (a) that the scores needed to reflect, as accurately as possible, the higher levels of engagement demanded of replies to ITT2 and ITT3; and (b) that the scores needed to reflect, to some degree, the likelihood that students would pick ITT1 over ITT2 and ITT3. Over the course of the semester, participating students in both classes that were part of the study published 1,304 tweets. Of those, 653 student tweets were written in reply to ITT1 (50.1% of the total), 560 student tweets were written in reply to ITT2 (42.9%), and 90 student tweets were written in reply to ITT3 (6.9%). Thus, students were 7.2% more likely to reply to ITT1 than ITT2 and 43.2% more likely to reply to ITT1 than ITT3. However, I did not feel that those percentages accurately reflected the higher levels of engagement demanded of replies to ITT2 and ITT3. Therefore, 1.25 and 1.88 were

Table 3

Instructor Tweet Types

Instructor Tweet Types	*N* of Tweets	Defining characteristics	Evaluative criteria from Student Tweet Rubric	Maximum possible outcome attainment points for student tweets responding to this ITT
Instructor Tweet Type 1	42	Most basic type; asks a simple question with a clear answer.	Accuracy	2
Instructor Tweet Type 2	44	Asks a more complex question that does not always have a clear answer; student has to identify and analyze content.	Accuracy, originality, critical thinking (when applicable)	6.7
Instructor Tweet Type 3	25	Most challenging type of tweet to respond to; no obvious answer or mode of answering it; often contains hyperlink.	Relevance, originality, critical thinking	6.7

Note. "Maximum possible outcome attainment points for student tweets responding to ITT" was figured by adding up the maximum number of points that a student tweet could receive on each of the evaluative criteria on the Student Tweet Rubric (see Appendix C) for a particular instructor tweet type. For example, student tweets written in reply to ITT3 were evaluated for "Relevance," "Originality," and "Critical Thinking." Respectively, the student tweet could have earned a maximum of 2, 1.7, and 3 attainment points on those three criteria.

Table 4

Instructor Tweets (N = 111)

Instructor Tweet Type	*N* of Instructor Tweets		Course Learning Outcome 1		Course Learning Outcome 2		Course Learning Outcome 3	
			38	34.2%	45	40.5%	28	25.2%
Instructor Tweet Type 1	42	37.8%	11	28.9%	20	44.4%	11	39.3%
Instructor Tweet Type 2	44	39.6%	16	42.1%	19	42.2%	9	32.1%
Instructor Tweet Type 3	25	22.5%	11	28.9%	6	13.3%	8	28.6%

chosen because it seemed reasonable to assume that replies to ITT2 reflected 25% more engagement than replies to ITT1 and that replies to ITT3 reflected 88% more engagement than replies to ITT1. Ultimately, those figures represent my best guess at the levels of engagement demanded by each instructor tweet type.

Finally, the sum of all of the engagement scores for each student's tweets was calculated and the resulting figure served as each student's EN score. Obviously, higher EN scores were found in cases where students replied to many instructor tweets and/or replied to many instructor tweets of ITT2 and ITT3, thus suggesting that the student was highly engaged. On the other hand, lower EN scores were found in cases where students replied to fewer instructor tweets and/or replied to many instructor tweets of ITT1, thus suggesting that the student was less engaged. An EN score for each of the content-based learning outcomes in the course was also calculated and integrated into the final analysis. Those variables were named EN-CLO1, EN-CLO2, and EN-CLO3.

Student learning outcomes attainment on Twitter (TwOA) was one of the independent variables and was calculated through a three-step process. First, an "attainment score" was calculated for each student tweet by evaluating each tweet according to the Student Tweet Rubric that corresponded with the type of instructor tweet to which the student replied. All of the Student Tweet Rubrics may be viewed in Appendix C. Next, the sum of attainment scores for each student's tweets was computed. The sum of attainment scores captured three types of data: the number of tweets that students published (because more student tweets led to a higher sum of attainment scores regardless of the quality of the student tweets), the types of instructor tweets to which

they replied (because replies to more challenging instructor tweets led to higher sums of attainment scores regardless of whether or not the student demonstrated attainment of the associated course outcome), and the total level of attainment of the course outcomes that the student demonstrated in all of their tweets (because they received more points for tweets that demonstrated higher levels of attainment). However, preliminary statistical analysis of the study data indicated an unacceptably high level of collinearity between the sum of students' engagement scores and EN ($R = .96$, $p < .000$).

Upon reflection it became clear that the sum of students' attainment scores might not be the best metric to capture student learning outcomes attainment on Twitter because it contained redundant information; EN already captured the number of tweets that students published and the types of instructor tweets to which they replied, neither of which are data points that are directly relevant to measuring student attainment of the course learning outcomes on Twitter. That redundancy also helped to explain the high level of collinearity between the sum of students' engagement scores and EN. Various methods of calibrating TwOA were tested that reduced or eliminated the influence of the number of tweets that students published and the types of instructor tweets to which they replied (measures of central tendency, percentages, ratios, etc.), but I did not feel that any of those methods were mathematically justifiable or authentic to the concepts being measured. Furthermore, it did not seem appropriate to entirely eliminate the influence of those two data points from the TwOA variable. After all, students who published more tweets would have more opportunities to demonstrate attainment of the course learning outcomes and students who showed a greater willingness to reply to difficult instructor

tweets had more opportunities to demonstrate a deep comprehension of the subject matter. In the end, I accepted that a high level of correlation between TwOA and EN was inevitable in light of the fact that both variables were captured from the same observations (i.e., student tweets), but I wanted to ensure that the correlation between them was diminished to an acceptable level (the widely-accepted threshold in this case being $R < .90$). Thus, in order to lower the correlation coefficient between TwOA and EN to an acceptable level, but still maintain the integrity of the TwOA variable, the decision was made to subtract each student's EN score from the sum of their outcome attainment scores on Twitter.

The final step in the process of calculating TwOA was to subtract each student's EN score from the sum of their outcome attainment scores on Twitter. This step controlled for, without eliminating, the influence of the number of tweets that students published and the types of instructor tweets to which they replied within the sum of their attainment scores and left intact the data gleaned from students' demonstrated attainment of the course learning outcomes on Twitter. The resulting TwOA variable was still highly correlated to EN ($R = .87$, $p < .001$), but subtracting EN from the sum of students' engagement scores lowered the correlation between TwOA and EN to an acceptable level.

With regard to the method used to derive attainment scores for student tweets, each student tweet was evaluated according to the Student Tweet Rubric that corresponded to the instructor tweet type to which the student tweet was written in reply. "Accuracy," as defined in the Student Tweet Rubric for ITT1, was the sole evaluative

criterion for student tweets that were written in reply to ITT1. “Accuracy,” “Originality,” and “Critical Thinking” were the criteria on which student tweets written in reply to ITT2 were evaluated, though not all student tweets of that type were evaluated for critical thinking. “Relevance,” “Originality,” and “Critical Thinking” were the criteria on which student tweets written in reply to ITT3 were evaluated. All student tweets written in reply to ITT3 were evaluated for evidence of critical thinking.

Calculating attainment scores for student tweets written in reply to ITT1 was straightforward. I simply evaluated the level of factual accuracy in the student tweet and whether or not the student who wrote it correctly answered the question in the instructor tweet to which they were replying. Calculating attainment scores for student tweets written in reply to ITT2 was somewhat more complicated than calculating them for those written in reply to ITT1. “Accuracy” was evaluated in exactly the same fashion as for those student tweets written in reply to ITT1, though it was arguably more difficult to answer the questions in ITT2 than it was for ITT1. Tweets that answered the question in the instructor tweet completely and accurately received 2 attainment points for “Accuracy.” Tweets that answered the question in the instructor tweet with some degree of accuracy and/or completeness received an attainment score of 1.7 or 1.4. Tweets that answered the question incorrectly received 1.1, 0.8, or 0 attainment points, depending on how much accurate information it contained.

Another criterion that was applied to all student tweets written in reply to ITT2 was “Originality.” When using Twitter in my classes, all students are required to “follow” the official class Twitter account (the source of all “instructor tweets”), which

means they can view all instructor tweets in their "feed." Students are also encouraged to follow the Twitter accounts of their classmates. In cases where a student follows both the official class account and a specific classmate, the student can then see all tweets and replies ("conversations") between the instructor and the classmate (users cannot see conversations between one person they follow and another that they do not follow). What that means is that students can see the replies of other students to published instructor tweets. For example, if Instructor Tweet A is published at 10:00 am and Student Z replies to that instructor tweet at 11:30 am, then Student Y will see both Instructor Tweet A and Student Z's reply if they log in to Twitter at 2:30 pm on the same day and they follow both the instructor and Student Z. Obviously that makes it possible for Student Y to copy Student Z's reply to Instructor Tweet A. There is no rule against it in the class and the criteria that determine students' grades on Twitter do not take into account the originality of student tweets. Consequently, there are many cases where student tweets are identical or near-identical to previously published student tweets. Unfortunately, there is no infallible method of determining whether or not a student tweet is original in content. However, some steps were taken in this study to account for the possibility that a student tweet might not be original given that unoriginal tweets are less likely to show legitimate evidence of learning. Student tweets written in reply to ITT2 and ITT3 were subjected to those steps.

Student tweets written in reply to ITT1 were exempted from the "Originality" criterion because correct answers to questions in ITT1 very rarely required much elaboration. For example, an instructor tweet of ITT1 that asked "The colony of

Maryland was originally founded as a refuge for people of what Christian denomination?" would not require much of an answer beyond "Catholics" or "Roman Catholics" in order to be correct. In fact, almost all of the replies to that instructor tweet were worded similarly and that is the case for virtually all of the replies to instructor tweets of ITT1. In light of the difficulties involved in determining the originality of student tweets written in reply to ITT1, I elected not to evaluate those tweets according to the "Originality" criterion.

All student tweets were curated in chronological order over the course of the semester by copying and pasting the text of them from Twitter into a Microsoft Excel spreadsheet. The date on which the tweet was published, the Twitter username of the student who authored the tweet, the text of the student tweet itself, and the instructor tweet to which the student tweet was written in reply were all recorded in the order they appeared in the feed of the official course Twitter account. At the completion of the semester all student tweets were numbered in the order they were published. When it was time to determine the originality of student tweets, all student tweets were sorted according to the instructor tweet to which they replied and the order in which they were published. From there it was possible to see which student tweets had been published earlier than others and which ones were worded similarly or identically to those that were published previously. Student tweets that were written in reply to ITT2 and ITT3 could earn 1.7 attainment points for being substantially different from other students' tweets, 1.4 attainment points for being somewhat different from other students' tweets, 0.5

attainment points for being somewhat similar to other students' tweets, and 0 attainment points for being identical or nearly-identical to other students' tweets.

The final criterion on which student tweets written in reply to ITT2 were evaluated was "Critical Thinking" as defined by Paul and Elder (2000). Paul is an influential scholar in the field of critical thinking and it has been argued that his work is particularly appropriate for application in history classrooms (Reed, 1998). In this case, student tweets were judged as displaying evidence of critical thinking if they exhibited clarity and precision of thought, depth and quality of reasoning, and an advanced comprehension of the course subject matter. The degree to which the student tweet evidenced those traits determined whether it received 3, 2.25, 1.5, 0.75, 0.25, or 0 attainment points. However, while all student tweets written in reply to ITT3 were evaluated for critical thinking, only select student tweets written in reply to ITT2 received attainment points for critical thinking. The decision on whether or not to award attainment points for critical thinking to student tweets written in reply to ITT2 was based on two factors: the instructor tweet to which the student was responding and the nature of the student's response.

Some ITT2 tweets were more provocative of critical thinking than others. For example, the instructor tweet that asked "Apart from the issue of taxation, what specific grievances did the American colonists have with the British before 1775?" afforded students a clear opportunity to demonstrate critical thinking (students could choose to focus on any number of economic or political issues with various degrees of specificity), while the question in "What is the most important reason why the Battle of Saratoga was

significant?" was less amenable to that (American victory at Saratoga convinced the French government to formally ally with the United States). Therefore, student tweets that were written in reply to instructor tweets of ITT2 that afforded greater opportunities for demonstrating critical thinking were more likely to receive attainment points for critical thinking than student tweets written in response to instructor tweets that were less conducive to critical thinking. However, not all student tweets that were written in response to critical thinking tweets of ITT2 received points for critical thinking. There had to be some evidence that the student put some thought into their tweet. For example, a student tweet that replied incorrectly to the first instructor tweet example above or that contained a brief and general response like "political" would not have received any points for critical thinking.

Student tweets written in reply to ITT3 were evaluated for "Originality" and "Critical Thinking" in the same fashion as those written in reply to ITT2. Instead of "Accuracy," though, student tweets written in reply to ITT3 were evaluated based on "Relevance." That divergence is based on the fact that instructor tweets of ITT3 never contained direct questions (see Appendix B for an example of ITT3). Rather, instructor tweets of ITT3 almost always contained a statement and a hyperlink to a website that was relevant to the course subject matter. Students were free to reply to ITT3 in any way they chose, though few did (only 6.9% of all student tweets in this study were written in reply to ITT3). There was no way to judge the accuracy of student tweets written in reply to ITT3 because there was never a "correct" answer to those types of instructor tweets. Hence, student tweets written in reply to ITT3 were examined for relevance to the

information contained in the statement and hyperlink in the instructor tweet. Student tweets could earn 2, 1.7, 1.4, 1.1, 0.8, or 0 attainment points depending on how relevant it was to the topic in the instructor tweet and the hyperlink. For example, one instructor tweet of ITT3 to which a number of students replied read "Jonathan Edwards' famous sermon, *Sinners in the Hands of an Angry God*, is a glimpse inside the mind of a Great Awakening Puritan" and contained a hyperlink to a primary excerpt of Edwards' sermon. To that instructor tweet, one student tweet replied "columbian exchange" and received 0 attainment points for relevance, another student tweet replied "the Great Awakening was a new way of preaching to get people back into God's way" and received 1.4 attainment points for relevance, and another replied "Edwards gave this speech in Great Awakening, a period of spiritual revival; He hope 2 achieve his goal by instilling the fear of hell [*sic*]" and received 2 attainment points for relevance. All student tweets written in reply to ITT3 were evaluated similarly.

Scores across each of the criteria relevant to the instructor tweet type that a particular student tweet was written in reply—accuracy for student tweets written in reply to ITT1; accuracy, originality, and critical thinking for student tweets written in reply to ITT2; and relevance, originality, and critical thinking for student tweets written in reply to ITT3—were added up to obtain the attainment score for each student tweet. Then, the sum of all attainment scores was calculated for each student and each student's EN score was subtracted from the sum of their attainment scores. The resulting figure was their TwOA score in the final analysis. A higher TwOA score was indicative of a student who demonstrated higher levels of attainment of content-based course learning outcomes on

Twitter while a lower TwOA score was indicative of a student who demonstrated lower levels of attainment of content-based course learning outcomes on Twitter. A TwOA score for each of the content-based course learning outcomes in the course was also calculated and integrated into the final analysis. Those variables were named TwOA-CLO1, TwOA -CLO2, and TwOA -CLO3.

Technology self-efficacy (SE) was the last calculated independent variable. Sagin Simsek (2008) reported that "numerous studies point to a positive correlation between positive attitudes towards computers and learners' success in both the subject matter learned and the use of communication technologies" (p. 201). In light of that research, a survey of students' attitudes towards technology and technology in learning was deployed in order to establish which students were more or less comfortable with technology in the classroom. The results of that survey were used to institute "technology self-efficacy" as a control variable in the final analysis. A protocol adapted from Sagin Simsek was included in the pre-course survey completed by participating students. In addition to asking students to report on their demographic characteristics, the types of computing devices they owned, and their previous experience with Twitter, the survey also asked students to answer 18 5-point Likert-scale items intended to gauge their attitudes towards technology in learning. Responses were scored from 1-5 based on the relative level of positivity towards technology that it displayed, with 1 indicating a highly negative attitude and 5 indicating a highly positive attitude. The mean of each student's response scores served as their SE score in the final analysis. Reliability testing on the

results of the technology self-efficacy protocol revealed that the scale had a high level of internal consistency, as determined by a Cronbach's alpha of.93.

Previous experience with Twitter was also used as a control variable in the study. Students were asked on the pre-course survey to indicate the degree to which they had used Twitter in the past. In the body of literature on SMT in higher education there is no clear consensus on whether or not previous experience with a technological application helps students to use that application more effectively as a learning tool. Where Wakefield et al. (2013) found that positive outcomes were heightened when students had previous experience with a particular technology, West et al. (2015) found no evidence that experienced Twitter users had any advantage over Twitter novices when it came to using the platform or learning through it. Given the lack of clarity in the literature on this question, it was necessary to account for students' previous experience in order to test for any influence on the dependent variable.

As previously indicated, the pre-course survey also asked students to report their gender, age, ethnicity, whether or not English was their first language, their parents' highest level of education, and the number and type of computing devices they owned. Each of these factors was included as independent variables in the quantitative analysis.

Institutional Setting and Participants

The data used in this study was taken from students in two sections, one face-to-face (F2F) and one online, of a community college United States history course that covered the early period of U.S. history (pre-Columbian America to the Civil War) in the spring 2015 semester. Students in neither section of the course had any prior knowledge

that using Twitter would be a required part of the class. I was the instructor for both sections. Over nine semesters from fall 2010 to fall 2014, 54.0% of all the students who enrolled in the U.S. history course that was part of this study received a grade of A, B, or C; 28.6% received a grade of D or F; and 17.4% withdrew or were dropped from the course before its completion. In the two classes that were part of this study, including both students who consented to participate and those that did not, 55.6% of students received a grade of A, B, or C, 25.9% received a grade of D or F, and 18.5% withdrew or were dropped from the course before its completion. Given these figures it is safe to conclude that the two classes that were part of this study were typical of the institution in terms of outcomes.

The community college at which the research was conducted is a large, suburban institution located in a major metropolitan area in the mid-Atlantic region of the United States. The student population in 2014 was 62.0% female and 38% male; 73.4% African American or black, 10.5% Hispanic or Latino, 5.4% white, and 4.1% Asian American. Additionally, 53.6% of the student population was 24 years of age or younger. The institutional review boards of both George Mason University and the community college at which the study took place reviewed, evaluated, and approved the protocols associated with the study.

Students in the F2F section of the class that was part of the study were introduced to the research in-person by me. Each student received a handout that described the research in detail. I went over the handout with them as a group, and then asked them if they had any questions. Students were made aware that I would have no knowledge of

whether or not they consented to participate and that their consent or refusal to consent would have no bearing on their final grade in the class. Once that process was completed, I left the room and a third party distributed consent forms and pre-course surveys to those students who consented to participate. Consent forms and completed surveys were held by that third party until the semester was formally complete and all final grades had been submitted.

Students in the online section of the class that was part of the study were introduced to the research by a special entry page on the course website within the college's official course management system. That entry page was the first thing they saw upon accessing the course website for the first time. They were prevented from accessing any course materials until they had reviewed all materials related to the research and completed the consent form. Students were apprised of their rights and that their consent or refusal to consent would have no bearing on their final grade in the class. Once that process was completed, students who agreed to participate were directed to complete the pre-course survey electronically using Survey Monkey. I did not have access to the resulting survey data until after the semester was completed and final grades were submitted.

As specified in Chapter One, 31 students who consented to participate made up the study sample at the conclusion of the data collection phase of the study. However, preliminary data screening suggested that one of those cases was problematic. The case had an extreme studentized deleted residual (-2.82), leverage value (0.50), and Cook's distance value (0.68). By themselves none of those figures would raise an issue. Taken

Table 5

Self-Reported Characteristics of Study Participants (N = 30)

Characteristic	*N*	%
Gender		
Men	12	40.0
Women	18	60.0
Age Group		
18-19	7	23.3
20-21	12	40.0
22-29	8	26.7
30-49	2	6.7
50+	1	3.3
Ethnicity		
Asian	3	10.0
Black or African-American	18	60.0
Hispanic or Latino	7	23.3
White	1	3.3
Did Not Respond	1	3.3
English-Speaking Status		
Native English Speaker	24	80.0
Non-Native English Speaker	6	20.0
First-Generation College Student Status		
First-Generation College Student	10	33.3
Non-First-Generation College Student	20	66.6
Device Ownership		
One Device	5	16.7
Two Devices	9	30.0
Three Devices	8	26.7
Four Devices	7	23.3
Previous Use of Twitter		
Once per Day	10	33.3
Once per Week	5	16.7
Less than Once per Month	5	16.7
Does Not Use / Never Used	10	33.3

together, however, they were interpreted as signs that the case was an outlier. Also, the student in this case officially withdrew from the course, thus failing to complete a significant portion of the course assignments. Given the small sample size in the study and the outsize influence that this case seemed to be having, it was removed from the sample.

With a final sample size of N = 30, 60% of participants were women, 60% were aged 18-21 years, and 60% were African American or black; 80% were native English speakers, 33.3% were first-generation college students, 80% owned two or more electronic devices, and 50% reported using Twitter at least once per week (see Table 5 for a the full breakdown of demographic characteristics of the study participants). Those 30 students published 1,304 tweets over 11 weeks of the spring 2015 semester. They received a grade for their work on Twitter in ten of those weeks.

Course Design

Course learning outcomes. The subject of both classes that were part of the study was U.S. history from the pre-Columbian era (before Columbus' arrival in the Americas) to the end of the Civil War. As such, the courses were divided into three blocks corresponding to the three departmentally-mandated content-based course learning outcomes. Those outcomes required that, by the end of the course, students would be able to:

CLO1: Discuss the origins and development of the American colonies and the rationale behind the movement towards independence as it emerged from 1763-1776;

CLO2: Discuss the foundation and evolution of the American republic from the early national period to the Age of Jackson; and,

CLO3: Describe how expansionism and sectionalism in the antebellum United States divided the nation and led to the Civil War.

All of the activities in the courses that were part of the study were aligned to one of those three content-based course learning outcomes. However, only activities that were common to both sections of the course were used in the data analysis for this study. The goal was to measure the degree to which students in the two classes demonstrated attainment of the course learning outcomes based on the quality and quantity of their work in the course.

The microblog as a learning tool. Despite the differences in format between the online and F2F sections of the course under examination, Twitter was used identically in both. Consistent with the research and recommendations of scholars (Clarke & Nelson, 2012; Junco, Elavsky, & Heiberger, 2012; Lin, Hoffman, & Borengasser 2013), student use of Twitter was required. Similar to West, Moore, and Barry (2015), students' work on the medium was worth 10% of their overall grade in the class. Students received a weekly grade for their work on Twitter over 10 weeks of the course in which its use was required. They were also encouraged to tweet in the last week of the course, which was the 11th week in which they could have used Twitter, though they did not receive a grade for any tweets in that week (the eleventh week of instructor tweets was included because it enabled me to tweet about the Civil War; students were not graded for their work on Twitter in that week so that they could focus on completing their final assignments

without the added pressure of having to write tweets). They could earn up to five points per week for their work on Twitter (out of 500 total points that were available to be earned in the class).

There were three basic criteria by which student work on Twitter was graded: (a) they could earn one point per course-relevant tweet up to a maximum of five per week, but (b) they could only earn credit for two tweets per day, and (c) the meaning of those tweets had to be readily understandable. Students whose use of Twitter met all of those guidelines in a given week received the full five points, but they could earn from 0-5 points for their work for the week if it fell short of those guidelines in some way. For example, a student who published two tweets on one day and three tweets on another would receive four points for the week. Whether a student tweet was correct or not did not factor in their weekly grade. The metric of five tweets per week was chosen because my experience with using Twitter as a learning tool suggested that five tweets per week was manageable in light of other course requirements. Students were limited to earning two points per day on Twitter because it required them to use the medium at least three days in a seven-day grading period, thus keeping them more engaged with the course. Requiring that students' tweets be clear and understandable helped them practice clear and concise writing.

Numerous scholars on the topic of SMT in the college classroom have recommended that instructors using SMT in their classrooms should establish clear expectations for student use (Dunlap & Lowenthal, 2009; Sample, 2010a), provide guidance in the terminology and proper use of the medium (Gray, Thompson, Sheard,

Clerehan, & Hamilton, 2010), and make efforts to safeguard students' privacy (Rodriguez, 2011). As a result, students in the classes that were part of this study were provided detailed instructions regarding course expectations on Twitter in the form of a special section in the course syllabus (see Appendix D). That special section addressed all aspects of how Twitter was to be integrated into the course, from why they needed to set up a Twitter account just for the class (a practice endorsed by Jones, 2011) to grading guidelines to tips for protecting their privacy while using Twitter. Additionally, a video was made available in the online class to help students acclimate to the medium while class time was spent in the F2F section to help students navigate the process of setting up an account, accessing the instructor's Twitter feed, and replying to instructor tweets. In both classes, Twitter was not used or graded until the third week of the class in order to give students time to get comfortable with the medium. Students were explicitly informed that I would not reply to every one of their tweets, but that I would instead reply to tweets that were particularly insightful, well-written, or incorrect (so the student could receive gentle correction). In general, I tried to model the types of instructor engagement recommended in the literature on this topic (Brownson, 2014; Clarke & Nelson, 2012; Dunlap & Lowenthal, 2009; Hostetter, 2013; Junco et al., 2012; West et al., 2015). As such, I replied to each student at least once per week on Twitter, but often ended up doing more.

As previously indicated, the primary manner by which students completed their work on Twitter was by responding to the tweets that I published as the instructor. Students occasionally published original tweets on their own initiative, but it was a rare

occurrence (less than 1% of student tweets). Ten to 12 instructor tweets were published each week—well above the threshold of six tweets/week identified by Clarke and Nelson (2012) as "heavy" instructor use of Twitter—usually two per day over five or six days (instructor tweets were usually published at 10:00 AM and 4:00 PM and were rarely published on Sundays). Each class had its own dedicated Twitter account, as recommended by Mollett, Moran, and Dunleavy (2011), and HootSuite, a Twitter client application, was used to schedule instructor tweets ahead of time and to maintain the multiple Twitter accounts that this teaching method requires, as recommended by Jones (2011). Instructor tweets were always aligned to the course content for the week and instructor tweets were scheduled in such a manner as to give students a choice in how they completed their work (i.e., instructor tweets were varied in terms of difficulty or instructor tweet type).

Formal learning through a microblog. The class microblog was mostly used as an objectivist instructional tool, as defined by Jonasson (1991), but there were some elements of constructivist learning in the way that Twitter was used in the classes for this study. In particular, the open-ended nature of instructor tweets of ITT3 provided students with regular opportunities for exploring content according to their preferences. As indicated above, I sent out 10-12 instructor tweets per week and students were required to respond to at least five of them over the course of that week. However, instructor tweets were deliberately varied in terms of type (ITT1, ITT2, ITT3) and students were allowed to choose the type of tweets to which they responded. I was careful to ensure that instructor tweets of all three instructor tweet types were consistently available.

Tweet types defined. Tweets of instructor tweet type 1 (ITT1) were objectivist in nature; they contained direct, easily interpretable questions and had clear answers that could be readily found in the course text. Appendix B contains examples of all three instructor tweet types. However, in many cases it may have been possible for students to answer tweets of this type without referring to the textbook. Though some level of engagement was required of students who chose to answer tweets of this instructor tweet type, ITT1 was the least demanding of the three types identified for this study. Furthermore, students did not necessarily need to demonstrate critical thinking skills to answer questions in ITT1 correctly and completely. Tweets of ITT1 made up 37.8% of all instructor tweets published as part of this study, but 50.1% of all student tweets were written in reply to instructor tweets of this type, making it the instructor tweet type to which students were most likely to reply.

Tweets of instructor tweet type 2 (ITT2) were somewhat constructivist in that students usually had to formulate a response based on their reading of the course text. The course textbook often did not contain direct answers to the questions being asked in ITT2, but all of the information that students needed to answer the questions in ITT2 could be found there. There were often multiple ways that students could correctly answer the questions in ITT2, but there was usually one best answer to the question. Similar to ITT1, students might have been able to answer the questions in ITT2 without referring to the text, but it was less likely in this case. It was assumed that a higher level of engagement with the course content was needed for students to respond to this tweet type accurately and thoughtfully than that which was required by ITT1. Further, some of

the tweets of this type provided opportunities for students to demonstrate some degree of critical thinking. The definition of critical thinking in this case conforms to guidelines articulated by Scriven and Paul (1987), which were discussed in Chapter One. Tweets of ITT2 made up 39.6% of all instructor tweets published as part of this study, though 42.9% of all student tweets were written in reply to instructor tweets of this type.

Instructor tweet type 3 (ITT3) was mostly constructivist and demanded the highest level of student engagement from the students who chose to answer them. Tweets of this type frequently included a declarative statement and a hyperlink to a previously vetted website. There was no clear or correct answer for students to provide in response to ITT3 because tweets of that type rarely asked direct questions (if they did ask a question it was usually along the lines of "What do you think?"). The only obvious course of action for the student to follow in responding to ITT3 was clicking the embedded hyperlink. Presumably, the student would read the information on the other side of the link and then reply to the instructor tweet based on what they read. It was assumed that some level of critical thinking would have to be involved in those replies because there was no obvious way to respond to the instructor tweet. Given the open-ended nature of instructor tweets of ITT3, it was not surprising that it was the least frequently answered type of instructor tweet. Though 22.5% of instructor tweets were of ITT3, only 6.9% of student tweets were written in reply to them.

Traditional assessments. As previously indicated, three types of "traditional" assessments were used to generate data on student learning outcomes attainment on traditional assessments for the study: 50 multiple-choice questions, 20 identifications, and

2 essays. Overall, each assessment type was worth 20% of each student's grade in the course.

Multiple-choice questions. Every student in both courses was required to answer 50 multiple-choice questions without the benefit of any course materials in a proctored setting. Students in the F2F section of the course took five in-class quizzes with five to 12 questions per quiz. Students in the online section of the course took two exams on-campus in the college testing center at the midpoint and end of the semester in which the study took place; each of those exams contained 25 multiple-choice questions. Students in both sections were provided with the same study guides to inform their preparation for the quizzes and exams. The study guides consisted of lists of historical terms as they appeared in the textbook and lecture notes (which were provided to students in the online class even though they did not attend lectures).

The 50 multiple-choice questions (items) that were used as part of this study were tested for reliability and validity in four classes over the course of three semesters prior to the commencement of the study. Identical versions of the items were used in each of those three semesters. The security of the items themselves was protected in several ways. First, students in online sections of the course were required to take exams in the on-campus testing center of the college where mobile devices are strictly prohibited and where test proctors and cameras constantly observe the students as they are taking exams. In those cases students were required to write all of their answers on the test form itself, which they had to submit back to testing center staff upon completion of the exam. They were not allowed to keep the exam forms and the forms were not returned to them. In the

F2F sections of the course, exams and quizzes were personally supervised by me and students were required to write all of their answers on the test form. Students in F2F sections were allowed to see their exams/quizzes after grading was completed, but all forms had to be returned to me before students left class. Given all of these precautions, the integrity of the multiple-choice items was reasonably assured.

As part of the preparation for the study described here, a total of 100 multiple-choice items were deployed in both F2F and online U.S. history courses over four classes in three semesters. In all, 72 students completed quizzes or exams that contained all 100 questions. At the conclusion of the spring 2014 semester a series of reliability tests was performed on the resulting data and there appeared to be internal consistency among all 100 items, $\alpha = .84$. However, in order to identify which items should be used in this study, analysis of *p*-values and point-biserial correlations was performed for each item. Using standards articulated by DiBattista and Kurzawa (2011), only those items with $p \geq .30$ and $p \leq .90$, indicating that the item is neither too difficult nor too easy for students to answer correctly, were considered for inclusion. Also, only those items with $r_{pbc} \geq .20$, indicating that the item effectively discriminates between high and low achieving students, were considered for inclusion. That analysis indicated that 55 items should be considered for inclusion in the study.

Given that only 50 items were needed for the assessments in this study, items were discarded based on a review of the alignments between the items and the course learning outcomes (i.e., some outcomes had more acceptable items aligned to them than others; thus, some excess items were removed). The final result was 50 items, 26 of

which aligned to CLO1, 13 of which aligned to CLO2, and 11 of which aligned to CLO3. While this result might seem imbalanced, it was considered appropriate in light of the fact that CLO1 encompasses approximately 47% of the course material, CLO2 encompasses approximately 29% of the course material, and CLO3 encompasses approximately 24% of the course material as measured by the number of pages devoted to topics aligning to those outcomes in the course textbook.

Final edits to the 50 multiple-choice items were made based on distractor analysis. That is, the percentage rates at which students selected incorrect answer options (distractors) for individual items were examined. DiBattista and Kurzawa (2011) provide a definition of a functional distractor as "one that was selected by at least 5% of examinees" (p. 3). Therefore, the distractors of all 50 items were examined and distractors that were selected by three or fewer students (5% of 72 = 3.6) were revised or rewritten to improve functionality according to guidelines identified by Haladyna, Downing, and Rodriguez (2002). In all, 22 out of 50 (44%) multiple-choice items were revised for improved distractor functionality.

Unfortunately, as articulated in Chapter One, three out of the 50 previously-selected multiple-choice items has to be discarded immediately before the commencement of the study due to a change in the course textbook. Three new, previously untested, items were then written in order to replace the discarded ones. The content covered by the three new items was kept consistent with the discarded items and the alignments between the course learning outcomes and the new items remained the same as the alignments between the outcomes and the old items. Additionally, a number

of items had to be revised in order to maintain consistency of content between the items and the new textbook.

Thirty-nine students in both classes that were part of this study answered all 50 multiple-choice items. Reliability testing on the results of the quizzes and exams revealed that the multiple-choice items used in this study had a moderate level of internal consistency, as determined by a Cronbach's alpha of 0.81. Given that DiBattista and Kurzawa (2011) define an acceptability threshold for Cronbach's alpha of 0.70 for quality multiple-choice assessments, it is reasonable to assume that the multiple-choice items used in this study were reliable indicators of student learning.

Identifications. Student in both courses that were part of this study were required to define and describe the historical significance of 20 historical terms. The terms covered a wide range of content related to the course learning outcomes: seven of the terms were aligned to CLO1, seven to CLO2, and six to CLO3. Students were presented the terms in a series of six "identification quizzes," each of which contained three to four terms. The quizzes were not timed except that students had to write and submit their identifications through a "test" form on the course website on the college's course management system by the quiz due date. Students were explicitly told that they should use all available course materials to complete their work on these quizzes, though they were prohibited from using materials outside of those approved for the class (i.e., they could only use the course textbook or other materials provided directly by me). All identifications had to be written in paragraph form. They were told to aim for

identifications that were five to seven sentences in length, though length was not among the grading criteria used to evaluate their work.

Each identification was graded individually using a detailed grading rubric that may be viewed in Appendix A. The grading criteria on the rubric emphasized: (a) the factual accuracy of the identification; (b) the level of detail that the student provided relative to the amount of detail available in the course materials; (c) how well the student paraphrased the language from the course materials; (d) how well they analyzed the historical significance of the term; and (e) whether or not they properly cited the source(s) they used to complete their work in the text of the identification. Each identification was evaluated on a five-point scale on each criterion from "Excellent," equivalent to a grade of A, to "Unsatisfactory," equivalent to a grade of F. Scores for each criterion on each identification were then entered into a Microsoft Excel spreadsheet, which was then used to calculate the total score for each identification.

The grading rubric that was used on the identifications was developed over several years with some collaboration from students and other history instructors. In the first two semesters in which I used the identification quiz grading rubric (spring 2013 and fall 2013) students were surveyed on their perceptions of the rubric and were asked to provide feedback on it. Additionally, the rubric was shared and discussed with three faculty members from the department in which the courses are taught, each of whom provided feedback. Finally, my own thoughts and ideas as to the wording and application of the rubric were applied over time to craft the rubric into the form it took for the study.

In order to ensure the highest possible level of reliability in the application of the identification rubric, I conducted a "norming" session with two history faculty members from the community college at which I teach. This session was conducted in accordance with guidelines suggested by Sholars, Terreri, and Richardson (2009) and it took place shortly after the first identification quizzes were due. Session participants were given the identification rubric ahead of time and I used the first few minutes of the norming session to briefly explain my understanding of each of the criteria within it. They were then asked to use the rubric to evaluate six identifications from six separate students that I had already evaluated. The six students and their accompanying identifications were purposefully chosen to obtain a range of quality. I attempted to pick two well-written identifications, two average identifications, and two poorly-written identifications. The results of the norming session suggested that my application of the rubric was somewhat more generous than my colleagues. In fact, on average they evaluated all six students lower than me on all aspects of the rubric. After discussing with them the justifications for their evaluations, and reflecting further upon my own justifications, it became clear that my relatively generous application of the rubric needed to be adjusted.

When the identification quiz rubric was first developed, students who scored in the "Excellent" performance level for a given criterion received 100% of the available points for that criterion, students who scored in the "Good" performance level for a given criterion received 85% of the available points for that criterion, students who scored in the "Average" performance level received 70% of the available points for that criterion, students who scored in the "Below Average" performance level received 55% of the

available points for that criterion, and students who scored in the "Unsatisfactory" performance level received 40% of the available points for that criterion. Out of a desire to encourage students towards success, and not wanting to score their work too harshly, I believe that I developed a tendency to score students more highly on the rubric than perhaps they deserved. However, over time the scoring system embedded in the rubric evolved. In the rubric that was used in the study, students who scored in the "Good" performance level received 80% of the available points for that criterion, students who scored in the "Average" performance level received 70-73% of the available points for that criterion (depending on the criterion), students who scored in the "Below Average" performance level received 60-65% of the available points for that criterion, and students who scored in the "Unsatisfactory" performance level received 50-53% of the available points for that criterion. Though the divergence between the higher performance levels on those two iterations of the rubric was slight, the divergence between the points available at the "Below Average" and "Unsatisfactory" levels was more marked. Realizing that I could apply the new iteration of the rubric more accurately to students' work without lowering their grades too severely, and cognizant of the divergence between my application of the rubric and my colleagues' application of it, I adjusted my application of the rubric downward to reflect that realization. In other words, I was less reticent about scoring students' work as "Below Average" and "Unsatisfactory" when it was warranted.

Essays. Students in both courses that were part of this study were required to write two essays in which they used evidence from both primary and secondary sources to craft arguments that answered specific prompts. The first essay prompt was aligned to

CLO1 and CLO2. The second essay prompt was aligned to CLO3. Students were required to write 750-1,000 words for each essay assignment and they were expected to use all available and approved course materials to write them. Final essays were submitted as electronic files through the course management system and each was subjected to an electronic plagiarism check using an application built into the course management system.

Each essay was graded using a detailed grading rubric that was specific to each particular essay assignment. Common to both essay rubrics, essays had to: (a) contain a clearly identifiable thesis statement; (b) contain an introduction and a conclusion and make use of topic sentences, paragraphs, and transitions; (c) directly address the prompt, make a coherent argument, and use evidence to support that argument; (d) contain proper source citations; and (e) make a persuasive argument that demonstrates a thorough understanding of the issues raised in the prompt. The parts of the grading rubrics that were specific to the respective essay assignments were based on the historical content that was explored in each. Much like the identifications, each essay was scored from 0-5 on each of the criteria in the respective rubrics, a 5 corresponding with an "Excellent" performance, equivalent to a grade of A, and a 0-1 corresponding with an "Unsatisfactory" performance, equivalent to a grade of F. The scores for each criterion on each essay were then entered into a Microsoft Excel spreadsheet, which was then used to calculate the total score for each essay.

The first iterations of the rubrics to be used in the courses to be studied were developed in accordance with institutional requirements for course-level student

outcomes assessment. As such, they were framed with the input of faculty members across the history department at the community college at which the study took place. The rubrics were approved by the college-wide faculty committee overseeing course-level student outcomes assessment and officially deployed for institutional assessment in the spring 2014 semester across all sections of this particular U.S. history course. As such, all eight instructors who taught that course in the spring 2014 semester had an opportunity to use the rubrics in their classrooms, including me. At the conclusion of the spring 2014 semester the department surveyed all relevant faculty members on their impressions of the rubrics and elicited suggestions for their revision. The results of those efforts were used to inform revisions of the rubrics used in this study.

In order to ensure the highest possible level of reliability in the application of the essay rubric, another "norming" session was conducted (separate from the one that was held to norm the identification rubric) with two history faculty members from the college at which I teach. This session was conducted in accordance with guidelines suggested by Sholars, Terreri, and Richardson (2009) and it took place shortly after the first essay assignment was due. Session participants were given the essay rubric ahead of time and I used the first few minutes of the session to briefly explain my understanding of each of the criteria within it. Unlike the identification rubric, however, my colleagues were acquainted with the essay rubric and had actually used it to evaluate students in their own classes. They were then asked to use the rubric to evaluate three essays from three different students that I had already evaluated. The three students and their accompanying essays were purposefully chosen to obtain a range of quality; I attempted to pick one

well-written essay, one average essay, and one poorly-written essay. The results of the norming session suggested that my application of the essay rubric was consistent with the manner in which my colleagues applied it. Consequently, I continued to apply the essay rubric as I had done in the past.

Instructional divergence between the courses. Every effort was made to make both the F2F and online courses involved in this study as consistent as possible. In fact, using grading percentages as a metric, 70% of the assignments in both courses were exactly the same (20% each for the multiple-choice assessments, identification quizzes, and essays; 10% for the use of Twitter in each class). Furthermore, another 10% of the grading structure in each course was made up by an "Orientation Quiz," which was a very basic assignment that required students to answer questions about the structure and requirements of the course as articulated in the course syllabus, and an "Academic Integrity Quiz" that quizzed students on the definitions and requirements of academic integrity. While those assignments were common across both courses, their inclusion in this study was not felt to be appropriate because neither was directly connected to the course learning outcomes. The final 20% of the grading structure in the two courses was divided in different ways across both courses.

In the F2F section, class attendance made up 10% of the course grade and a written final exam made up the final 10% (the institution requires a final exam). The final exam took place in class and required students to write a reflective essay in which they described the assumptions and significance of the history discipline. In the online section, the final 20% of the course grade was earned through completion of five discussion board

assignments, each worth 4% of the course grade. These discussion board assignments presented students with a set of primary source documents and asked them to respond to a specific question pertaining to those documents.

Data Collection

A great deal of data collection took place throughout the research phase of the study. In fact, much of the quantitative data that resulted from the study came as student work was graded throughout the semester. Student answers to multiple-choice questions were entered into a Microsoft Excel spreadsheet as the semester progressed. My evaluations of identifications and essays across all of the criteria on the grading rubrics for those assessments were also entered into Microsoft Excel spreadsheets. However, analysis of the resulting data did not take place until after the completion of the spring 2015 semester.

Pre-course survey. Demographic information, data on the number and types of electronic devices that students owned, their previous experiences using Twitter, and student self-assessment of their own technology self-efficacy was obtained from students who agreed to participate in the study through a survey administered at the beginning of the courses being studied. The full text of the pre-course survey may be viewed in Appendix E. In the F2F section of the course, paper copies of the survey were distributed and collected on the first day of class by a third party. Completed surveys were held by that third party until the completion of the spring 2015 semester. I had no knowledge of which students consented to participate in the research or what they reported on the pre-course survey until the semester was over and final grades were submitted.

An identical pre-course survey was administered electronically to students in the online section using Survey Monkey. Students were prevented from accessing the course and the pre-course survey until they completed the consent form. Those who did not consent to participate were then allowed to fully access the course, but students who agreed to participate were directed to a hyperlink to the electronic version of the survey. The survey was created and maintained by a third party and I had no access to the resulting data until the completion of the semester. Nevertheless, I was able to see which students consented to participate in the study. Due to constraints within the course management system, the only way to keep students from accessing the course before they completed the consent form was to set up the consent form as an ungraded quiz within the course management system. Once students submitted the consent form, regardless of whether or not they consented to participate, the full course was available to them. The results of the consent form "quiz" were then visible within the course management system grade book.

Collecting data on Twitter. The grading of student activity on Twitter occurred separately from the collection and analysis of student activity on Twitter. In fact, the collection and analysis of student activity on Twitter had no bearing on students' grades. Where the criteria for the grading of student work on Twitter were very basic (essentially rewarding students for effort), the methods by which students' work on Twitter were analyzed for this study were much more complex. As such, it was necessary to create an archive of all instructor and student activity on Twitter for post-semester analysis. That archive was maintained in two Microsoft Excel files.

All primary instructor tweets (those of ITT1, ITT2, and ITT3 that were not published in reply to a student) were pre-selected from a body of tweets sent out in previous semesters. Ordered according to the planned progression of the course, each was aligned to one of the course learning outcomes and was scheduled ahead of the time of publication using the Twitter client application HootSuite. The order of the tweets, their respective alignments to the content-based course learning outcomes, their ITT classification, their dates of publication, the actual text of the tweets, and any hyperlinks the tweets might contain were all stored in a Microsoft Excel file.

As previously described, another Microsoft Excel file was created in order to curate all student tweets. Two separate sheets within that file contained the tweets from the students in the online class and those from students in the F2F class. Tweets were saved in chronological order along with the date of publication, the username of the student who authored the tweet (students with Twitter usernames that did not allow me to easily identify them were asked to provide their usernames confidentially), and the instructor tweet to which the student tweet was written in reply. This was done by manually copying-and-pasting every student tweet from Twitter into Excel. At the completion of the data collection phase of the study, all student tweets were then assigned a number corresponding to the order in which they were published.

Twitter questionnaires. Students were asked to comment anonymously on their impressions of Twitter as a learning tool twice over the course of the semester. Comments were elicited through two brief electronic questionnaires that were created using Survey Monkey. The text of both questionnaires is viewable in Appendix F. Links

to both questionnaires were sent to all students in both classes over Twitter. The link to the first questionnaire was sent to students near the end of the second week of the course in which the use of Twitter was required (the fourth week of the course overall). It asked them to answer one yes/no question, one Likert-style question, and two open-ended questions. The second questionnaire was sent to students in the tenth and last week in which they were graded for their work on Twitter (week fourteen of the course, which was two weeks before the final exam period). It asked them two Likert-style questions and three open-ended questions. Questionnaires were set up and maintained electronically by a third party and I did not have access to the results of the questionnaires until the completion of the semester.

Data Analysis

Data analysis began once the spring 2015 semester was formally complete and all final grades for students had been issued. The quantitative data from the study was processed and analyzed first, followed by the qualitative data. Copies of all of the spreadsheets associated with the research were made in order to protect the integrity of the original data and analysis was conducted on those copies. A master spreadsheet was then established to compile the results of all of the quantitative data analysis.

Processing the Quantitative Data. Quantitative data was collected from numerous sources. Each are described below in detail.

Pre-course survey. Responses from the pre-course survey administered to students on or around the first day of class (depending on the course format) were made

available to me at the conclusion of the semester in which the study took place. Demographic and personal responses were coded in the following manner:

- Gender: 1 for male and 2 for female
- Age: 1 for 18-19 years of age, 2 for 20-21, 3 for 22-29, and 4 for 30 and over. Students were given eight age ranges from which to choose. Their selections were consolidated into four groups because few or no respondents selected some age ranges.
- Ethnicity: 1 for Asian and White, 2 for African American or black, 3 for Hispanic or Latino, 4 for those who chose not to respond. Students were given eight ethnicities from which to choose. Their selections were consolidated into four groups because few or no respondents selected some ethnicities.
- English speaking status: 1 for native English speaker and 2 for non-native English speaker. Students were asked if English was their first language. Students who answered "Yes" were classified as native English speakers and students who answered "No" were classified as non-native English speakers.
- First-generation college student status: 1 for first-generation college student, 2 for non-first-generation college student. Students were asked to identify the highest level of education completed by either of their parents. Consistent with the U.S. Department of Education's definition of a first-generation college student, students who selected "Did not finish high school" and "High school diploma or G.E.D." were classified as first-generation college students. Students who

selected "Attended college but did not complete degree" and above were classified as non-first-generation college students.

- Electronic device ownership (students were asked to report all of the device types they owned among smartphone, tablet, laptop computer, and desktop computer): 0 for no devices, 1 for owns one of the listed devices, 2 for owns two of the listed devices, 3 for owns three of the listed devices, and 4 for owns all of the listed devices
- Previous Twitter usage: 1 for at least once a week, 2 for once a month or less, 3 for do not use it. Students were asked how often they used Twitter and had five alternatives from which to choose. For the sake of easy of analysis, students who selected "At least once a day" and "At least once a week" were classified as frequent Twitter users and students who selected "Less often than every month" and "Don't use it/never heard of it" were classified as infrequent Twitter users. No students reported that they used Twitter "At least once a month."

As previously noted, students' responses to the 18 survey items on technology self-efficacy were scored from 1-5 based on the level of positivity towards technology that it displayed, with 1 indicating a highly negative attitude and 5 indicating a highly positive attitude. The mean of responses on those 18 items was then calculated for each student and served as the student's technology self-efficacy (SE) score.

Student outcomes attainment on traditional assessments. Given that much of the raw data on this variable was generated in the course of the semester, data on student performance on traditional assessments was readily calculable. Records of student

performance on the multiple-choice items were entered into a Microsoft Excel spreadsheet as they were completed. Student responses on each question were recorded and the software calculated whether those responses were correct or incorrect, indicated by a 1 or 0 respectively. That same file listed the alignments between multiple-choice items and course learning outcomes. With that information it was possible to calculate the number of points that students earned on the multiple-choice items overall as well as for each course learning outcome. The resulting four values for each student were entered into the master spreadsheet, an overall score for all of the multiple-choice items and a score for each course learning outcome.

Data on student performance on all of the identifications were stored in spreadsheets maintained for each class. Those same spreadsheets listed the alignments between each identification and the course outcomes. With that information it was possible to calculate the number of points that students earned on all 20 identifications as well as the number of points they earned on the identifications aligned to each of the course learning outcomes. The resulting four values for each student were then entered into the master spreadsheet, an overall score for all of the identifications and a score for each course learning outcome.

Data on student performance on both of the essays were stored in spreadsheets maintained for each class. While the total number of points that students earned on both essay assignments could be applied to their overall TrOA score, a method had to be developed to equitably divide the points from essay one between CLO1 and CLO2 since it was aligned to both. That was done in two steps. First, the points that students earned

on the rubric criteria that applied to the entire assignment—Thesis Statement, Organization, Development, Proper Citation of Sources, and Analysis & Evaluation (see Appendix A for the full rubrics)—were halved and divided between students' outcomes attainment scores on the essays for CLO1 and CLO2. Next, the points that students earned on the rubric criteria that were specific to those two course learning outcomes—"The revolutionary period" for CLO1 and "The early national period" for CLO2—were added to the halved points from the other rubric criteria. The sum of those figures equaled the total number of points that were allocated to each student's outcome attainment scores on the essays for CLO1 and CLO2. Since the second essay assignment was only aligned to CLO3, the total number of points that students earned on that assignment were allocated to their outcomes attainment score for CLO3. The resulting four values for each student were then entered into the master spreadsheet, an overall score for both essays and a score for each of the course learning outcomes.

Student outcomes engagement and attainment on Twitter. The work of calculating student attainment of course learning outcomes on Twitter was extensive. As previously described, all 1,304 student tweets published by students participating in the study were archived (in fact, many more student tweets were archived because I did not know who consented to participate in the F2F class; archived tweets published by students who did not consent to participate were deleted once I found out who had consented). Once the semester was complete a copy of the raw student tweet archive was made. On that copy, each student tweet was assigned a number corresponding to the order in which it was published. Then, all of the student tweets were sorted according to

the text of the instructor tweets to which they were written in reply. That made it easy to assign an ITT number and a CLO number to each student tweet, corresponding respectively to the type of instructor tweet to which it was written in reply (ITT1, ITT2, or ITT3) and the course learning outcome to which the instructor tweet was aligned (CLO1, CLO2, or CLO3). From there an engagement score and an outcomes attainment score were calculated for every student tweet.

Engagement points were assigned to student tweets by using a nested IF formula in Microsoft Excel to calculate the engagement scores for each, as noted above. Once that operation was completed, all of the student tweets were then re-sorted according to student name. From there it was a simple matter to calculate each student's total EN score and their EN score for each of the three course learning outcomes. All four figures were then entered into the master spreadsheet.

The bulk of the work in preparing the student tweets for outcomes attainment analysis was completed while assigning outcomes attainment points to each. The working spreadsheet containing all student tweets and the data associated with them was sorted according to the instructor tweets to which the student tweets were written in reply and to each tweet's order of publication (in that order). This enabled me to evaluate, at the same time, all of the student tweets that were written in reply to particular instructor tweets. As described in detail above, that entailed using the Student Tweet Rubrics (see Appendix C) to evaluate student tweets written in response to ITT1 for accuracy; student tweets written in response to ITT2 for accuracy, originality, and critical thinking (when appropriate); and student tweets written in response to ITT3 for relevance, originality,

and critical thinking. Points were assigned for each criterion individually and were then added together to form the outcomes attainment score for each student tweet. Finally, the spreadsheet was sorted by student name and each student's total TwOA score and their TwOA score for each of the three course learning outcomes were calculated. All four figures were then entered into the master spreadsheet.

The key to the calculations underpinning students' outcomes attainment scores on Twitter was the Student Tweet Rubrics. Again, those rubrics were not used to grade student tweets and the point system behind them should not be understood as a model approximating a grading system (though it is possible that they could be used in such a manner). In fact, students were not aware that the rubrics were being used to evaluate their tweets because they were only used for the purposes of this research and they were only used after the completion of the semester in which the study took place. The rubrics were used only as tools to evaluate and quantify the degree to which each student tweet demonstrated attainment of the course learning outcomes on Twitter.

Final quantitative analysis. All of the relevant quantitative variables for each student were exported from Excel to an SPSS data sheet, including gender, age group, ethnicity, English-speaking status, first-generation college student status, electronic device ownership, previous experience with Twitter, technology self-efficacy (SE), student outcomes attainment on traditional assessments (TrOA), student outcomes attainment on Twitter (TwOA), and student engagement on Twitter (EN). Additionally, TrOA, TwOA, and EN scores for each student for each of the course learning outcomes were included on the SPSS data sheet.

Once the SPSS data sheet was created, hierarchical multiple regression analysis was performed to investigate whether students' personal characteristics, their engagement with the course through Twitter, and the level of attainment of the course learning outcomes they demonstrated on Twitter could predict the level of attainment of the course learning outcomes that students demonstrated on traditional assessments. The predictor variables were entered in three steps as follows—Step 1: gender, age group, ethnicity, English-speaking status, first-generation college student status, number of electronic devices owned, previous use of Twitter, computer self-efficacy (SE); Step 2: Twitter engagement (EN); Step 3: outcomes attainment on Twitter (TwOA). Zero-order, part, and partial correlations of each predictor were requested.

Preliminary data screening included examination of histograms of scores on all non-demographic study variables and examination of scatterplots for all pairs of variables. Univariate distributions were reasonably normal with no extreme outliers; bivariate relations were fairly linear and there were no multivariate outliers. Further analysis revealed a Durbin-Watson value of 2.27, which suggested that the residuals in the model might not be independent. However, given that EN and TwOA were both derived from the same observations (student tweets), some autocorrelation between the two variables was to be expected. A scatterplot of studentized residuals to unstandardized predicted values suggested that the sample could be in violation of the assumption of homoscedasticity. However, a Breusch–Pagan test and Koenker test were performed despite the relative smallness of the sample in this study. The results of both the Breusch-Pagan test ($BP = 11.93$, $p = .29$) and the Koenker test ($K = 12.28$, $p = .27$) suggested that

the assumption of homoscedasticity was not violated. At best, the question of whether or not the sample violates the assumption of homoscedasticity is inconclusive; I elected to proceed with the analysis without any further changes to the data set or variables. The histogram and normal probability plot of standardized residuals indicated a normal distribution. Tolerance values for all variables were greater than 0.1, though, as expected, the tolerance values for student engagement on Twitter (tolerance = .17) and student outcomes attainment on Twitter (tolerance = .13) were close to, but did not exceed, that threshold. As a result, multicollinearity was not considered a serious problem in the final model.

Partial regression plots of the dependent variable against the continuous independent variables appeared linear in nature. An examination of the studentized deleted residuals did not indicate the presence of any cases above 3 SD or below -3 SD and an examination of the values for Cook's distance revealed no cases with a Cook's distance value greater than 1. Leverage values for three cases were greater than 0.50, but the studentized deleted residuals and Cook's distance values in those cases were within acceptable ranges. One case had a leverage value of .54, a Cook's distance value of .69, and a studentized deleted residual of 2.80, which could have been interpreted as evidence that the case was an outlier. However, the student in that case completed all assignments in the course and finished the class satisfactorily. In light of the small sample size, this case was retained in the data set.

Processing the Qualitative Analysis. Quantitative data was collected from two questionnaires sent to students over Twitter. Data from those questionnaires was processed in accordance with the procedures described below.

Twitter questionnaires. Responses from the two Twitter questionnaires were made available to me at the conclusion of the semester in which the study took place, but analysis of them did not take place until after the quantitative analysis was completed. Responses to both questionnaires were provided in spreadsheet form; 28 students responded to questionnaire 1 (Q1) and 25 students responded to questionnaire 2 (Q2). Responses to the yes/no and Likert-scale questions on both questionnaires—"Had you ever used social media as part of a class before you took this class?" and "Do you think that Twitter was valuable or distracting?" on Q1; "Do you think that Twitter was a valuable part of this class or did you view it more as a distraction?" and "Do you think that using Twitter has helped you get better grades in this class?" on Q2—were counted and quantified.

Both questionnaires included open-ended questions that asked students to report how they chose which instructor tweets to which they replied. There were a variety of responses to those questions. Responses were coded according to key words and phrases used by the students (i.e., "easy," "interesting," "know the answer," etc.), which revealed nine types of responses that were consistent across both questionnaires. The nine types of responses are detailed in Table 6. From those nine types of responses, three categories of student response were identified and will be discussed in the next two chapters of this thesis. The other open-ended questions that students were asked to answer, "Is there

Table 6

Reported Methods of Replying to Instructor Tweets

Types of Response	Questionnaire 1	Questionnaire 2
Selects tweets to which they know the answer	5	5
Tries to answer all tweets	4	0
Picks easiest tweets to answer	4	4
Selects in order to maximize their learning	3	2
Chooses interesting content	3	2
Response did not answer the question	3	2
Selects randomly	2	2
Chooses to answer direct questions	2	1
Selects most recent tweets	1	6

Note. Questionnaire 1 was distributed to students in Week 4 of the course. Questionnaire 2 was distributed in Week 14.

anything you would change about the way Twitter is being used in this class?" and "Has using Twitter helped you to feel more connected to your classmates and/or the instructor?" were essentially yes/no questions that provided students with space to elaborate. As such, responses were coded and categorized according to whether or not they replied "yes" or "no" to each question. No consistent themes were uncovered in responses where students chose to elaborate beyond merely writing "yes" or "no," but noteworthy responses will be discussed where appropriate later in this thesis.

Chapter Five

The main purpose of the study described here was to explore whether or not requiring students to use a microblog as a formal learning tool in a community college history course would help students attain the content-based course learning outcomes as measured by their performance on "traditional" types of assessments. To that end, quantitative data such as student performance on those traditional assessments, student tweets published as part of the class, and student responses on a pre-course survey were collected. In addition, qualitative data was obtained by asking students to complete a series of two questionnaires. The questionnaires asked students to report on their perceptions of Twitter as a learning tool and how they completed their work on it. Data from both methods were integrated into the final analysis that will be presented in the next chapter.

Quantitative Results

Demographics. As previously noted, the sample for this study was taken from two community college U.S. history courses. The final sample size for this study was 30 students, including 21 students from a F2F section and 9 students from an online section. The final sample closely resembled the overall population of the community college at which the study took place in that 60% of the students who participated in the study were female and 40% were male; 67.7% of the sample reported being 24 years of age or

younger; and 60% self-identified as African American or black, 23.3% as Hispanic or Latino, 10% as Asian American, and 3.3% as white. Table 5 contains the full demographic breakdown of the study sample. In 2014, the college at large was 62% female and 38% male, 53.6% were 24 years of age or younger, and 73.4% were African American or black, 10.5% Hispanic or Latino, 4.1% Asian American, and 5.4% white. Additionally, 20% of the students in the sample reported that English was not their first language and 33.3% reported that they were first-generation college students. Figures on the percentage of students at the college as a whole for whom English is a second language were not readily obtainable.

Attitudes towards technology and experience with technology. In terms of the number of electronic devices owned by students in the sample (students were asked to select all of the devices they owned on the pre-course survey from smartphone, tablet, laptop computer, and desktop computer), 16.7% reported owning only one electronic device, 30% reported owning two, 26.7% reported owning three, and 23.3% reported owning all four; the mean number of devices owned by students in the sample was 2.60. As far as their previous experiences with Twitter, 33.3% of the students reported that they used Twitter at least once per day prior to the study, 16.7% reported using it at least once per week, 16.7% reported using it less than once per month, and 33.3% reported never using it (see Table 5). All 30 students in the sample completed the 18-item portion of the pre-course survey that was intended to measure technology self-efficacy. With a score of 1 representing a person with extremely negative feelings towards technology in learning and a score of 5 representing a person with extremely positive feelings towards

technology in learning, the mean of all students' technology self-efficacy scores was 3.37 (*SD* = 0.61).

Description of Student Work. Students could have earned a total of 300 points for their work on the multiple-choice items, identifications, and essays, or 100 points per assessment type. On average, students earned means of 58.87 points for the multiple-choice items (*SD* = 17.31), 72.82 points for the identifications (*SD* = 18.20), and 63.49 points for the essays (*SD* = 21.55). In order to earn full credit for their work on Twitter each week, students needed to publish at least five tweets per week. They could earn points towards their Twitter grade in the class over 10 weeks of the course. There was also one week near the end of the course in which students were encouraged to publish tweets, though they did not earn any points towards their grade for them. The mean number of tweets published per student per week, in weeks in which their work on Twitter was graded, was 4.19 (*SD* = 0.51). The mean number of tweets published per student in the week in which their work was not graded was 1.60. Table 7 shows the trend over time of the total number of student tweets per week and the mean number of student tweets per week.

As previously discussed, the great majority of the 1,304 student tweets that were curated for this study were published as replies to one of 111 instructor tweets (less than 1% of all student tweets were not replies to instructor tweets). Each instructor tweet was classified as ITT1, ITT2, or ITT3, depending on the complexity of the instructor tweet, and each instructor tweet was aligned to one of the three course learning outcomes that were part of the classes under investigation. Table 4 details instructor tweets by

Table 7

Student Tweets over Time

Week	*N* of Tweets	Tweets/Student
Week 1	150	5.00
Week 2	117	3.90
Week 3	116	3.87
Week 4	118	3.93
Week 5	139	4.63
Week 6	126	4.20
Week 7	118	3.93
Week 8	113	3.77
Week 9	109	3.63
Week 10	150	5.00
Week 11	48	1.60

Note. The mean of student tweets/week was 4.19 (*SD* = .51). Students were not required to tweet in Week 11 and received no grade for it if they did.

tweet type and course learning outcome: 37.8% of all instructor tweets were classified as ITT1, 39.6% were classified as ITT2, and 22.5% were classified as ITT3. However, despite the relatively balanced nature of the instructor tweets, students were much more likely to reply to instructor tweets of ITT1 than to the other instructor tweet types. Table 8 details all of the student tweets by instructor tweet type replied to and course learning outcome: 50.1% of student tweets were written in reply to instructor tweets of ITT1, 42.9% of student tweets were written in reply to instructor tweets of ITT2, and 6.9% were written in reply to instructor tweets of ITT3. A closer examination of the trends in student tweeting in Table 8 shows that the rate at which students chose to reply to instructor

tweets of ITT1 rose from CLO1 to CLO2 and CLO3 (the three course learning outcomes were addressed in order in both classes): 42.9% of student tweets aligned to CLO1 were written in reply to instructor tweets of ITT1, 51.6% of student tweets aligned to CLO2 were written in reply to instructor tweets of ITT1, and 63.8% of student tweets aligned to CLO3 were written in reply to instructor tweets of ITT1. There was also a commensurate decline in the percentage of student tweets that were written in reply to instructor tweets of ITT2 from CLO1 to CLO2 and CLO3, from 46.8% to 42.3% to 29.8%. Variations across the course learning outcomes in the percentages of student tweets written in reply to ITT3 were negligible, though the percentages remained low relative to the other instructor tweet types.

In all, 92.8% of student tweets written in reply to ITT1 were deemed to have demonstrated attainment of the course learning outcome associated with the instructor tweet, as determined by the accuracy and completeness of the student tweet; 59.8% of student tweets written in reply to ITT2 demonstrated attainment of the course learning outcomes, as determined by the accuracy, completeness, originality, and critical thinking displayed in the tweet (where appropriate); and 51.8% of student tweets written in reply to ITT3 demonstrated attainment of the course learning outcomes, as determined by the relevance, originality and critical thinking displayed in the tweet.

Given the ease with which students could read the tweets of their peers, the originality of student tweets written in response to ITT2 and ITT3 was evaluated as part of this study. Those evaluations were integrated into the TwOA metric to account for the likelihood that students would publish tweets that were worded similarly or identically to

Table 8

Student Tweets (N = 1,304)

Instructor Tweet Type	*N*		Course Outcome 1		Course Outcome 2		Course Outcome 3	
			632	48.5%	351	26.9%	312	23.9%
Instructor Tweet Type 1	653	50.1%	271	42.9%	181	51.6%	199	63.8%
Instructor Tweet Type 2	560	42.9%	296	46.8%	159	42.3%	93	29.8%
Instructor Tweet Type 3	90	6.9%	65	10.3%	11	3.2%	20	6.4%

Note. The percentages of student tweets written in reply to each tweet type and percentages of student tweets written in reply to instructor tweets aligned to the course outcomes do not add up to 100% because some student tweets were not replies to instructor tweets and/or did not align to any course outcome.

those of their peers. In the final analysis, 68.9% of all student tweets written in reply to instructor tweets of ITT2 and 81.1% of student tweets written in reply to instructor tweets of ITT3 were found to be substantially or somewhat different than the tweets of other students. Student tweets written in reply to instructor tweets of ITT1 were not evaluated for originality.

With regard to the dependent variable in the analysis, outcomes attainment on traditional assessments (TrOA), students' scores ranged from a high of 292 points to a low of 46.76 points; the mean TrOA score was 195.18 (*SD* = 51.44). For the key independent variable, outcomes attainment on Twitter (TwOA), scores ranged from 118.56 to 7.95; the mean TwOA score was 59.66 (*SD* = 27.21). For Twitter Engagement (EN), scores ranged from 112.14 to 8.25; the mean EN score was 51.13 (*SD* = 22.22).

Table 9 lists the means and standard deviations of the variables associated with each of the three course learning outcomes: TrOA-CLO1, TrOA-CL02, TrOA-CLO3; EN-CLO1, EN-CLO2, EN-CLO3; TwOA-CLO1, TwOA-CLO2, TwOA-CLO3. Where the means of outcomes attainment on traditional assessments is relatively consistent between all three course learning outcomes, a review of the means for the EN and TwOA variables shows sharp declines from EN-CLO1 to EN-CLO2 and from TwOA-CLO1 to TwOA-CLO2. The means on EN and TwOA from CLO2 to CLO3 are much closer together. These statistics reveal significantly higher levels of student engagement on Twitter and outcomes attainment on Twitter for CLO1 than for CLO2 and CLO3.

Hierarchical multiple regression results for overall model. In the primary

Table 9

Means for Course Outcome-Specific Variables

Variable	*M* for all students	*M* for CLOs	*SD* for CLOs
TrOA	195.18		
TrOA-CLO1	67.52		
TrOA-CLO2	63.35		
TrOA-CLO3	66.54	65.80	2.18
EN	51.13		
EN-CLO1	26.06		
EN-CLO2	14.25		
EN-CLO3	13.08	17.80	7.18
TwOA	59.66		
TwOA-CLO1	31.93		
TwOA-CLO2	14.90		
TwOA-CLO3	15.36	20.73	9.70

Note. CLOs = Course Learning Outcomes; TrOA = Outcomes Attainment on Traditional Assessments; EN = Twitter Engagement; TwOA = Outcomes Attainment on Twitter.

status (native or non-native), first-generation college student status, electronic device ownership, previous use of Twitter, technology self-efficacy, Twitter engagement (EN), and total outcomes attainment on Twitter (TwOA). The total *N* for this sample was 31, but one case was dropped because of extreme studentized deleted residual, Cook's distance, and leverage values and because the student in the case officially withdrew from the course. Therefore, for this analysis, $N = 30$.

Hierarchical multiple regression was performed; that is, the predictor variables were entered in three steps in an order determined by me. In Step 1 of the primary

regression analysis, eight independent variables were entered: gender, age group, ethnicity, English-speaking status, first-generation college student status, device ownership, previous use of Twitter, and technology self-efficacy (SE). In Step 2, EN was entered. In Step 3, TwOA was entered. The rationale for this order was that the covariates in Step 1 were entered as control variables to test whether or not any of them were significantly correlated to TrOA independent of EN and TwOA. Twitter Engagement was entered in Step 2 because research on this topic suggests that using SMT in the college classroom increases engagement and could lead to better academic outcomes. The final independent variable, TwOA, was entered in Step 3 because the primary purpose of this study was to investigate whether or not students who demonstrated attainment of course learning outcomes on Twitter would also demonstrate attainment of course learning outcomes on traditional assessments. Results for this hierarchical multiple regression are summarized in Tables 10 and 11.

The overall regression, including all 10 predictors, was statistically significant, $R = .77$, $R^2 = .59$, adjusted $R^2 = .37$, $F(10, 19) = 2.69$, $p = .03$. Outcomes attainment on traditional assessments could be predicted somewhat from this set of variables, with approximately 37% of the variance in TrOA accounted for by the regression, though TwOA was the only independent variable found to be a statistically significant predictor of TrOA in the analysis, $\beta = 1.01$, $t(19) = 2.45$, $p = .02$. TwOA was also found to be significantly correlated to TrOA in the full model, $R = .67$, $p < .001$. Although EN was

Table 10

Summary of Correlations of All Study Variables (N = 30)

Variables	TrOA	TwOA	EN	G	A	E	ES	FG	D	P
TrOA	-									
TwOA	.67**	-								
EN	.55**	.88**	-							
Gender (G)	-.20	-.18	-.10	-						
Age Group (A)	.06	.33*	.18	.04	-					
Ethnicity (E)	.14	.07	-.06	.08	.03	-				
English-speaking Status (ES)	.09	.04	.05	.04	.33*	-.19	-			
First-Generation Status (FG)	-.12	-.27	-.10	.05	.03	-.26	.00	-		
Device Ownership (D)	-.06	-.22	-.29	.11	.13	.24	-.13	.20	-	
Previous Use of Twitter (P)	.25	.19	.14	-.01	.27	-.40*	.69*	.00	-.04	-
Technology Self-Efficacy (SE)	.15	.16	.05	-.29	-.03	.32*	-.07	-.05	.18	-.08

Note. TrOA = Outcomes Attainment on Traditional Assessments; TwOA = Outcomes Attainment on Twitter; EN = Twitter Engagement.
*$p < .05$. **$p \leq .001$.

Table 11

Hierarchical Regression Model of Outcomes Attainment on Traditional Assessments (N = 30)

Predictor	*R*	R^2	ΔR^2	*B*	SE	β	*t*	*p*
Step 1	.47	.22*						
Gender				-20.03	21.80	-.19	-.92	.37
Age Group				.55	11.51	.01	.05	.96
Ethnicity				28.77	20.09	.36	1.43	.17
English-speaking status				-28.87	35.37	-.23	-.82	.42
First-generation status				2.14	22.74	.02	.09	.93
Device Ownership				-7.14	10.45	-.15	-.68	.50
Previous Use of Twitter				26.41	14.36	.55	1.84	.08
Technology Self-efficacy				3.51	18.48	.04	.19	.85
Step 2	.68	.46**	.24**					
Gender				-17.89	18.66	-.17	-.96	.35
Age Group				-6.41	10.12	-.12	-.63	.53
Ethnicity				26.77	17.20	.33	1.56	.14
English-speaking status				-12.86	30.73	-.10	-.42	.68
First-generation status				2.60	19.45	.02	.13	.90
Device Ownership				2.34	9.50	.05	.25	.81

Previous Use of Twitter				19.71	12.49	.41	1.58	.13
Technology Self-efficacy				-1.14	15.89	-.01	-.07	.94
Twitter Engagement				1.25	.42	.54	2.95	.01
Step 3	.77	.59***	.13***					
Gender				-9.91	17.01	-.09	-.58	.57
Age Group				-17.89	10.20	-.33	-1.75	.10
Ethnicity				18.84	15.73	.23	1.20	.25
English-speaking status				9.34	28.95	.07	.32	.75
First-generation status				19.70	18.75	.18	1.05	.31
Device Ownership				3.92	8.52	.08	.46	.65
Previous Use of Twitter				10.76	11.76	.22	.92	.37
Technology Self-efficacy				-7.50	14.45	-.09	-.52	.61
Twitter Engagement				-.60	.84	-.26	-.71	.49
Outcomes Attainment on Twitter				1.90	.78	1.01	2.45	.02

*p = .66, **p = .12, ***p = .03

significantly correlated to TrOA in the full model, $R = .55$, $p = .001$, it was not a statistically significant predictor of TrOA in Step 3 of the regression analysis, $\beta = -.26$, $t(19) = -.71$, $p = .49$. The entry of TwOA in Step 3 significantly increased the R^2 of the model over the Step 2 model, $R^2_{\text{increment}} = .13$, $p = .02$. The nature of the relation of TwOA to TrOA was as expected, with higher scores on TwOA predicting higher scores on TrOA. The semi-partial regression coefficient of TwOA suggests that TwOA explains 36.1% of the variance in TrOA. These data suggest that higher levels of outcomes attainment on traditional assessments were found among students that demonstrated higher levels of outcomes attainment on Twitter.

In Step 2, EN was significantly predictive of TrOA, $\beta = .54$, $t(20) = 2.95$, $p = .01$, and the entry of EN into the model caused a significant change over the Step 1 model, $R^2_{\text{increment}} = .24$, but the model itself was not statistically significant, $F(9, 20) = 1.86$, $p = .12$. The Step 1 model was not statistically significant either, $F(8, 21) = .74$, $p = .66$, and none of the independent variables in Step 1 was found to be significantly predictive of TrOA.

Analysis of hierarchical regression results related to individual course learning outcomes. Three hierarchical regression analyses were performed in which gender, age group, ethnicity, English-speaking status, first-generation college student status, device ownership, previous use of Twitter, and (SE) were maintained as step 1 covariates, but the dependent variable and remaining independent variables in each of these analyses were those associated with the three course learning outcomes. In other words, TrOA-CLO1 was the dependent variable and EN-CLO1 and TwOA-CLO1 were

independent variables in one analysis, TrOA-CLO2 was the dependent variable and EN-CLO2 and TwOA-CLO2 were independent variables in the second analysis, and TrOA-CLO3 was the dependent variable and EN-CLO3 and TwOA-CLO3 were independent variables in the final analysis. All of the steps were completed in the same order as they were in the primary regression analysis.

For the analysis associated with course learning outcome 1 (see Tables 12 and 13), the Step 1 model was not statistically significant, $F(8, 20) = .61$, $p = .76$, and none of the independent variables was found to be significantly predictive of TrOA-CLO1. The model remained statistically insignificant after the addition of EN-CLO1 in Step 2, $F(9, 19) = 1.02$, $p = .46$, and none of the independent variables was found to be significantly predictive of TrOA-CLO1 in that step either. The addition of TwOA-CLO1 in Step 3 made the model statistically significant, $R = .82$, $R^2 = .67$, adjusted $R^2 = .49$, $F(10, 18) = 3.66$, $p = .01$. Three of the independent variables were found to be significantly predictive of TrOA-CLO1 in Step 3: age group, $\beta = -0.54$, $t(18) = -3.02$, $p = .01$; EN-CLO1, $\beta = -0.69$, $t(18) = -2.34$, $p = .03$; and TwOA-CLO1, $\beta = 1.48$, $t(18) = 4.34$, $p < .001$. Those results suggest that students' performance on traditional assessments aligned to CLO1 were negatively related to their age and engagement on Twitter and positively related to the level of outcomes attainment they demonstrated on Twitter. In other words, older students who were more engaged on Twitter, but who demonstrated lower levels of attainment of CLO1 on Twitter, did worse on the traditional assessments aligned to CLO1 than younger, less Twitter-engaged students who nevertheless demonstrated higher levels of attainment of CLO1 on Twitter. The semi-partial regression coefficients of the

Table 12

Summary of Correlations of All Study Variables Related to Course Learning Outcome 1 (N = 29)

Variables	TrOA1	TwOA1	EN1	G	A	E	ES	FG	D	P
TrOA1	-									
TwOA1	.60**	-								
EN1	.36*	.82**	-							
Gender (G)	-.01	-.23	-.16	-						
Age Group (A)	.04	.39*	.17	.05	-					
Ethnicity (E)	.08	.11	-.03	.08	.03	-				
English-speaking Status (ES)	.08	.00	-.01	.05	.32*	-.19	-			
First-Generation Status (FG)	-.08	-.24	-.09	.03	.03	-.26	.01	-		
Device Ownership (D)	.13	-.10	-.19	.07	.15	.26	-.11	.18	-	
Previous Use of Twitter (P)	.23	.12	-.02	.16	.26	-.40*	.68**	.02	.00	-
Technology Self-Efficacy (SE)	.32*	.29	.15	-.32*	-.02	.32*	-.05	-.07	.16	-.06

Note. TrOA1 = Outcomes Attainment on Traditional Assessments for Course Learning Outcome 1; TwOA1 = Outcomes Attainment on Twitter for Course Learning Outcome 1; EN1 = Twitter Engagement for Course Learning Outcome 1.
*$p \leq .05$, **$p < .001$.

Table 13

Hierarchical Regression Model of Outcomes Attainment on Traditional Assessments for Course Learning Outcome 1 (N = 29)

Variables	*R*	R^2	ΔR^2	*B*	*SE*	β	*t*	*p*
Step 1	.44	.20*						
Gender				2.38	5.92	.09	.40	.69
Age Group				-.34	3.07	-.02	-.11	.91
Ethnicity				1.26	5.49	.06	.23	.82
English-speaking status				-4.50	9.48	-.14	-.47	.64
First-generation status				-1.52	6.07	-.06	-.25	.81
Device Ownership				.72	2.88	.06	.25	.81
Previous Use of Twitter				4.70	3.92	.37	1.20	.25
Technology Self-efficacy				7.24	5.02	.33	1.44	.17
Step 2	.57	.33**	.13**					
Gender				3.30	5.583	.121	.59	.562
Age Group				-1.74	2.977	-.123	-.58	.567
Ethnicity				1.82	5.16	.09	.35	.73
English-speaking status				-3.27	8.93	-.10	-.37	.72
First-generation status				-.87	5.71	-.03	-.15	.88
Device Ownership				1.84	2.76	.14	.67	.51
Previous Use of Twitter				4.85	3.69	.39	1.32	.20
Technology Self-efficacy				5.75	4.78	.26	1.20	.24

Twitter Engagement-CLO1				.58	.30	.39	1.92	.07
Step 3	.82	.67***	.35***					
Gender				6.75	4.09	.25	1.65	.12
Age Group				-7.66	2.54	-.54	-3.02	.01
Ethnicity				-2.32	3.83	-.11	-.61	.55
English-speaking status				8.95	7.00	.27	1.28	.22
First-generation status				4.64	4.29	.17	1.08	.29
Device Ownership				2.89	2.00	.23	1.44	.17
Previous Use of Twitter				-.74	2.95	-.06	-.25	.81
Technology Self-efficacy				1.84	3.55	.08	.52	.61
Twitter Engagement-CLO1				-1.02	.43	-.69	-2.39	.03
Outcomes Attainment on Twitter-CLO1				1.37	.32	1.48	4.34	.00

*p = .76, **p = .46, ***p = .01

Table 14

Summary of Correlations of All Study Variables Related to Course Learning Outcome 2 (N = 29)

Variables	TrOA2	TwOA2	EN2	G	A	E	ES	FG	D	P
TrOA2	-									
TwOA2	.25	-								
EN2	.21	.82*	-							
Gender (G)	-.25	-.04	-.02	-						
Age Group (A)	.06	.26	.04	.05	-					
Ethnicity (E)	.10	-.01	-.20	.08	.03	-				
English-speaking Status (ES)	.02	-.07	.10	.05	.32**	-.19	-			
First-Generation Status (FG)	.00	-.22	-.06	.03	.03	-.26	.01	-		
Device Ownership (D)	.13	-.23	-.30	.07	.15	.26	-.11	.18	-	
Previous Use of Twitter (P)	.21	-.02	.14	.02	.26	-.40**	.68**	.02	.00	-
Technology Self-Efficacy (SE)	.20	.06	.08	-.31**	-.02	.32	-.05	-.07	.16	-.06

Note. TrOA2 = Outcomes Attainment on Traditional Assessments for Course Learning Outcome 2; TwOA2 = Outcomes Attainment on Twitter for Course Learning Outcome 2; EN2 = Twitter Engagement for Course Learning Outcome 2.
*$p < .001$, **$p \leq .05$.

Table 15

Hierarchical Regression Model of Outcomes Attainment on Traditional Assessments for Course Learning Outcome 2 (N = 29)

Variables	*R*	R^2	ΔR^2	*B*	*SE*	β	*t*	*p*
Step 1	.45	.20*						
Gender				-7.77	6.57	-.26	-1.18	.25
Age Group				.17	3.41	.01	.05	.96
Ethnicity				5.96	6.08	.26	.98	.34
English-speaking status				-9.01	10.51	-.25	-.86	.40
First-generation status				2.05	6.73	.07	.30	.76
Device Ownership				.42	3.19	.03	.13	.90
Previous Use of Twitter				6.78	4.35	.48	1.56	.14
Technology Self-efficacy				1.36	5.57	.06	.24	.81
Step 2	.51	.26*	.06*					
Gender				-8.46	6.51	-.28	-1.30	0.21
Age Group				-.15	3.37	-.01	-0.05	0.96
Ethnicity				7.11	6.08	.31	1.17	.26
English-speaking status				-8.62	10.38	-.24	-.83	.42
First-generation status				2.48	6.65	.08	.37	.71
Device Ownership				1.51	3.27	.11	.46	.65
Previous Use of Twitter				6.46	4.30	.46	1.50	.15
Technology Self-efficacy				.01	5.61	.00	.00	.99

Twitter Engagement-CLO2				-8.46	6.51	-.28	-1.30	.21
Step 3	.53	.28*	.02*					
Gender				-7.97	6.64	-.26	-1.20	.25
Age Group				-1.77	4.19	-.11	-.42	.68
Ethnicity				6.52	6.23	.28	1.05	.31
English-speaking status				-5.98	11.25	-.17	-.53	.60
First-generation status				3.92	7.08	.13	.55	.59
Device Ownership				1.66	3.33	.12	.50	.62
Previous Use of Twitter				6.60	4.37	.47	1.51	.15
Technology Self-efficacy				.43	5.72	.02	.08	.94
Twitter Engagement-CLO2				-7.97	6.64	-.26	-1.20	.25
Outcomes Attainment on Twitter-CLO2				-1.77	4.19	-.11	-.42	.68

*$p > .66$.

Table 16

Summary of Correlations of All Study Variables Related to Course Learning Outcome 3 (N = 28)

Variables	TrOA3	TwOA3	EN3	G	A	E	ES	FG	D	P
TrOA3	-									
TwOA3	.28	-								
EN3	.20	.57*	-							
Gender (G)	-.25	-.07	.02	-						
Age Group (A)	-.14	-.05	.20	.01	-					
Ethnicity (E)	.11	-.10	-.08	.31	.01	-				
English-speaking Status (ES)	-.01	.03	-.15	-.04	.31	-.23	-			
First-Generation Status (FG)	-.29	-.19	-.01	.08	-.04	-.25	-.01	-		
Device Ownership (D)	-.23	-.11	-.12	.24	.08	.35*	-.14	.11	-	
Previous Use of Twitter (P)	.14	.28	.15	-.04	.24	-.42*	.69*	-.05	-.09	-
Technology Self-Efficacy (SE)	.13	.09	-.03	.01	-.04	.32	-.07	-.06	.21	-.09

Note. TrOA3 = Outcomes Attainment on Traditional Assessments for Course Learning Outcome 3; TwOA3 = Outcomes Attainment on Twitter for Course Learning Outcome 3; EN3 = Twitter Engagement for Course Learning Outcome 3.
*$p < .05$.

Table 17

Hierarchical Regression Model of Outcomes Attainment on Traditional Assessments for Course Learning Outcome 3 (N = 28)

Variables	*R*	R^2	ΔR^2	*B*	*SE*	β	*t*	*p*
Step 1	.51	.26*						
Gender				-5.08	8.05	-.14	-.63	.54
Age Group				-2.77	4.01	-.15	-.69	.50
Ethnicity				7.66	7.42	.27	1.03	.32
English-speaking status				-8.81	12.13	-.21	-.73	.48
First-generation status				-6.04	8.07	-.16	-.75	.46
Device Ownership				-4.70	4.00	-.27	-1.18	.25
Previous Use of Twitter				6.58	4.99	.40	1.32	.20
Technology Self-efficacy				1.68	6.39	.06	.26	.80
Step 2	.53	.28*	.02*					
Gender				-5.40	8.16	-.15	-.66	.52
Age Group				-3.67	4.25	-.19	-.86	.40
Ethnicity				7.23	7.54	.26	.96	.35
English-speaking status				-4.51	13.64	-.11	-.33	.75
First-generation status				-6.38	8.19	-.17	-.78	.45
Device Ownership				-4.03	4.15	-.23	-.97	.35

Previous Use of Twitter				5.18	5.41	.32	.96	.35
Technology Self-efficacy				1.61	6.47	.06	.25	.81
Twitter Engagement-CLO3				-5.40	8.16	-.15	-.66	.52
Step 3	.53	.28*	.003*					
Gender				-5.37	8.38	-.15	-.64	.53
Age Group				-3.36	4.54	-.18	-.74	.47
Ethnicity				7.33	7.76	.26	.95	.36
English-speaking status				-4.69	14.03	-.11	-.33	.74
First-generation status				-5.89	8.65	-.16	-.68	.51
Device Ownership				-4.06	4.27	-.24	-.95	.36
Previous Use of Twitter				4.97	5.63	.30	.88	.39
Technology Self-efficacy				1.39	6.71	.05	.21	.84
Twitter Engagement-CLO3				-5.37	8.38	-.15	-.64	.53
Outcomes Attainment on Twitter-CLO3				-3.36	4.54	-.18	-.74	.47

*$p > .59$.

three variables suggest that 40.8% of the variance in TrOA-CLO1 can be explained by age group, 32.3% by EN-CLO1, and 58.7% by TwOA-CLO1. Given tolerance values of .57 for age group, .22 for EN-CLO1, and .16 for TwOA-CLO1, there is evidence to suggest that there is a great deal of shared variance between the three, especially between EN-CLO1 and TwOA-CLO1.

For the analysis associated with course learning outcome 2 (see Tables 14 and 15), none of the models in any of the three steps were statistically significant, none of the independent variables in any of the three steps were significantly correlated with TrOA-CLO2, and none of the independent variables in any three of the steps were significantly predictive of TrOA-CLO2. That was also the case for all of the models and independent variables associated with course learning outcome 3 (see Tables 16 and 17). None of the models in any of the three steps associated with CLO3 were statistically significant, none of the independent variables in any of the three steps were significantly correlated with TrOA-CLO3, and none of the independent variables in any three of the steps were significantly predictive of TrOA-CO3.

Qualitative Results

Qualitative data for this study were collected through two anonymous electronic questionnaires. The first questionnaire was sent to students in the second week of the class in which Twitter use was required (the fourth week in the class overall) and the second was sent to students in the last week of the class in which Twitter use was required (week 14 of each course). Each questionnaire contained a mix of fixed-response and open-ended questions. The results of both surveys were held until the completion of

the semester in which the study took place. Analysis of the results of the questionnaires did not occur until after all of the quantitative data had been processed and analyzed.

On questionnaire 1 (Q1), students were asked whether or not they had ever before used social media as part of a class: 2 out of 28 respondents (7.1%) reported having previously used social media as part of a class; 26 out of 28 respondents (92.9%) reported that they had never used social media as part of a class.

On Q1, students were asked "Do you think that Twitter was valuable or distracting?" (see Table 18 for the full results). Among the 28 students who completed

Table 18

Student Responses When Asked if Twitter was a Valuable or Distracting Part of the Class

Questionnaire	Valuable	Somewhat Valuable	Somewhat Distracting	Distracting	No Response
Questionnaire 1	10	12	2	1	3
	35.7%	42.9%	7.1%	3.6%	10.7%
Questionnaire 2	8	11	2	2	2
	32.0%	44.0%	8.8%	8.0%	8.0%

Note. Questionnaire 1 was administered in the second week of the class and Questionnaire 2 was administered in the tenth week of the class.

the questionnaire, 78.6% reported that they found Twitter to be a valuable or somewhat valuable part of the class and 10.7% of respondents reported that they found Twitter to be a distracting or somewhat distracting part of the class; no response to the question was provided by 10.7% of respondents. On questionnaire 2 (Q2), students were asked "Do

you think that Twitter was a valuable part of this class or did you view it more as a distraction?" Among the 25 students who completed the questionnaire, 76% reported that they found Twitter to be a valuable or somewhat valuable part of the class and 16% of respondents reported that they found Twitter to be a distracting or somewhat distracting part of the class; no response to the question was provided by 8% of respondents.

On Q2, students were asked "Do you think that using Twitter has helped you get better grades in this class?" Among the 25 respondents, 32% reported that using Twitter had "definitely" helped them get better grades, 16% reported that Twitter had been "somewhat" helpful in getting better grades, and 16% reported that it was no help at all; 36% of respondents did not answer the question. Thus, 48% of students who completed the questionnaire, a plurality of overall respondents and a majority of those who answered the question, reported that using Twitter helped their grades in the course to some degree.

On both Q1 and Q2 students were asked the open-ended question "How do you pick which of the instructor's tweets you are going to respond to?" The question was answered by 27 students on Q1 (one student did not respond) and 24 students on Q2 (one student did not respond). Responses were coded according to keywords and key phrases (i.e., "easy," "interesting," "know the answer," etc.), which revealed nine types of responses that were consistent across both questionnaires. Table 6 contains a full list of all nine response types and the frequencies with which they appeared on both questionnaires. For the purposes of this study, the nine types of responses were then placed into three categories, including the Path of Least Resistance, Academically

Purposeful, and Other (for students who did not respond or who responded to the question in a way that was not meaningful). Table 19 contains a list of all three categories of response and the frequencies with which each appeared on both questionnaires, including the response types that made up each category.

Table 19

Categories of Student Methods of Replying to Instructor Tweets

Category	Q1	Q2
Path of Least Resistance	42.9%	64.0%
Selects most recent tweets		
Selects tweets to which they know the answer		
Picks easiest tweets to answer		
Chooses to answer direct questions		
Academically Purposeful	35.7%	16.0%
Selects in order to maximize their learning		
Chooses interesting content		
Tries to answer all tweets		
Other	21.4%	20.0%
Selects randomly		
Response did not answer the question		
Did not respond		

Note. Q1 = Questionnaire 1; Q2 = Questionnaire 2.

Those three categories were chosen because the types of responses aligned to each revealed some of the underlying motivations that informed how students completed their

coursework on Twitter. For example, it was assumed for the purposes of this study that students who selected instructor tweets that were recent, easy, framed as direct questions with simple answers, or that they knew readily how to answer were less concerned with using Twitter as a learning tool and more concerned with fulfilling the course requirements as they pertained to the medium. Thus, responses of those four types were categorized as indicating students who chose the "path of least resistance" to completing their work on Twitter, the "path" being one that leads to the attainment of points towards their final grade in the course. Responses which indicated that the student approached their work on Twitter with an eye towards increasing their learning of the subject matter in some manner were classified as "academically purposeful." Students who provided responses of this type expressed concern for learning the subject matter by choosing to answer difficult instructor tweets, ones to which they did not know the answer, or those that sparked their interest in some fashion. Whatever the case, it was assumed that these "academically purposeful" responses were indicative of students who treated Twitter as more of a learning tool than those students whose responses fell into the "path of least resistance" category. Responses (and non-responses) that fell into the "Other" category did not provide any insight into students' motivations and have been ignored in this analysis.

As Table 19 reveals, 42.9% of student responses on Q1 to the question "How do you pick which of the instructor's tweets you are going to respond to?" fell into the "Path of Least Resistance" category while 35.7% fell into the "Academically Purposeful" category. However, those percentages changed significantly from Q1 to Q2. On Q2, 64%

of responses to the same question were categorized as “Path of Least Resistance” while 16% were categorized as “Academically Purposeful”.

On Q1, 27 students responded to the open-ended question “Is there anything you would change about the way Twitter is being used in this class?” Among the 27 respondents, 19 answered “no” and declined to elaborate their response any further (67.9%), 3 answered “no” and provided some justification for their answer (10.7%), 4 provided minor suggestions for changing the way Twitter is used (14.3%), 1 student rejected outright the idea that Twitter had value to the course (3.4%), and 1 student did not respond to the question (3.4%). In other words, 78.6% of respondents did not want to change anything about how Twitter was used in their course. On Q2, 24 students responded to the open-ended question “Is there anything you would change about the way Twitter was used in this class?” Among the 24 respondents, 17 answered “no” and declined to elaborate their response any further (68%), 5 answered “no” and provided some justification for their answer (20%), 1 provided minor suggestions for changing the way Twitter is used (4%), 1 student rejected the use of Twitter outright (4%), and 1 student did not respond to the question (4%). In other words, 88% of respondents did not want to change anything about how Twitter was used in their course.

The final question that made up Q2 was open-ended and asked students if “using Twitter helped you to feel more connected to your classmates and/or the instructor?” Out of 25 students who completed the questionnaire, 24 answered that question; 52% of respondents reported feeling a greater sense of connection to the instructor, other students, or both while 44% reported feeling no greater sense of connection to either the

instructor or the other students; 4% of respondents did not answer this question. Five out of 25 respondents (20%) answered “yes” to the question without elaboration, 10 respondents (40%) reported feeling more connected to the instructor, and 3 respondents (12%) reported feeling more connected to their classmates (the sum of these percentages is greater than 52% because some of the responses overlapped). Notably, two of the respondents who specifically identified themselves as students in the online class that was part of this study wrote that they felt more connected to both the instructor and their classmates by using Twitter.

Chapter Six

This chapter includes a summary of the study, a review of the results, a description of the findings, and a discussion of how this study fits within the current body of literature on the use of SMT in higher education. Furthermore, the limitations and potential significance of the study will be outlined and recommendations for further research on this topic will be offered.

The mixed methods study described here was designed to explore the degree to which using a microblog as a formal learning tool in a community college history course would help students demonstrate higher levels of attainment of content-based course learning outcomes on traditional assessments. Quantitative methods were used to measure students on the quantity and quality of their work on both traditional assessments (operationalized by tracking students' performance on multiple-choice questions, identification, and essays) and on Twitter (operationalized by tracking the volume and quality of students' tweets) when controlling for student engagement on Twitter (operationalized by tracking the number of tweets that students published and the types of instructor tweets to which they replied), gender, age, ethnicity, English-speaking status, first-generation college student status, number of electronic devices owned, previous experience with Twitter, and technology self-efficacy. The research question that drove the quantitative portion of the study was:

RQ1: When a microblog is used as an instructional tool in a community college history survey course, do relationships exist between or among student learning outcomes attainment on traditional types of assessments, student learning outcomes attainment on the microblog, and student engagement on the microblog? What roles do previous experience in using Twitter, level of electronic device ownership, technology self-efficacy, age, gender, ethnicity, English-speaking status, and first-generation college status play in those relationships?

Qualitative data was obtained through anonymous electronic questionnaires that asked students to report upon their perceptions of Twitter as a learning tool and the manner in which they used it in the class. The research question that motivated the qualitative portion of the study was:

RQ2: How do students in a community college history survey course that requires the formal use of a microblog make decisions about how to use the medium in the context of the course?

The sample for the study consisted of 30 students from two community college U.S. history courses—one online and one face-to-face—at a large, diverse, suburban community college in the U.S. mid-Atlantic in the spring 2015 semester. Participating students consented to the use of data obtained from their grades in the course and from the tweets they published. Additionally, participants completed a pre-course survey on which they reported demographic characteristics and answered questions related to their

feelings of technology self-efficacy. Hyperlinks to anonymous questionnaires for the qualitative portion of the study were sent using Twitter to all students in both classes.

Key Findings

Evidence was uncovered that a meaningful positive relationship existed between student learning outcomes attainment on Twitter (TwOA) and student learning outcomes attainment on traditional assessments (TrOA) when controlling for all of the other study variables. That is, students that demonstrated higher levels of course learning outcomes attainment on Twitter also demonstrated higher levels of course learning outcomes attainment on traditional assessments. Additional support for that finding emerged from the qualitative portion of the study, as majorities of students on both questionnaires reported that Twitter was a valuable part of the class and a plurality on the second questionnaire reported that using Twitter helped them get better grades in the class. Those results were found despite the fact that a majority of the students who answered the questionnaires reported that they did not necessarily use Twitter in an academically purposeful way.

To answer Research Question 1, a three-step hierarchical multiple regression was performed in which student learning outcomes attainment on traditional assessments (TrOA) was the dependent variable and student learning outcomes attainment on Twitter (TwOA), student engagement on Twitter (EN), previous experience in using Twitter, level of electronic device ownership, technology self-efficacy (SE), age, gender, ethnicity, English-speaking status, and first-generation college status were independent variables. Of particular interest in the analysis were the relationships between TrOA and

TwOA and TrOA and EN. When controlling for the influence of EN and the other eight independent variables, a statistically significant positive relationship was found between student learning outcomes attainment on traditional assessments and student learning outcomes attainment on Twitter, $R = .67$, $R^2 = .45$, $\beta = 1.01$, $t(19) = 2.45$, $p = .02$. The semi-partial correlation between TrOA and TwOA suggests that TwOA explained 36.1% of the variance in TrOA. Despite being highly correlated to TrOA, $R = .55$, $p = .001$, student engagement on Twitter was not found to be significantly predictive of TrOA, $\beta = -.26$, $p = .49$, and none of the other independent variables in the study were found to be correlated with or predictive of TrOA. These figures suggest the possibility that using Twitter as a formal learning tool helped students achieve higher levels of attainment of the course learning outcomes in the course.

The results of the two anonymous questionnaires were utilized in order to answer Research Question 2. Given that over 99% of student tweets were written in response to instructor tweets, students were asked on both questionnaires "How do you pick which of the instructor's tweets you are going to respond to?" On Questionnaire 1 (Q1), 42.9% of students reported that they completed their work on Twitter in a manner consistent with the "path of least resistance," as compared to 35.7% of students who were more "academically purposeful" in doing so. On Questionnaire 2 (Q2), 64% of students reported that they chose the "path of least resistance" to completing their work on Twitter, as compared to 16% of students who were more "academically purposeful" in doing so. In other words, a plurality of the students who completed Questionnaire 1 and a majority who completed Questionnaire 2 reported that they completed their work on

Twitter in a manner that suggests they were more interested in completing their work easily and quickly than in using the medium purposefully as a learning tool.

Further findings from the qualitative portion of the study suggest that students found Twitter to be an academically beneficial part of the class: 78.6% of respondents to Q1 and 76% of respondents to Q2 reported that they found Twitter to be a valuable or somewhat valuable part of the class and 48% of students who completed Q2 reported that using Twitter helped their grades in the course to some degree (36% of respondents did not answer the question). Additionally, 78.6% of respondents to Q1 and 88% of respondents to Q2 did not want to change anything about how Twitter was used in their class and 52% of respondents to Q2 reported feeling a greater sense of connection to their peers, the instructor, or both as a result of using Twitter.

An unexpected result of the study was found when data for each of the three course learning outcomes were analyzed separately. That is, three three-step hierarchical regressions, identical in structure to the one performed for the primary analysis, were performed to test for the influence of the independent variables on outcomes assessment on traditional assessments for each of the three content-based course learning outcomes. Though the eight control variables remained the same in all three regressions (previous experience in using Twitter, level of electronic device ownership, technology self-efficacy, age, gender, ethnicity, English-speaking status, and first-generation college status), each of outcomes attainment on traditional assessments (the dependent variable), outcomes attainment on Twitter, and student engagement on Twitter were calculated from student work that was aligned to one of the three course learning outcomes. Neither

of the regression models for course learning outcomes 2 and 3 were found to be statistically significant and none of the independent variables in either model were found to be significantly correlated with outcomes attainment on traditional assessments for those outcomes. However, the regression model for course learning outcome 1 was statistically significant, $F(10, 18) = 3.66$, $p = .01$, and three of the independent variables in that model were found to be significantly predictive of TrOA-CLO1: age group ($\beta = -0.54$, $t(18) = -3.02$, $p = .01$), student engagement on Twitter for CLO1 ($\beta = -0.69$, $t(18) = -2.34$, $p = .03$), and outcomes attainment on Twitter for CLO1 ($\beta = 1.48$, $t(18) = 4.34$, $p < .001$). Stated plainly, for materials aligned to CLO1, older students who were more engaged on Twitter, but whose tweets demonstrated low levels of attainment of the learning outcome, did worse on the traditional assessments aligned to the learning outcome than younger students who were less engaged on Twitter, but whose tweets demonstrated higher levels of attainment of the learning outcome.

Integration of Findings

The responses of many students on the questionnaires suggest that that they completed their work on Twitter in the simplest way possible: that is, they sought the easiest path to earning the points they needed to get the grade they wanted in the class. The evidence implies that many students engaged with the course on Twitter less out of a desire to learn and more out of a desire to complete their work as quickly as possible. That conclusion is supported by the fact that 50.1% of all student tweets were written in reply to instructor tweets of ITT1, the easiest type of instructor tweet to answer, even though instructor tweets of ITT1 were only 37.8% of the available instructor tweets.

Further, only 6.9% of student tweets were written in reply to instructor tweets of ITT3, the most difficult type of instructor tweet to answer, although instructor tweets of ITT3 made up 22.5% of available instructor tweets. These pieces of evidence could help to explain why student engagement on Twitter (EN) was statistically insignificant in the final step of the primary hierarchical regression analysis. After all, if many of the students who participated in the study were going on Twitter with the sole intention of completing their work in the fastest way possible, then the mere fact of completing their work may not necessarily have led to them learning the course material. In many cases they could have been copying the tweets of their classmates, a behavior that we would not necessarily expect to be conducive to real learning, or answering instructor tweets to which they knew the answer. In the case of the latter, they might have known the answer from reading it in the textbook or hearing it in class, so that answering the instructor tweet may have provided students with an opportunity to reinforce their prior knowledge. However, in the absence of data that would indicate why students answered particular instructor tweets, there is no way to measure the degree to which answering instructor tweets to which they knew the answer might have contributed to students' overall learning, but it is feasible that doing so added some value to their educational experience.

On the other hand, despite the fact that many students did not approach completing their work on Twitter in an academically purposeful way, there is compelling evidence that using Twitter did nevertheless help students learn the course material. Most importantly, the statistically significant contribution of TwOA to TrOA in the final regression analysis strongly supports such a conclusion. Further support was found in the

fact that 77.4% of student respondents on both questionnaires reported that they found Twitter to be a valuable or somewhat valuable part of the class and that 48% of student respondents on Questionnaire 2 reported that using Twitter "definitely" or "somewhat" helped their grades in the course (only 16% reported that it did not help at all, 36% of respondents did not answer the question). It seems that, for students who went about completing their work on Twitter in the fastest way possible, the mere act of completing their work on Twitter may have had some impact on their attainment of the course learning outcomes on traditional assessments. Moreover, given that 35.7% of student respondents to Questionnaire 1 and 16% of student respondents to Questionnaire 2 reported choosing instructor tweets for reply in an academically purposeful way, there would have been some group of students that were using Twitter deliberately as a learning tool. Whichever the case, it seems reasonable to conclude that at least some students ended up learning about the course content, whether they meant to or not, as they completed their work on Twitter.

With regard to the findings related to each of the three course learning outcomes, there are several possible explanations. As the semester progressed students could have become more aware that they could complete their work on Twitter by copying their classmates' tweets, diminishing their opportunities for genuine learning. It is also possible that the novelty of using Twitter in a class (92.9% of students reported on Questionnaire 1 that they had never used social media in a class before) was exciting to some students early in the class, but the novelty wore off as they came to accept it as just another way to submit coursework. That possibility is supported by the fact that the

number of students who reported using Twitter in an "academically purposeful" manner was higher earlier in the course than it was near the end of it. In fact, 35.7% of students who responded to Questionnaire 1, administered in the second week in which Twitter use was required, reported that they chose instructor tweets in an "academically purposeful" manner and 42.9% reported that they chose instructor tweets in a manner consistent with the "path of least resistance," while only 16% of respondents to Questionnaire 2, administered in the tenth week in which Twitter use was required, reported that they chose instructor tweets in an "academically purposeful" manner and 64% chose instructor tweets consistent with the "path of least resistance." That shift in students' reported motivation could be interpreted as evidence that, as the class progressed, the novelty of using a new technology dissipated and students became less interested in engaging with the medium purposefully. They still did their work on the medium (see the next paragraph), but they gained less from it because they were less interested in doing so.

A further explanation for the lack of significance in the regression models for CLO2 and CLO3 may be found by examining the trend of student engagement on Twitter over the course of the semester in which the study took place. As Table 7 shows, the number of tweets published in weeks when students were required to use Twitter stayed somewhat consistent over the course of the semester, never going above 150 student tweets or falling below 109 student tweets (M = 118.55, SD = 27.50). Also, the trend in outcomes attainment on traditional assessments over all three outcomes was extremely consistent (M = 65.80, SD = 2.18), as shown in Table 9. Yet, despite the relative consistency in the number of tweets published by students every week and the outcomes

attainment on traditional assessments they demonstrated across each of the course learning outcomes, the trends in student engagement on Twitter and outcomes attainment on Twitter for each of the course learning outcomes declined markedly from CLO1 to CLO2 and CLO3 (*M* of EN-CLO scores = 17.80, *SD* = 7.18; *M* of TwOA-CLO scores = 20.73, *SD* = 9.70). These data suggest that, while the total volume of student tweets stayed consistent across the whole semester, the engagement demonstrated by students on Twitter fell sharply by the time the class was covering material from CLO2 and CLO3. In practical terms, that means students were publishing about the same number of tweets each week as the course progressed, but they increasingly chose to reply to instructor tweets that were easier to answer.

That trend is further confirmed by data in Table 8, which shows that 42.9% of the student tweets that dealt with material from CLO1 were written in reply to instructor tweets of ITT1, 51.6% of the student tweets that dealt with material from CLO2 were written in reply to instructor tweets of ITT1, and 63.8% of the student tweets that dealt with material from CLO2 were written in reply to instructor tweets of ITT1. Along with that, student replies to instructor tweets of ITT2 declined from 46.8% of student tweets dealing with material from CLO1, to 42.3% of student tweets dealing with material from CLO2, to 29.8% of student tweets dealing with material from CLO3. This evidence suggests that students became less academically purposeful over time in their use of Twitter, a finding supported by the qualitative data obtained from questionnaires 1 and 2.

Another interesting piece of evidence worth noting here is the fact that, for instructor tweets aligned to CLO1, there were more student tweets written in reply to

instructor tweets of ITT2 than ITT1. Table 8 shows that 42.9% of student tweets aligned to CLO1 were written in reply to instructor tweets of ITT1 while 46.8% of student tweets aligned to CLO1 were written in reply to instructor tweets of ITT2. Those percentages shifted decisively for CLO2 and CLO3 as more student tweets were written in reply to instructor tweets of ITT1 for those outcomes. Why did students reply more often to instructor tweets of ITT2 for CLO1? After all, as Table 4 indicates, instructor tweets of ITT2 were no more prevalent for CLO1 than for the other course learning outcomes. Based on the results of the first questionnaire, which was administered during the period in which subject-matter aligned to CLO1 was the focus of the course, and which indicate that 35.7% of students reported completing their work on Twitter in an academically purposeful manner, it is possible to conclude that more students treated Twitter as a learning tool in that early stage of the course than did later. There are multiple possible explanations for why they might have done so: they might have been more eager to do well early in the class; they might have become more aware that the quality of their work on Twitter did not affect their grade on there and adjusted their behavior accordingly; or they just might have gotten tired of using Twitter. If it is true that students were more academically purposeful in their use of Twitter early in the semester, then that would help to explain the statistically significant relationship between outcomes attainment on traditional assessments and outcomes attainment on Twitter for CLO1.

It seems reasonable to conclude, based on the evidence presented here, that the formal use of microblogging in the community college history classroom can contribute positively to student performance on traditional assessments, with three major

qualifications. First, the data generated from this study suggest that using a microblog for an entire semester might diminish its effectiveness. Students reported that they were less inclined to use Twitter in academically purposeful ways as the semester progressed and the available quantitative data confirmed that disinclination. Second, students are more likely to learn about the course content through a microblog when it is a required part of a class, but the amount they learn is almost certainly contingent upon how they use it. Some students will use the microblog in academically purposeful ways and some will not, but more purposeful students are likely to learn more than less purposeful students. The fact, reflected in both quantitative and qualitative data, that students were more academically purposeful when completing their work on Twitter for CLO1, lends itself to the conclusion that the manner in which students approached the medium was decisive in how it contributed to their learning.

Despite the evidence uncovered in this study which suggests that Twitter was an effective tool for learning, the final qualification to these conclusions concerns the existence of a possible unexplored confounding variable. West, Moore, and Barry (2015) examined how the use of Twitter related to learning outcomes and found "unclear evidence about the impact of Twitter on students' final grades" (p. 8). In seeking to articulate why the evidence they found was unclear, West et al. pointed out the possible existence of an endogeneity problem in their results. That is, they did not account for the probability that successful students were more likely to engage in academically productive behaviors than less successful students. If that was the case for West et al., then the same confounding variable is possible here. Namely, that the observed statistical

relationship between outcomes attainment on traditional assessments and outcomes attainment on Twitter could be due to the fact that higher-achieving students demonstrated higher levels of attainment on both types of coursework and lower-achieving students demonstrated lower levels of attainment on both types of coursework. Since no effort was made in this study to control for students' prior achievement level (high school GPA, college GPA, placement test scores, etc.), it is entirely possible that the results found in this study are due to some degree to students' personal characteristics.

Significance of the Study

This study suggests that microblogs can be viable platforms for teaching and learning. However, they might just as easily be ineffective for that purpose. After all, Hirsh (2012) found no statistically significant connection between the use of Twitter in an online community college classroom and the final grades of the students in those classes. That result should not necessarily be interpreted as a failure of the technology though. Tay and Allen (2011) and Hew and Cheung (2013) argued that any effects observed from using SMT in the college classroom might be attributable to the manner in which the technology was used and not to the technology itself. Although Hirsh provided very little detail with regard to the manner in which the instructors involved in her study used Twitter, one is left with the impression that they used it very sparingly. If that is true, it would go some distance towards explaining Hirsh's findings. Despite the conclusions drawn in the present thesis, the likelihood remains that the medium itself was not the key factor that helped students learn. Instead, the key factors were probably the

instructor, the method in which the instructor used the medium, and the students themselves.

Over and over again in the literature on this topic, scholars emphasized the critical role of the instructor in using SMT effectively. Regardless of the teaching tool, technologically-based or otherwise, teachers who are experienced with the tool and who have made use of it in different ways and in different contexts are better equipped to deploy the tool in productive ways than someone with little knowledge of or experience with the tool. In the case of this study, I experimented extensively with Twitter for three years and only firmly settled on a method of using it about one year before the study commenced. There is no way to quantify the impact that my previous experience had on the results of this study, but it is doubtless that there was some. An aspect of this topic that has gone under-reported in the literature is the experience that teachers have with the SMT they deployed in their classrooms.

Dunlap and Lowenthal (2009) maintained that using SMT in the classroom was an effective way to increase instructor presence and instructor-student interaction. Similar to the instructor involved in Clarke and Nelson's (2012) study, I was highly engaged and used Twitter extensively in the two classes that were part of this study, according to Clarke and Nelson's definition. I was ever-present and consistently reachable through Twitter—"reachable at all times" according to one student respondent to Questionnaire 2—instructor characteristics that were bound to increase the sense of connection that students felt to the course according to Junco, Elavsky, and Heiberger (2012) and Brownson (2014). In fact, 52% of respondents to Questionnaire 2 reported that using

Twitter helped them to feel a greater sense of connection to their instructor and/or classmates. In particular, two respondents to the questionnaire wrote that they were students in the online section of the course (they were not asked to identify the class in which they were enrolled, they just volunteered the information) and that using Twitter helped them feel closer to their instructor and classmates. One wrote that they felt connected to the instructor and their classmates "more so than any [other] online class I'd taken." Those feelings of connection, brought about by the specific manner in which Twitter was used as a teaching and learning platform, could partly explain why students seemed to benefit from its use (Chickering & Gamson, 1987).

Brinthaupt, Fisher, Gardner, Raffo, and Woodard (2011), Junco et al. (2012), and Hostetter (2013) all wrote that the teacher and the teaching methods used through SMT were decisive factors determining whether or not positive outcomes would emerge from the use of technology. Mindful of that research, I was very careful to structure Twitter into my courses and to scaffold its use for students in such a manner as to maximize the likelihood that positive outcomes would be observed. Requiring students to use Twitter, providing them with detailed instructions and guidelines for its use in a special section of the syllabus, in-class training on the appropriate use of the medium (a video in the case of the online class), and using it to model effective communication styles to students and to communicate regularly with them were among the strategies utilized towards that end. West et al. (2015) asserted that the effectiveness of teaching strategies utilizing SMT were "highly dependent on the level of comfort and expertise of the instructor [in using the technology]" (p. 9). My extensive experience in using Twitter in the classroom (the

two classes in this study were the eleventh and twelfth classes in which I used Twitter) also may have played a role in the outcome of this study. The manner in which Twitter was used here hewed closely to the practices recommended by numerous scholars. The instructor of the classes was experienced with Twitter and highly engaged on it, the pedagogy of its use was carefully considered, and students received a high level of support in their use of it. Perhaps as a result of that, evidence emerged that Twitter was effective at helping students attain the course learning outcomes at a higher rate than they would have without using it. I would argue that the results of this study provide confirmation of the soundness of the many of the guidelines for teaching practice that appear in the literature on the use of Twitter and/or SMT in the college classroom.

Finally, this study adds to the literature on this topic by exploring empirically the connection between SMT usage and academic performance, a deficiency in the research pointed out by Ravenscroft, Warburton, Hatzipanagos, and Conole (2012) and Davis, Dell-Amen, Rios-Aguilar, and Gonzalez Canche (2012). It looks at the use of SMT in classrooms outside those at four-year higher education institutions, which was an under-developed sector of the research on this topic according to Davis et al. (2012). Gao, Luo, and Zhang (2012) argued that too few studies in this area reported on the reliability of study instruments or provided data on participants, setting, or implementation procedures and that too many studies relied on participant self-reporting for their data. This study was constructed with all of those critiques in mind and to address some important gaps in the literature. In particular, as both the instructor of the classes using Twitter and the

primary researcher I was able to use student performance data (i.e., grades) in a manner that has not appeared in the literature on this topic.

Limitations of the Study

The single most significant limitation of the study described here has to do with the small sample size, increasing the likelihood that the quantitative results were affected by type I error. With $N = 30$, any conclusions drawn from this study must be treated carefully. Although the qualitative aspects of the research design were able to contribute meaningful data to the study, the fact remains that the sample in this case was well below that which is recommended by most scholars for multiple linear regression. Guidelines typically range from a minimum of 100 participants, plus 10 for every predictor, to at least 300 when there are more than 10 predictors (as in this case). No matter which guideline is preferred, the sample size in this study was well below it. Thus, it is possible that the effect detected between TwOA and TrOA was falsely positive. Alas, there was no reasonable method available of increasing the sample size substantially within a realistic timeframe. Extending the study for one semester might have increased the sample size by 25-40 students, but that would still have left the sample below the recommended size and would have introduced other difficulties.

An additional problematic design constraint stems from the fact that all of the students in the sample were from one instructor's classes at one institution of higher education. Given that I was the only instructor whose classes were involved in the study, there can be no way of knowing the degree to which the observed findings from this study would be confined to only my classes. Also, the institution at which the study was

conducted has a unique character, being classified as both suburban and predominantly black by the U.S. Department of Education. The fact that the study was confined to just two of my classes at one distinctive institution limits the generalizability of the study findings.

The design of the courses in this study is also a limiting factor. Specifically, the manner in which Twitter was integrated into the courses as a teaching and learning tool was unique. Students were required to use Twitter, they were graded on their work on the medium, and the primary manner in which they used it was replying to tweets published by the instructor. As pointed out in Chapter Two, this combination of classroom practices has not been found in any other published studies. Twitter use was mandatory for students in some studies, but it was voluntary in most of them; students' work on Twitter was ungraded or graded only in a general way (such as through a "participation" grade) in virtually all of the studies; and no study I have ever uncovered reported that student activity on Twitter was almost exclusively completed by replying to tweets published by the course instructor. The highly distinctive context in which this study took place means that the findings from it must be applied cautiously to other contexts.

Another limitation of the study is related to the possible presence of bias. Specifically, two of the most important variables in the study, TrOA and TwOA, were based on my subjective evaluation of student work. Though an argument could be made that students' performance on the multiple-choice questions was fairly objective, the same cannot be said of their work on the identifications and the essays. While efforts were made to test the reliability of my use of the rubrics related to those two assessment

types (see Chapter Four), the fact is that I still had to repeatedly and subjectively apply the rubrics. The same could be said of the evaluations upon which the TwOA variable was based. In determining whether or not students "attained" the related course outcome on their tweets, evaluative decisions had to be made repeatedly. While "accuracy" and "relevance" could be gauged from student tweets rather simply, originality and critical thinking were often more challenging to determine. In the end I simply had to rely upon the judgment I have developed over ten years as a college teacher, including over three years in which Twitter was used as a teaching and learning tool. Still, the evaluation of student work on traditional assessments took place during the course of the semester, limiting the possibility for bias, and student tweets were evaluated for engagement and outcomes attainment before any quantitative analysis took place. There was simply no way for me to know how the data would turn out when those evaluations were made.

Recommendations for Further Research

West et al. (2015) did not account for students' prior level of academic achievement in this study and neither did I. As a result, the results of both studies have to be qualified with the admission that any observed learning gains might have been attributable to students' innate abilities. Any further research on this topic should attempt to control for this factor in order to reduce or eliminate the endogeneity problem identified by West et al. Future researchers on this topic could either ask students to self-report on their prior academic achievement on a pre-course survey or ask them for consent to use their academic records as a control variable.

A larger sample size is something that future researchers in this field should obtain. It may be challenging to find instructors experienced with microblogs who are willing to use it in a fashion similar to that which has been reported here, but a sample with students from numerous courses across different disciplines could potentially answer some significant questions raised here. Additionally, I would be very interested to see a robust comparison between student populations in both online and F2F classes. I wanted to make such a comparison myself, but the limitations of the study prevented me from doing so (I only had nine students agree to participate in the online section of the course included in this study). Despite the validity concerns I expressed in Chapter Three about the grade data from my classes that used Twitter before this study, those data nevertheless suggest that using microblogs in the classroom might improve pass and fail rates, especially in online classes. As for the higher withdrawal rate in the online classes that used Twitter, I wonder if offering students an alternative to using the microblog would help to mitigate that problem. Future studies could address these questions.

Future studies on this topic should also seek to further clarify students' motivation for using SMT in their classrooms. In the case of the study described here, students received a grade for their work on Twitter, which meant that earning points was a motivation, perhaps the primary motivation, for students to use it. I concur with Junco et al. (2012) that requiring students to use a microblog is preferable to making it optional in terms of promoting positive outcomes. However, I would go further in encouraging teachers to grade students' work on the medium. For numerous ethical and practical reasons many scholars have rejected the issuance of grades for coursework completed on

SMT, but I am unconvinced by those concerns in light of the advantages to be gained by using microblogs as tools of formal assessment. That said, I tried in the past to grade students on the academic and structural quality of their tweets and it did not work for me. The workload it entailed was onerous and struck me as inauthentic to the medium. Now I grade students on the effort they demonstrate on Twitter, but I am careful to continue to use the medium in a focused and purposeful way; I want students who are academically motivated to be able to use it productively.

A scholar looking to replicate the study described here should consider making the use of the microblog more challenging for students. For example, a study that provided students with fewer opportunities to answer lower level instructor tweets, such as those of ITT1, and instead provided only higher level instructor tweets to answer might generate more positive results in terms of student outcomes. Given that many of the students involved in this study chose to answer greater numbers of lower level instructor tweets as the semester progressed, it would be interesting to test for any added impact that might be found if they did not have the option to do so. Along those same lines, more instructor tweets could be structured in a way to make them more open-ended. By fashioning instructor tweets in such a way as to make plagiarism difficult or impossible, it could lead to a greater possibility of more positive student outcomes.

I would strongly encourage future researchers on this topic to consider much more robust qualitative methods in their approach. In particular, focus groups of students who used a microblog in their class could potentially offer deeper insight into how they viewed it both as an assignment and as a learning tool. I initially planned to conduct

focus groups as part of this study, but practical considerations made them impossible. I would have appreciated the opportunity to present students with numerous examples of different instructor tweet types in order to ask them what they thought of the different tweet types and why they would or would not reply to them. In interviews students could be asked to what degree they are really approaching their work on the medium as just another requirement to fulfill. Do they see connections between their work on the medium and their academic progress in the class?

Any scholar considering the study of SMT in the classroom needs to take into account the experience of the teachers involved in using the selected SMT. As previously indicated, it is highly probable that my extensive experience and experimentation with Twitter played a significant role in the outcomes observed in this study. Yet, in the literature on this topic, the experience of the instructors involved in the research in using SMT is almost never reported. That is a deficiency that future researchers should rectify.

As pointed out here, no statistically significant relationships were found between outcomes attainment on traditional assessments and outcomes attainment on Twitter for the second and third course learning outcomes. Future studies should seek to replicate that result or should seek to find out if limiting the amount of time that the technology is used affects its usefulness.

Appendix A

GEORGE MASON UNIVERSITY

Office of Research Integrity and Assurance

Research Hall, 4400 University Drive, MS 6D5, Fairfax, Virginia 22030
Phone: 703-993-5445; Fax: 703-993-9590

DATE:	January 12, 2015
TO:	Kelly Schrum
FROM:	George Mason University IRB
Project Title:	[626791-2] Comparison of Student Learning Outcomes Attainment on Twitter and Traditional Assessments
SUBMISSION TYPE:	Amendment/Modification
ACTION:	APPROVED
APPROVAL DATE:	January 12, 2015
EXPIRATION DATE:	July 10, 2015
REVIEW TYPE:	Expedited Review
REVIEW TYPE:	Expedited review category #7

Thank you for your submission of Amendment/Modification materials for this project. The George Mason University IRB has APPROVED your submission. This submission has received Expedited Review based on applicable federal regulations.

Please remember that all research must be conducted as described in the submitted materials.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by the IRB prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to the Office of Research Integrity & Assurance (ORIA). Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed (if applicable).

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to the ORIA.

The anniversary date of this study is July 10, 2015. This project requires continuing review by this committee on an annual basis. You may not collect date beyond this date without prior IRB approval. A continuing review form must be completed and submitted to the ORIA at least 30 days prior to the

Appendix B

Grading rubrics for traditional assessments

Identification Grading Rubric

Domain	Excellent	Good	Average	Below Average	Unsatisfactory
Accuracy 15%	Points: 0.75 Identification contains no factual inaccuracies.	Points: 0.6 Identification is mostly accurate, but contains one or two minor factual inaccuracies.	Points: 0.55 Identification is mostly accurate, but contains one major factual inaccuracy OR more than two minor inaccuracies.	Points: 0.5 Identification contains some accurate information, but has one major inaccuracy AND more than two minor inaccuracies.	Points: 0.4, 0 Identification may contain one or two minor points of accuracy, but is otherwise incomplete and/or filled with inaccurate information.
Level of detail provided 15%	Points: 0.75 Identification is described with as much detail as the approved course materials will allow.	Points: 0.6 Identification fails to include one major relevant detail from the course materials, but is otherwise thoroughly described.	Points: 0.55 Identification fails to include two major relevant details from the course materials, but is otherwise adequately described.	Points: 0.5 Identification includes some relevant details from the course materials, but is missing more than two others.	Points: 0.4,0 Identification includes little to no relevant details from the course materials.
Paraphrasing 10%	Points: 0.5 A key quote may be included from the approved course materials, but the language and sentence syntax in the identification are obviously the student's own.	Points: 0.4 The identification may be too dependent on quotations from the course materials, though at least two-thirds of the language and sentence syntax in the identification are the student's own.	Points: 0.35 The identification is too dependent on quotations from the course materials, though at least 50 percent of the language and sentence syntax in the identification are the student's own.	Points: 0.3 The identification is almost entirely dependent on quotations from the course materials.	Points: 0.25,0 The language and sentence syntax in the identification are obviously the student's own, but the identification is poorly written and/or overly brief.
Analysis of the term's significance	Points: 2.5 The historical significance of the term is analyzed thoroughly	Points: 2 An attempt is made to analyze the historical significance of the term, but the logic behind that	Points: 1.75 An attempt is made to analyze the historical significance of the term, but the logic behind that analysis	Points: 1.5 An attempt is made to analyze the historical significance of the term, but there is no logic	Points: 1.25,0 No attempt is made to analyze the historical significance of the term.

50%	using sound logic that is supported by appropriate evidence from the approved course materials.	analysis is weakly developed OR the analysis itself is poorly supported by evidence from the approved course materials.	is weakly developed AND the analysis itself is poorly supported by evidence from the approved course materials.	behind it and it has no basis in evidence.	
Appropriate use of citations 10%	Points: 0.5	Points: 0.4	Points: 0.35	Points: 0.3	Points: 0.25,0
	All sources from approved course materials are cited appropriately and correctly within the text of the identification.	All sources from approved course materials are appropriately cited, but the formatting of the citations is incorrect.	Some attempt was made to cite sources, but those citations may be incomplete or they are formatted incorrectly.	Some attempt was made to cite sources, but those citations are incomplete and they are formatted incorrectly.	No sources were cited, but it is clear that approved course materials were used in the identification.

Grading rubric for Essay 1

Domain	Excellent	Good	Average	Below Average	Unsatisfactory
Thesis Statement	Points: 2.5	Points: 2	Points: 1.75	Points: 1.5	Points: 1, 0
	Essay contains a clearly identifiable thesis statement AND explicitly outlines a course of argument for the paper.	Essay contains a clearly identifiable thesis statement OR explicitly outlines a course of argument for the paper.	Essay contains a thesis statement AND outlines a course of argument for the paper, but neither are well-developed.	Essay contains a thesis statement, but it merely restates the prompt. No attempt to outline a course of argument.	Essay contains neither a thesis statement nor an outline of the paper's argument.
Organization	Points: 2.5	Points: 2	Points: 1.75	Points: 1.5	Points: 1, 0
	The essay has an introduction and a conclusion. Uses topic sentences, paragraphs, and transitions throughout.	The essay has an introduction and a conclusion, but it fails to make use of one of the following: topic sentences, paragraphs, and transitions.	The essay has an introduction and conclusion, but it fails to make use of two of the following: topic sentences, paragraphs, and transitions.	The essay has an introduction OR a conclusion, but not both. Fails to make use of at least one of the following: topic sentences, paragraphs, and transitions	No introduction or conclusion. Fails to use topic sentences, paragraphs, or transitions.
Development	Points: 7.5	Points: 6	Points: 5.25	Points: 4.5	Points: 3.75,0
	The essay directly addresses the issues and ideas raised in the prompt, makes an argument throughout the essay that supports the thesis statement, and uses specific evidence throughout the essay to support that argument.	The essay directly addresses the issues and ideas raised in the prompt, but either the argument does not adequately support the thesis statement OR the evidence is not well-connected to the argument.	The essay addresses the issues and ideas raised in the prompt, but the argument does not adequately support the thesis statement AND the evidence is not well-connected to the argument.	The essay addresses the issues and ideas raised in the prompt, but there is no coherent argument and it makes little use of specific evidence.	The essay does not address the prompt, does not make any coherent argument that connects to the thesis, and uses almost no specific evidence.
Proper Citation	Points: 2.5	Points: 2	Points: 1.75	Points: 1.5	Points: 1.25,0

of Sources (all sources should be provided in MLA format)	All sources cited in the appropriate format.	At least 75% of the sources are cited in the appropriate format.	At least 75% of the sources are cited, but they may not be in the appropriate format.	There is some attempt to cite sources, but they may not be in the appropriate format.	No attempt to cite any sources.
The revolutionary period (1763-1789)	Points: 10, 9	Points: 8	Points: 7	Points: 6	Points: 5,2,0
	Essay uses appropriate and convincing evidence to thoroughly address TWO of the following: How the traditional political autonomy enjoyed by the colonies contributed to a shared sense of grievance after 1763; The shared experience of war and state constitution-making during the Revolutionary War; and The failure of the Articles of Confederation and the perceived need for the Constitutional Convention.	The evidence provided is not always appropriate or convincing, but essay thoroughly addresses TWO of the topics relevant to this criterion.	Little evidence is provided, but the essay adequately addresses TWO of the topics relevant to this criterion; OR Essay uses appropriate and convincing evidence to thoroughly address ONE of the topics relevant to this criterion.	Essay adequately addresses ONE of the topics related to this criterion, though little evidence is provided.	Essay fails to address any of the issues that are relevant to this criterion.
The early national period (approx.. 1789 – 1800)	Points: 10, 9	Points: 8	Points: 7	Points: 6	Points: 5,2,0
	Essay uses appropriate and convincing evidence to thoroughly address TWO of the following: The debates over the Constitution that took place during either the Constitutional Convention or the ratification period; Disagreements between the Federalists and Republicans in the 1790s over the meaning of the Constitution, from the debates over Hamilton's financial program to the dispute over the Alien and Sedition Acts;	The evidence provided is not always appropriate or convincing, but essay thoroughly addresses TWO of the topics relevant to this criterion.	Little evidence is provided, but the essay adequately addresses TWO of the topics relevant to this criterion; OR Essay uses appropriate and convincing evidence to thoroughly address ONE of the topics relevant to this criterion.	Essay adequately addresses ONE of the topics related to this criterion, though little evidence is provided.	Essay fails to address any of the issues that are relevant to this criterion.

	The development of the first political party system and the leaders, constituencies, and beliefs of those first parties.				
Analysis & Evaluation	Points: 15	Points: 12	Points: 10.5	Points: 9	Points: 7.5
	The essay makes a persuasive argument that traces how and why the American colonies became a single nation. Analysis demonstrates a thorough understanding of the question.	The argument presented in the essay for how and why the colonies became a single nation is mostly persuasive. Analysis demonstrates understanding of the question, though it may be unevenly developed.	Some evaluation of the topic is presented, but the essay may be more descriptive than analytical. Argumentation is minimal and analysis is adequate, but unevenly developed.	The essay is almost exclusively descriptive rather than analytical. Argumentation is minimal or non-existent and the analysis demonstrates little understanding of the question.	Little to no understanding of the question. No argumentation or analysis.

Grading rubric for Essay 2

Domain	Excellent	Good	Average	Below Average	Unsatisfactory
Thesis Statement	Points: 2.5	Points: 2	Points: 1.75	Points: 1.5	Points: 1, 0
	Essay contains a clearly identifiable thesis statement AND explicitly outlines a course of argument for the paper.	Essay contains a clearly identifiable thesis statement OR explicitly outlines a course of argument for the paper.	Essay contains a thesis statement AND outlines a course of argument for the paper, but neither are well-developed.	Essay contains a thesis statement, but it merely restates the prompt. No attempt to outline a course of argument.	Essay contains neither a thesis statement nor an outline of the paper's argument.
Organization	Points: 2.5	Points: 2	Points: 1.75	Points: 1.5	Points: 1, 0
	The essay has an introduction and a conclusion. Uses topic sentences, paragraphs, and transitions throughout.	The essay has an introduction and a conclusion, but it fails to make use of one of the following: topic sentences, paragraphs, and transitions.	The essay has an introduction and conclusion, but it fails to make use of two of the following: topic sentences, paragraphs, and transitions.	The essay has an introduction OR a conclusion, but not both. Fails to make use of at least one of the following: topic sentences, paragraphs, and transitions	No introduction or conclusion. Fails to use topic sentences, paragraphs, or transitions.
Development	Points: 7.5	Points: 6	Points: 5.25	Points: 4.5	Points: 3.75,0
	The essay directly addresses the issues and ideas raised in the prompt, makes an argument throughout the essay that supports the thesis statement, and uses specific evidence	The essay directly addresses the issues and ideas raised in the prompt, but either the argument does not adequately support the thesis statement OR the evidence is not well-connected to the	The essay addresses the issues and ideas raised in the prompt, but the argument does not adequately support the thesis statement AND the	The essay addresses the issues and ideas raised in the prompt, but there is no coherent argument and it makes little use of specific evidence.	The essay does not address the prompt, does not make any coherent argument that connects to the thesis, and uses almost no specific evidence.

	throughout the essay to support that argument.	argument.	evidence is not well-connected to the argument.		
Proper Citation of Sources (all sources should be provided in MLA format)	Points: 2.5	Points: 2	Points: 1.75	Points: 1.5	Points: 1.25,0
	All sources cited in the appropriate format.	At least 75% of the sources are cited in the appropriate format.	At least 75% of the sources are cited, but they may not be in the appropriate format.	There is some attempt to cite sources, but they may not be in the appropriate format.	No attempt to cite any sources.
Western expansion and Manifest Destiny (approx.. 1803 – 1850)	Points: 10, 9	Points: 8	Points: 7	Points: 6	Points: 5,2,0
	Essay uses appropriate and convincing evidence to thoroughly address TWO of the following: The Missouri Compromise of 1820 as one of the first manifestations of growing sectionalism; The impact of Manifest Destiny ideology on American attitudes towards expansionism; The rise of aggressive expansionism in the Democratic Party and the rise of the Free Soil movement; The origins of the Mexican War.	The evidence provided is not always appropriate or convincing, but essay thoroughly addresses TWO of the topics relevant to this criterion.	Little evidence is provided, but the essay adequately addresses TWO of the topics relevant to this criterion; OR Essay uses appropriate and convincing evidence to thoroughly address ONE of the topics relevant to this criterion.	Essay adequately addresses ONE of the topics related to this criterion, though little evidence is provided.	Essay fails to address any of the issues that are relevant to this criterion.
Events and issues surrounding the coming of the Civil War (approx.. 1820 – 1861)	Points: 10, 9	Points: 8	Points: 7	Points: 6	Points: 5,2,0
	Essay uses appropriate and convincing evidence to thoroughly address TWO of the following: The immediate impact of the Mexican War on the question of slavery in the territories; The failure of the Compromise of 1850 to settle the question of slavery in the territories;	The evidence provided is not always appropriate or convincing, but essay thoroughly addresses TWO of the topics relevant to this criterion.	Little evidence is provided, but the essay adequately addresses TWO of the topics relevant to this criterion; OR Essay uses appropriate and convincing evidence to thoroughly address ONE of the topics relevant to this criterion.	Essay adequately addresses ONE of the topics related to this criterion, though little evidence is provided.	Essay fails to address any of the issues that are relevant to this criterion.

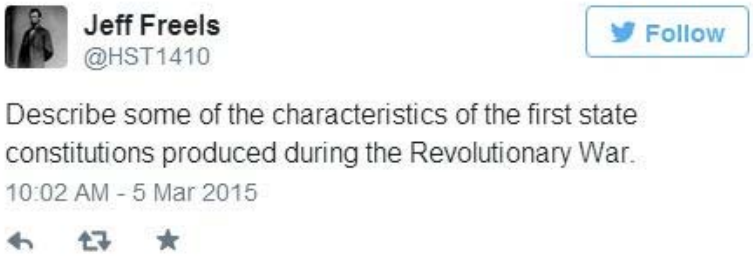
	The Kansas-Nebraska controversy and the breakdown of the two-party system; The Dred Scott decision and the irreconcilable views of north and south towards slavery; The sectional nature of the Republican Party and Southern attitudes towards it.				
Analysis & Evaluation	Points: 15	Points: 12	Points: 10.5	Points: 9	Points: 7.5
	The essay makes a persuasive argument connecting western expansion and the disagreements it caused over the extension of slavery into the territories to the outbreak of the Civil War. Analysis demonstrates a thorough understanding of the question.	The argument presented in the essay connecting western expansion and the disagreements it caused over the extension of slavery into the territories to the outbreak of the Civil War is mostly persuasive. Analysis demonstrates understanding of the question, though it may be unevenly developed.	Some evaluation of the topic is presented, but the essay may be more descriptive than analytical. Argumentation is minimal and analysis is adequate, but unevenly developed.	The essay is almost exclusively descriptive rather than analytical. Argumentation is minimal or non-existent and the analysis demonstrates little understanding of the question.	Little to no understanding of the question. No argumentation or analysis.

Appendix C

Examples of Instructor Tweets

Example of Instructor Tweet Type 1

Example of Instructor Tweet Type 2



Example of Instructor Tweet Type 3

Appendix D

Student Tweet Rubrics

Student Tweet Rubric for Instructor Tweet Type 1

Performance Level	5	4	3	2	1
Accuracy	Points: 2	Points: 1.7	Points: 1.4	Points: 1.1	Points: 0.8, 0
	ST provides a correct and factually accurate response to the IT to which it is replying.	ST provides a correct response to the IT to which it is replying and it contains no more than one minor factual inaccuracy.	ST provides a mostly correct response to the IT to which it is replying and it contains no more than one minor factual inaccuracy.	ST provides an incomplete or incorrect response to the IT to which it is replying, though it contains some accurate information.	ST provides an incomplete or incorrect response to the IT to which it is replying and contains little to no accurate information.

Student Tweet Rubric for Instructor Tweet Type 2

Performance Level	5	4	3	2	1
Accuracy	Points: 2	Points: 1.7	Points: 1.4	Points: 1.1	Points: 0.8, 0
	ST provides a correct and factually accurate response to the IT to which it is replying.	ST provides a correct response to the IT to which it is replying and it contains no more than one minor factual inaccuracy.	ST provides a mostly correct response to the IT to which it is replying and it contains no more than one minor factual inaccuracy.	ST provides an incomplete or incorrect response to the IT to which it is replying, though it contains some accurate information.	ST provides an incomplete or incorrect response to the IT to which it is replying and contains little to no accurate information.
Originality		Points: 1.7	Points: 1.4	Points: 0.5	Points: 0
		The language of the ST is substantially different	The language of the ST is somewhat different	The language of the ST is somewhat similar to	The language of the ST is near-identical to the

		from the tweets of other students.	from the tweets of other students.	the tweet of another student.	tweet of another student.
Critical Thinking	Points: 3	Points: 2.25	Points: 1.5	Points: 0.75	Points: 0.25
	ST is clear, precise, well-reasoned, deep, and insightful. Displays an advanced comprehension of the course material. Conforms generally to the FCT's "High Level Performance" standard.	ST is clear, precise, and well-reasoned, but displays little or no depth or insight. Displays an adequate comprehension of the course material. Conforms generally to the FCT's "Grade of B" performance standard.	ST is inconsistently clear, precise, and well-reasoned, but displays only a basic comprehension of the course material. Little or no depth or insight. Conforms generally to the FCT's "Grade of C" performance standard.	ST is unclear, imprecise, and poorly reasoned, but displays some comprehension of the course material. No depth or insight. Conforms generally to the FCT's "Grade of D" performance standard.	ST is unclear, imprecise, poorly reasoned, and displays little to no comprehension of the course material. Conforms generally to the FCT's "Grade of F" performance standard.

Note. FCT stands for the Foundation for Critical Thinking. The standards referred to in this rubric are based on the work of Richard Paul and may be found in the FCT's "College-Wide Grading Standards" document.

Student Tweet Rubric for Instructor Tweet Type 3

Performance Level	5	4	3	2	1
Relevance	Points: 2	Points: 1.7	Points: 1.4	Points: 1.1	Points: 0.8, 0
	ST is obviously relevant to the IT to which it is replying.	ST is mostly relevant to the IT to which it is replying.	ST is marginally relevant to the IT to which it is replying.	ST is barely relevant to the IT to which it is replying.	ST is not relevant to the IT to which it is replying.
Originality		Points: 1.7	Points: 1.4	Points: 0.5	Points: 0
		The language of the ST is substantially different from the tweets of other students.	The language of the ST is somewhat different from the tweets of other students.	The language of the ST is somewhat similar to the tweet of another student.	The language of the ST is near-identical to the tweet of another student.
Critical Thinking	Points: 3	Points: 2.25	Points: 1.5	Points: 0.75	Points: 0.25
	ST is clear, precise, well-reasoned, deep, and insightful. Displays an advanced comprehension of the course material. Conforms generally to	ST is clear, precise, and well-reasoned, but displays little or no depth or insight. Displays an adequate comprehension of the course material.	ST is inconsistently clear, precise, and well-reasoned, but displays a basic comprehension of the course material. Little or no depth or insight. Conforms	ST is unclear, imprecise, and poorly reasoned, but displays some comprehension of the course material. No depth or insight. Conforms generally to	ST is unclear, imprecise, poorly reasoned, and displays little to no comprehension of the course material. Conforms generally to

	the FCT's "High Level Performance" standard.	Conforms generally to the FCT's "Grade of B" performance standard.	generally to the FCT's "Grade of C" performance standard.	the FCT's "Grade of D" performance standard.	the FCT's "Grade of F" performance standard.

Note. FCT stands for the Foundation for Critical Thinking. The standards referred to in this rubric are based on the work of Richard Paul and may be found in the FCT's "College-Wide Grading Standards" document.

Appendix E

Syllabus Insert

What is Twitter?
Wikipedia describes Twitter as "an online social networking and micro-blogging service that enables its users to send and read text-based posts of up to 140 characters, informally known as 'tweets'."[3] As a Twitter user you can post updates, follow and view updates from other users, and send a public reply or private direct message to connect with another Twitter user.

Though users can answer the prompt, "What are you doing?", tweets have evolved to more than everyday experiences, and take the shape of shared links to interesting content on the web, conversations around hot topics (using hashtags→ #), photos, videos, music, and, most importantly, real-time accounts from people who are in the midst of a newsworthy event, crisis, or natural disaster.[4]

Why Twitter?
"Tell me and I forget. Teach me and I remember. Involve me and I learn." – Benjamin Franklin

Quite simply, I want students to get more involved in the classroom learning process. The rapid, real-time nature of Twitter will allow all of us to have a richer dialogue regarding the subject matter in the classroom and throughout the semester. On top of that, Twitter is free, easy to use, and relatively popular.

How is this going to work?

1. Set up a Twitter account by Monday, February 2. **If you already have a Twitter account, you will need to set up a new account just for this class.** (No offense, but it is distracting when my Twitter feed is filled with tweets that are not relevant to the class.)
2. Follow @[OFFICIALCLASSUSERNAME] so that you can see my tweets that pertain to the class. Send a tweet to @[OFFICIALCLASSUSERNAME] to say hello once you get set up!

[3] From http://en.wikipedia.org/wiki/Twitter
[4] From http://mashable.com/what-is-twitter/

3. Follow your classmates so that you can see what they are tweeting. You can do this by checking to see who @[OFFICIALCLASSUSERNAME] is following. I only follow students of this class.
4. When you see a tweet from me, reply to that tweet appropriately (see "How do I tweet for this class?" below for guidelines on appropriate kinds of tweets).
5. Make comments or ask questions by tweeting on your own, always making sure to direct your tweet to @[OFFICIALCLASSUSERNAME].
6. You will receive a grade of 0-5 points each week depending on three factors (see "Twitter Grading Guidelines" below).
7. **DO NOT use Twitter to communicate any personal or potentially sensitive information.** That includes specific information about grades, medical or personal problems, and issues you might be having with the class. Any concerns or questions you have in those areas should be directed to me through the official college email system.

Instructions for getting started on Twitter:

1. Navigate to http://twitter.com/, enter your full name (or not), and click the yellow button on the right side of your screen, or simply go to https://twitter.com/signup.
2. Fill in the first field with your full name (or an alias if you are not comfortable using your real name).
3. Select a username from one of the usernames Twitter suggests, or create your own. They will automatically suggest available usernames based on the real name and email address you've entered. Try to pick something that describes you – whether it's a nickname, an interest or a hobby.
4. Enter a password. Be tricky! Make sure your password contains letters, numbers, and symbols.
5. Enter your email address.
6. Fill in the Captcha to prove you're human, not a machine!
7. To find @[OFFICIALCLASSUSERNAME], type the username into the search box.
8. Tweets related to your query will show in the center of the page. A list of matching accounts will show on the right hand side of your screen.
9. Click the Follow button next to the correct account. A confirmation message will appear.

Useful Twitter terminology:

TERM	DEFINITION
Follow	Following another user means that all their tweets will appear in your feed. Click on their user name, and their profile will appear on the right of your screen, with a bright green Follow button. Just click this to follow.
Unfollow	To stop seeing someone else's tweets, go to your following list and find the person you want to stop following and hover the cursor over the

	green Following button until it is replaced by the red Unfollow button, then click.
Block	From time to time a spammer or other unsavory character may appear in your Followers list. Click the head and shoulders icon next to the unwanted follower's name so that the 'Block [their name]' option appears – click this and they will be removed from your Followers list. For any form of spammer or malware user it's a good idea to click also 'Report [their name] for spam' so as to limit their capacity to annoy others. You should look at and weed out your 'Followers' list regularly. Twitter shows the new followers at the top of the list.
Retweet, or RT	To share somebody else's tweet that you have seen in your feed, hover above it and select retweet. It then goes to all your followers, with a small arrow icon, which shows others that this wasn't originally your tweet.
Reply	To respond to somebody else's tweet, hover over it and select the Reply option, which will then appear in their @Mentions column. They may also reply to you, so check your @Mentions column.
@	Used in tweets when you want to mention another user. Also the first part of every Twitter user name – for example @[OFFICIALCLASSUSERNAME]
Mentions	Check your @Mentions column to see when others have mentioned you.
#	Hashtag – used to categorize tweets. Popular topics are referred to as trending topics and are sometimes accompanied by hashtags, such as #superbowl or #ipad. Click on any of them listed on the home page and you'll see a list of related tweets from many different users. Including popular hashtags that are already in use in a tweet may attract more attention. Hashtags are also used as part of 'backchannel' communication around an event, be it a conference, a TV program or a global event. An event audience can share comments, questions and links with each other while continuing to follow the formal presentation.
Direct message, or DM	These are private messages that you can send to other Twitter users. Click the Message menu at the top of the home page.
Shortened URLs	Given that a typical web address is rather long and clumsy, free URL shortening sites such as bitly.com and tinyurl.com provide shorter links which you can paste into tweets. Simply copy the web address of the page that you'd like to share, paste it into the box on either site, and you will be given a short link which will re-direct anybody who clicks on it back to the original page you want to share.

Adapted from: *Using Twitter in university research, teaching and impact activities: A guide for academics and researchers*, by Amy Mollett, Danielle Moran and Patrick Dunleavy, September 2011. http://blogs.lse.ac.uk/impactofsocialsciences/files/2011/11/Published-Twitter_Guide_Sept_2011.pdf

Twitter Grading Guidelines:
The guidelines for how your work on Twitter will be graded are fairly simple. There are 10 weeks in the semester where you will be expected to engage with me and the class on Twitter (see the "Twitter Grading Schedule" below). Each week you may earn up to five points. To get the full five points each week you should follow ALL of the following guidelines:

1. Write five tweets per week that are relevant to the class. You get one point per tweet up to five for the week, BUT…
2. Only two tweets per day will count towards your grade for the week. In other words, to earn full credit for the week you will need to send out five tweets over at least three separate days.
3. I will not be super strict on spelling, grammar, and punctuation, but your tweets need to be readable and understandable. You should strive to write tweets that can be clearly understood and are mechanically correct as much as possible.

You may earn partial credit each week. For instance, if you write all five of your weekly tweets, but you wrote them all on the same day, then you might earn two points for the week (since you only get credit for two tweets per day). I will also deduct one or two points per week if most of your tweets in a given week are hard to read and/or understand.

Twitter Grading Schedule:
There are 10 full weeks in which you may engage the class on Twitter. Each week you may earn up to five points towards your final grade. Tweets MUST be sent by 11:59 pm on the last day of the grading period or they will not be considered part of that period. Grading periods will ALWAYS begin on a Monday and end on a Sunday, or seven full calendar days. You may send out tweets at any time over that period.

- **No Twitter grading in the first two weeks of the class**
- Week 1 : February 2 – February 8 (Week 3 of the class)
- Week 2 : February 9 – February 15
- Week 3 : February 16 – February 22
- Week 4 : February 23 – March 1
- Week 5 : March 2 – March 8
- **MIDTERM EXAM:** March 9 – March 15 **(no Twitter grading this week)**
- Week 6 : March 16 – March 22
- Week 7 : March 23 – March 29
- **SPRING BREAK**: March 30 – April 5 **(no Twitter grading this week)**
- Week 8 : April 6 – April 12

- Week 9 : April 13 – April 19
- Week 10 : April 20 – April 26
- **Voluntary, ungraded use of Twitter** the week of April 27 – May 3
- **FINAL EXAM :** May 4 – May 10 **(no Twitter grading this week)**

Note: It is YOUR responsibility to know the Twitter grading schedule so that you can tweet appropriately each week. There is no "making up" your work for this class on Twitter.

How do I tweet for this class?
There are several ways for you to engage the instructor and your classmates through Twitter:

- The most common way that students complete the course requirements on Twitter is by replying to tweets that I send out. I will send out approximately 10 per week on topics that are relevant to that week's material in the course. All you have to do is reply to SOME of those tweets. I would prefer that you tweet in this manner whenever possible.
- What kind of tweets will I send out? You may reply to any or all of these types of tweets:
    - Tweets that ask about material in the textbook(s).
    - Simple but direct questions about that week's topic.
    - Links to a website that is relevant to that week's material. I may also ask you to comment on what the website says.
    - Study tips, advice for completing your work in the class, or class announcements.
- Of course, you can always tweet directly to me or to other students by writing @username (write @[OFFICIALCLASSUSERNAME] in your tweet to get at me) followed by your message. Just try to keep the content of your tweet focused on the course or the course material.
- If you plan to deactivate or suspend your Twitter account at the end of the semester, please wait to do so until all course grades have been submitted.

For those with concerns about privacy
If you are concerned about your privacy on Twitter, there are some ways you can protect yourself. However you decide to configure your Twitter account for this class, just make sure that you do three things: follow me on Twitter, make it so that I can follow you, and make sure I know which Twitter username belongs to you (so you can receive credit in your grade).

Everything you send out on Twitter is publicly available unless you adjust the settings to restrict access to your tweets. This can be done by going to Settings → Security and Privacy and clicking the box for "Protect my Tweets". This makes it so that only those

you approve will receive your Tweets. It might be a good idea to browse the other privacy settings as well.

The easiest way to protect your privacy is to simply not give Twitter that much information about you. After all, they don't ask for much information and you don't necessarily have to give them accurate information (for instance, Twitter asks you to enter your full name when you sign up for an account, but the information you enter does not need to be true). In other words, you have complete control over the personal information to which Twitter has access. If you are REALLY concerned about your privacy, just give them a fake name. As long as you have access to Twitter for this class, it does not really matter what name it's under. Just make sure I know your Twitter username – send me an email with your name and Twitter username.

Another good way to protect your privacy on Twitter is to make sure that you log off from the service when you are not online. While it is probably safe to stay logged in to Twitter on your mobile phone or your home computer (assuming you have up-to-date anti-virus software and run regular scans of your system), it very important to log off if you are using any kind of public computer (like those at a public library or in a college computer lab). Failure to log off could make it possible for someone using the computer after you to do bad things in your name.

These websites have some useful information about protecting your privacy on Twitter:

- http://twitter.knoji.com/how-to-adjust-your-privacy-settings-on-twitter/
- http://www.quickonlinetips.com/archives/2012/05/protect-privacy-on-twitter/

Appendix F

Pre-Course Survey

1. What is your name?

2. What is your sex?
a. Male
b. Female

3. Mark your age group.
a. 18 to 19
b. 20 to 21
c. 22 to 24
d. 25 to 29
e. 30 to 39
f. 40 to 49
g. 50 to 64
h. 65+

4. What is your racial or ethnic identification?
a. American Indian or Alaska Native
b. Asian
c. Black or African American
d. Hispanic or Latino
e. Native Hawaiian or Other Pacific Islander
f. White
g. Other
h. I prefer not to respond

5. Is English your native (first) language?
a. Yes
b. No

6. What is the highest level of education completed by either of your parents (or those who raised you)?
a. Did not finish high school
b. High school diploma or G.E.D.
c. Attended college but did not complete degree
d. Associate's degree (A.A., A.S., etc.)
e. Bachelor's degree (B.A., B.S., etc.)
f. Master's degree (M.A., M.S., etc.)
g. Doctoral or professional degree (Ph.D., J.D., M.D., etc.)

7. Which of the following devices do you own? Select all that apply.
a. smartphone (a cell phone with Internet access, like an iPhone or Android device)
b. tablet (iPad, Samsung Galaxy Note, Microsoft Surface, etc.)
c. laptop computer
d. desktop computer

8. How often do you use Twitter?
a. At least once a day
b. At least once a week
c. At least once a month
d. Less often than every month
e. Don't use it / Never heard of it

9. I have a positive attitude toward the use of technology for learning.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

10. Courses that make use of technology are more personal than face-to-face courses.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

11. I have a positive attitude toward the use of the Internet for learning.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

12. Students in courses that make use of technology feel more comfortable in asking questions.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

13. Courses that make use of technology allow students to learn at their own pace.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

14. Online teaching techniques encourage students to learn more.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

15. Instructors in courses that make use of technology are more available.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

16. Courses that make use of technology are more flexible with regard to my time.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

17. Students in courses that make use of technology learn more.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

18. Students in courses that make use of technology are more satisfied.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

19. Students in courses that make use of technology know their instructors better.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

20. Students in courses that make use of technology ask more questions.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

21. Working on student projects in courses that make use of technology is easier.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

22. Courses that make use of technology are easier.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

23. Online learning environments are better for learning.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

24. Students in courses that make use of technology have fewer problems getting help.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

25. Students in courses that make use of technology communicate with each other more.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

26. Students in courses that make use of technology know other students better.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

27. Courses that make use of technology have more technical difficulties.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

Appendix G

Twitter Questionnaires

I would really like to know what you think about how Twitter was used in this class. The information I get from this survey will be used to inform the way I use Twitter in future courses, so you have an opportunity to impact how future students experience this course. The survey is anonymous. Please provide as much detail as possible where appropriate. Thanks!

1. Had you ever used social media as part of a class before you took this class?
   Yes or No

2. Do you think that Twitter was a valuable part of this class or do you view it more as a distraction?
   Valuable part of the class - - - - More of a distraction

3. Do you think that using Twitter has helped you get better grades in this class?
   Yes, definitely - - - - No, not at all

4. How do you pick which of the instructor's tweets you are going to respond to? Please be as specific as possible.

5. Has using Twitter helped you to feel more connected to your classmates and/or the instructor?

6. Is there anything you would change about the way Twitter was used in this class?

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