

MEANINGFUL ENGAGEMENT IN FACEBOOK LEARNING ENVIRONMENTS: Merging Social and Academic Lives

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ABSTRACT

This study compared the effectiveness of different learning environments between interactive Facebook instructional method and non-Facebook instructional method for undergraduate students. Two outcome dimensions were measured: student grades and learning engagement. A pretest-posttest control group experimental design was used. The experimental group (n= 134) received the interactive Facebook instructional method, and the control group students (n= 57) received the non-Facebook instructional method. Data pertaining to student Facebook use and activities were also collected. Independent samples *t*-tests were used to measure significant differences in grades and engagement between the Facebook and non-Facebook classroom contexts. Pearson's correlation coefficient was used to measure the relationships between interactive Facebook instructional method and grades. A linear regression was also performed to analyze the predictors of student grades. Content analyses of samples of Facebook communication exchanges were also conducted. The results revealed that experimental group had a significant positive effect on grades and engagement. This study concludes that Facebook use in instructional method assists students in achieving better grades, higher engagement, and greater satisfaction with the university learning experience. Thus, the authors provides experimental evidence that Facebook can be used as an educational communication and interaction tool to enable faculty to assume a more active and participatory role.

Keywords: Engagement learning, Facebook, learning outcomes, social network, Web 2.0.

INTRODUCTION

With the new forms of web design, namely, Web 2.0 applications, new social networking tools have been developed to enhance user involvement and engagement in the Web environment.

Based on Downes (2005), the Web has become a platform in which users can create and share content in a virtual community. In other words, Web 2.0 applications have clearly afforded new possibilities for user involvement in the Internet.

Web 2.0 applications, such as social network sites (SNSs), including MySpace, Facebook, and wikis, can be used in education to enhance student learning and encourage them to network and share resources with one another (Ajjan & Hartshorne, 2008; Alexander, 2006; Boulos & Wheeler, 2007; Chen et al., 2009; Ellison et al., 2007). The last decade has witnessed an increase in Web-based instruction in many classrooms. Technology has enabled students in these classrooms to learn in new ways. As the incorporation of Web 2.0 into classroom instruction has been increasing dramatically throughout the world, it is not surprising that Web 2.0 plays a significant role in the university teaching and learning setting.

Purpose of the Study

In this study, the authors seek to promote an interactive Facebook instructional method as an alternative avenue for improving learning engagement of fostering interaction and relationships among students themselves, and between students and instructors, and students and institution. The purpose of this study was to access students' experiences and perceptions of the emergence used of Facebook as part of educational and social interaction tool and better understand what students do on course-based Facebook. In addition, student grades are examined as a desired outcome factor.

THEORETICAL FRAMEWORK

Social Network Sites

A major category of Web 2.0 applications is social networking sites which have been widely used, and many college students have integrated these sites into their daily lives (Boyd & Ellison, 2008; Cotten, 2008). To date, the existence of hundreds of SNSs (Table 1) is consistent with the modern views of the deeply social nature of human mentality and the importance of support communication between users (Alexander, 2006; Franklin & van Harmelen, 2007). SNS can be defined as Web-based services that allow individuals to:

- constructing a public or semi-public profile within a bounded system,
- articulating a list of other users with whom they share a connection and
- viewing and traverse their list of connections and those made by others within the system" (Boyd & Ellison, 2008, p. 211).

Facebook

With social networking activities becoming the predominant Web 2.0 application, Facebook created by Mark Zuckerberg in 2004 is the most popular SNS and the largest proportion of overall Internet traffic. Similar to other virtual communities on SNSs, Facebook enables users to interact with people whom they already know offline or to meet new people online. In addition, Facebook provides opportunities for sharing social and emotional support, information resources and bonds with other people who work, study, and live around them (Cheung et al., 2011; Eyadat & Eyadat, 2010). It obviously colonized their daily lives (Frost, 2011). Facebook users can present themselves in their own online profiles, share resources with their friends who can view one another's profiles and post comments on one another's pages.

They can also join virtual groups and organizations based on similar interests, meet people with similar interests, receive updated news, share information, and engage in other activities online. In addition to all of these functions that are common to most traditional social networking sites, Facebook offers a variety of additional functions, including online games, virtual farms, virtual pets, the wall, and virtual gifts. Furthermore, Facebook also features the news feed, through which users can follow the movements of their Facebook friends who are also users of the system.

Table: 1
Major SNSs and their launch dates

Name	Active User Accounts	Launch Date	Referral Traffic Ranking
Facebook	845+ million	02/2004	1
Qzone	536+ million	02/1999	
Twitter	380+ million	03/2008	4
Windows Live	330+ million	11/2005	
TencentWeibo	310 million	04/2010	
Habbo	230 million	08/2000	
Skype	200 million	08/2003	
Vkontakte	167+ million	10/2006	
Badoo	121+ million	11/2006	
Beno	117 million	07/2005	
LinkedIn	100+ million	05/2003	6
Google +	100 million	06/2011	3
Pinterest	< 100 million	03/2010	2
Reddit	< 100 million	06/2008	5

Note: The information was updated in January 2012.

Source from Wikipedia (2012), "List of virtual communities with more than 100 million users".

Throughout the world, Facebook has 179 million active monthly users in North America, 229 million users in Europe, and 212 million users in Asia. Currently, Facebook reports 526 million daily active users with 200,000 new subscribers per day (Facebook, 2012). The most popular Facebook activities are likes and comments. Users engage in like and comment activities approximately 3.2 billion times and upload 300 million photos per day, indicating that Facebook is tightly integrated into the daily lives of its users.

Facebook and Student Engagement

In the context of student learning, Astin (1984) defined engagement as "the amount of physical and psychological energy that the students devote to the academic experience" (p. 297). Today, engagement refers to the amount of time and effort that students spend on educational activities that are related to college academic work (Kuh, 2009). Chickering and Gamson (1987) offer 7 principles for improving undergraduate education based on research on exemplary teaching and learning in colleges and universities. All of these are related to student engagement, including:

- encourages contact between students and faculty,
- develops reciprocity and cooperation among students,
- encourages active learning,
- provides prompt feedback,
- emphasizes time on task,
- communicates high expectations,
- respects diverse talents and ways of learning (Washington Center News, 1987).

Scholarly studies of Facebook (Hewitt & Forte, 2006; Mazer et al., 2007; Tuncay & Uzunboylu, 2010) reveal a significant relationship between the Facebook use of college-age respondents and higher motivation to learn, more effective learning and classroom climate, and improved faculty-student relationships.

Facebook serves as a means for instructors to connect, befriend and communicate with students to extend the communicative activities of the traditional physical classroom to a virtual form. Through Facebook, information can be exchanged.

These features enhance the quality of interaction and relationship among students, instructors, and institution (Figure 1). Godwin-Jones (2008) claimed that Facebook is a tool and platform “that enhances communication and human interaction and can potentially be harnessed for language learning” (p. 7).

From a language learning perspective, Blattner and Fiori (2009) studied the use of Facebook as a valuable tool for authentic language interaction and as a platform for increasing student motivation and enhancing their English learning.

In a study based on data from the National Survey of Student Engagement (NSSE), Chen et al. (2010) found a significant relationship between the use of educational technology and student engagement. Studies that focused on specific relationships between social media and engagement (Astin, 1984; Heiberger and Harper, 2008) also found a positive correlation between the use of social networking sites and the engagement of college students.

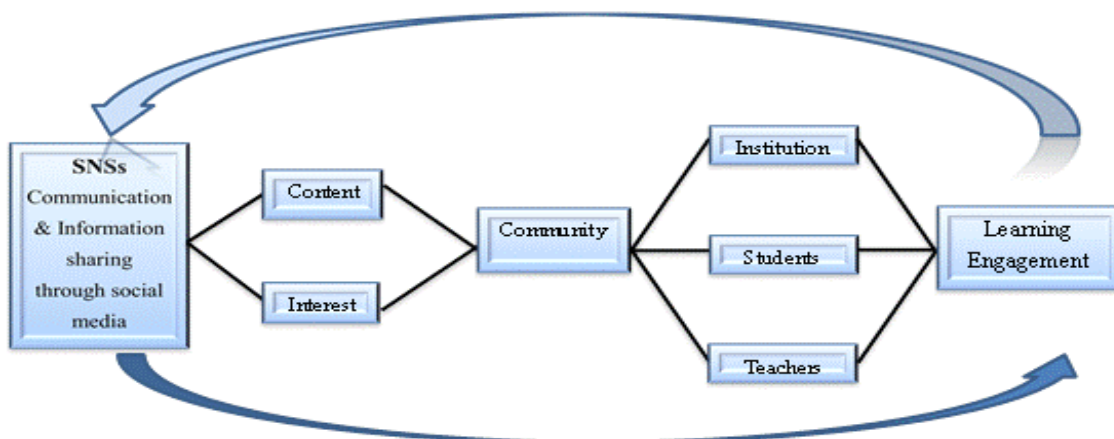


Figure: 1
Learning engagement versus SNSs

Facebook Use and Academic Performance

Most of the research on the academic performance of Facebook use has been conducted at the higher education level and has found disparate results. For instance, some studies (Kirschner & Karpinski, 2010; Banquil et al., 2009; de Villiers, 2010) have found that Facebook use denoted negative effects on a student’s performance in school. Researchers found that Facebook users had significantly lower grade point average (GPA) compared to non-users; additionally, Facebook users reported spending fewer hours per week on their school work than non-users.

On the other hand, some researchers (Pasek, et al., 2009) found there was no significant relationship between Facebook use and GPA. However, the relationship between Facebook use and GPA did not appear to depend on Facebook-based instruction over learning performance. Prior studies have not examined whether the instructors used Facebook as a part of curriculum. If getting good grades is an important goal, how to merge students' social and academic lives and integrate their social communication tool with classroom learning tool should be a critical factor in reaching that goal.

RESEARCH METHOD

Research Questions

The following research questions are examined:

- What do students do on Facebook?
- How do students perceive Facebook instructional practices in terms of fostering learning engagement? Seven subscales of learning engagement include teacher caring qualities, teacher trustworthiness qualities, teacher-student relationship, cooperative student learning, active learning, student-student relationship, and student-institution relationship.
- What effects do Facebook instructional practices have on the academic grades of students?
- Is there a relationship between grades and the frequency of engaging in Facebook activities? How does the frequency of Facebook use affect the academic grades of students?

Sample

Convenient purposeful sampling procedures were used. The participants included students in two university classes, Advanced English Course. Of the 134 questionnaires that were distributed, 134 were returned and 130 were valid, yielding a response rate of 97.15%. Of the 2 classes, 65 out of 70 (52.31%) students participated in class A, whereas 69 out of 64 (47.69%) of the class B students participated. Therefore, there was no significant difference between the groups in terms of participation rates.

Validity and Reliability of the Instrument

The instrument consisted of three sections: demographics (10 items), learning engagement (26 items), and the frequency of Facebook activities (20 items). The items in the first and last sections were designed to collect information regarding participant demographics and the frequency of engagement in Facebook activities.

The items in the second section were adapted from the questionnaire of the NSSE investigating learning engagement. Learning engagement distributed across 7 categories which were teacher caring qualities (TC), teacher trustworthiness (TT), teacher and student relationship (TQ), cooperative student learning (CL), active learning (AL), student and student relationship (SQ), and student and institution relationship (SI).

For the items concerning learning engagement, the participants responded on a 5-point Likert-type scale that ranged from "definitely agree" to "definitely disagree. For the items concerning the frequency of Facebook activities, the participants responded to the

question "How frequently do you perform the following activities when you are on Facebook?" For each item, the students responded on a 5-point Likert scale that ranged from "very frequently (100%) to "never" (0%). The NSSE is the most well-known and widely used college student engagement questionnaire for educational contexts (Chen et al., 2010).

For use in this study, the scale was modified and left 40 items suitable. Additionally, through principle component analysis of factor analysis, factors with an Eigen value larger than 1 and items with a factor loading larger than .5 were selected. Factor analysis was conducted 5 times and 14 items were deleted.

Finally, three factors including "student and faculty interactions", "student and student interactions", and "student and institution interactions" were extracted, and the accumulated variance explained was 43.27%. Therefore, the validity of the scale was conducted. The analysis result presented the Cronbach's α reliability of each subscale ranged from .45 to .89. Table: 2 shows the Cronbach's α reliability for all the subscales along with the mean scores and standard deviations.

Table: 2
Descriptive statistics of subscales and items reliability

Abbrev.	Scales & Subscales	Overall		Reliability (# of items)
		Mean	SD	
	<i>Student-Faculty</i>			.717 (11)
TC	Teacher Caring Qualities	3.669	.714	.810 (4)
TT	Teacher Trustworthiness	3.656	.749	.890 (5)
TQ	Teacher-Student Relationship	4.077	.633	.451 (2)
	<i>Student-Student</i>			.746 (11)
CL	Cooperation Student Learning	4.360	.563	.832 (5)
AL	Active Learning	4.235	.636	.785 (4)
SQ	Student-Student Relationship	4.446	.560	.620 (2)
	<i>Student-Institution</i>			.740 (4)
SI	Student-Institution Relationship	3.577	.715	.740 (4)

The three-page questionnaire was pre-tested on a group of 10 undergraduate students to ensure that the questions would be understood and interpreted correctly by the target sample. After the pre-test scale was compiled, three experts in e-learning were invited to review the scale. Based on the suggestions provided, the scale was modified to obtain expert validity.

Instructional Methods

To connect with integrated Facebook learning environments, all participants received instructional methods according to the 7 principles for improving engagement proposed by Chickering and Gamson (1987), including the following characteristics.

- **Class presentation:** Based on the course objectives, the teacher lectured to the entire class and aroused their interest in a discussion to help all the students understand the importance of the course content and context.
- **Quizzes:** All students were asked to take 12 quizzes during the 10-month treatment. The quizzes were conducted individually, with no notes, textbooks, or peer help allowed. Each student was responsible for his/her own learning.

- **Individual improvement scores:** Each student's average score for the previous exams/quizzes served as the basic score. The score for the current quiz minus the basic score was the index of learning progress. All teams added all team members' index numbers and calculated the average score as their cumulative group score. A higher cumulative group score indicated better academic performance for that group.
- **Classroom demonstration:** All teams were asked to orally present their group projects in class along with an MS-PowerPoint slideshow. The class voted for 2 outstanding projects out of all the group presentations.
- **Team recognition:** Members with a higher team score and those with outstanding projects received rewards and public praise. In addition, members who had made significant progress were rewarded and praised individually. Award titles and certificates were presented in class.
- **Grouping on Facebook:** Teacher included the entire class to the Facebook course group. After the face-to-face lectures, all students asked the instructor and/or other students questions to clarify facts on the Facebook course sites.
The students also participated in a discussion about new, relevant content information. Furthermore, on each Facebook course site, students were divided into heterogeneous groups. According to their previous academic average grades, the team members were included in high-, mid-, or low-competence groups. Through the private page, students collaborated with other students on a shared project. During the process of group learning on the Facebook sites, all team members helped all other members to achieve their common goal.
- **Coaching and monitoring:** Teachers served as a coach on Facebook sites and monitored each individual's learning progress between classes.
- **Immediate feedback:** Students received instant feedback on Facebook sites and received prompt responses from the teachers after regular classes.

Procedure

This study was conducted in the context of university courses at a 4-year university. During the second week of the first semester, the participants (n=134, 2 classes) were introduced to the Facebook social networking site and received an hour-long training session on how to use Facebook. During the training session, all students were asked to send a welcome post, share a link, post a reply, like one's comment, and private message. The participants received Facebook instructional practices through the private Facebook course pages. Facebook activities were shown as follows. The instructor created a private group for the class. All members could only join with the approval of the instructors. This was to ensure that only the members in this closed group could access. Only within the private group, students can be able to upload or attach academic files, such as MS-Word and MS-PowerPoint files. Every student was instructed to access Facebook at their convenience between classes. The instructor announced that the class-related content will be uploaded to this space constantly. The students were encouraged to follow each other and reply to other students. The students were instructed to work in groups together to share ideas, initiate and develop a project, and participate in a discussion on Facebook. Students were then acknowledged an option of creating a different private study group for their project which only allowed access within the same group members. Private groups organized by their own with little interaction with the instructors.

Two individual groups of course Facebook sites were administered and managed independently by the authors. Every week, the teachers attached a discussion question to the Facebook course sites regarding the subject of the following week. The students were asked to examine various sources while providing outputs to the discussion questions and to respond the comments from others.

The students clicked like feature when they agreed or simply like the comments from others. The purpose was to have students come to the class prepared. Both the interaction on Facebook and in the classroom settings synchronized with one another.

The instructors asked some particular students who had interesting thoughts on Facebook to lead the discussion in the classroom. Between classes, the teachers offered help regarding the course subjects of each week and provided answers if needed. The students continue their discussion regarding the group projects and course content. The purpose was to extend class discussion beyond the classroom setting. The students were required to upload their group projects and share the links including video and audio on the Facebook course sites. Students made comments on what they liked and disliked about each. The purpose was to exchange knowledge or information and share accomplishments with other group members.

In addition, the instructors responded to any questions posted through the comment wall or questions through online chats or private messages. In order to receive private messages, the instructors kept their personal account active. The purpose was to enhance students' understanding of course concepts and lecture content as well as to give shy students an opportunity to ask their questions online. Students understood that via Facebook course sites, they communicated for classroom assignments or through instructors' personal account, they could communicate with the instructor on a personal level. This was to ensure both active and passive students were given equal importance to participate their learning. Regularly, the instructors posted information about academic enrichment opportunities on campus. Besides, the instructors also shared the links of off-campus academic contest opportunities. The instructors provided encouragement and assistance in online communication. Constantly, the instructors also posted current IT news and other relevant real world activities. The purpose was to maintain students' interest and subsequently gain a better understanding of the subject matter. Periodically, the instructors and the students provided emotional support when students posted things like being upset, sad, worried or frustrated about anything happened around. Besides making verbal comments, they also presented their support simply by clicking on like function. Through the online communication, class reminders including assignment due dates, exam dates, or classroom arrangement were posted on Facebook. At the end of the study, the participants (n= 134) completed the research instrument voluntarily during the final week of the second semester.

RESULTS

Demographic Statistics

Participation in the survey was completely voluntary. In sum, there were 134 participants, including 109 (81%) females and 25 (19%) males. All (100%) of them were full-time undergraduate students between the ages of 20 and 24. The mean age of the sample was 22 with a standard deviation of 1.2. None of participants reported that he/she did not have a Facebook account prior to the start of the course.

Facebook Usage

As can be seen in Table 3, students actively participated in building dialogue and commenting on each other's postings during the study period. On average, each student wrote approximately 2 wall postings per week.

The most commonly used feature was the comment feature (87% of all content), which allows active participation in group discussion among the students and between students and instructors.

In addition, the majority of the students used the "like" feature most of the time. Wall posts included text, images, videos, and links/tags to external resources. There were a total of 297 wall postings and 2,057 comments every month, on average. Every comment obtained 5.38 likes, on average. At peak use (during midterms and finals), the pages had 2,497 wall text posts, 13,666 comments, and 75,492 likes. Examination periods were associated with higher use.

In addition to the text-only postings, there were a total of 468 image and video tags. Once a member posted his or her group project presentation video to other students, the students began to have lengthy conversations by commenting on each other's responses. This interaction led to many lively conversations and active engagement among the group members.

Table: 3
Total number of Facebook postings every month (2 Facebook groups, 134 members)

Wall posts & comments	Sept.	Oct.	Nov. (Midterm)	Dec.	Jan. (Final)	Feb.	Mar.	April (Midterm)	May	June (Final)
Text only	96	163	382	124	406	110	158	427	148	483
Text & images	4	12	16	28	28	46	18	24	18	25
Text & videos	2	12	48	15	52	3	6	50	8	53
Comments	472	970	3,011	1,200	3,204	310	1,730	3,542	2,220	3,909
Likes	1,994	2,905	9,243	2,112	8,790	860	3,112	10,023	2,998	11,436

Research Question 1

Question 1: What do students do on Facebook? Facebook is a Web-based social communication application. Thus, both the amount of time spent on Facebook and daily frequency of Facebook use affect the total engagement in Facebook activities among students. Facebook activities include updating one's personal status, chatting, or uploading or tagging music or photos. Hence, it is necessary to identify patterns in terms of how students spend their time on Facebook and the daily frequency of checking Facebook. Frequencies, percentages, and nonparametric tests were employed for this research question.

- The students spent a mean of 116.87 (SD 56.25) minutes per day on Facebook.
- The students checked Facebook a mean of 3.3 (SD 1.33) times per day.

Daily Facebook usage by male and female respondents was compared using the Kolmogorov-Smirnov test, and the results rejected the null hypothesis ($p = .004$). The analysis ($z = 4.250$; $p < .05$) also showed a significant difference in the time spent on Facebook across genders: the female respondents spent more time on the site daily compared with the male respondents.

Specifically, females spent an average of 122 minutes (or 2.0 h) daily participating in Facebook activities compared with an average of 103 minutes (1.7 h) daily for males. The average amount of time spent on Facebook exceeded the amounts that were reported by Ellison et al. (2007), Pempek et al. (2009), and Junco (2009).

The higher averages in this study may have been observed because the students were given opportunities to communicate with instructors between classes, discuss class projects with group members online, submit class assignments through online tools, and conduct online research. These tasks may have caused the participants of this study to remain logged in to their Facebook accounts while engaging in online class activities. Table 4 illustrates the relationship between the amount of time spent on Facebook and the classes (class A & B) of the students as tested by Pearson's chi-squared tests of association. The group of classes yielded insignificant results ($\chi^2 = 1.635$; $p = .891$). Therefore, the data collected from 2 classes were combined for further analysis.

Table: 4
Comparison of time spent on Facebook and demographic profile using chi-square tests

Time spent on Facebook	χ^2 (p -value)	Cramer's V (p -value)
Program of study	1.635 (.891)	0.159 (.897)

The students in the sample spent a substantial amount of time on Facebook every day: they checked Facebook a mean of 3.3 (SD 1.33) times per day. There was a moderate correlation between the amount of time spent on Facebook and the frequency of checking Facebook (Person's $r = .3999$, $p < .001$). The students reported that they participated in a variety of Facebook activities, and chatting (84.6%), viewing photos (66.2%), and commenting on friend's posts (64.6%) were the most popular activities. In this study, many students indicated that they used Facebook to start projects (58.5%) and share links/information (49.2%).

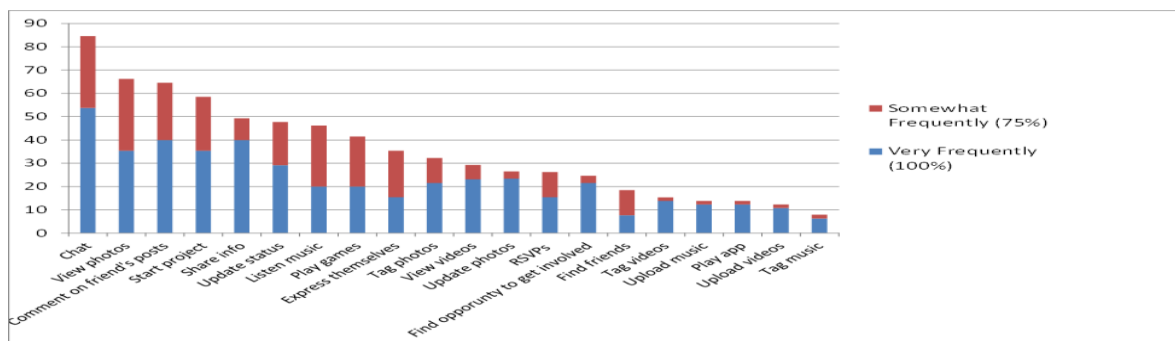


Figure: 2.
Most often frequency Facebook Activities

The frequencies of Facebook activities that were reported by the participants in this study were generally inconsistent with those reported by Pempek et al. (2009). Part of the reasons was from the instructional methods of this study that the students were given opportunities to exchanges ideas on Facebook of how and what to do with their group projects.

The results also showed that only 41.5% of the respondents reported playing games on Facebook and only two respondents (1.5%) reported using non-game applications on Facebook very frequently (Figure: 2). This result is inconsistent with a previous study (Junco, 2011) that found that most sampled students (71%) used Facebook to play games very frequently. The results of this study indicated that students were less likely to playing games or application on Facebook if the Facebook was integrated with the course instruction.

Research Question 2

Question 2: How do students perceive Facebook instructional methods in terms of fostering learning engagement? Seven subscales of learning engagement include teacher caring qualities, teacher trustworthiness qualities, teacher and student relationship, cooperative student learning, active learning, student and student relationship, and student and institution relationship.

It was important to ascertain whether the amount of time that students spent on Facebook affected or influenced the time that they spent preparing for class, the time that they spent participating in co-curricular activities on campus, and the time that they spent relaxing and socializing (e.g., watching TV or partying). Several cross-tabulations were performed.

The correlation between the amount of time spent on Facebook and the amount of time spent preparing for class was not significant (Pearson's $r = .154, p > .1$). There was a moderate correlation between the amount of time spent on Facebook and the amount of time spent participating in co-curricular activities (Pearson's $r = .480, p < .001$). A moderate correlation between the amount of time spent participating in co-curricular activities and student perceptions of the institution (Pearson's $r = .375, p < .01$) was also found. Furthermore, there was a substantial correlation between the amount of time spent on Facebook and the amount of time spent relaxing and socializing (Pearson's $r = .603, p < .001$). There was a relatively small correlation between the amount of time spent relaxing and socializing and the amount of time spent participating in co-curricular activities (Pearson's $r = .298, p < .005$) and preparing for class (Pearson's $r = .277, p < .005$). Interestingly, the amount of time that students spent on Facebook was unrelated to the amount of time that they spent preparing for class. More importantly, the students who spent more time on Facebook also spent more time engaging in co-curricular activities, including student organizations, student government, or intercollegiate sports on campus.

Student and Faculty Interactions and Relationships: More than half of the respondents (60.6%) reported that their instructor devoted attention to the needs of students, and 62.1% of the students believed that their instructor was open and honest with them. Two-thirds (66.6%) of the students reported that their instructor cared about them.

In sum, many of the students (69.7%) viewed their instructor as helpful and sympathetic.

Student and Student Interactions and Relationships: The respondents indicated that the quality of their interactions and relationships with their fellow students was better than those with their instructor. Most of the respondents (93.9%) stated that they enjoyed chatting with friends. Similarly, a majority of the students (90.1%) indicated that interacting with friends was enjoyable. Many participants (75.7%) also indicated that other students cared about them.

Almost all of the students (95.5%) described their peers at this institution as very supportive and reported experiencing a strong sense of belonging.

Student and Institution Interactions and Relationships:

Two-thirds of the respondents (74.2%) agreed that they felt connected with the university as a result of their conversations with classmates on Facebook. In addition, 69.7% of the respondents agreed that the overall educational experience at this institution is excellent.

Research Question 3

Question 3: What effects do Facebook instructional practices have on the academic semester grades of students?

To detect outliers, the authors examined the mean scores from the 3 major categories concerning the quality of interactions and relationship among between;

- student and instructor,
- student and student, and
- student and institution.

The exclusion of two cases with unvaried outliers in the student-faculty items resulted in 128 cases remaining for the analysis.

Table 3 presents the mean, standard deviation, and Cronbach's α coefficient for each subscale. Table: 5 presents a correlation matrix of 3 subscales concerning the quality of student and faculty interactions and relationships, 3 subscales concerning the quality of student-student interactions and relationships, 1 subscale concerning the quality of student and institution interactions and relationships, and student grades.

There were statistically significant, moderate positive relationships with the grades for the subscales of TC (Pearson's $r = .399$), TT (Pearson's $r = .377$), TQ (Pearson's $r = .326$), CL (Pearson's $r = .415$), and SI (Pearson's $r = .375$) at the .01 level. Regarding interaction between student and instructor, there was a statistical significant, very strong positive association between the subscales of TT and TQ (Pearson's $r = .826$, $p < .01$). Regarding interaction among students themselves, with the connection of Facebook learning environment, there were statistically significant, substantial positive relationships with CL for the subscales of AL (Pearson's $r = .588$), SQ (Pearson's $r = .534$), and SI (Pearson's $r = .596$) at the .01 level.

In addition, subscale AL was substantially correlated with CL (Pearson's $r = .588$, $p < .01$) and SQ (Pearson's $r = .568$, $p < .01$). The results revealed that the more active interaction among students themselves, between students and instructors, and students and institution, the better grades the students had.

These significant relationships between CL and AL may have been observed because the students were given particular active Facebook instructional methods.

The methods allowed students to work together on Facebook course sites with instructors and among students themselves.

Table: 5
Intercorrelations between Facebook instructional methods and grades

Variables	grades	TC	TT	TQ	CL	AL	SQ	SI
grades	1.000	.399	.377	.326	.415	.050	.064	.375
TC	.399	1.000	.612	.442	-.010	-.140	-.275	-.016
TT	.377	.612	1.000	.826	.314	.231	.284	.163
TQ	.326	.442	.826	1.000	.224	.173	.310	.224
CL	.415	-.010	.314	.224	1.000	.588	.534	.596
AL	.050	-.140	.231	.173	.588	1.000	.568	.172
SQ	.064	-.275	.284	.310	.534	.568	1.000	.357
SI	.375	-.016	.163	.224	.596	.172	.357	1.000

The linear regression showed that the amount of time spent on Facebook ($F_{(7, 125)} = 5.848, p < .01$) (Table 6) and the amount of time spent on co-curricular activities ($F_{(7, 126)} = .6558, p < .001$) (Table: 7) were significant predictors of student grades, and teacher caring was a significant predictor of the amount of time spent on co-curricular on campus ($F_{(6, 124)} = 3.478, p < .05$).

Together, grades and the amount of time spent on co-curricular activities accounted for 27.7%, 41.8%, 21.9% of the variance in the amount of time spent on Facebook, the amount of time spent on co-curricular activities on campus, and Facebook instructional practices, respectively.

Both amount of time spent on Facebook and the amount of time spent on co-curricular on campus significantly explained the variance in grades.

Finally, Facebook instructional practices and teacher caring significantly explained the variance in the amount of time spent on co-curricular activities on campus.

Table: 6
Linear regression for Facebook instructional methods and time spent on Facebook explaining grades

Variables	β	SEB	β	t	Sig. (t-tailed)
TC	.577	.304	.297	1.899	.063
TT	-.297	.428	-.161	-.694	.491
TQ	.352	.406	.161	.866	.390
CL	1.335	.411	.542	3.248	.002**
AL	-.506	.308	-.232	-1.647	.105
SQ	-.204	.370	-.082	-.550	.584
SI	.210	.260	.108	.808	.423
Time spent on FB	.007	.003	.289	2.633	.010**

Note: β = Beta, the standardized regression coefficient. $R^2 = .277$. ** $p < .001$

Table: 7
Linear regression for Facebook instructional methods
and time spent on co-curricular on campus explaining grades

Variables	β	SEB	β	<i>t</i>	Sig. (t-tailed)
TC	.116	.333	.057	.347	.730
TT	-.116	.408	-.063	-.283	.778
TQ	.488	.410	.222	1.192	.239
CL	.986	.392	.399	2.513	.015
AL	-.412	.292	-.191	-1.411	.164
SQ	-.315	.359	-.129	-.877	.384
SI	.133	.257	.068	.516	.608
Time spent on co-curricular	.448	.120	.434	3.725	.000**

Note: β = Beta, the standardized regression coefficient. R^2 = .418. ** p < .001

Research Question 4

Question 4: Is there a relationship between grades and the frequency of engaging in Facebook activities? How does the frequency of Facebook use affect the academic grades of students?

To examine this relationship, the authors calculated Pearson's *r*. The results indicate a moderate association between initiating projects and grades (Pearson's $r = .348$, $p < .001$). In contrast, playing games (Pearson's $r = -.228$, $p < .01$) and spending time using non-game applications (Pearson $r = -.207$, $p < .01$) are negatively associated with grades. In other words, students who play games or use non-game applications on Facebook are more likely to have lower grades.

Linear regression was also used to test the causal relationship between grades and Facebook activities. Among 20 Facebook activities, initiating a project ($\beta = .758$, $p < .001$), uploading videos ($\beta = .613$, $p < .05$), and tagging videos ($\beta = .623$, $p < .05$) were positive predictors of grade, whereas playing games ($\beta = -.242$, $p < .001$) and using non-game applications ($\beta = -.025$, $p < .001$) were negative predictors of grades. Initiating projects was the strongest predictor of overall grades with a β of .758 ($p < .001$). In this study, the students received course-based interactive Facebook instructions, therefore, they were given alternatives to discuss with peers about their group projects and required to upload their group project presentation videos on Facebook course sites. The importance of how to utilize technology tool was significantly related to the learning outcomes which was consistent with prior studies (Ellison, 2007; Pempek et al., 2009).

Nevertheless, playing games was the strongest negative predictor of overall grades with a β of $-.242$ ($p < .001$) which was consistent with the several studies involving Facebook use and GPA ((Kirschner & Karpinski, 2010; Banquil et al., 2009).

DISCUSSION

Consistent with the findings of other studies (Heiberger & Harper, 2008; Pasek et al., 2009) but in contrast with other findings (Kirschner and Karpinski, 2010; Astin, 1984), the amount of time spent on Facebook was found to be a positive predictor of grades.

Based on the students in this sample, the amount of time spent on co-curricular activities on campus was positively correlated with engagement and was a strong positive predictor of grades.

More importantly, specific Facebook activities were found to be stronger predictors of student engagement, grades, and time spent engaging in co-curricular activities on campus compared with the overall amount of time spent on Facebook. This finding is consistent with prior research on educational technology, which has shown that the manner in which technology is used tends to be a stronger predictor of outcomes than the amount of time that is spent using the technology (Cotten, 2008; Ellison et al., 2007; Heiberger & Harper, 2008; Pempek et al., 2009). Furthermore, the amount of time spent on Facebook explained 27.7% of the variance in grades, and Facebook-based instructional practices explained 21.9% of the variance in time spent engaging in co-curricular activities.

Students use Facebook in ways that are both positively and negatively related to their grades and engagement. It is important to examine the real-world implications of these findings to better understand why students engage in Facebook activities. Specifically, initiating projects, uploading videos, and tagging videos were positive predictors of grades, whereas playing games and using non-game applications were negative predictors of grades.

Given that certain types of Facebook use result in positive outcomes and are positive predictors of engagement in the real world, these types of activities may be related to the construct of engagement and may foster academic benefits (Kuh, 2009).

Implications

The connection between Facebook-based instruction and learning engagement that was revealed in this study suggests that Facebook can be integrated into instruction to encourage students to engage in ways that are important for their academic outcomes and learning engagement. Thus, this study provides support for the 7 principles of good practices of improving engagement in undergraduate education (Chickering and Gamson, 1987) along with the Facebook platform, as detailed below:

- Taking advantage of Facebook communication features to extend the learning environment facilitates increased communication between students and their teachers. (principle 1)
- The students in this study used Facebook to initiate their projects online and hold discussions with their group members. Thus, Facebook provides an easy-to-use collaborative technology for students under the virtual group they create to work together. The students form collaborative learning by doing. They also received motivation and encouragement from their peers upon expressing their own emotions. Thus, Facebook fosters a sense of belonging to a specific group. (principle 2)
- Facebook assignments promote active learning. The students used Facebook to active share personal experience, as well exchange knowledge or information on academic and campus issues with other group members. (principle 3)
- Both the teachers and students were able to receive prompt feedback for a range of questions that were posted on the site. Through Facebook Chat, a feature that is similar to MSN Messenger, the students were able to see who else is online and chat with them online in real time. (principle 4)
- Class discussion was extended beyond the classroom. Facebook enabled learning to continue between classes. Thus, using Facebook assisted in maximizing time on task. (principle 5)

- The teachers communicated their expectations through Facebook regarding student projects, course assignments, and class materials. In this manner, Facebook allowed the teachers to promote learning and knowledge sharing both inside and outside of the classroom. (principle 6)
- Finally, the use of Facebook in instructional method accommodated diverse talents and methods of learning. For example, shy students who may have been uncomfortable asking questions during class were given an opportunity to ask their questions online. (principle 7)

Even though the results revealed positive impacts on student learning engagement and academic performance, it is important to note that these results may not be solely attributable to the technology. The integration of Facebook communication tool and instructional method brought positive engagement between students, students interacted each other frequently on academic and co-curricular activities which enrich their relationships. It is common that someone supports one another on Facebook when someone posts about his/her situations. In addition, the instructors constantly monitored and engaged in discussion with students. The use of Facebook created a causal connection with the instructors. Students linked with the instructors actively which may not have happened in the real world.

This helped students build rapport with the instructors and the institution, part of engagement. Hence, it helped students to be involved in more educational activities. Additionally, with the prompt feedback from both the instructors and students, it also helped increase students' academic performance. Therefore, students became more autonomous learners.

Limitations

There are several limitations associated with this study. The first limitation is possible sampling bias. All students who volunteered to participate in the study took the same classes, so the students represent a distinct population within the university. As such, the sample was very homogeneous and may not be representative of all the university students. Furthermore, a narrow selection of the overall student population at one institution is not sufficiently adequate to be representative of all university students.

Another limitation is the variables used in the present study. Like all self-reports, the survey used to measure the variables of student engagement has reliability and validity limitations. Further research should include alternative techniques for assessing the actual process of student learning engagement, such as in-class observation and interview with students and faculty. One further limitation is the instructors' skills and characteristics. Ractham and his associates (2012) note that "the more open and friendly the instructors are with students, the more friendly and responsive they were likely to be in terms of the community atmosphere and system usage" (p. 181).

In other words, the instructors' passionate and high abilities in the adoption of technology in their classrooms may be the major cause for increasing student grades and learning engagement. The instructors' skills and personal characteristics must be considered for further research to better measure students' learning engagement through the use of Web 2.0 tools. A final limitation is the students' and instructors' unique computer background. Completing a task actually depends on peers, instructors, and administrators. Therefore, the findings of this study are limited by students' computer background and their access to the computer technology.

Furthermore, whether the school policy can allow any system that is not hosted by the school should also be considered.

CONCLUSION

The results of this study offer three significant contributions. First, this research revealed that the use of Facebook contributes to the level of learning engagement in the real world. Specifically, Facebook assists students in merging their social and academic lives. In this study, Facebook was used to improve learning engagement in terms of fostering diverse interactions and nurture personal relationships among instructors, students, and institution. The students in this study were highly engaged and expressed satisfaction with their instructors, peers, and institution. Second, the use of the popular Web 2.0 artifact sustained learning engagement both inside and outside of the classroom. An essential goal of higher education professionals is to assist student in obtaining benefits, including those derived from the use of technology. Therefore, it is important to determine whether the integration of Facebook (or another Web 2.0 artifact) into instructional strategies can truly improve engagement in new areas in which students feel comfortable. The results suggest that instructors should utilize SNSs and organize class materials and activities in accordance with various instructional strategies.

Having a clear picture of its use can help educators design different academic activities for students to spend some time on Facebook more effectively and efficiently. Third, this study found that the use of Facebook as a new learning tool led to better academic outcomes in certain ways (Ellison et al., 2011).

Facebook can indeed empower the e-learning environment and is certainly not merely a time waster. Therefore, it is crucial to ensure that the current thinking regarding the implementation of new learning social network sites in classroom curricula is compatible with opportunities related to Web 2.0 activities.

The findings have several implications for educators. First, the instructor should demonstrate a positive perspective toward Facebook communication tool when they decide to include it as a class activity. Clear instructions and course requirements including guidelines of Facebook participation should be addressed in the class. Second, the instructor should create a collaborating learning environment to promote students' participation in the Facebook discussion activity. The instructor should also value the postings of all Facebook discussion and help students recognize the value of their participation. Third, the instructor should actively engage in the Facebook discussion, leading students' learning direction and guiding their interests for further interaction among students themselves. Finally, the authors recommend further studies of the use of Facebook or other Web 2.0 artifacts in educational settings, particularly controlled experiments to confirm and verify the cause-effect relationships that were inferred in this study.

Analysis of student interviews is recommended to explain the results from the standard quantitative approach. In addition, researchers must continue to explore the relationships and factors that are associated with student Facebook use in relation to academic learning outcomes. Another direction of further research might include the development of students' experience in the use of mobile Web 2.0 tools within the process of teaching and learning.

Hence, mobile Web 2.0 learning studies implementing telephone devices and other mobile devices to the shaping of new concepts of teaching and learning are suggested. Furthermore, use of the qualitative evaluation research for examining and the monitoring of student learning progress via Web 2.0 artifacts for the development of students' key competences are also suggested.

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