Social Media in the Classroom: Facebook vs. Wiki

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Abstract
The increasing popularity and influence of social media provide opportunities for instructors to leverage the power of new technologies, applications and platforms to improve teaching and student performance. In particular, students are increasingly relying on social media to facilitate their communication and collaboration for teamwork, especially complex team tasks. Social media as collaborative tools not only allow team members from diverse locations to work together, but also facilitate communication and knowledge sharing among them. Given this backdrop, this paper investigates the role of social media in team communication and team outcomes in the context of university teaching. In particular, the current study operationalizes the measurement of the social media capabilities construct based on the Media Synchronicity Theory (Dennis et al. 2008) and empirically tests the impacts of social media capabilities on three important aspects of student teamwork—namely administrative efficiency, knowledge sharing, and quality feedback on individual member's work. A survey was conducted to collect the evaluation of five capabilities of social media by a convenient sampling of 109 undergraduate students from universities in Hong Kong and their use of social media in team project assignments. The data collected was analyzed using SmartPLS to empirically test the hypotheses. Social media capabilities are found to have differential predicting power for teamwork outcomes—i.e., administrative efficiency, knowledge sharing, and quality feedback. Implications are provided and discussed based on the results of the empirical study.

Keywords: Social media, media capabilities, teamwork

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Introduction

Undoubtedly, social media have been revolutionizing people's ways of communicating and interacting with others (Aral et al. 2013). Till June 2013, the largest social networking site - Facebook has 1.11 billion users and 665 million daily active users; LinkedIn has 255 million users; WhatsApp has 200 million users; Skype has 280 million users; Youtube has 1 billion users and 4 billion views per day; Instagram has 100 million users and 4 billion photos; and Dropbox has over 100 million users and 1 billion files uploaded daily (Smith 2013). And we can reasonably expect that social media continue to expand and grow in various forms.

The increasing popularity and influence of social media provide a new set of opportunities for firms to leverage the power of new technologies, applications and platforms. Though the impacts of social media on firm's marketing performance have gained relatively great research interests among scholars (Aral et al. 2013), it yet is an untouched question that how virtual teams can benefit from social media. Contemporary firms are increasingly relying on virtual teams, whose members communicate and collaborate virtually, to accomplish complex tasks (Kanawattanachai and Yoo 2007). The advancement of information and communication technology (ICT) allows team members from diverse locations to work together for shared team tasks. Concerning the increasing adoption of social media within teams as collaborative tools to facilitate communication and knowledge sharing, among young people and virtual teams in particular, this paper starts from operationalization of media capabilities (based on the Media Synchronicity Theory, Dennis et al. 2008) and empirically tests the impact of social media capabilities on three important aspects of teamwork: administrative efficiency, knowledge sharing, and quality feedback on individual member's work.

Literature Review

The capabilities of media were firstly documented by the Media Richness Theory (MRT), which argues that media differ in richness: the ability to process many different amounts of and types of information that changes understanding within a time period (Daft and Lengel 1986). According to Daft and Lengel (1986), the richness (or the information carrying capacity) of a medium is increased by the extent to which the medium meets four criteria: 1) the ability to facilitate immediate feedback, 2) the ability to support simultaneous transmissions of multiple cues (both verbal and nonverbal cues), 3) the ability to convey a message in multiple language types (in written, verbally or visually), and 4) the ability to convey personal feelings and emotions. Face-to-face (F2F) communication is the richest medium, while social media, as a form of computer-mediated communication (CMC), capable of providing slower responses (specific comments or information may be ignored completely or not be responded in a timely manner) and supporting fewer cues (e.g., no physical cues) are leaner.

Based on MRT, Dennis et al. (2008) proposed the Media Synchronicity Theory (MST) and further identified five capabilities of media (transmission velocity, parallelism, symbol sets, rehearsability, and reprocessability) that may affect information transmission and processing. Transmission velocity is the speed at which a medium can transmit a message to recipients. Media high in transmission velocity

enable messages to reach recipients as soon as they are sent, thereby allowing fast responses (Dennis et al. 2008). Parallelism is the number of concurrent transmissions that can effectively take place over the medium. High-parallelism media allow simultaneous sending and receipt of messages to and from multiple parties (multidirectional communication and multiparty transmissions) and increase the number of concurrent conversations (Dennis et al. 2008). Symbol sets are the number of ways in which a medium can support to encode information for communication. Media that are low in symbol sets are considered to be low in social presence (Short et al. 1976). Low social presence may reduce satisfaction of the communication and interactivity, limiting the sharing of knowledge and experience among colleagues. Rehearsability is the extent to which senders can rehearse and fine tune messages before sending. Media that support rehearsability allow messages to be better crafted and reasoned (Maruping and Agarwal 2004), therefore ensure the intended meanings are expressed precisely (Dennis et al. 2008). Reprocessability is the extent to which participants can reexamine or reprocess previously sent content either within the communication event or at a later time. Media that support rehearsability allow recipients to spend more time on decoding messages by revisiting prior messages for better understanding and additional consideration, as well as provide a memory that can remind participants on their early discussion contents and help new participants to understand past activities (Dennis et al. 2008).

Research Hypotheses

Social Media Capabilities and Administrative Efficiency

Teamwork involves miscellaneous administrative communication such as arranging meetings or announcing. Extensive team communication and coordination for performing a task consume the team members considerable time and efforts and cognitive resources. Administrative efficiency refers to the ability to support easy, convenient and efficient handling of administrative issues. Administrative issues can be communicated to all via social media quickly (fast transmission velocity) and in parallel (high parallelism). Thus, all recipients can respond immediately. Concerning their fast transmission velocity and high parallelism, and relative lean in media richness, social media are suitable for efficient handling of administrative issues (non-equivocal, analyzable, task-oriented tasks) which involve interchanging of clear messages and discussion over simple topics. Therefore,

Hypothesis 1a (H1a): Using social media high in transmission velocity has a positive impact on administrative efficiency.

Hypothesis 1b (H1b): Using social media high in parallelism has a positive impact on administrative efficiency.

Social Media Capabilities and Knowledge Sharing

Teamwork frequently demands its members sharing task-related information and knowledge. Social media have been proven to be superefficient in disseminating information (Jue et al. 2010). Knowledge sharing has two forms: knowledge donating and knowledge collecting. Knowledge donating is a process of actively communicating to others what an individual knows, while knowledge collecting is a

process of actively consulting others to learn what they know (Hooff and Weenen 2004). Social media, as ICTs, offer unique opportunities for virtual teams to overcome time and space barriers by allowing dispersed team members to communicate and collaborate online, and improve access to information. The value of ICTs for knowledge sharing, however, is generally considered limited because it does not give attention to when and how quality of knowledge sharing will be enhanced (Hendriks 1999). Social media users cannot communicate in physical ways (e.g., a handshake or a gentle touch), and can only use limited visual (limited set of emoticons) and verbal cues. They usually communicate using written, digital symbols like words, images and videos. Also, social media can hardly support simultaneous transmissions of multiple cues. Being low in symbol sets, social media are low in social presence (Short et al. 1976). We argue that low social presence may discourage participation and conversation, thereby discouraging group members to share their knowledge with others to collectively contribute to the group knowledge construction. Therefore,

Hypothesis 2a (H2a): Using social media low in symbol sets has a negative impact on knowledge sharing.

Social media's high parallelism facilitates knowledge sharing by extending people's reach to a wider network for knowledge sharing (Jue et al. 2010). Previously, people who were not close to a project may not have been aware that they could contribute. Social media such as social networking sites, forums and wikis enable these individuals to offer their ideas and experiences (knowledge donating) when the project team signals the need for assistance. High parallelism enables signaling for assistance (knowledge collecting) to a wide pool of knowledge community in parallel. Therefore,

Hypothesis 2b (H2b): Using social media high in parallelism has a positive impact on knowledge sharing.

Social Media Capabilities and Quality Feedback

Quality feedback refers to consistent, informative and useful feedback that helps recipients to improve performance (Steelman et al. 2004; Watts 2007). In social media where communication is not necessarily in real time, the chance to contemplate or edit a message prior to sending it is high. Social media also maintain a record of all communications for reference. Social media's high rehearsability and reprocessability facilitate quality feedback. High rehearsability enables the sender to ensure that the intended meaning of the message is expressed precisely, thereby improving the subsequent decoding and information processing of the recipient (Dennis et al. 2008). High reprocessability provides the recipient opportunities for offline deliberation and reflection after the interaction (Maruping and Agarwal 2004) in order to develop better understanding and for additional consideration (Dennis et al. 2008). Since social media possess the capabilities that make the messages more rigorously deliberated and better crafted, users are more likely to receive consistent, informative and useful feedback on this platform. Therefore,

Hypothesis 3a (H3a): Using social media high in rehearsability has a positive impact on quality feedback.

Hypothesis 3b (H3b): Using social media high in reprocessability has a positive impact on quality feedback.

Methodology

A survey was conducted to collect the evaluation of five capabilities of social media by university students and their use of social media in doing group assignments. A convenient sampling of total 109 undergraduate students and fresh graduates (50 females and 59 males) from 7 universities in Hong Kong completed the questionnaire. Data collected from the survey was then analyzed to empirically test the hypotheses using SPSS.

The items measuring five media capabilities were self-developed based on the conceptual definitions and arguments by Dennis et al. (2008). The card sorting technique (Moore and Benbasat, 1991) was employed to develop the measurement instrument in a scientific way. Since there is no available measure capturing administrative efficiency, we self-developed a set of 5-item instrument following the same procedure. Validated survey items from prior studies were adopted to measure knowledge sharing (Hooff and Weenen 2004) and quality feedback (Watts 2007). Besides the common demographic factors, i.e., age, gender, year of study, faculty, we also controlled the frequency of using social media for teamwork (Cao et al. 2012), perceived level of familiarity with teammates (Janssen et al. 2009), task interdependence (Kirkman et al. 2004), and online communication self-efficacy (Lin and Overbaugh 2009). A full list of survey items are reported in Appendix A. All questions were rated using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Results

The self-developed constructs showed satisfactory reliability in terms of Cronbach's alpha: transmission velocity (.832), parallelism (.864), symbol sets (.894), rehearsability (.873), and reprocessability (.863), and administrative efficiency (.833).

In the questionnaire, we asked the respondents to indicate a certain type of medium that they most frequently used for teamwork and to answer following questions regarding that particular medium. That created a chance for us to further understand whether different social media tools differ in their capabilities. Facebook (frequency = 39; 35.8%) and WhatsApp (frequency = 56; 51.4%) were the two major social media tools that the study population frequently used for doing their group assignments. As a result, we analyzed the data using three sub-sets: overall social media use (1), Facebook users (2), and WhatsApp (3). Table 1 presents the mean values of the five media capabilities of the three sub-sets. Results of the t-test showed that Facebook possessed significantly lower level of symbol sets (Sig. < .05) and higher level of rehearsability (Sig. < .05) than Whatsapp's. Table 2 summarizes the results of linear regression tests to check for significant relationships of media capabilities on work-related outcomes.

Frequency of using social media is positively associated with administrative efficiency for the general sample (B=.200) and Facebook users (B=.282), but not for WhatsApp group. Task interdependence is also positively associated with

administrative efficiency for Facebook users (B=.288). Self-efficacy for online communication is positively associated with administrative efficiency for the general sample (B=.209) and WhatsApp group (B=.290), but not for Facebook users. Self-efficacy is also positively associated with knowledge sharing and quality feedback for the general sample (B=.293 and .366 respectively), Facebook users (B=.364 and .447 respectively) and WhatsApp group (B=.270 and .322 respectively).

Table 1. Mean values of the five media capabilities

Sample Set	N	Transmission Velocity	Parallelism	Symbol Sets	Rehearsability	Reprocessability
1.Social media	109	4.1216	4.4541	2.8647	3.7110	4.0206
2.Facebook	39	4.0385	4.4103	**2.6538**	**3.8910**	4.0256
3.WhatsApp	56	4.2009	4.5089	**3.1205**	**3.5580**	4.0000

Table 2. Summary of hypothesis testing results

Sample Set		Social media		Facebook		WhatsApp	
Independent variables	Dependable variables	R^2	Significance	R^2	Significance	R^2	Significance
H1a:Transmission Velocity	Administrative Efficiency	.390	–	.632	–	.307	–
H1b: Parallelism			.208**		.412**		–
H2a: Symbol Sets	Knowledge Sharing	.413	–	.599	–	.405	.126, p<.1
H2b: Parallelism			.200***		.259*		–
H3a: Rehearsability	Quality Feedback	.340	–	.480	–.247*	.375	–
H3b: Reprocessability			.222**		.306*		.205*

***p<.001. **p<.01. *p<.05.

Discussions

The results showed that transmission velocity did not influence administrative efficiency (H1a unsupported), while parallelism was found to have a positive effect on administrative efficiency (H1b supported). Despite of its high transmission velocity capability, social media do not guarantee immediate responses from the recipients because users may intentionally (e.g., to take time for deliberation or being uncooperative) or unintentionally (e.g., being unaware of the requests to respond because they are temporarily absorbed in other tasks or disconnected from internet access) respond later. These may explain why social media's high transmission velocity did not contribute to administrative efficiency.

Parallelism was positively associated with administrative efficiency (H1b supported). Results obtained from WhatsApp subset, however, did not support. This may be explained by the physical limitation of smart phones (WhatsApp is run on smart phones). Despite of possessing similar high level of parallelism as of Facebook, the smaller screen size of smart phones limited WhatsApp users to open multiple conversation windows concurrently. By contrast, Facebook, can be and is often accessed using computers with larger displays, enables users to open multiple conversation windows simultaneously and communicate with multiple parties concurrently without switching back and forth between conversations.

The results indicated that symbol sets did not influence knowledge sharing (H2a unsupported), while parallelism was found to have a positive effect on knowledge sharing (H2b supported). Prior studies argue that social media are objectively lower in social presence (Short et al.1976), thereby reducing the level of interactions and the number of contributions and discouraging group members to share their knowledge

with others to collectively contribute to group knowledge construction (the "why care" or "why bother" problems due to perceived low social presence by virtual teams). Results obtained in this study, however, revealed that social media were not always perceived as low in social presence, and thus, supporting the arguments of another stream of researches: subjective qualities of social presence are influential to actual experience of social presence (Swan and Shih 2005). The sample of this survey was university students who were familiar with ICT and experienced in online communication. Their interactions through social media were often loaded with social interchange. Also, social media support exchanging of multiple cues by providing a variety of emoticons for users to express facial expressions and supporting transmission of multimedia files to convey verbal and visual cues. Social media are not perceived as low in social presence when taking these subjective characteristics of social media into consideration. These may explain despite of its objectively low in social presence, social media did not discourage knowledge sharing.

The results supported that parallelism was positively associated with knowledge sharing (H2b). This demonstrates that social media's high parallelism extends people's reach to a wider knowledge community for knowledge sharing. Results obtained from sample set on WhatsApp, however, did not support - parallelism did not influence knowledge sharing. This may be explained by the limited actual experience of parallelism on WhatsApp (similar to hypothesis 1b). Since there was no relationship between parallelism and knowledge sharing on WhatsApp samples, knowledge sharing had to rely on another capability - symbol sets (H2a). Also, WhatsApp possessed markedly higher level of symbol sets (mean value of 3.12) than that of Facebook (mean value of 2.65) as users generally use it more often for daily social interactions and it offers a wider variety of emoticons. WhatsApp, therefore, enjoys higher level of social presence which increases the level of interactions and encourages group members to share their ideas and collaborate with others to contribute to group knowledge construction. Therefore, symbol sets was found to be contributive to knowledge sharing.

The results showed that rehearsability did not influence quality feedback (H3a unsupported), while reprocessability was found to have a positive effect on knowledge sharing (H3b supported). Although social media allow users to rehearse and perfect messages before sending them, social media users may decide not to do so. The decision to rehearse and fine tune messages or not depends on the recipients, both in terms of size and formality of the group. If the group is large in size and/or the group context is more formal, people tend to carefully rehearse and fine tune messages before sending them to ensure that messages are complete, grammar- and syntax-free and precise. People have a tendency to better behave when interacting with a large group of people and/ or in formal contexts. If the recipients are small, informal group, people tend to be less careful in crafting and fine tuning messages before transmission because the main goal is to respond quickly. Even the messages may be incomplete or with minor errors, as long as they can convey the intended meanings, they are considered to have fulfilled the communication needs. These may explain despite of its high rehearsability capability, social media did not contribute to quality feedback.

Paradoxically, rehearsability was found to have a negative effect on quality feedback on Facebook samples, rejecting hypothesis 3a. This may be explained by the fact that

people may tend to hide their true and immediate responses after rehearsal and consideration (groupthink). Since Facebook maintains a digital record of all conversations, participants may feel inhibited to voice unusual or conflicting ideas because of higher opportunities for retribution from other team members (Valacich et al. 1994). Groupthink is the "phenomenon in which the norm for consensus overrides the realistic appraisal of alternative courses of action" (Robbins and Judge 2010, p. 331). "Group pressures for conformity deter the group from critically appraising unusual, minority, or unpopular views (Robbins and Judge 2010, p. 330)." Thus, rehearsal may deter group members to voice unusual or unpopular ideas which could be valuable and contributive to better group performance. These may explain despite of its high rehearsability capability, Facebook did not contribute to quality feedback.

The results showed that reprocessability was positively associated with quality feedback (H3b supported). This demonstrates that social media's capability of maintaining a digital record of conversations enables users to revisit previously interactions to spend more time on decoding messages for deliberation, and helps to remind users on previously discussed content, thus, contributing to quality feedback.

The results also indicated that self-efficacy was significant for nearly all hypotheses, except for hypotheses 1a and 1b on Facebook samples. Not surprisingly, respondent's self-efficacy for online communication was important to favorable group outcomes because social media users have to be knowledgeable about the capabilities of social media and be confident that they can make good use of these capabilities to assist them for effective and efficient communication and collaboration within virtual groups. Knowledge of such capabilities is therefore crucial in determining the impact of using social media on teamwork. Competent users can make good use of the capabilities of social media to improve team level information sharing and work-related outcomes. Thus, self-efficacy for online communication is justified for administrative efficiency, knowledge sharing and quality feedback. At the same time, frequency of using social media for teamwork was found to have a positive effect on administrative efficiency. Prior studies suggest that knowledge of the social media tools (self-efficacy) may be the results of prior usage of these tools (frequency) (Majumdar and Krishna, 2011). Therefore, frequency and self-efficacy were interrelated to contribute to administrative efficiency.

Task interdependence was also found to have a positive effect on administrative efficiency for Facebook users. This may be explained by different usages of different social media tools on teamwork for. Students often use WhatsApps to communicate administrative issues, whereas for Facebook, apart from administrative coordination, students more often use it to share resources and exchange documents with team members. This is because Facebook allows users to attach files to messages. This justified the significant task interdependence association with administrative efficiency on Facebook samples.

Limitations and Future Research

The major limitation of this study is the sample size of the survey, especially on the investigation of difference(s) in capabilities of different social media tools. There were only 56 and 39 responses on WhatsApp and Facebook respectively which were

insufficient to provide a representative overview of how media capabilities differ across different social media tools.

The results revealed that transmission velocity did not contribute to administrative efficiency. Also, the associations of symbol sets on knowledge sharing (only supported by WhatsApp sub-sample) and rehearsability on quality feedback (only supported by Facebook sub-sample) are considered to be weak. Therefore, future research could investigate other aspects of team level information sharing and work-related outcomes that transmission velocity may have impact on. Future empirical studies might also further test the associations of symbol sets on knowledge sharing and rehearsability on quality feedback in order to further comprehend the phenomenon. Future research could also investigate the relationship between capabilities of social media and other meaningful outcome variables such as group satisfaction, group well-being, group cohesiveness and so on.

This study investigated the impact of social media capabilities on teamwork using student sample, leaving a need to empirically examine its impact in work contexts in real-world organizations. Also, since it was a self-report study, future research could also collect real data, for example, with the access to the archival history of a group chat from the respondents, future research is able to give objective examination of the link between perception of media capabilities and consequent behaviors.

Conclusion

Based on MST, this study proposed a hypothesized model to investigate which capability (-ies) of social media may impact the team interaction and outcomes. It thus makes several contributions. First, this study developed a set of reliable scales to measures media capabilities. It is the first study, to our knowledge, that empirically evaluates the five capabilities. Our study thus provided a nice ground for future research on social media or other media's impact on various outcomes. Second, this study empirically validated that parallelism of social media had positive impact on both administrative efficiency and knowledge sharing, and reprocessability positively impact quality feedback users can get from social media. These findings serve as a preliminary exploration of social media's influence on teamwork in workplace, thus moving forward the body of knowledge on social media beyond the individual- and firm-level. Third, this study proposed administrative efficiency as one of the important team process variables. It is a new concept emerged from qualitative interviews of sample users of social media. Our results proved that the use of social media can largely improve the efficiency of team coordination. It thus sheds a light on more potential aspects of group work research.

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