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Connecting blog, Twitter and Facebook use with gaps in knowledge and participation

Sung Woo Yoo
swyoo@utexas.edu
Ph.D. Candidate, University of Texas at Austin, School of Journalism, 78712 Austin, United States.

Homero Gil de Zúñiga
homero.gil.de.zuniga@univie.ac.at
Medienwandel Chair Professor and Director, Media Innovation Lab (MiLab), University of Vienna. Research Fellow, Universidad Diego Portales, Chile

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Abstract

Although they share a similar 'social media' tag, blogs, micro-blog sites like Twitter, and social networking sites (SNS) like Facebook are distinctive in their relationships with political engagement. This paper examined the impact of the use of the three media on the gaps in political knowledge and participation between the more and less educated people. In the results, Facebook use interacted positively with education in predicting civic and issue knowledge. The gap of offline participation was larger among heavy Twitter users than among light users. Overall, findings imply that social media amplify or reinforce inequality of political engagement.

Keywords

knowledge gap, participation, social media, Facebook, Twitter

1. Introduction

One ideal of democracy is for the public to make political decisions based on knowledge and rationality. The role of the internet in the democratic process, however, is unclear and at best paradoxical (Boulianne, 2009; Hindman, 2008). An often cited controversy is that people engage less in public affairs for the very reason that they have more choice what to do in cyberspace (Prior, 2007; Sunstein, 2009).

While scholars have been debating, the internet has continued to evolve, diversified into several distinct media. News aggregators, blogs, micro-blogs, social networking sites (SNS), and news websites all serve as channels of political engagement. They have unique influence on civic life by specializing in different aspects of communication technology. The literature on digital media's effects, however, is confined mostly to researching the internet use as a whole, or including several platforms to one category of social media disregarding the differences (Nam & Stromer-Galley, 2012; Swigger, 2012).

Using original U.S. national survey data, this study explores differentiated effects of the three interactive media: blogs, micro-blog sites like Twitter, and SNS like Facebook. In particular, this study examines whether the use of the three media is related to the widening gap of political engagement between people with higher socioeconomic status (SES) and the lower status. Although they stem from the same root, the three media are distinctive in their effects. In search of dissimilarity, this study examines their relationship with four types of political engagement: civic knowledge, current issue knowledge, and

online and offline political participation. In doing so, this study aims to assess the potential prospect and limitation of digital media's role for the democratization of knowledge and participation.

2. Theoretical background

2.1. *The internet and political engagement*

The more we know about public affairs, the better off our politics may be (Delli Carpini & Keeter, 1996). For a political system to operate soundly, however, the sheer amount of knowledge is not enough. What makes political knowledge special compared to other types of knowledge is that it should be distributed equally among constituents of a political system (Habermas, 1985). Political participation is another pillar of a well-functioning democracy. As the use of online communication tools emerged, restrictions of participation are removed. At the same time, concerns are raised that new opportunities may mostly benefit elites (Krueger, 2002).

The internet is multifaceted media, and its influence on political knowledge and participation is complex (Chadwick, 2012; Gil de Zúñiga, 2002). Some scholars argue the internet environment offers two kinds of opposing influences: one tending to suppress political engagement, the other leading to a greater engagement (Chadwick, 2012; Brundidge & Rice, 2009). The two forces occasionally counteract each other, sometimes leading to a net effect of increased learning and participation, other times to civic decline. This suppressing force is related to the selectivity of the internet. Citizens are distracted from political engagement in online environment because they are able to select among increased choices of daily activities (Putnam, 2000). The internet selectivity leads citizens to form homogeneous social networks, which result in sterile and one-sided information environment (Wojcieszak & Mutz, 2009; Gaines & Mondak, 2009).

The interest of this study, however, is more focused on the features of the internet that facilitate political engagement. One argumentation in favor of the internet's democratic potential is based on the low cost of communication. Users reduce time and effort to expose to viewpoints and associate with other individuals (Farrell, 2012), and transcend the physical boundaries of exchanging information (Brundidge & Rice, 2009). Another important characteristic that facilitates engagement is the interactivity of the digital media. Scholars from various disciplines conceptualized interactivity to explain communication behaviors and academic works have been devoted to categorizing diverse definitions[1]. Rafaeli's (1988) often cited definition states, "Interactivity is an expression of the extent that in a given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchanges referred to even earlier transmissions" (p.111). Based on the definition, he indicates that the highest level of interactive communication is face-to-face interpersonal conversation. Leary (1990) also notes that the success of a computer mediated medium hinges on its ability to resemble the interpersonal communication. In line with Rafaeli and others, this study summarizes the definition of interactivity as a comprehensive characteristic of communication media that responds to the user's demand to hold interpersonal communication transcending time and range.

[1] For example, Heeter (1989) proposed six dimensions of interactivity: complexity of choice available, effort that users must exert, responsiveness, monitoring of information use, ease of adding information, facilitation of interpersonal communication. Downes and McMillan (2000) proposed interactivity to be examined with direction of communication, time flexibility, sense of place, level of control, responsiveness. Kiousis (2002) suggests proximity, sensory activation, perceived speed, telepresence as operational guideline.

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2.2. *Blogs, Twitter, Facebook and interactivity*

Although the comparison is seldom made in academia, users are aware of the differences among social media and treat them separately. To predict how such characteristics lead to differentiated effects on political engagement, this study looks into digital media's level of interactivity (Gil de Zúñiga & Rojas, 2009). We assume that the cost of communicating across digital media is more or less the same. Various operational elements were used to measure levels of interactivity in the literature (see Heeter, 1989; Downes & McMillan, 2000; Kiousis, 2002). In line with the purpose of this investigation, we consider three: proximity, reciprocity, and content control. Proximity is related to the awareness who you are talking to, or anonymity. It is also measured as the degree to which "a respondent feels he/she is near" (Kiousis, 2002, p. 377). Reciprocity is whether the distinction between sender and receiver of message is unclear that they can reverse roles freely (Rafaeli, 1988). The element of content control is related to the amount and complexity of information a medium is able to convey, and the ease of adding information (Heeter, 1989).

Communications on Twitter and Facebook are different in their levels of proximity. Twitter, unlike Facebook, allows users to be anonymous. As with previously invented forms of online communication such as discussion sites, users do not need to disclose themselves to say what you have to say. Because of this trait, motivation for using Twitter may differ from Facebook (Huberman, Romero, & Wu, 2009). From the users' standpoint, information on Twitter may be perceived as less trustworthy. Trust and credibility of media and sources are crucial variables of media effects (Tsfati, 2003; Kiousis, 2001). Schmierbach and Oeldorf-Hirsch 2012) found that college students rated news items less credible when reading the same story from the official New York Times Twitter feed than viewing the New York Times website.

Also, communications on Facebook is more reciprocal as compared to Twitter. Research indicates that Twittersphere resembles mass media in that a limited number of senders disseminate most of news (Kwak, Lee, Park, & Moon, 2010). On the other hand, reciprocal message exchanges on Facebook may bring the users closer to the quality of communication that Rafaeli (1988) called a simulation of interpersonal communication.

A singular characteristic of blogs is not easy to specify. Blog use was not associated with political knowledge or participation in a study (Eveland and Dylko, 2007), but was so in another study (Gil de Zúñiga et al., 2009). Yet, a comparison of interactivity elements may indicate blog and Twitter use have different level of relationship with political engagement. As with Twitter, anonymous communication is possible with blogs. Blogs may be hard to differentiate from Twitter in terms of reciprocity. However, blogs are strong in content control as there are no restrictions to create and maintain the amount of posts. 140 character message length of micro-blog may limit the influence on political engagement as compared to blogs. Twitter specialized in diffusion speed and mobility, making it the first web service to break free of personal computers. However, Twitter compromised content control for the sake of mobility. Based on these analyses, this study presents the first research question.

RQ1: Do the uses of blogs, Twitter, and Facebook have different level of relationship with political knowledge?

2.3. *The knowledge gap hypothesis*

Communication media may not increase political knowledge directly, but widen the gap of knowledge between people with different level of SES (Grabe, Kamhawi, & Yegiyan , 2009; Tichenor, Donohue, & Olien, 1970). When Tichenor and colleagues (1970) first proposed the knowledge gap hypothesis, they thought the gap increased because elites adapt to new technology faster. Comparing correlations between formal education level and various types

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of knowledge over time, they concluded the mass media have a function of consolidating or increasing inequalities. Level of education has been typically used as indicator of SES. In later studies, education was considered to be related with more than learning capability. For example, scholars thought people with higher education will be exposed to higher quality of information than people with lower education level. A study argued that newspaper use amplified the knowledge and participation gap because of newspaper's content and structure (Eveland & Scheufele, 2000). Other scholars observed the relationship was further influenced by motivational factors such as news interest (Genova & Greenberg, 1979), personal and social involvement (Kwak, 1999), and need for cognition (Liu & Eveland, 2005). Studies indicated, overall, newspapers were more beneficial to knowledgeable people, while television was more beneficial to the less knowledgeable.

Previous studies indicate that the internet amplifies the inequality of knowledge. Using Switzerland survey data from 1997 to 2000, Bonfadelli (2002) found the high educated people's use of the internet is information oriented, whereas the less educated are interested in entertainment. Analyzing a South Korean urban-area survey, Kim (2008) found the knowledge gap across education levels to be greater among heavy political-website users. Similar results were found in the U.S. context (Cho, Gil de Zúñiga, Rojas, & Shah, 2003).

We assume the impacts of blog, Twitter, and Facebook use on the knowledge gap are different. High proximity and reciprocity based on mutual consent imply that Facebook conversation is likely to go on among people with relatively similar status. People with high levels of SES are much more likely to be exposed to public affairs information and to retain it (Zaller, 1992). Jerit and colleagues (2006) found that the quality of media contents reinforce socio-economic differences in political knowledge. In the light of this literature we present the following research question:

RQ2: Do the uses of blogs, Twitter, and Facebook have different impacts on the knowledge gap between people with high and low SES?

2.4. *Media use and participation gap*

The role of media in the widening gap of political participation is similar to the role in knowledge gap. Specifically, news media are sources of mobilizing information (Lemert, 1992), which enables citizens to engage in participatory activities.

News consumption also facilitates interpersonal discussion or intrapersonal reflection leading to increased political participation (McLeod et al., 1999; Rojas et al., 2010). Digital media has a strongpoint in this process. The cognitive mediation model (Eveland, 2001) argued multimedia elements and hyperlinks arouse cognitive elaboration leading to political participation. The communication mediation model (McLeod, Scheufele, & Moy, 1999) and the citizen communication mediation (Shah, Cho, Eveland, & Kwak, 2005), and the campaign mediation model (Shah et al., 2007) or O-S-R-O-R model (Cho et al., 2009), suggest a procedural structure letting news consumption encourage communication among citizens, which then mediates increase in political participation.

Studies examined the relationship between Facebook/Twitter use and political participation yielded mixed results. Examining data of the 2008 U.S. presidential election, Vitak and colleagues (2010) found a significant association between use of Facebook for political purposes and political participation. However, in the same study, general use of Facebook measured by hours spent and network size had a negative relationship with political participation. As for Twitter, a study found that political tweets encourage citizens to vote (Pew Research Center, 2010). These results are not free from the criticism as they may elicit a circular logic as social networking for political purposes may be in itself a form of political participation.

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The present study separates online and offline political participation as outcome variables. Traditional offline participation requires time and civic skills that are less required for online participation. Nevertheless, some argue online political participation is no less consequential in the democratic process (Gil de Zúñiga, Molyneux & Zheng, 2014). On the other hand, a number of scholars expressed concern that online activities may lack the political meaning that traditional forms encompass (Papacharissi, 2009). Tests of the general internet use indicate online activity is only related to online political activity, and will have a minimal or negative relationship with real world activity (Kenski & Stroud, 2006). In the light of this contrasting literature, this study presents the following research question:

RQ3: Do the uses of blogs, Twitter, and Facebook have different relationship with online and offline political participation?

As for participation gap, studies show that online opportunities for participation primarily benefit elites (Krueger, 2002). Interpersonal and digital discussions facilitated by news media may impact the inequality of political participation as they vary by the interactivity of the media platforms they use. Because the impacts are similar, key literature of knowledge gap studies have examined participation gap alongside knowledge gap (Prior, 2007). Particularly for social media, users engage in political conversation almost simultaneously as one is exposed to news. Given that the purpose of this study is to identify the differential effects of social media, this study asks the research question:

RQ4: Do the uses of blogs, Twitter, and Facebook have different impacts on the gap of online and offline political-participation between those with high and low SES?

3. Method

3.1. *Data*

The data set used in this study is based in a crossectional collection obtained from the second wave data of a two-wave national panel online survey administered by the Digital Media Research Program at University of Texas at Austin. Both waves of the study were administered using Qualtrics, an online surveyor.

The first survey wave of the survey was conducted with U.S. adults from across the country between late December 2008 and early January 2009. Participants were randomly selected from an online panel of the Lab. For a more accurate representation of the U.S. population, the Lab based this national sample on two U.S. Census variables, gender (50.2% men and 49.2% women) and age (30% 18-34; 39% 35-54; 31% 55 or more). 10,000 participants listed in the panel pool were selected and the survey's URL was provided with information about compensatory money incentives. The procedure of matching online samples with census data to provide a more accurate representation of the population has been validated by previous research (Iyengar & Hahn, 2009). 1,432 addresses were invalid. Of the 8,568 participants, 1,159 completed the survey. 205 had missing values for the variables of interest. The first-wave response rate was 23 percent based on the American Association of Public Opinion Research's (2008, pp.34-35) RR3 calculation, acceptable for panel web-based surveys.

The second wave of the survey was conducted in July 2010 with the interviewees of the first wave providing additional monetary compensation. 312 participants completed the survey, for a 27 percent retention rate. Analyses reported here were confined to respondents interviewed for the second wave because only the second wave survey had items of interest such as issue specific political knowledge. No panel data causality could be inferred with this data. Nevertheless, the second wave respondents were reasonably representative of the U.S. population except for education. Comparing this dataset with the

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US census, we created a post-stratification survey weight to correct for oversampling the highly educated and female groups.

Before correction, the education levels of the dataset were; high school or less = 10.6%, (44.8 % after correction), some college = 29.6% (28.3%), college degree = 24.8% (18%), graduate degree = 35.1% (8.9%). For gender, male = 35.4% (48.3%), female = 64.6% (51.7%). A comparison of demographic profile of the data with other comparable surveys is shown in Appendix 1 (for more information on the data see also Gil de Zúñiga & Hinsley, 2013).

3.2. *Measurement*

Political knowledge. This study placed political knowledge into two categories: civic (general) knowledge and issue (domain specific) knowledge (Delli Carpini & Keeter, 1996). Four questions tapped the issue knowledge variable: Open-ended questions asking "the candidate and party that won the 2010 Massachusetts special election to replace deceased Senator Ted Kennedy", "the cause of the Toyota vehicle recall", "the controversy about Arizona immigration law", and a closed-end question about "countries suffering high earthquake casualties that year". We selected questions using the News Coverage Index of the Project of Excellence in Journalism (PEJ) prior to the survey period. Correct scores were averaged (α =.71, M = 2.118, SD = .952). The civic knowledge measure was constructed by combining four questions selected from a recommended index in the literature (Delli Carpini & Keeter, 1996, pp. 303-305): "the name of the speaker of the US House of Representatives", "the institution responsible for determining whether a law is constitutional", "the majority required in the US Senate and House to override a presidential veto", and "the party with the most members in the US House of Representatives" (α =.79, M = 2.926, SD = 1.218).

Political participation. The offline political participation variable (α = .80, M = 3.79, SD = 2.08) was created by averaging responses to nine questions about how often respondents had engaged in the following activities during the past twelve months: "Attended a public hearing, town hall meeting, or city council meeting;" "Called or sent a letter to an elected public official;" "Spoken to a public official in person, posted a political sign, banner, button or bumper sticker;" "Attended a political rally;" "Participated in any demonstrations, protests, or marches;" "Voted in the 2008 presidential election;" "Written a letter to a news organization;" "Participated in groups that took any local action for social or political reform;" and "Involved in public-interest groups, political-action groups, political clubs, or party committees." Answers raged from 1(never) to 10(all the time).

The online political participation variable (α = .85, range = 1 to 10, M = 2.68, SD = 2.01) was created by averaging responses to six questions about how often respondents had engaged in the following activities using the internet in the same period: "Write to a politician," "Make a campaign contribution," "Subscribe to a political listserv," "Sign up to volunteer for a campaign/issue," "Send a political message via email," and "Write a letter to the editor of a newspaper."

Blog use. This variable was created by averaging scores of nine items tapping blog use for communication and information purposes: "Write posts or entries on your own blog," "Write comments on others' blogs," "Read posts or entries on others' blogs," "Read comments on others' blogs," "Link to other blogs," "Visit blogs about news, politics, and public affairs," "Use blog to be informed about local community," "Get a space to talk about politics," "Get news from mainstream media blogs such as the New York Times," (α =.92, range = 1 to 10, M = 2.89 , SD = 2.08).

Twitter use. This variable was created by averaging scores of eleven items tapping Twitter use for communication and information purposes: "Post thoughts about current events," "Post experiences related to politics," "Get breaking news," "Follow journalists,"

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"Follow politicians," "Follow news organizations," "Follow political organizations," "Journalists follow you," "Politicians follow you," "News organizations follow you," "Political organizations follow you," (α = .96, range = 1 to 10, M = 1.84, SD =1.81).

Facebook use. This variable was created by averaging scores of ten items tapping Facebook use for communication and information purposes: "Post or share thoughts about current events or politics," "Post experiences related to politics and campaigning," "Forward political commentary of others," "Get informed about current events and public affairs," "Meet people who share my interests," "Stay informed about local community," "Get news from mainstream media," "Contact people I wouldn't meet otherwise," "Stay in touch with my friends and family," "Discuss with people who have different views," (α = .94, range = 1 to 10, M = 3.19 , SD = 2.19).

Education. In some studies of political communication, SES was measured as a combination of education and income (Verba et al., 1995). However, in the tradition of knowledge gap studies, SES was operationalized as level of formal education (Kwak, 1999; Eveland & Scheufele, 2000). As with previous studies, this study measured education level with an eight-point scale ranging from "less than high school" to "doctoral degree" and used it as an indicator of SES (M = 4.11, Mdn = 2-year college degree, SD = 1.50).

Political interest. Respondents were asked to rate their own interests in politics and public affairs using a ten-point scale ranging from "none" to "a great deal" (M = 7.0, SD = 2.63).

Internet general use. This variable, created by combining five items, was used as a control. Items were self-reported frequency of internet use for entertainment, games, sports information, and instant messaging in a ten-point scale (α =.78, M = 4.56, SD = 1.99).

Traditional media use. This variable was created by combining eight items (α =.77, M = 3.65, SD = 1.08): "Watching local television news;" "National network news on ABC, CBS, NBC, and PBS;" "Cable news networks such as CNN, Fox News, and MSNBC;" "Radio news programs such as NPR;" "National newspapers online;" "National newspapers in print;" "Local newspapers online;" and "Local newspapers in print." Each item asked respondents: "How often do you watch, read, or listen to the following media to get information about current events, public issues, and politics?" Answers had a seven-point response scale ranging from "everyday" to "never."

Demographic variables. A number of demographic variables were included for control purposes. Age was measured with an open-ended question (M = 49.32, SD = 12.25). As for gender, males were assigned value "0" and females "1' (Male = 35%, Female = 65%). Income was measured with nine categories ranging from 1 indicating under $10,000 to 9 indicating over $ 100,000 (M = 6.26, SD = 2.53). Respondents' race was also asked (binary recoded as white = 1, 84.4%).

3.3. *Analysis*

The traditional approach to the knowledge-gap hypothesis examines longitudinal data on a single topic (Tichenor et al, 1970; Genova & Greenberg, 1979). An alternative approach uses cross-sectional data to evaluate interaction between education and the use of a specific media platform (Kim, 2008; Eveland & Scheufele, 2000; Kwak, 1999). Consistent with this method, the hypotheses were tested by four sets of hierarchical OLS regressions, using issue knowledge, civic knowledge, offline participation, and online participation as outcome variables. The independent variables were entered causally in separate blocks: demographics; personal differences such as education, political interest and internet general use; media use such as blogs, Twitter, and Facebook; and interaction terms to assess the impact of education on the relation between digital media use and dependent variables.

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4. Results

Table 1 presents the results of OLS regression models predicting the two different types of political knowledge. As expected, patterns are somewhat different between issue and civic knowledge. Education and political interest are the strongest predictors of issue knowledge ($\beta = .188$, $p < .01$; $\beta = .182$, $p < .01$) and civic knowledge ($\beta = .242$, $p < .001$; $\beta = .349$, $p < .001$). No media-use variables were related to the increase of civic knowledge. Traditional media use was a significant predictor of issue knowledge ($\beta = .154$, $p < .05$). As for digital media, only blog use was positively associated with issue knowledge ($\beta = .168$, $p < .05$). Facebook use and Twitter use were not directly related to knowledge. RQ1 asked if blog, Facebook and Twitter use have different relationship with political knowledge. This study found blog and Facebook use has a stronger association with political knowledge than has Twitter.

Table 1. Types of Interactive Media Predicting Political Knowledge

	Issue Knowledge	Civic knowledge
Block 1: Demographics		
Age	-.106	-.124
Gender	-.085	-.204***
Income	.142*	.152*
Race	-.006	.080
ΔR^2	.095***	.197***
Block 2: Individual differences		
Education	.188**	.242***
Political interest	.182**	.349***
internet use	-.094	-.153*
ΔR^2	.092***	.169***
Block 3: Media use		
Traditional Media use	.154*	.063
Blog use	.168*	.052
Twitter use	-.100	-.008
Facebook use	.020	-.027
ΔR^2	.040*	.006
Block 4: Interactions		
Education x Blog use	-.177*	-.128
Education x Twitter use	-.140	.060
Education x Facebook use	.272**	.179*
ΔR^2	.038*	.015
Total R^2	.264***	.386***

Note: Regression coefficients were estimated after all variables were entered in the model.
Cell entries are OLS standardized coefficients. All independent variables are standardized.
* $p < .05$, ** $p < .01$, *** $p < .001$

RQ2 asked if the impacts of blog, Facebook and Twitter use on knowledge gap are different. Facebook use interacts with education in predicting both issue knowledge ($\beta = .272$, $p < .01$) and civic knowledge ($\beta = .179$, $p < .05$). Figure 1 graphs the interaction effects, which indicate the relationship between education and political knowledge is stronger

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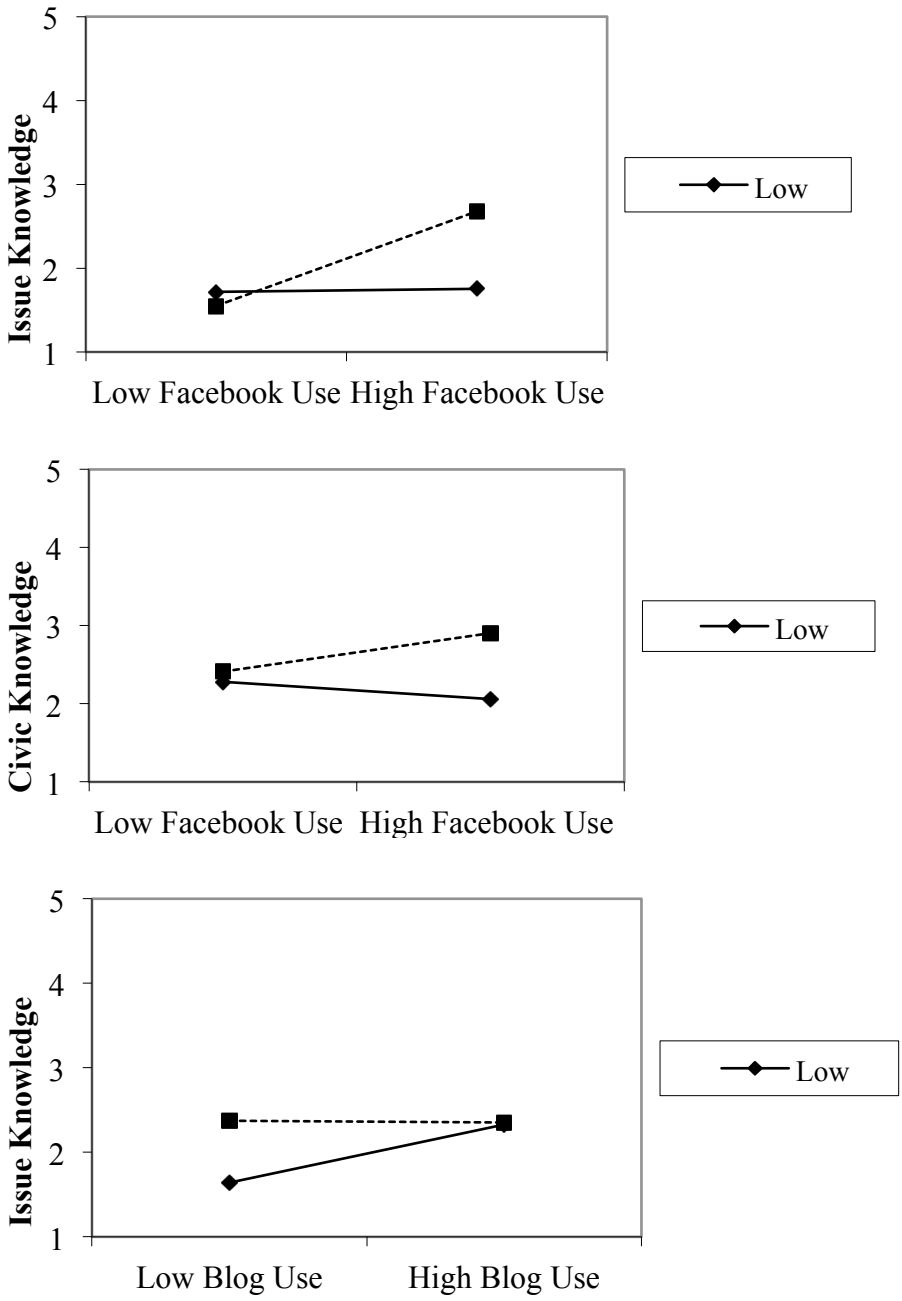
among heavy Facebook users. Twitter use did not interact with education. Blog use interacted with education in predicting issue knowledge (β = .165, p < .015) but not civic knowledge. The plot shows the relationship between education and political knowledge is stronger among light blog users. Unexpectedly, in the relationship between civic/issue knowledge and Facebook use, the slope of the low education group was negative. This means the heavy users of Facebook in the low education group were less knowledgeable about the public affairs than the light users.

Figure 1. Interaction Effects of Education and Facebook Use, Blog Use on Political Knowledge



For RQ3, Table 2 displays the result of OLS regression models predicting online and offline political participation. Political interest is the strongest predictor of both online (β = .298, p < .001) and offline participation (β = .307, p < .001). Demographic variables are not related to online participation. For offline participation, however, age (β = .167, p < .01) and

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income (β = .130, p < .05) are positively associated. Generally speaking, the impact of demographic variables is weaker for online participation, which may reflect its lower cost of participation.

Facebook use was a significant predictor of both online (β = .259, p < .01) and offline participation (β = .333, p < .001). Traditional media, blogs, and Twitter use are not related to political participation.

Table 2. Types of Interactive Media Predicting Political Participation

	Online political participation	Offline political participation
Block 1: Demographics		
Age	.113	.167**
Gender	.023	.073
Income	.017	.130*
Race	-.018	.018
ΔR^2	.013	.039*
Block 2: Individual differences		
Education	.087	.027
Political interest	.298***	.307***
Internet use	.000	.000
ΔR^2	.214***	.230***
Block 3: Media use		
Traditional media use	.038	.061
Blog use	.085	.052
Twitter use	.031	-.024
Facebook use	.259**	.333***
ΔR^2	.064***	.074***
Block4: Interactions		
Education x Blog use	-.053	-.048
Education x Twitter use	.144	.165*
Education x Facebook use	-.001	-.067
ΔR^2	.013	.013
Total R^2	.304***	.350***

Note: Regression coefficients were estimated after all variables were entered in the model. Cell entries are OLS standardized coefficients. All independent variables are standardized.
* $p < .05$, ** $p < .01$, *** $p < .001$

Responding to RQ4, blog, Twitter, or Facebook use did not interact with education in predicting online participation. In offline political participation though, Twitter use interacted significantly with education (β = .165, p < .05). Figure 2 shows the gap between social classes for offline participation is larger among heavy Twitter users than among light users. The slope of the low education group is negative.

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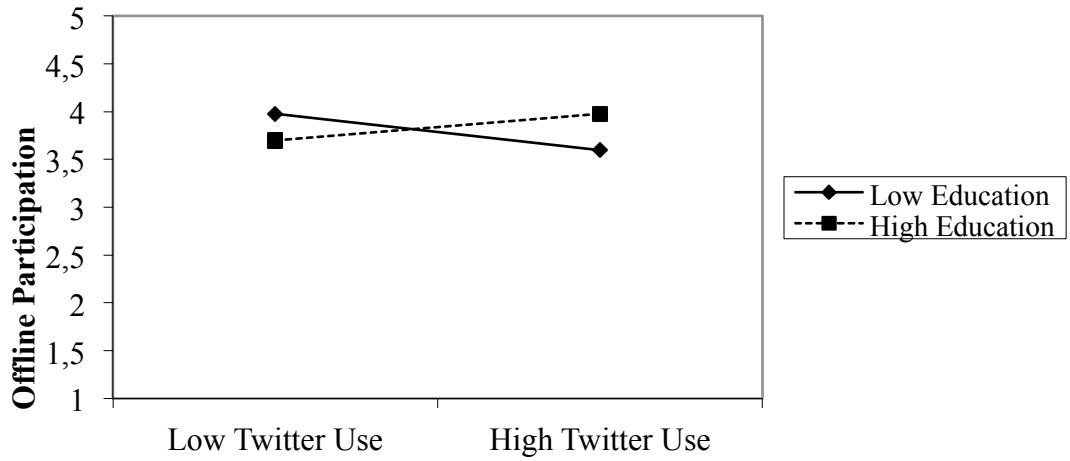
Figure 2. Interaction Effects of Education and Twitter Use on Political Participation



5. Discussion

The results of this study indicated a two-fold conclusion. The first is that blogs, Twitter, and Facebook seem to have different qualities as news media. Testing them all as distinct media variables simultaneously in our statistical model enabled us to identify unique influences on the gaps of political engagement variables. As history shows, media constantly evolve, corresponding to the public's changing demands, the development of technology, and the resulting new social environment. For example, blogs are not the most interactive media they were thought to be when first appeared. The traits of media are not fixed. Scholarly efforts are needed to identify the user demand driving the change of media traits. This study proposed interactivity as one of such user demands.

The second implication of this investigation is that Facebook and Twitter may be amplifiers of inequality between people with different socioeconomic status, consistent with the knowledge-gap-hypothesis tradition. Blog use is significantly associated with an increase in issue knowledge within the less-educated group. This finding is probably due to the fact that many blogs, if not all, offer softened content of political news. Previous studies examined mostly the impact of the internet use on the knowledge gap. The investigation of the differentiated effects of blog, Twitter, Facebook use represents a step forward in understating today's media landscape.

Among the three digital media, Facebook use was associated with a gap increase in both issue and civic knowledge. This result implies that although Facebook are widely used for information exchange, the content and quality of information are disparate between those with high SES and low SES. Users in higher status exchange public-affairs information and are able to retain it, while users in lower status do not share information leading to political-knowledge increase. Although Twitter is often used as a breaking-news messenger, it may be less related to long-term retention of public-affairs information. Twitter did have an impact on the gap in offline political participation. This implies the relationship between Twitter use and participatory activities are stronger among the educated people.

One of the most important requirements for the functioning of representative democracy is the existence of politically knowledgeable and participating citizens. Since the beginning of mass opinion surveys, findings have consistently indicated a huge gap between the informed and engaged elite and the rest of citizens who are anything but knowledgeable about public affairs. Taken as a whole, this study shows that the use of Facebook and Twitter is not likely to lessen the inequality of engagement but serve to amplify of the gap.

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Negative slopes of the interaction variables need further interpretation. The results may indicate a displacement mechanism of social media within the boundary of low education groups, like the use of TV showed in the previous studies (Putnam, 2000). Because of the heavy Facebook use, an individual with low knowledge has less time to interact with people with high knowledge, resulting in less exposure to public affairs information. That is to say, the quality of friendship is compromised because of the proximity and reciprocity of the Facebook relationship. This finding is in line with a study (Vitak et al., 2010) that hours spent on Facebook were negatively associated with political participation. Overall, this investigation showed that Facebook is the only media significantly associated with all four dependent variables.

A number of study drawbacks must be addressed. Although the findings are generalizable and based on methods of previous knowledge-gap research, this investigation relies on cross-sectional data. Therefore, the causality interpretations have to be taking with a certain degree of caution. The interpretation of the result of this analysis is based on the premise that digital media use is exogenous, and political engagement variables are endogenous. We cannot exclude the possibility that political engagement causes positive interaction of education and media use. For example, among the highly educated, people with high issue knowledge may use Facebook more frequently. This could be due to their necessity to stay in touch with current affairs information, or because they use Facebook to exchange information. In this case, Facebook use reflects the behavioral pattern of highly educated people. It cannot be argued that Facebook use influences level of knowledge.

Also, the survey from which the findings were drawn had relatively small samples, although every effort was made by the researchers to achieve the most representative generalizability and the measures of social media use are exhaustive.

This study used comprehensive measures of digital media use to tap various aspects of communication on blogs, Facebook and Twitter. This is advancement when compared to previous studies that measured time spent on the media. For future studies, an investigation to compare the specific purpose-oriented usage within the media would contribute to the literature. For example, active use of Twitter (e.g. tweeting about politics) and passive use (following politician) may have a different relationship with political engagement, as it has been showed to be the case in the blogosphere (Gil de Zúñiga et al., 2013).

Lastly, the interactivity concept as a theoretical tool may also need to be refined. This study relied on a particular conceptualization to capture the dynamic of interpersonal communication and social-media features. Each operational element of interactivity can be empirically examined by placing it within a larger model. For example, data from articulate questionnaire may explore whether the element of proximity mediates the relationship between Facebook use and political engagement.

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Appendix 1. Demographic Profile of Study Survey and Other Comparable Surveys

	Study Survey Wave 1 (Jan. 2009)	**Study Survey Wave 2 (Jul. 2010)**	**Pew internet and American Life Project Post-Election Survey (Dec. 2008)**	**U.S. Census Community Population Survey (Nov. 2008)**
	(%)	(%)	(%)	(%)
Age:				
18-24	3.5	1.1	6.0	12.5
25-34	18.9	12.5	9.9	17.8
35-44	21.6	22.9	13.5	18.4
45-64	50.5	53.5	40.5	34.6
65 or more	5.5	10	30.2	16.6
Gender:				
Male	33.0	35.4	47.2	48.3
Female	67.0	64.6	52.8	51.7
Race / Ethnicity:				
White	84.4	88	79.8	68.5
Hispanic	4.5	4.7	6.1	13.7
African American	5.0	3.6	9.2	11.8
Asian	3.0	2.6	1.3	4.6
Education:				
High school or less	15.4	10.6	38.4	44.6
Some college	28.1	29.6	27.7	28.3
College degree	37.2	24.8	19.8	18.1
Graduate degree	19.2	35.1	14.1	9.0
Household Income:				
Less than $49,999	41.1	37.5	51.2	42.0
$50,000 to $99,999	37.9	34.3	31.8	35.3
$100,000 or more	21.0	28.3	17.1	22.7

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