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In this issue:

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Facebook's Effect on Learning in Higher Education: An Empirical Investigation

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Abstract

Due in part to its widespread acceptance, Facebook has been adopted as a tool for higher education courses. Proponents claim that Facebook-enhanced courses facilitate an increased community of practice, sense of learning and sense of connectedness compared to non-enhanced courses. This empirical study uses a survey methodology in an independent measures static group comparison research design to compare the responses of 586 students who were enrolled in Facebook-enhanced business courses with those who were not. The courses were taught by two instructors at two different universities in the USA. The use of Facebook in students' courses serves as the independent variable. Students' attitudes toward the community of practice, sense of learning and sense of connectedness that evolved in their classrooms serve as the dependent variables. Research findings show that students in the Facebook-enhanced courses experienced a somewhat more positive community of practice, sense of learning and sense of connectedness compared to students in non-Facebook-enhanced courses. Implications for teaching, limitations and further research are discussed.

Keywords: Facebook, Social Networks, Technology in Higher Education Classrooms, Sense of Classroom Community, Sense of Learning, Sense of Connectedness, Community of Practice

1. INTRODUCTION

Many collegiate educators believe that online social networks have enormous potential to shape the way humans learn (Bosch, 2009; Harris & Rea, 2009; Ractham, Kaewkitipong, & Firpo, 2012). They believe that capitalizing on the social nature of online networks can create an optimal environment for learning to occur (Hung & Yuen 2010), given that today's students learn about computers, software and network technologies at an early age. Those students are primarily "digital natives" (Prensky, 2001) who are comfortable with technology even before

they enroll in their first university course. The higher education community has made great strides in utilizing technology infrastructure, yet the pedagogical implications remain vastly unexplored (Hemmi, Bayne, & Land, 2009).

The ubiquity of social networking media is no more apparent than at universities where social media, including Facebook, are steadily transforming education and the way most subjects are taught (Tess, 2013). Because social media are interactive, participants can create, edit or share information. Unlike traditional one-way media such as television, social media are

two-way conversations in which control is decentralized and open to masses of users (Barczyk & Duncan, 2012). Consequently, faculty are becoming less the authoritative deliverers of knowledge and more the facilitators of exploration and collaboration in pursuit of answers and solutions to problems. Some higher education faculty view Facebook and other social media as a way to motivate and engage students to be actively involved in their learning (Junco, Heiberger, & Loken, 2011).

Facebook has the potential to become an exciting instructional tool given its popularity and students' familiarity with its site. In fact, it has the potential to influence students in the United States and globally. Because 80% of Facebook's 1.55 billion monthly active users live outside the United States (Facebook, 2015), it represents a global, engaging information-sharing mechanism that can facilitate critical thinking and intercultural dialogue (Maher & Hoon, 2008). Research suggests that Facebook's focus on peer-to-peer interactions enhances informal learning experiences (Goodwin, Kennedy, & Vetere, 2010; Madge et al., 2009; Selwyn, 2009). Other studies have shown that students have effectively used Facebook for learning and activism (Bosch, 2009; Grosseck, Bran, & Tiru, 2011).

While students' use of Facebook is well documented, research demonstrates that faculty members have also utilized it for academic purposes. Junco (2012) reports that faculty are using social media sites for course-related purposes and that usage is rapidly increasing. However, some college educators are hesitant to embrace Facebook as an instructional tool (Moran, Seaman, & Tinti-Kane, 2011; Roblyer, McDaniel, Webb, Herman, & Witty, 2010). A study by Kirschner and Karpinski (2010) reported that student users of Facebook had significantly lower grade point averages than non-users; and they spent fewer hours per week engaged in study compared to non-users. In sum, the current research suggests that Facebook is a promising, but not a perfect, educational tool that warrants further application and study.

The primary purpose of this paper is to discuss the results of a study designed to determine whether the incorporation of Facebook into the instructional design of business courses has an impact on students' attitudes and perceptions of those courses. Specifically, students' perceptions of the classroom community of practice (CoP) established in their Facebook-enhanced courses

will be compared to students' perceptions of the CoP in non-Facebook-enhanced courses. Additionally, whether students in Facebook-enhanced courses perceive a different sense of classroom community (SCC) from those in non-Facebook-enhanced courses will be analyzed.

Organizationally, this paper is divided into four parts. The first reviews the literature and formulates three research questions. The second describes the methodology used to address the research questions and begins with a description of how the classroom CoP was created using Facebook. The third summarizes the findings associated with the research questions. The fourth discusses the conclusions and limitations of this study, and areas for future research.

2. REVIEW OF THE LITERATURE AND FORMATION OF RESEARCH QUESTIONS

Attitudes toward using Facebook in the classroom

The earliest definition of attitude is provided by Allport (1935) who indicated that it is a neural or mental state of readiness, which is organized through experience and exerts a directive influence on the individual's response to all objects and situations to which it is related. Pickens (2011) defines an attitude very simply by stating that it is a mindset to act in a certain way due to both an individual's experience and temperament. Attitudes help define how people see situations and how they behave toward them. When reference is made to a person's attitudes, it is an attempt to explain his or her behavior. Attitudes are a complex set of things sometimes called personality, beliefs, behaviors, values, and motivations.

Perceptions are closely related to attitudes. Lindsay and Norman (1977) indicate that perception is a process wherein organisms interpret and organize sensation to produce a meaningful experience of the world. Pickens (2011) suggests that when a person is confronted with a stimulus or a situation, s/he interprets it into something meaningful based on prior experiences. What that person perceives may be substantially different from reality.

It is important to understand students' perceptions and attitudes because these form the basis for feeling and action in the learning environment. Perceptions influence behavior and behavior influences decision making – a critical skill for students and classroom instructors. By understanding students'

attitudes toward Facebook and how they perceive this form of social media, instructors can design instructional objectives, content, and assessments to enhance learning.

Few studies have researched the potential of web-based technologies to engage students in higher education (Hurt, Moss, Bradley, et al, 2012). Previous research has suggested that investigators should examine how the features of Facebook help build classroom community. An analysis of students' attitudes toward the classroom use of Facebook could serve as the building block. On that foundation research questions could be designed to determine whether Facebook is (1) perceived as a convenient medium for interaction, (2) a contributor to course quality, (3) a mechanism to foster professional growth, and (4) a facilitator of classroom participation.

A recent study of the attitudes of 107 students toward Facebook provides some insights. In a survey designed to compare the attitudes and perceived learning between Facebook and eLearning Commons (a Blackboard Learning Management System tool), Hurt, Moss, Bradley, et al (2012) found that:
1. Facebook was preferred over eLearning Commons as a classroom supplement. Many of the students were already familiar with Facebook, used it frequently and found it easy to navigate.
2. Facebook users became more acquainted with their classmates.
3. Facebook users felt like valued participants and learned more course material.
4. If used appropriately, Facebook may help to increase student engagement by cultivating classroom community and stimulating intellectual discourse.

In sum, Facebook can be used effectively for academic discussions.

Ractham, Kaewkitipong and Firpo (2012) used Facebook as a learning tool in an introductory management information systems course to build and foster an enhanced learning environment. They used the social interactions among Facebook-connected students to develop a constructivist learning atmosphere. A variety of pedagogic strategies were used to integrate activities both inside and outside of the classroom to achieve social learning. The authors sought to implement and evaluate several features of a social networking technology, i.e. Facebook, in an attempt to enhance communication, collaboration, and other innovative uses in future classes. The four features they activated were (1) Social playground through Facebook Wall, (2) Social discussion through Facebook Discussion, (3) Social roll call through Facebook Photos, and (4) Social tube through Facebook Videos.

Seventy five students participated in the Ractham, Kaewkitipong and Firpo (2012) study, which resulted in 55 completed, usable questionnaires. It was found that 55% of the students felt that Facebook helped them in learning. Even more, 78% felt that Facebook was a useful supplemental learning tool. The high volume of communication between students and the positive responses to the survey led to the conclusion that there was great potential for informal learning environments with Facebook as the primary space to communicate and collaborate. The authors observed that some students participated in a casual manner in the same way they would casually interact with friends on their personal Facebook accounts.

Among the lessons learned by Ractham, Kaewkitipong and Firpo (2012) were that Facebook usage in the classroom is time consuming for instructors, yet it is important to communicate frequently with students in order to maintain a high level of interest and activity in the overall learning environment. They also learned that the Facebook effect was somewhat dependent on the instructor's skills, personal characteristics and willingness to commit the time needed. Faculty need to provide structure in spite of more focus on learner centeredness.

de Villiers (2010) studied the potential of Facebook group and discussion facilities for focused academic use. In a study of 35 postgraduate distance-learning students who joined an optional Facebook group to discuss academic content, it was found that learning and perceptions were enhanced by participating in the discussions. The students benefitted from contact with fellow online students; they especially benefitted by researching beyond the assigned study materials and by making personal contributions.

Based on these studies indicating that students had favorable attitudes toward social media-enhanced courses, we advance the first research question:

Is there a difference in the attitudes of students in Facebook-enhanced courses and those in non-enhanced courses on whether Facebook (1) is convenient to use

in the classroom, (2) enhances the quality of courses, (3) fosters professional growth, and (4) increases classroom participation?

Community of Practice
This study focuses on learning as a social construct, explained in part by students' sense of classroom community and their establishment of a course level CoP. The social nature of learning can be distinguished from other perspectives that are either cognitive or affective in nature. Lave and Wenger (1991) contend that learning involves engagement in social interaction. It is part of a broader conceptual concept, namely CoP, which constitutes the lowest meaningful context for learning to occur. It is primarily a framework for social participation, in which people are engaged at home, work, school, or other group settings. Typically, individuals are involved in a number of CoPs, which share a common assumption. The assumption is that "engagement in social practice is the fundamental principle by which we learn and so become who we are" (Wenger, 1998, p. 45). The current study is modeled after that of Hung and Yuen (2010), which principally examined students' CoP and sense of classroom community (Rovai 2001, 2002a, 2002b, 2003).

A classroom community is psychological in nature and has the following characteristics: (a) its environment exists in the world of education; (b) its fundamental purpose is learning; and (c) the community has a fixed organizational tenure, i.e., the course or program in which members are engaged has a fixed length (Rovai, 2001). This view of classroom community suggests that any course in which students are enrolled, whether good or bad, can be a classroom community. It implies that any efforts that classmates put into establishing and sustaining their community can be grounded in the framework of classroom CoP (Rovai, 2001).

Research has established the importance of classroom CoPs to facilitate effective learning. Summers and Svinicki (2007) investigated the relationship between students' perceptions of motivation and classroom community. They found that students in cooperative learning classrooms had a greater motivation to achieve goals and a higher sense of community than those in non-cooperative learning classrooms. As such, CoP affected students' sense of classroom community. Other studies revealed that teaching, cognitive, and social factors are related to the nurturing of students' sense of classroom community (Garrison, Anderson, & Archer, 2000; Shea, 2006; Shea & Bidjerano, 2008). As cited in Hung and Yuen (2010), Rovai argues that when learners "feel a sense of community, it is possible that this emotional connectedness may provide the support needed for them not only to complete successfully a class or a program, but also to learn more" (2002b, p. 321).

Based on these studies, we advance the second research question:

Is there a difference in the perceptions of the CoP that evolves in Facebook-enhanced courses as compared to the CoP that evolves in non-Facebook-enhanced courses?

Sense of Classroom Community
Classroom community has been described as the sense of trust and interaction between groups of learners (Graff, 2003). It has been suggested that sense of community is imperative to successful learning. It is a type of mutual interdependence among members of a learning community, which has shared goals and values. While classroom community is a shared phenomenon, it is conceivable that individuals differ on the extent to which they sense this trust and interaction. As such, sense of community may be more crucial to some learners than to others. Rovai (2001), for example, noted that females report a greater sense of classroom community than their male counterparts (Graff, 2003).

According to Rovai (2002b), a *classroom community* is a "feeling that members have of belonging, a feeling that members matter to one another and to the group, that they have duties and obligations to each other and to the school, and that they possess shared expectations that members educational needs will be met through their commitment to shared learning goals" (p. 322). Rovai (2002b) contends that classroom community consists of two factors. The first is learning, which is "the feeling that knowledge and meaning are actively constructed within the community, that the community enhances the acquisition of knowledge and understanding, and that the learning needs of its members are being satisfied" (p. 322). The second is connectedness, which is "the feeling of belonging and acceptance and the creation of bonding relationships" (p. 322). A strong classroom community demonstrates characteristics such as shared common interests, active engagement in two-way communications, as well as trusting and helping other members (Rovai, 2002b).

Social media such as Facebook, Google+ and MySpace are designed to facilitate social interaction and information exchange. A number of researchers believe that social networking is the life blood of CoP. Among those researchers are Mason and Rennie (2007) who incorporated several forms of social media to support a local community's development of a land trust. They found that social media supporting social interaction increased the emotional connectedness of community members, which facilitated the development of the land trust.

Social media, especially Facebook, has the capacity to enhance student engagement and satisfaction. In a study by deVilliers (2010), Facebook groups were used to foster optional discussions in an online course. She found that the voluntary Facebook group members benefited in the course by critically thinking about required material and contributing to the online discussion. In another study by Wang et al (2013), Facebook was used by undergraduate students who made up the experimental group. It was not used by students in the control group. Results indicated that the experimental group of Facebook users experienced significantly higher engagement, higher grades and greater satisfaction with their university learning experience compared to the control group.

Schroeder and Greenbowe (2009) conducted a study of undergraduate students in a basic organic chemistry laboratory who participated in an optional, out-of-class Facebook discussion group. Students who participated in the Facebook discussion group posted items more frequently and dynamically than those in the official course website.

Barbour and Plough (2009) analyzed the pedagogical use of social media in an online program at a charter high school. The high school attempted to increase students' SCC by incorporating technologies such as Facebook and Ning. Incorporating social media into the blended learning courses enhanced students' learning experiences, and was found to be effective and well-regarded by both faculty and students. This body of research suggests that social media enhance the learning experience and student engagement in various types of CoPs – professional, informal, and online.

Based on these studies, we advance the third research question:

Is there a difference in the sense of community related to learning and connectedness that students experience in Facebook-enhanced courses as compared to those experienced in non-Facebook-enhanced courses?

3. METHODOLOGY

Description of the Classroom CoP Created with Facebook – Experimental Group

Students at two universities in California and Indiana were encouraged to voluntarily participate in the Facebook component of four different business courses offered during two academic terms. The courses were accounting, business law, human resource management, and organizational staffing. While the subject matter in these courses was different, the classroom style and teaching philosophy of the instructors were similar. Both used a participative, student-focused, collaborative approach to teaching.

The instructors agreed on a uniform teaching protocol so that presentation of the courses was consistent and similar. Thus, course design and instructor differences were minimized. Only students registered for the course were allowed to access the Facebook group page. This protected privacy and provided an environment conducive to postings and the general use of Facebook. What follows is a description of how Facebook was integrated into the instructional design of the courses in order to create an enhanced CoP. All courses used Blackboard as the official course management system and Facebook was employed as an instructional supplement and the experimental intervention.

Students were assigned a term project in their respective courses and worked in teams, usually comprised of four members. The project was required but incorporating Facebook use into the project was optional. Teams using Facebook held virtual meetings, posted YouTube links and research findings relevant to the team project and commented on one another's works. Initially some students were quite unfamiliar with social media technology, but the CoP evolved as they became more comfortable with using Facebook. Some students needed reassurance that their postings were private and would only be viewed by members of the class, i.e., participants in the CoP. They also needed reassurance about the security of the information posted, because while they had no objections to sharing thoughts and opinions in a classroom CoP, they did not want those ideas revealed to employers, outsiders, or even Facebook "friends."

It appeared that Facebook, more so than BlackBoard, facilitated student interactions and had a positive influence on their senses of learning and connectedness. Students in some teams used Facebook for other course work even beyond their assigned projects.

After about six weeks, the semblance of an enhanced CoP became apparent when students started asking questions on Facebook about the upcoming examination, quizzes, holiday break, and deadlines for the submission of their term project. Fellow students who knew the answers to many questions felt comfortable posting a response, which created open dialogue. This was advantageous because sometimes students posted a response before the question was seen by the professor. For example, there was one situation where the professor posted an announcement on Blackboard, but because of a system failure, a majority of the students in the course were unable to see it. One student who saw the Blackboard announcement posted it to the group Facebook page and the information was effectively disseminated immediately to all the students in the course.

The CoP continued to evolve as both students and instructors became increasingly comfortable posting YouTube videos, comments about course-related events on campus, and summaries of material related to the term project. Class participation grew in terms of volume and quality. A review of the times during which material was posted indicated that students' interactions and engagement went beyond their classrooms and scheduled class meeting times.

Students in the control group were not given the opportunity to use Facebook in their courses, which was the experimental intervention. All other aspects of their courses mirrored those in the experimental group.

Students who participated in the Facebook and non-Facebook-enhanced courses were encouraged to complete a paper-based questionnaire, which was designed to assess their course experiences.

Survey Instrument
The questionnaire consisted of 52 closed and open-ended items. To assess students' attitudes toward the use of Facebook in the classroom, eight questions were constructed. Among other things, they related to whether Facebook (1) was convenient to use in a course, (2) enhanced the quality of a course, (3) facilitated

professional growth, and (4) increased students' classroom participation. Students responded to these questions as five-point Likert-type items where 1 represented strong disagreement and 5 represented strong agreement.

To assess students' perceptions of the CoP that evolved in the experimental and control groups, a question containing eight sub-items was adapted from the Hung and Yuen (2010) study. The question assessed the extent to which the CoP facilitated (1) knowledge sharing, (2) collaboration and interaction, and (3) learner centered activities. Students responded to these questions as five-point Likert-type items where 1 represented strong disagreement and 5 represented strong agreement.

To assess SCC, a series of questions from Rovai's (2002a) Classroom Community Scale was adopted. Ten questions that have been validated in other studies (Hung and Yuen, 2010; Black, Dawson, & Priem, 2008; Rovai, 2002a, 2003) were used to measure students' feelings of learning-oriented behaviors and their feelings of connectedness. Students responded to these questions as five-point Likert-type items where 1 represented strong disagreement and 5 represented strong agreement. Four questions were reverse scored. Analysis of the questionnaire was carried out such that higher scores on the 10 SCC questions reflected stronger senses of learning and connectedness. The questionnaire for the control group was modified to preserve the essential content of each question, but to reflect the fact that students in the courses of that group did not participate in the Facebook intervention.

The questionnaire, which also assessed student demographics, was administered in a paper-and-pencil format.

Respondents
Respondents included 586 students from 22 face-to-face business courses at two public universities located in California and Indiana, USA. There were a total of 671 registrants in the courses taught by the authors of this paper. Students in those courses voluntarily participated in the survey, which was approved by the universities' Institutional Review Board. The respondents completed the questionnaire anonymously.

Procedure
The study was conducted using a survey methodology in an independent measures static group comparison research design (Campbell &

Stanley, 1963). "This is a design in which a group which has experienced X is compared with one which has not, for the purpose of establishing the effect of X" (Campbell & Stanley, 1963, p. 12). The incorporation of Facebook into the instructional design of the respective courses served as the experimental manipulation. There were two groups of courses, with the experimental group receiving the Facebook intervention. The courses in the control group had identical content but did not have the Facebook intervention. During the last week of classes, students in both groups were surveyed. Each student received a paper questionnaire and was informed that completion of the survey was voluntary and would not affect her/his course grade. Each student was also informed that all data collected would be maintained anonymously. Students completed the questionnaire in about 12 minutes.

4. FINDINGS

Characteristics of Respondents
There were 586 respondents to the survey, of which 303 had participated in Facebook-enhanced business courses and 283 had participated in non-Facebook-enhanced business courses. The study consisted of 297 (50.7%) males and 288 (49.1%) females. One respondent failed to indicate gender. The data on age were categorized into two groups: 25 years old or less and more than 25 years old. Three hundred seventy six respondents (64.1%) were between the ages of 18 and 25, while 207 respondents (35.4%) were over the age of 25. Three respondents failed to indicate their age. The majority of respondents (n = 480) had previous experience with online education (81.9%). Similarly, a majority (n = 508) were full-time students (86.7%). In terms of class level, the majority of respondents (88.2%) were upper division students and 11.8% were lower division undergraduate students.

It was found that student-respondents in the experimental group used Facebook once a day or more (62%) and accessed their group page once daily or more (56%). Sixty four percent of the students agreed or strongly agreed with the statement that using Facebook for classroom discussion was very convenient, was more effective in the classroom than Blackboard (31%), and their overall experience using Facebook was very positive (52%). Fifty six percent of the students agreed or strongly agreed that Facebook was well integrated into their courses. Seventy three percent of the students agreed or strongly agreed that they

acquired personal or professional growth after completing the course with the Facebook CoP.

Analytic Approach
This study summarizes the results associated with three research questions. Each research question focuses on students' attitudes and perceptions toward Facebook. These serve as the dependent variables designed to measure how students perceive Facebook and its effect in the classroom. In all cases, Likert-type items were employed in the survey instrument completed by the student-respondents. Likert scales are widely used in research studies rooted in education, behavioral sciences, healthcare, and marketing. When responding to a Likert scale, respondents typically indicate their level of agreement to statements with five or seven ordered response levels (deWinter & Dodou, 2010). There is ongoing debate about whether Likert data should be analyzed with parametric statistics such as the t-test or nonparametric statistics such as the Mann-Whitney-Wilcoxon (MWW) test. In a simulation study with five-point Likert items, Gregoire and Driver (1987) did not find a preference toward either the t-test or nonparametric tests. However, a reanalysis of the data two years later pointed to flaws in the original study and it was concluded that parametric tests are more powerful (i.e., exhibit a lower Type II error rate) than their nonparametric counterparts (Rasmussen, 1989). It was also found that there were no large differences between the parametric and nonparametric tests with respect to false positives (i.e., a Type I error rate). In light of the deWinter and Dodou (2010) findings that t-tests and MWW generally have similar power, this study analyzes the Likert-type attitudinal data using parametric statistics, namely t-tests.

First Research Question – Attitudes toward Facebook
Table 1 (in appendix) summarizes the data associated with the questionnaire items designed to measure the attitudes of students in Facebook-enhanced (experimental group) and non-enhanced (control group) business courses. The table shows the mean and standard deviation for eight attitudinal questions to which students in the experimental and control groups responded. It also shows the results of the t-tests employed to determine whether there was a statistically significant difference between the means of each attitudinal item for the experimental and control groups. Levene's test of equality of variances was performed on each item and revealed significance levels less than .05. This indicated that the assumption of

homogeneity of variance should be rejected. As such, the independent sample t-tests performed in this study assumed unequal variances between the group means for each of the eight attitudinal items.

The data in Table 1 indicate that students in the experimental group, compared to those in the control group, felt significantly more positive toward Facebook. They thought it was convenient for classroom discussions, a way to improve the quality of their course, and an improvement that should be introduced in more courses. They thought it was more effective than Blackboard and preferred using it over Blackboard. Students in the experimental group felt more connected to fellow students using Facebook than those in the control group. However, there was no significant difference between the experimental and control group students on the issues of professional growth and enhancement of participation. Students exposed to Facebook did not perceive that they experienced more personal or professional growth than students in the control group. Similarly, students in the Facebook-enhanced courses did not perceive that they engaged in more class participation than those in the non-Facebook-enhanced courses.

Overall, students' attitudes on the convenience of using Facebook and its ability to add quality to their courses were positive and significantly greater for the experimental group, as compared to the control group, whose students did not participate in Facebook-enhanced courses.

Second Research Question-CoP Perceptions
Table 2 (in appendix) summarizes the data associated with the questionnaire items designed to measure students' perceptions of the CoP associated with Facebook and non-Facebook-enhanced business courses. The table shows the means, standard deviations, and percentages associated with the experimental and control groups. It also shows the results of the t-tests that helped to determine whether there was a statistically significant difference between the means for each CoP item in the experimental and the control groups. Levene's test of equality of variances was performed to determine whether the significance levels were greater than .05. Since the significance level of Levene's test was less than .05, independent sample t-tests were performed assuming unequal variances between the means for each CoP item.

The data indicate that a greater percentage of respondents in the experimental group agreed or strongly agreed with the statements concerning their CoP as compared to the respondents in the control group. This indicates that the perceptions of students in the experimental group were more positive toward their CoP compared to their counterparts in the control group. The data reveal that there were significant differences between the means of the experimental and control groups for two of the eight items assessing CoP. Those two items related to Facebook's ability to foster collaboration and interaction. On the item related to Facebook's capacity to encourage students to hold forums on topics of interest, there was a statistically significant difference ($t = 4.23$, $df = 503$, $p < .001$) between the mean for the experimental group ($M = 3.78$) and the control group ($M = 3.43$). On the item related to Facebook's ability to facilitate communication with classmates, there was a statistically significant difference ($t = 2.50$, $df = 523$, $p < .05$) between the mean for the experimental group ($M = 3.97$) and the control group ($M = 3.78$). Generally, students in the experimental group had more positive perceptions of their CoP than students in the control group. There were no significant differences between the experimental and control group means for any of the items related to Facebook's ability to promote knowledge sharing or learner-centered activities in the CoP.

Third Research Question – Sense of Classroom Community: Learning and Connectedness
Table 3 (in appendix) summarizes the data associated with the questionnaire items designed to measure students' perceptions of the SCC in their Facebook and non-Facebook-enhanced business courses. The table shows means, standard deviations, and percentages associated with the sense of learning and sense of connectedness items for the experimental and control groups. It also shows the results of the t-tests that helped determine whether there was a statistically significant difference between the means for the SCC items in the experimental and control groups. Levene's test of equality of variances was performed to determine whether the significance levels were greater than .05. If so, an independent sample t-test was performed assuming equal variances between the means for the respective SCC item. If the significance level of Levene's test was less than .05, the independent sample t-test was performed assuming unequal variances between the means for the respective SCC item.

The data indicate that there was a statistically significant difference between the experimental group (M = 19.41) and the control group (M = 20.09) associated with the composite scale for sense of learning (t = 2.27, df = 581, p < .05). There was no difference between groups for the composite scale associated with sense of connectedness. What is counterintuitive is the direction of the differences for sense of learning. The students in the control group, who did not participate in the Facebook-enhanced courses, actually experienced a greater sense of learning. While not statistically significant, students in the experimental group (M = 16.46), as contrasted with those in the control group (M = 15.94), experienced a greater sense of connectedness. The students in the experimental group participated in Facebook-enhanced courses.

There was a statistically significant difference between the means for the experimental and control groups for two of the 10 items associated with students' SCC. Students in the experimental group had a significantly lower mean score (M = 3.80) than those in the control group (M = 3.95) on the sense of learning item that read "I am given ample opportunities to learn" (t = 2.10, df = 577, p < .05). However, students in the experimental group had a significantly higher mean score (M = 3.24) than those in the control group (M = 3.04) on the sense of connectedness item that read "Students in this course care about each other" (t = 2.71, df = 577, p < .01). There were no statistically significant differences between the experimental and control groups for the remaining eight SCC items. These findings provide only minimal support for the hypothesis that Facebook-enhanced courses facilitate students' sense of learning and sense of connectedness.

5. CONCLUSION

Three Research Questions
This article discussed the results of a study designed to establish whether students perceived a difference in their perceptions of social media, CoP, and SCC when Facebook was integrated into the instructional design of their business courses. Facebook, the most globally popular social networking site, served as the classroom intervention in a study using a static group comparison research design. In the experimental group students participated in the Facebook intervention. In the control group students did not participate in the intervention.

Relative to the first research question, there were significant differences between the experimental and control groups on the issue of students' attitudes toward the use of the social media – Facebook – in their courses. Students participating in the Facebook-enhanced courses reported that Facebook was a convenient and quality-oriented supplement to their traditional on-campus courses. This finding is consistent with the work of Hurt, Moss, Bradley, et al (2012). Compared to the control group, students in the Facebook-enhanced (experimental) group thought that Facebook should be introduced in more courses and that it made them feel more connected to their classmates. The results of this study are in accord with Sanchez, Cortijo, and Javed (2014) who found that among undergraduates at the University of Huelva (Spain), students were influenced to adopt Facebook to establish contact with others with whom they shared interests. Students in the experimental group, as compared to the control group, did not perceive that using Facebook in the classroom had a significant impact on their professional growth or ability to participate effectively in their courses. On these two variables, there were no significant differences between the means for the two groups.

In the second research question, we examined whether students perceived the CoP that evolved in their Facebook-enhanced courses was different from the CoP in the non-enhanced courses. Statistically significant differences were found between the experimental and control groups for two of the eight variables measured. The experimental group, as compared to the control group, had significantly higher mean scores for two of the three items related to collaboration and interaction. This indicates that incorporating Facebook into the instructional design of a course affects students' perceptions of social learning, i.e., the CoP that evolves in a classroom environment. An overwhelming majority of students in the experimental group perceived that Facebook allowed students to create forums to discuss topics of interest (69%) and to communicate with classmates (78%). Clearly, Facebook facilitated engagement among students in course-related dialogue, which is believed to have impacted their overall learning experience. Consistent with research by Garrison, Anderson, and Archer (2000), Shea (2006), and Shea and Bidjerano (2008), the integration of Facebook into students' courses was a social factor that created an effective CoP.

Overall, students in this study perceived some benefit from adding Facebook to their courses.

They thought that it improved the quality of their courses, was more effective than Blackboard, and enabled them to feel more connected to their classmates. Facebook contributed to the enhancement of the CoP in business courses because of its capacity to facilitate collaboration and interaction. However, the use of Facebook in the classroom was not found to significantly improve students' CoP in terms of knowledge sharing and learner-centered activities. The Facebook effect in university classrooms, therefore, is considered moderately positive.

In the third research question, we examined whether students perceived the SCC in their Facebook-enhanced courses to be different from the SCC in non-enhanced courses. Statistically significant differences between the experimental and control groups were found for two of the ten SCC variables. In terms of students' sense of learning, there was a significant difference between the mean scores for the experimental and control groups on the composite scale. Students in the control group perceived a greater sense of learning than those in the experimental group. In other words, students perceived a greater sense of learning in their non-Facebook enhanced courses. This finding is contrary to the results of earlier studies, which were based on analyses of data from non-control group designs (Barczyk & Duncan, 2013) or on the analysis of a single activity such as posts to a discussion group (Schroeder & Greenbowe, 2009). It was initially believed that Facebook-enhanced courses resulted in students having an increased sense of learning. The data from this study shows just the opposite.

Overall, students in this study perceived no benefit from adding Facebook to their courses in terms of their sense of connectedness. There was no difference between the mean score of students in the experimental group and the control group on the composite scale for sense of connectedness. Only one item indicated that students in Facebook-enhanced courses felt that their classmates cared about each other. There was a statistically significant difference between the means of the experimental and control groups for this item, which revealed that Facebook had a positive effect on students' sense of connectedness in terms of their caring more about each other when Facebook was incorporated into the instruction design of their course. The results associated with this single item are consistent with those of Junco, Heiberger, and Loken (2011) who found that when Facebook was used in the classroom students felt more engaged. Engagement occurs when students care about each other.

Implications for Teaching

A major finding of this study is that Facebook facilitated the development of an enhanced classroom CoP. This has implications for teaching and learning. According to Junco (2012), students who have strong feelings of community because of enhanced collaboration and interaction are more likely to be engaged and persist in their studies (Rovai, 2002b) than students who feel alienated or alone. Instructional design strategies that help establish and maintain the CoP in courses may help student learning, engagement, and possibly retention.

By facilitating interaction and collaboration, Facebook may provide students with the opportunity to engage beyond their classroom periods. Students were noted to post items in their Facebook-enhanced CoP outside of their designated class meeting times. It is believed that this increased participation in course-related discussion and created a positive learning experience. Instructors should examine and consider using Facebook so as to create a productive learning community. They should note, however, that supplementing a course with Facebook is time-intensive. As VanDoorn and Eklund (2013) point out, if social media are to be properly incorporated into teaching, instructors need to be fully aware of the time resources required to provide this level of learning support. Furthermore, students may find that they are overloaded with the abundant information shared by members of their CoP. As such, instructors should develop a strategic instructional plan and a structured mechanism for information sharing and interaction to manage their classroom CoP. In so doing, they can insure its effectiveness and benefits.

When using Facebook for instructional purposes in higher education, instructors should respect students' need for privacy and information security. As students are introduced to Facebook in their courses, a concerted attempt should be made to limit outsider access to group pages. Only members of the CoP, i.e., students officially registered for the course, should be allowed to access the group Facebook page.

Until the instructional efficacy of social media is better documented, faculty should use prudence in enhancing their courses with Facebook.

Limitations

This study has two potential limitations. The first relates to its use of a single survey instrument, which could result in a common method bias. Future research should use additional methods for collecting data such as interviewing or focus groups. This would buttress survey results and lessen the threat to validity occasionally observed in educational research that uses a single data collection instrument (Donaldson & Grant-Vallone, 2002). The second limitation relates to this study's reliance on self-report measures. Even though the student respondents completed the questionnaire anonymously, there is the potential for social-desirability bias.

Future Research

Using an experimental research design, this study documented the effect of social media on students' perceptions of their classroom CoP and senses of learning and connectedness. These findings are based on self-reported subjective measures. Future research should be designed to go beyond measures of attitudes and perceptions. Studies should measure the extent to which Facebook and other social media impact actual learning outcomes and student performance. These objective measures would provide additional insights into the pedagogical value of social media.

6. REFERENCES

Allport, G. W. (1935). Attitudes. In Murchison, C. (Ed.) *Handbook of social psychology* (pp. 798-844). Worcester, MA: Clark University Press.

Barbour, M. & Plough, C. (2009). Social networking in cyberschooling: Helping to make online learning less isolating. *TechTrends 53*(4), 56-60.

Barczyk, C. C. & Duncan, D. G. (2013). Facebook in higher education courses: An analysis of students' attitudes, community of practice, and classroom community. *International Business and Management, 6*(1), 1-11,

Barczyk, C. C. & Duncan, D. G. (2012). Social networking media: An approach for the teaching of international business. *Journal of Teaching in International Business*, 23(2), 98-122.

Black, E. W., Dawson, L., & Priem, J. (2008). Data for free: Using LMS activity logs to measure community in online courses. *The Internet and Higher Education, 11*(2), 65-70.

Bosch, T. E. (2009). Using online social networking for teaching and learning: Facebook use at the University of Cape Town. *Communicatio: South African Journal for Communication Theory and Research, 35*(2), 185-200.

Campbell, D. & Stanley, J. (1963). Experimental and quasi-experimental design for research. Chicago, IL: Rand McNally College Publishing Company.

deVilliers, M. R. (2010). Academic use of a group on Facebook: Initial findings and perceptions. Paper presented at Informing Science & IT Education Conference (InSITE), Cassino, Italy. Retrieved from http://proceedings.informingscience.org/InSITE2010/InSITE10p173-190Villiers742.pdf

deWinter, J.C. & Dodou, D. (2012). Five-point Likert items: t test versus Mann-Whitney-Wilcoxon. *Practical Assessment, Research & Education, 15*(11). Retrieved from http://pareonline.net/getvn.asp?v=15&n=11.

Donaldson, S. I. & Grant-Vallone, E. J. (2002). Understanding self-report bias in organizational behavior research. *Journal of Business and Psychology, 17*(2), 245-260.

Facebook (2015). Key Facts, Facebook Newsroom. Retrieved from http://newsroom.fb.com/Key-Facts (last accessed 19 November 2015).

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(3), 87-105.

Goodwin, K., Kennedy, G., & Vetere, F. (2010). Getting together out-of-class: Using technologies for informal interaction and learning. In *Curriculum, Technology & Transformation for an Unknown Future,* eds. C. H. Steel, M. J. Keppell, P. Gerbic and S. Housego. Proceedings of ascilite, Sydney, 387-392. Retrieved from http://www.ascilite.org.au/conferences/sydney10/procs/Goodwin-concise.pdf

Graff, M. (2003). Individual differences in sense of classroom community in a blended learning environment. *Journal of Educational Media, 28*(2-3), 203-210.

Gregoire, T. G. & Driver, B. L. (1987). Analysis of ordinal data to detect population differences. *Psychological Bulletin, 101,* 159-165.

Grosseck, G., Bran, R., & Tiru, L. (2011). Dear teacher, what should I write on my wall? A case study on academic uses of Facebook. *Procedia – Social and Behavioral Sciences, 15,* 1425-1430.

Harris, A. L. & Rea, A. (2009). Web 2.0 and virtual world technologies: A growing impact on IS education. *Journal of Information Systems Education*, 20(2), 137-144.

Hemmi, A., Bayne, S., & Land, S. (2009). The appropriation and repurposing of social technologies in higher education. *Journal of Computer Assisted Learning*, 15, pp. 19-30.

Hurt, N. E., Moss, G. S., Bradley, C. L., Larson, L. R., Lovelace, M. D., Prevost, L. B., Riley, N., Domizi, D., & Camus, M. S. (2012). The 'Facebook' effect: College students' perceptions of online discussions in the age of social networking. *International Journal for the Scholarship of Teaching and Learning, 6*(2). Retrieved from http://academic.georgiasouthern.edu/ijsotl/v6n2.html (last accessed 1 August 2012).

Hung, H. T. & Yuen, S. C. (2010). Educational use of social networking technology in higher education. *Teaching in Higher Education, 15*(6), 703-714.

Junco, R. (2012). The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement. *Computers & Education, 58*(1), 162-171.

Junco, R., Heiberger, G., & Loken, E. (2011). The effect of Twitter on college student engagement and grades. *Journal of Computer Assisted Learning,* 27(2), 119-132.

Kirschner, P.A. & Karpinski, A. C. (2010). Facebook and academic performance. *Computers in Human Behavior, 26,* 1237-1245.

Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* New York: Cambridge University Press.

Lindsay, P. and Norman, D. A. (1977). *Human information processing: An introduction to psychology*. New York: Harcourt Brace Jovanovich, Inc.

Madge, C., Meek, J., Wellens, J., & Hooley, T. (2009). Facebook, social integration and informal learning at university: 'It is more for socializing and talking to friends about work than for actually doing work'. *Learning, Media and Technology, 34*(2), 141-155.

Maher, J. & Hoon, C. H. (2008). Gender, space, and discourse across borders: Talking gender in cyberspace. *Feminist Teacher, 18*(3), 202-215.

Mason, R. & Rennie, F. (2007). Using Web 2.0 for learning in the community. *The Internet and Higher Education, 10*(3), 196-203.

Moran, M., Seaman, J. & Tinti-Kane, H. (2011). Teaching, learning, and sharing: How today's higher education faculty use social media. Research report published by Pearson, the Babson Survey Research Group, and Converseon. Retrieved from http://www.completionmatters.org/resource/teaching-learning-and-sharing-how-today%E2%80%99s-higher-education-faculty-use-social-media

Pickens, J. (2011). Attitudes and perceptions. In Borkowwski, N. (Ed.), *Organizational behavior in health care, 2nd Edition* (pp. 41-70). Sudbury, MA: Jones and Bartlett Publishers.

Prensky, M. (2001), Digital natives, digital immigrants. *On the Horizon, 9*(5), pp. 1-6.

Rasmussen, J. L. (1989). Analysis of Likert-scale data: A reinterpretation of Gregoire and Driver. *Psychological Bulletin, 105,* 167-170.

Ractham, P., Kaewkitipong, L. and Firpo, D. (2012), The use of Facebook in an introductory MIS course: Social constructivist learning environment. *Decision Sciences Journal of Innovative Education*, 10(2), 165-188.

Roblyer, M. D., McDaniel, M., Webb, M., Herman, J., & Witty, J. V. (2010). Findings on

Facebook in higher education: A comparison of college faculty and student uses and perceptions of social networking sites. *Internet and Higher Education, 13,* 134-140.

Rovai, A. P. (2001). Building classroom community at a distance: A case study. *Educational Technology Research and Development, 49*(4), 33-48.

Rovai, A. P. (2002a). Development of an instrument to measure classroom community. *Internet and Higher Education, 5,* 197-211.

Rovai, A. P. (2002b). Sense of community, perceived cognitive learning, and persistence in asynchronous learning networks. *Internet and Higher Education, 5,* 319-332.

Rovai, A. P. (2003). The relationships of communicator style, personality-based learning style, and classroom community among online graduate students. *The Internet and Higher Education, 6*(4), 347-363.

Sanchez, R., Cortijo, V., & Javed, U. (2014). Students' perceptions of Facebook for academic purposes. *Computers & Education, 70,* January, 138-149.

Schroeder, J. & Greenbowe, T. J. (2009). The chemistry of Facebook: Using social networking to create an online scientific community for the organic chemistry laboratory. *Innovate, 5*(4). Retrieved from http://www.innovateonline.info/pdf/vol5_issu e4/The_Chemistry_of_Facebook_Using_Socia l_Networking_to_Createan_Online_Communit y_for_the_Organic_Chemistry_Laboratory.pdf

Selwyn, N. (2009). Faceworking: Exploring students' education-related use of Facebook. *Learning, Media and Technology, 34*(2), 157-174.

Shea, P. J. (2006). A study of students' sense of learning community in an online learning environment. *Journal of Asynchronous Learning Networks, 10*(1), 35-44.

Shea, P. J. & Bidjerano, T. (2008). Community of inquiry as a theoretical framework to foster "epistemic engagement" and "cognitive presence" in online education. *Computers and Education, 52*(3), 543-553.

Summers, J. J. & Svinicki, M. D. (2007). Investigating classroom community in higher education. *Learning and Individual Differences, 17*(1), 55-67.

Tess, P. A. (2013). The role of social media in higher education classes (real and virtual) – A literature review. *Computers in Human Behavior*, 29, A60-A68.

Wang, J., Lin, Chun-Fu C., Yu, Wei-Chieh W., Wu, Emily & Gung, Chang (2013). Meaningful Engagement in Facebook Learning Environments: Merging Social and Academic Lives. *Turkish Online Journal of Distance Education*, 14(1), 302-322.

VanDoorn, G. & Eklund, A. A. (2013). Face to Facebook: Social media and the learning and teaching potential of symmetrical, synchronous communication. *Journal of University Teaching and Learning Practice*, 10(1), article 6.

Wenger, E. (1998). *Communities of practice.* Cambridge: Cambridge University Press.

Appendix

Questions [a]	Experimental [b]		Control [b]		df	t
	M	SD	M	SD		
Facebook for classroom discussions is very convenient	3.57	(0.99)	2.93	(1.18)	549	7.07***
Facebook improved the quality of my course	3.17	(0.97)	2.72	(1.08)	565	5.30***
Facebook should be introduced in more courses	3.30	(0.93)	2.79	(1.17)	536	5.82***
Facebook was more effective than Blackboard	2.86	(1.13)	2.53	(1.19)	578	3.46***
I preferred using Facebook over Blackboard	2.94	(1.15)	2.51	(1.25)	566	4.39***
I felt more connected to fellow students using Facebook	3.39	(0.99)	3.01	(1.28)	528	4.02***
I acquired personal or professional growth using Facebook	3.81	(0.82)	3.90	(0.85)	579	1.33
Facebook enhanced my experience of participation in this course	3.81	(0.76)	3.76	(0.83)	565	0.73

Notes:
[a]   Rated using five-point Likert-type items where 1 = strongly disagree, 5 = strongly agree
[b] $N = 303$ for the experimental group; $N = 283$ for the control group
*** $p < .001$

Table 1

Students' ratings on questions assessing their perceptions of Facebook usage

Item [a]	Experimental [b]		Control [b]		df	t
	M	P [c]	M	P [c]		
Knowledge Sharing						
Social networking site allows me to share my personal interests	3.43 (0.90)	53	3.58 (1.08)	53	533	1.80
Social networking site allows me to find and share educational resources	3.75 (0.85)	67	3.63 (1.04)	53	523	1.41
Social networking site promotes knowledge sharing	3.87 (0.82)	73	3.80 (1.01)	64	524	0.88
Collaboration and Interaction						
Social networking site allows me to hold forums to discuss topics of interest	3.78 (0.82)	69	3.43 (1.08)	46	503	4.23***
Social networking site allows me to communicate with classmates	3.97 (0.79)	78	3.78 (0.98)	67	523	2.50*

Social networking site provides collaborative learning opportunities	3.81 (0.87)	68	3.68 (1.03)	57	531	1.63

Learner-Centered Activities

Social networking site allows me to personalize pages to express individuality	3.42 (0.91)	50	3.49 (1.03)	48	541	0.87
Social networking site encourages learner-centered activities	3.59 (0.81)	55	3.50 (1.04)	50	515	1.11

Notes:
a	Rated using five-point Likert-type items where 1 = strongly disagree, 5 = strongly agree
b	*N* = 303 for the experimental group; *N* = 283 for the control group
c	Indicates the percentage of respondents who agreed or strongly agreed with this item
***	*p* < .001
*	*p* < .05

Table 2

Students' ratings on items assessing the perceptions of their CoP

Questions [a]	Experimental [b]		Control [b]			
	M	*P* [c]	*M*	*P* [c]	*df*	*t*
Sense of Learning						
Composite Scale	*19.41 (3.50)*		*20.09 (3.74)*		*581*	*2.27**
I am encouraged to ask questions	3.78 (0.93)	66	3.88 (0.94)	71	574	1.32
Is not hard to get help when I have a question [d]	3.98 (0.87)	78	4.12 (0.93)	79	572	1.88
My educational needs are being met [d]	3.95 (0.92)	74	4.09 (0.99)	74	570	1.84
I am given ample opportunities to learn	3.80 (0.82)	71	3.95 (0.90)	76	577	2.10*
Course promotes a design to learn [d]	4.01 (0.91)	75	4.13 (1.00)	76	566	1.52
Sense of Connectedness						
Composite Scale	*16.46 (3.26)*		*15.94 (3.89)*		*552*	*1.72*
Students in this course care about each other	3.24 (0.87)	37	3.04 (0.95)	28	577	2.71**
This course is like a family	2.76 (1.01)	31	2.61 (1.05)	18	576	1.71
I do not feel isolated in this course [d]	3.88 (0.91)	68	3.93 (1.02)	69	579	0.63
I can rely on others in this course	3.14 (1.01)	39	3.12 (1.07)	39	577	0.26
Others will support me	3.49 (0.87)	52	3.39 (0.92)	44	578	1.44

Notes:
a	Rated using five-point Likert-type items where 1 = strongly disagree, 5 = strongly agree
b	*N* = 303 for the experimental group and *N* = 283 for the control group
c	Indicates the percentage of respondents who agreed or strongly agreed with this item
d	Reverse scored question, framed positively in this table
**	*p* < .01
*	*p* < .05

Table 3

Students' Ratings on Questions Assessing Their Sense of Classroom Community