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Analyzing knowledge dimensions and cognitive process of a project-based online discussion instructional activity using Facebook in an adult and continuing education course

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ABSTRACT

In recent years, social networking services (SNSs), for example, Facebook, have shown exponential growth in their number of users. Witnessing the popularity of these SNSs, educational researchers have also explored the potential educational value of using SNSs. Despite the few studies that have investigated learners' attitudes toward and the effects of incorporating SNSs in class, limited attention has been paid to examining learners' knowledge and cognitive processes involved in online discussions using SNSs. Although general public interest in life-long learning has been gradually increasing, relatively little attention has been devoted to exploring the application of SNSs in adult and continuing education programs.

To promote a better understanding of using SNSs in learning, this study seeks to explore learners' online discussion behaviors in an art course that involved a project-based learning activity using a popular SNS, Facebook, to support students' asynchronous online discussions. The participants in our study included 62 students enrolled in the school of continuing education at a university in northern Taiwan. Adapting the Revised Bloom's Taxonomy as a coding scheme, this study employed a quantitative content analysis (QCA) and lag sequential analysis (LSA) to examine the content and behavioral patterns of students' discussions. The results indicate that the most prominent knowledge dimension in students' discussions is the meta-cognitive knowledge, while the cognitive process is primarily focused on understanding and comprehension. In addition, a moderate proportion of off-topic discussion was found in this study. Considering the different behaviors that may be exhibited by members of varied age and gender, a further analysis based on students' individual differences was conducted. The results showed that, in the context of online discussions, female and older learners are more likely to engage in off-topic discussions. Based on these findings, this study suggests that when conducting online discussion activities using SNSs, instructors should consider the characteristics of adult learners and their individual differences and design their teaching activities accordingly. Implications and limitations of this study are discussed, and pedagogical suggestions for adapting SNSs to teaching activities for adult and continuing education are proposed.

1. Introduction

In recent years, the advent of Web 2.0 and rapid advances in Information & Communication Technology (ICT) have fostered the emergence of novel web services. Social networking services (SNSs), such as Facebook, Twitter, Plurk etc., are among the novel web services that have dramatically changed the way people share information and interact with each other (Hughes, Rowe, Batey, & Lee, 2012). Among various SNSs, Facebook is a very popular one. Facebook emphasizes connections among individuals and the formation of community. By

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using Facebook, people can easily interact and share multiple formats of information, including texts, pictures, videos, etc., with each other via diverse digital devices (e.g., smartphone) without temporal or spatial constraints.

Witnessing Facebook's worldwide popularity and prevalence among college students (Kabilan, Ahmad, & Abidin, 2010), educational researchers have recently begun to investigate students' perceptions toward and behavior of using Facebook and the relationship between the use of Facebook and learning performance (e.g., Gray, Annabell, & Kennedy, 2010; Junco, 2012a; Kabilan et al., 2010; Kirschner & Karpinski, 2010; etc.).

With regard to students' perceptions toward using Facebook in the classroom, previous studies have found that students generally show positive and open attitudes regarding its educational use. Nonetheless, adequate pedagogical design is needed if the use of SNSs in the classroom is to improve learning performance (Kabilan et al., 2010; Roblyer, McDaniel, Webb, Herman, & Witty, 2010). With respect to Facebook usage, students primarily use Facebook for social interaction. While some students may discuss educational issues in Facebook, most people use Facebook primarily for informal learning (Madge, Meek, Wellens, & Hooley, 2009). Regarding the association between learning performance and Facebook usage, previous research generally suggests a negative relationship between the amount of time spent on Facebook and learning performance (Junco, 2012b; Kirschner & Karpinski, 2010). However, Junco (2012b) further noted that students' using Facebook to collect and share information could positively predict their learning performance. Moreover, Yu, Tian, Vogel, and Chi-Wai Kwok (2010) found that students' online social network engagement can help students attain social acceptance and adapt to the university culture, which, in turn, improves their perceived performance proficiency. These results suggest that using Facebook is not necessarily harmful to a student's learning performance. Adequate learning activity design and pedagogical goal setting could, in fact, exploit the social and information-sharing function of Facebook, thereby supporting academic learning (Gray et al., 2010).

Project-based learning (PBL) is recognized as a learning activity that can deliver satisfactory learning performance (Thomas, 2000). In the process of project-based learning, learners must utilize different kinds of knowledge (e.g., discrete declarative knowledge and dynamic procedural knowledge) (Lou, 2004). Meanwhile, students can develop higher level of cognitive skills for a specific domain as well as the ability to apply adequate knowledge to a specific domain or context during PBL (Barron et al., 1998; Blumenfeld et al., 1991).

Moreover, Koh, Herring, and Hew (2010) noted that a project-based learning activity could help students achieve higher cognitive levels and deeper knowledge construction. In PBL, multiple information sources, intensive interaction and information sharing are discerned as critical elements in the learning process (Blumenfeld et al., 1991). Facebook has created an environment for people to share information and socialize with others. It is worth further exploration to probe if this environment could facilitate students to accomplish meaningful online discourse that involves different levels of cognitive skills and diverse types of knowledge.

With the proliferation of the knowledge economy and the rapidly changing requirements from industries, learning is now considered a life-long venture. Thus, the importance of adult education in the overall educational system is gradually increasing. Compared with traditional learners of higher education, adult learners usually play multiple roles in both family and work environments, which may impose temporal or geographical constraints as they seek to commit to additional learning opportunities (Holmberg, 1995). Incorporating computer technology to support learning may help adult learners overcome some of these constraints. Additionally, by adopting computer-supported collaborative learning (CSCL), the diverse individual differences and experiences of adult learners can be leveraged for learners as they co-construct deeper and richer knowledge via interaction among learners, teachers and the learning environment. Thus, meaningful learning can be achieved (Kilgore, 2004; LeNoue, Hall, & Eighmy, 2011).

LeNoue et al. (2011) further suggest that a well-designed social networking site, which facilitates both broad and deep interactions, can allow learners to collaboratively explore and process information, thus contributing to diversified opportunities for learning. Furthermore, adult learners generally have more diverse individual differences with respect to age, work experience, etc. Age is considered a critical factor in predicting a learner's cognitive maturity and learning strategy in higher education (Bye, Pushkar, & Conway, 2007). Moreover, gender difference is also regarded a significant moderating factor in educational research (Teo, 2010; Terzis & Economides, 2011; Yukselturk & Bulut, 2009). Previous studies have found that males and females act differently in group/social interactions and social media usage (Glynn, Huge, & Hoffman, 2012; Muscanell & Guadagno, 2012; Payne & Monk-Turner, 2006). Therefore, the use of SNSs requires further investigation regarding the effects of adult learners' individual differences on the behavior of online collaborative learning.

In summary, this study seeks to advance the understanding of adult learners' behaviors in online project discussions using Facebook. Specifically, the type of knowledge dimension and the cognitive processes demonstrated in the learners' online discussions are to be scrutinized in this study. Quantitative content analysis (QCA) is used to investigate the frequency of various discussion behaviors among online learners. Moreover, a lag sequential analysis (LSA) is used to visually present the behavioral patterns that learners exhibit during the process of online discussion. Few previous studies have explored the relationship between students' Facebook usage and learning performance. However, relatively few empirical studies have extensively examined the interactions and learning behaviors among students in Facebook, which has been formally integrated with course activity. In addition, studies that combine QCA and LSA in examining the dimension of learners' knowledge and cognitive process in PBL using Facebook are relatively rare. Findings derived from this study may help depict a clearer picture of the type of knowledge and the cognitive processes involved in students' online discussions on Facebook. By combining the results from the QCA and the LSA, researchers can better understand the bottleneck of knowledge construction in online discussions. According to the research findings, adequate pedagogical design and strategy could be proposed to facilitate higher level of cognitive interaction and diversity of knowledge among learners.

Specifically, this study addresses the following research purposes:

(1) To explore the distribution of knowledge dimension and the cognitive process that learners demonstrate in online discussions of PBL using Facebook in an adult and continuing education course.
(2) To portray the behavioral patterns of knowledge dimension and cognitive process that learners demonstrate in online discussions of PBL using Facebook.
(3) To examine the effects of individual differences, i.e., gender and age, with respect to the aforementioned distribution and behavioral patterns.