

**Twitter as a Technology Tool to Elicit Deeper Levels of Understanding  
among Adult Learners**

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*Abstract*

Technology tools, such as Twitter, have the potential to facilitate collaboration and engage adult learners within online learning contexts. The purpose of the current study was to investigate Twitter as technology tool to elicit deeper levels of understanding. A mixed methods research design was used among participants ( $n = 42$ ) enrolled in a graduate-level online course. Participants completed pre- and post-surveys to indicate their levels of confidence and perceived importance. These quantitative data were analyzed with frequency counts and mean comparisons performed with paired samples  $t$ -tests. Small group interactions on Twitter were collected and analyzed qualitatively with content analysis techniques to identify categories for nature of interactions. Frequency counts were also used to indicate intensity among identified categories. Data analyses revealed two statistically significant findings and identified eight categories that described the nature of interactions. Implications from these findings were discussed, as well as limitations and recommendations for future research.

*Keywords:* Twitter, online learning, adult learners, collaborative learning

Technology tools and digital applications have significantly transformed postsecondary teaching and learning. In addition to the growing popularity of online learning contexts, technology tools have also become customary characteristics within blended and face-to-face, traditional learning contexts (Guri-Rosenblit, 2009; Hoskins, 2011). This trend is most notable at the graduate-level of education where the reported number of graduate students who took online courses in 2015 totaled over 1 million (Allen & Seaman, 2016). As the postsecondary teaching and learning landscape continues to evolve and incorporate more online methods of instruction, postsecondary faculty are challenged with employing technology-based techniques that engage adult learners with meaningful and relevant learning experiences (Linder-VanBerschot & Summers, 2015; Scanlon, McAndrew, & O'Shea, 2015). With this in mind, online learning experiences should be learner-centered and “maximize approaches that encourage student ‘voice,’ and promote student knowledge and interests in the classroom as well as their capacity to create and reflect on meaning” (Tibbetts & Hector-Mason, 2015, p. 1).

### **Review of Literature**

Consultation of recent literature related to technology-based collaborative learning experiences in postsecondary learning contexts highlighted a number of innovative academic uses with social networking sites, such as Twitter. Twitter has been primarily viewed as a technology tool that supports engagement with learning (Junco, Elavsky, & Heiberger, 2013). For example, Twitter has been utilized to facilitate interactive online lectures (Elavsky, Mislán, & Elavsky, 2011; Scott & Stanway, 2015; Tiernan, 2014), disseminate self-reporting surveys (Cree & Dean, 2015); and support interactions among adult learners both inside and outside of the classroom (Bledsoe, Harmeyer, & Wu, 2014; Domizi, 2013; Hsu & Ching,

2012; Ross, Banow, & Yu, 2015). Twitter has also been recognized as an engaging technology tool that improves reflection and writing skills (Kassens, 2014), provides immediate feedback (Amaro-Jiménez, Hungerford-Kresser, & Pole, 2016), and supports global connectedness among adult learners (Lewis & Rush, 2013).

It is evident from the literature consulted that Twitter has the potential to be an engaging technology tool among adult learners within postsecondary online learning contexts. Learner engagement within online learning contexts is of primary importance, particularly among adult learners (Huang, 2002). The value of learning is strengthened when learning experiences are designed to engage learners with collaborative interactions to “synthesize shared knowledge” (p. 33). However, limited literature was available that extended beyond learner engagement and investigated the potential of Twitter as a technology tool to elicit deeper levels of understanding (Machado & Jiang, 2014). The aim of the current study was to address this gap in the literature and explore Twitter as a technology tool to elicit deeper levels of understanding among adult learners in a postsecondary online learning context.

The current study was rooted in sociocultural theory, which posits that learning is contextual and dependent upon each individual’s interactions with others in a commonly shared community with shared standards for participation (Wilson & Peterson, 2006). The current study acknowledged the rich benefits that accompany participation in collaborative, social learning experiences to co-construct knowledge and understandings (Vygotsky, 1978). As individuals interact during collaborative learning experiences, their mental processes and individual contributions are shaped by their own unique cultural and historical experiences (Pavlenko, 2016). Through participation in collaborative, social learning experiences, each participant assumes the role of “knowledge generator,” who learns by making meaningful

connections, and the role of “contributor,” who adds value to the learning experience of others in the community (Willis, Davis, & Chaplin, 2013, p. 41). Within online learning contexts, technology tools that support collaborative learning experiences grounded in socioculturalism play a significant role with online instructional design methods (Bonk & Cunningham, 1998) and lead to deeper levels of understanding (Willis et al., 2013).

## **Methods**

### **Participants**

Participants in the current study were graduate students affiliated with the education department at a Level 5 postsecondary institution accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSCC). Participation was limited to students enrolled in a graduate-level educational research course that was administered online during the Summer 2016 and Fall 2016 semesters. Prior to conducting the study, permission to conduct the research endeavor was granted by the University’s Institutional Review Board.

At the beginning of both semesters, a recruitment email was sent to all students enrolled in the course. Students who elected to participate completed and submitted a consent form. Students who chose to not participate were excluded from data analyses. Out of 43 total students, 42 students provided consent to participate, of which there were an even number of males ( $n = 21$ ) and females ( $n = 21$ ). Participants also indicated whether they had previous experiences with Twitter in academic or non-academic settings. Eleven participants (26%) indicated that they had previous experience with Twitter for non-academic purposes, while only two participants (5%) indicated that they had previous experience with Twitter for academic purposes.

### **Context**

The current study was conducted in an educational research graduate-level course, which was a core course that all master's degree-seeking majors in the education department were required to complete successfully. The course addressed foundational concepts in educational research, the social science research process, and academic writing. The content of the course was delivered in seven different lessons, and each lesson developed understandings with specific course learning outcomes. Each lesson contained a lecture, designated course text readings, a small group activity, and an assignment with which to gauge individual mastery of the corresponding course learning outcomes. Since the content of the course was generally new and unfamiliar to students, the small group activities were designed to facilitate collaborative, social learning experiences through the use of different technology tools.

To achieve the purpose of the current study, participants were randomly assigned to three different small groups at the beginning of each semester. Each small group activity was deployed with its corresponding lesson and open for participation for one week during the summer semester and two weeks during the fall semester. The course calendars were designed according to the University's academic calendar each semester. During the summer semester, courses were deployed in 8 weeks, while courses deployed during the fall semester were deployed in 16 weeks.

The Twitter small group activity was implemented with Lesson 6, which addressed the following course learning outcomes:

- Develop understandings related to quantitative research techniques and analyses.
- Develop understandings related to qualitative research techniques and analyses.
- Develop understandings related to mixed methods research techniques and analyses.

- Engage in collaborative, interactive learning experiences that deepen understandings related to education research.

Once Lesson 6 became available to participants, directions and evaluation criteria for the Twitter small group activity were provided (see Figure 1). A document with directions related to creating a Twitter account was also accessible within the lesson. These directions encouraged participants to schedule a conference with the professor if they needed additional support with creating their Twitter account or using Twitter. One participant requested assistance with using Twitter and conferenced with the professor by telephone.

You and your small group members will exchange tweets on the Twitter social media platform. Tweets are virtual messages that consist of 140 characters or less. Within your small group, you will complete a minimum of one (1) original tweet and three (3) replies. Your activity will be assessed with the provided rubric.

#### Directions for Creating an Original Tweet

1. Log in to Twitter: <https://twitter.com/>
2. In the **What's Happening?** box, type a tweet. You may also click the green **Tweet** button. Your tweet needs to generate discussion related to the following guiding question:
  - What are strengths, weaknesses, and/or limitations associated with the quantitative, qualitative, and mixed methods research techniques and analyses?In your tweet, you may insert links. You may also use the green icons on the bottom of the tweet box to add images and video, GIF, or a poll. Please keep the following in mind:

<p>In your tweet, you must include the following hashtag:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;">If you are in:</th> <th style="text-align: left;">Use this hashtag:</th> </tr> </thead> <tbody> <tr> <td>Group 1</td> <td>EDPD6303G1</td> </tr> <tr> <td>Group 2</td> <td>EDPD6303G2</td> </tr> <tr> <td>Group 3</td> <td>EDPD6303G3</td> </tr> </tbody> </table>	If you are in:	Use this hashtag:	Group 1	EDPD6303G1	Group 2	EDPD6303G2	Group 3	EDPD6303G3	<p>Conserve your use of characters. Use commonly accepted abbreviations, such as:</p> <p style="text-align: center;">Ts = Teachers</p> <p style="text-align: center;">Ss = Students</p> <p style="text-align: center;">Quan = Quantitative</p> <p style="text-align: center;">Qual = Qualitative</p> <p style="text-align: center;">MM = Mixed methods</p> <p style="text-align: center;">Ps = Participants</p>
If you are in:	Use this hashtag:								
Group 1	EDPD6303G1								
Group 2	EDPD6303G2								
Group 3	EDPD6303G3								

- When you complete your tweet, click **Tweet**.

Directions for Replying to a Tweet

- Log in to Twitter: <https://twitter.com/>
- In the **Search Twitter** box, type in your small group's hashtag (see above chart).
- Select the tweet you wish to reply to and click the arrow icon (Reply function).
- Type a reply in the tweet box.
- Click **Tweet**.

<b>Criteria</b>	N/A	<b>Improvement Needed</b>	<b>Proficient Performance</b>	<b>Advanced Performance</b>
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Original Tweet	0 points	0-49 points Original tweet did not address and/or minimally addressed the guiding question.	50 points Original tweet thoroughly addressed the guiding question.	55 points Original tweet thoroughly addressed the guiding question and included formatted text, images, links, multimedia, and/or attachments.
Reply #1	0 points	0-9 points Reply #1 was minimal in content and fostered little interaction among group members.	10 points Reply #1 was specific, detailed, and somewhat added to the interaction among group members.	15 points Reply #1 was specific, detailed, and thoroughly added to the interaction among group members.
Reply #2	0 points	0-9 points Reply #2 was minimal in content and fostered little interaction among group members.	10 points Reply #2 was specific, detailed, and somewhat added to the interaction among group members.	15 points Reply #2 was specific, detailed, and thoroughly added to the interaction among group members.
Reply #3	0 points	0-9 points Reply #3 was minimal in content and fostered little interaction among group members.	10 points Reply #3 was specific, detailed, and somewhat added to the interaction among group members.	15 points Reply #3 was specific, detailed, and thoroughly added to the interaction among group members.

Figure 1. Directions and assessment criteria for Twitter small group activity.

## **Research Design**

The current study utilized a mixed methods research design. Quantitative data were collected with pre- and post-surveys that were administered prior to and after participation with the Twitter small group activity. Survey instruments included two Likert-type items that used a 5-point scale with which participants rated their levels of confidence and perceived importance with Twitter before (i.e., pre-survey) and after (i.e., post-survey) using it as a technology tool for learning. Frequency counts were performed with quantitative data and subsequent mean comparisons were conducted with paired samples *t*-test statistical analyses using IBM SPSS Statistics Software, Version 23. The following null hypotheses were established:

H<sub>01</sub>: There is no statistically significant difference with levels of confidence with Twitter.

H<sub>02</sub>: There is no statistically significant difference with perceived importance of Twitter.

Prior to statistical testing, the data set was inspected to confirm that each assumption had been satisfied (Field, 2013). After this confirmation, statistical significance was set at  $\alpha < .05$ ,  $\beta = .20$ , and effect sizes were to be reported as small (.20), medium (.50), or large (.80) for findings that showed statistical significance (Cohen, 1992).

## **Data Collection and Analyses**

Quantitative data were collected via pre- and post-surveys related to the Twitter small group activity. Qualitative data consisted of Twitter original posts and replies, which revealed the nature of interactions among participants. Original tweets and replies were retrieved from each participant's Twitter account. After Twitter data was retrieved, they were

analyzed inductively with content analysis techniques using the constant comparative method (Glaser & Strauss, 1967). During this process, each datum was coded “into as many categories of analysis as possible, as categories emerge[d] or as data emerge[d] that fit an existing category” (p. 105). During the coding process, constant comparisons were made between data and categories until data saturation was attained. The intensity of each category was also documented with frequency counts of the number of related units of text. Validity was established representationally and ecologically through the employment of a coding scheme that “record[ed] the socially constructed reality as represented” to “the degree to which all members of a social community share[d] the same meaning” (Potter & Levine-Donnerstein, 1999, p. 268). Reliability was established through test-retest procedures to confirm stability of analyses.

## **Results**

### **Survey Data**

As shown in Table 1, forty participants completed the pre- and post-surveys related to the Twitter small group activity ( $n = 40$ ). A cursory analysis of quantitative survey data showed higher ratings for levels of confidence with Twitter after participating in the small group activity:  $M = 2.58$ ,  $SD = 1.11$ ;  $M = 3.85$ ,  $SD = 1.17$ , respectively. To test the related null hypotheses, a paired samples  $t$ -test was conducted. This level of data analysis revealed a statistically significant difference, thus rejecting the null hypothesis;  $t(39) = -7.12$ ,  $p = .00$ . Cohen’s  $d$  was calculated at 1.11, which was considered a large effect (Cohen, 1992). The magnitude of this effect size has suggested the likelihood that use of Twitter during small group, collaborative, interactive learning experiences will have a major impact on students’ perceived levels of confidence with Twitter as a technology tool for learning.

Table 1

*Levels of Confidence and Perceived Importance*

	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<u>95% CI</u>		Cohen's
						<i>LL</i>	<i>UL</i>	<i>d</i>
Levels of Confidence	40			-7.12	.00	-1.64	-.91	1.11
Pre-Survey		2.58	1.11					
Post-Survey		3.85	1.17					
Perceived Importance	40			-2.88	.01	-.89	-.16	.44
Pre-Survey		3.10	1.26					
Post-Survey		3.63	1.15					

Similarly, a cursory analysis of quantitative survey data showed higher ratings for perceived importance of Twitter after participating in the small group activity:  $M = 3.10$ ,  $SD = 1.26$ ;  $M = 3.63$ ,  $SD = 1.15$ , respectively. To test the related null hypotheses, a paired samples  $t$ -test was conducted. This level of data analysis revealed a statistically significant difference, thus rejecting the null hypothesis;  $t(39) = -2.88$ ,  $p = .01$ . Cohen's  $d$  was calculated at .44, which was considered a small effect (Cohen, 1992). Although the magnitude of this effect size was small, it still has suggested the probability that use of Twitter during small group, collaborative, interactive learning experiences will have an impact on students' perceived importance of Twitter as a technology tool for learning.

**Twitter Data**

Twitter data collected from original posts and replies produced a total of 5,260 words. Content analyses techniques categorized 525 units of text into eight categories that revealed the nature of interactions on Twitter (see Figure 2).

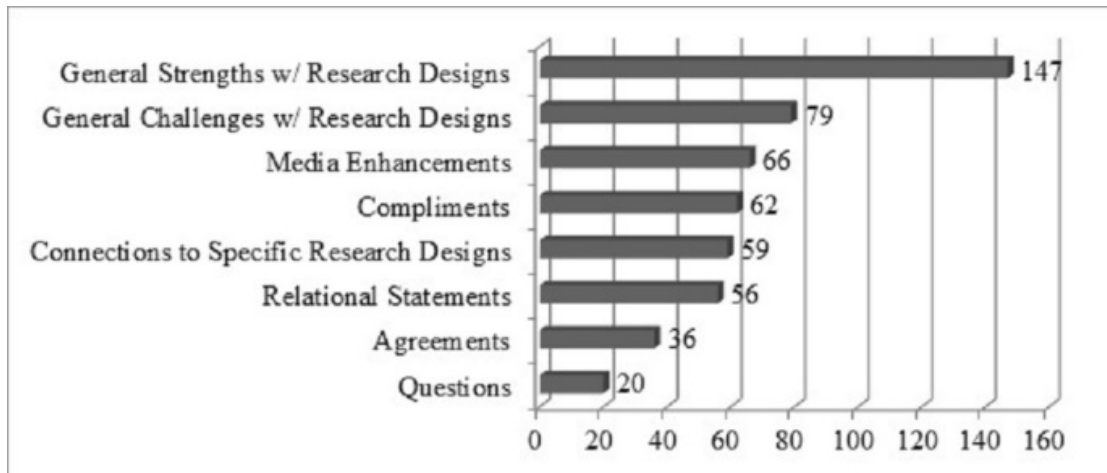


Figure 2. Identified categories for nature of interactions on Twitter.

Examples of coded units of text for each category are provided below in Table 2, followed by a discussion of each category.

Table 2

*Categories with Examples of Coded Units of Text from Twitter Original Posts and Replies*

Category	Examples of Coded Units of Text
Questions	<ul style="list-style-type: none"> <li>• <i>Do I need scholarly references in the research question section of methodology paper?</i></li> <li>• <i>How will you use this to enhance your topic?</i></li> <li>• <i>What do you think of Mixed Methods?</i></li> </ul>

<p>Agreements</p>	<ul style="list-style-type: none"> <li>• <i>I completely agree with you.</i></li> <li>• <i>I decided that was the best platform for my research as well.</i></li> <li>• <i>Exactly, for Quan research</i></li> </ul>
<p>Relational Statements</p>	<ul style="list-style-type: none"> <li>• <i>You aren't alone! Deciphering thru this scientific Lang. has been hard for this frmr Engl major!</i></li> <li>• <i>You will do an amazing job of using MM &amp; it will give you the best of both Qual &amp; Quan.</i></li> <li>• <i>My brain is not mathematical, results are hard to understand</i></li> </ul>
<p>Connections to Specific Research Designs</p>	<ul style="list-style-type: none"> <li>• <i>I think it best suites my topic. Precise data is desperately needed for coteaching.</i></li> <li>• <i>I was perplexed about using MM because of its benefits but I think the one dimensional coding of QUAN suits mine best</i></li> <li>• <i>This can cause conflict and yield inaccurate results. You will definitely need to gather a lot of info, which can be time consuming.</i></li> </ul>
<p>Compliments</p>	<ul style="list-style-type: none"> <li>• <i>I like the graphic that you chose. It makes it very easy to see the difference between quan/qual.</i></li> <li>• <i>Excellent resource! It was the best resource for breaking things down.</i></li> <li>• <i>Creswell is thorough on his explanation of its value and best practices.</i></li> </ul>
<p>Media Enhancements</p>	<ul style="list-style-type: none"> <li>• Emojis: 2</li> <li>• Polls: 2</li> <li>• Videos: 7</li> <li>• URLs: 10</li> <li>• Images: 45</li> </ul>
<p>General Challenges w/ Research Designs</p>	<ul style="list-style-type: none"> <li>• <i>I just feel that people will not be honest all the time when conducting surveys.</i></li> <li>• <i>Understanding the complex Lang assoc w/QUAN can be hard for those not familiar w/content</i></li> <li>• <i>MM is research method that combines quan and qual strands. The extra time may be inconvenient</i></li> </ul>
<p>General Strengths w/ Research Designs</p>	<ul style="list-style-type: none"> <li>• <i>Qual research strengths include the ability to go deep</i></li> <li>• <i>I like that quan is measurable.</i></li> <li>• <i>MM reduces limitations of quan and qual by cross checking and provides complexity</i></li> </ul>

**Questions.** This was the smallest category that emerged and consisted of 20 units of coded text. Questions posed during Twitter interactions sought to stimulate additional interaction (e.g., *What type of research method are you using?*), clarify specific discussion points (e.g., *Are you claiming that mixed methods is the endall beall of research design?*), and query about a related course assignment (e.g., *Do I need scholarly references in the research question section of methodology paper?*) among small group members.

**Agreements.** This category consisted of 36 units of coded text. These units of text represented Twitter discussion points that resonated with small group members (e.g., *Yes!*, *TOTALLY AGREE!*, *I decided that was the best platform for my research as well.*).

**Relational Statements.** This category consisted of 56 units of coded text. Relational statements encompassed Twitter interactions that were intended to develop the community within the small group. Units of text within this category included:

- well-wishes (e.g., *Good luck on your project!*),
- encouragements (e.g., *You will do an amazing job of using MM & it will give you the best of both Qual & Quan.*),
- humor (e.g., *May change my name to Dory until I finish!*), and
- personal admissions (e.g., *I still struggle knowing how to properly use this tool.*).

**Connections to Specific Research Designs.** This category consisted of 59 units of coded text. The majority of units of text within this category were specific references that participants made about their own selected research design (e.g., *After reviewing MM in depth and understanding the platform. I find MM as a top choice for my study*). However, some units of text were specific references participants made about the selected research designs of

their small group members (e.g., *it would be interesting to see the results of a MM study rather than Quan here. You possibly reveal a more accurate picture.*).

**Compliments.** This category consisted of 62 units of coded text. Although compliments provided were mainly geared towards the work of small group members (e.g., *That is a good summary of MM.*), some compliments commended the work of others outside of the class (e.g., *Creswell is thorough on his explanation of its value and best practices.*).

**Media Enhancements.** This category consisted of 66 units of coded text. As shown in Table 3, media enhancements were visual literacy elements included within Twitter interactions. Media enhancements included emojis, polls, videos, weblinks, and images.

Table 3

*Media Enhancements in Twitter Original Posts and Replies*


Media	(n)	Example
Emoji	2	👁️
Poll	2	0% observation 100% interview 0% document 0% Audio-Visual
Video	7	 Developing Mixed Methods Research with Dr. Joh... Explore developing your own Mixed Methods Research plan as Dr. John W. Creswell uses mixed methods research to survey participants testing a new video ga... youtube.com
Weblink	10	Best research assistance site: <a href="http://researchrundowns.com">researchrundowns.com</a>



Image	45	<p style="text-align: center;">Comparison of Quantitative and Qualitative Research</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">Quantitative</th> <th style="text-align: center;">Qualitative</th> </tr> </thead> <tbody> <tr> <td><b>Purpose</b></td> <td>To study relationships, cause and effect</td> <td>To examine a phenomenon as it is, in rich detail</td> </tr> <tr> <td><b>Design</b></td> <td>Developed prior to study</td> <td>Flexible, evolves during study</td> </tr> <tr> <td><b>Approach</b></td> <td>Deductive; tests theory</td> <td>Inductive; may generate theory</td> </tr> <tr> <td><b>Tools</b></td> <td>Uses preselected instruments</td> <td>The researcher is primary data collection tool</td> </tr> <tr> <td><b>Sample</b></td> <td>Uses large samples</td> <td>Uses small samples</td> </tr> <tr> <td><b>Analysis</b></td> <td>Statistical analysis of numeric data</td> <td>Narrative description and interpretation</td> </tr> </tbody> </table>		Quantitative	Qualitative	<b>Purpose</b>	To study relationships, cause and effect	To examine a phenomenon as it is, in rich detail	<b>Design</b>	Developed prior to study	Flexible, evolves during study	<b>Approach</b>	Deductive; tests theory	Inductive; may generate theory	<b>Tools</b>	Uses preselected instruments	The researcher is primary data collection tool	<b>Sample</b>	Uses large samples	Uses small samples	<b>Analysis</b>	Statistical analysis of numeric data	Narrative description and interpretation
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**General Challenges w/ Research Designs.** This category consisted of 79 units of coded text. This data included units of text that made generic references to challenges associated with qualitative, quantitative, or mixed methods research designs (e.g., *Qual weaknesses: researcher's own experiences/history may impact analysis (interpretation bias).*, *Quan also leaves gaps for biased opinions, Weakness of MM: It is more time consuming*).

**General Strengths w/ Research Designs.** This was the largest category that emerged and consisted of 147 units of coded text. This data included units of text that made generic references to benefits associated with qualitative, quantitative, or mixed methods research designs (e.g., *qual accounts for characteristics.*, *Quan gives hard data, MM research is more valuable in collecting all kinds of data. Mixing the methods helps qualify and quantify data*).

## Discussion

The current study investigated levels of confidence and perceived importance of Twitter among adult learners, as well as the nature of their interactions while enrolled in an

online graduate-level course. With respect to levels of confidence and perceived importance, findings produced interesting results. After participating in the Twitter small group activity, levels of confidence and perceived importance among participants increased in a statistically significant manner and revealed a large effect size for levels of confidence and small effect size for perceived importance. Before the present study commenced, the majority of participants indicated that they had no previous academic or non-academic experiences with Twitter. Therefore, these findings showed tremendous positive growth regarding reported levels of confidence and perceived importance towards Twitter as a technology tool for learning.

These findings align with the Technology Acceptance Model (TAM), which identified two contributing factors of technology acceptance: perceived usefulness and ease of use (Davis, 1989). Technology acceptance has a direct impact on whether an individual rejects or accepts use of a technology tool. Although the TAM model was originally applied in work contexts, studies have since investigated and confirmed its applicability amidst postsecondary contexts (e.g., Iqbal & Bhatti, 2015; Park, 2009), even with respect to the use of Twitter (Lowe, D'Alessandro, Winzar, Laffey, & Collier, 2013; Murphrey, Rutherford, Doerfert, Edgar, & Edgar, 2012). Murphrey et al. emphasized that considerations towards technology acceptance were especially important among postsecondary faculty who embed technology tools within the instructional design of their courses because adult learners may not value technology tools with the same regard as their professors.

Other interesting findings from the current study were related to the nature of interactions on Twitter. This study sought to address a gap in the literature regarding use of Twitter as a technology tool to elicit deeper levels of understanding among adult learners in

online learning contexts. According to Hattie (2015), “Surface learning privileges knowing facts, ideas, and content, whereas deeper learning privileges knowing relations and connections between ideas and extending these ideas to other contexts” (p. 80).

Findings suggested that participation in the Twitter small group activity led to deeper levels of understanding with the three course learning outcomes that related to the different types of research designs (i.e., qualitative, quantitative, and mixed methods). For example, four of the eight categories of interactions described surface learning contributions (i.e., Questions, Agreements, Relational Statements, Compliments). These contributions had value with adding to the Twitter conversation and cultivating a positive sense of community among small group members. However, the other four categories of interactions (i.e., Connections to Specific Research Designs, Media Enhancements, General Challenges w/ Research Designs, General Strengths w/ Research Designs) demonstrated deeper levels of learning through interactions that utilized higher order thinking skills. At the time this study was conducted, individual tweets were limited to 140 characters, which previous literature regarded as a potential constraint (Cohen & Duchan, 2012; Kassens-Noor, 2012; Prestridge, 2014). Despite this limitation, findings from the current study aligned with Machado and Jiang’s (2014) assertion that Twitter was a technology tool for learning that promoted “higher-level thinking and reflective practice” (p. 582).

### **Implications**

Findings from the current study point to several implications for postsecondary faculty who teach in online learning contexts. With respect to postsecondary faculty in all disciplines, two trends currently impact institutional decision-making: mobile technologies and online learning contexts (Johnson, Brown, Becker, Cummins, & Diaz, 2016). Based on this

understanding, it is imperative that postsecondary faculty become familiar with technology tools and instructional design techniques that scaffold adult learner success within online learning contexts. Technology tools, such as Twitter, have the ability to foster a sense of community (Domizi, 2013; Kassens, 2014), promote development of individual and group understandings with course content (Bledsoe et al., 2014; Domizi, 2013; Hsu & Ching, 2012), enhance peer relationships resulting from brief and concise social exchanges (Domizi, 2013; Hsu & Ching, 2012), and demonstrate responsible use of a virtual medium accessible to the general public (Kassens, 2014). Moreover, many technology tools, such as Twitter, support online learning by removing time and place constraints (Kassens-Noor, 2012). Previous literature has also regarded Twitter's 140-character limit as a potential constraint "for any meaningful information to be exchanged" (Cohen & Duchan, 2012, p. 159). However, Twitter recently tested doubling the number of allowable characters per tweet (i.e., 280) in order to allow for more developed expression (Rosen & Ihara, 2017).

With respect to postsecondary faculty among education programs, Twitter has recently been identified as an extremely popular tool that educators use to satisfy professional development needs (Carpenter & Krutka, 2014). Twitter permits educators to overcome feelings of isolation and create professional learning networks that are affordable, accessible, personalized, and collaborative. Therefore, integrating use of Twitter into the instructional design of education courses exposes aspiring and current educators to an authentic technology tool that has immediate applicability within their professional field. As noted in the empirical findings of the current study, providing this exposure leads to enhanced levels of confidence and perceived importance, which are contributing factors for technology acceptance and continued use among educators (Hopp & Gangadharbatla, 2016; Li, Li, & Franklin, 2016; Mills, 2014).

Finally, findings also point to important considerations for any adult instructor who works with adult learners. The current study appreciated the distinctive teaching methods practices recommended for adult learners and applied concepts and understandings related to ‘andragogy’ within the instructional design of an online learning context (Knowles, 1984; Knowles, Holton, & Swanson, 2015). Andragogical instructional practices recognize that adult learners are generally self-directed, motivated, and possess a robust knowledge base. Therefore, adult instructors must consider these characteristics and design online learning experiences that are relevant, applicable to the real world, and have a problem-solving orientation. In tandem with use of technology tools that elicit deeper levels of understanding, adult instructors are strongly encouraged to infuse andragogical principles into the instructional design of “digitally expanded educational context[s]” (Blakely & Sheffield, 2015, p. 407). By doing so, they provide engaging and quality postsecondary learning experiences among adult learners (Conaway & Zorn-Arnold, 2015, 2016a, 2016b)

### **Limitations and Recommendations for Future Research**

Although these findings have provided empirical and interpretative results, there were a few limitations. First, participants in the current study were limited to graduate, degree-seeking students. Although graduate coursework and programs have a significant online presence, online learning contexts among other types of adult learners, such as undergraduate students, are becoming more ubiquitous (Guri-Rosenblit, 2009). Therefore, it is recommended that future studies explore levels of confidence and perceived importance of Twitter, as well as the nature of interactions among other types of adult learners.

Another limitation was related to the research methods. The Twitter small group activity was implemented as a collaborative, social learning experience during one lesson in

an online course that was accessible during a one- or two-week period of time. Although this aspect of the research methods did not fully capitalize on the affordances of Twitter as a technology tool for learning, it was a course-level instructional design consideration. However, in order to fully gauge levels of confidence and perceived importance, as well as the nature of interactions, it is recommended that follow-up, longitudinal studies be conducted. These studies should also explore how individual understandings are impacted by the exchange of discourse via tweets. In order to tap into Twitter's affordances, particularly with the recent increase in allowable character counts for individual tweets, longitudinal analyses should explore these phenomena among various types of adult learners as they progress through their respective programs, as well as beyond program completion.

## **Conclusion**

As the postsecondary teaching and learning landscape continues to change, it is imperative that postsecondary faculty members engage in continuous efforts to develop their expertise with innovative technology tools and instructional design techniques for online learning contexts. Through the use of technology tools, such as Twitter, postsecondary faculty members are able to augment online learning contexts with evidence-based teaching practices that scaffold adult learner success with authentic, collaborative, and meaningful learning experiences. In doing so, postsecondary faculty members ensure that their online courses and programs are relevant and cultivate deep understandings of content in ways that are beneficial to adult learners.

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