Facebook as a Teaching Enhancement Tool to Facilitate College Student Learning: A Case Study

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Abstract: - The purpose of this study was to explore the relationship between Facebook Group participation and the academic achievement of college students in Taiwan. The ten-week educational discussions among fifty Taiwanese college students on two Facebook discussion pages were recorded and analyzed. The online participation frequency of each student was then subsequently compared with his Grade Point Average. The result indicates that there is a significant positive correlation between a student’s online participation frequency and his GPA. Furthermore, it was found that evaluation criteria and teacher facilitation can have an effect on the direction of online discussions. According to the results, we can conclude that educational discussions on Facebook may enhance student learning, and hence Facebook may serve as a promising teaching tool to be used by educators.

Key-Words: - Facebook, social network, evaluation criteria, academic achievement

1 Introduction
Today, the Internet has led to the formation of a whole new kind of community, the “virtual community,” eliminating geography and time constraints. Parks [1] suggested that “being connected to others fosters a sense of purpose, belonging, and attachment that is central to the concept of community.” Founded in 2004, Facebook is an online social networking service that has more than 800 million active users and is highly popular among college students [2]. Social networking sites serve as a genre of “networked publics”, to transform how people think and communicate by providing a variety of technical features to their users [3]. These sites allow individuals to present themselves online, establish new connections, and maintain connections with existing contacts. As a social networking service provider, Facebook allows its users to share interests, interact with their own personal networks, and post comments on the profile page of other users. Therefore, Facebook was chosen as the example social networking service in this study.

Coleman [4] viewed communities and families as repositories of social capital and established the importance of these networks in fostering academic success. Semo & Karmel [5] argued that network associations and influences can increase educational engagement and achievement. Thus social networks in schools can be beneficial to students’ learning and foster academic success.

The relationship between student engagement through the use of Facebook and student’s academic performance was examined. It has been found that students who are more engaged during the learning process tend to perform better in their academic studies [6]. Therefore, an investigation on the relationship between student engagement and their academic performance by using Facebook as an educational enhancement tool is worthy of study.

Based on these suggestions, the present study is to investigate how teachers can incorporate the use of Facebook in guiding and facilitating college student learning. Of Hew’s 36 literature reviews, eight papers were based on content analysis of Facebook features [7]. However, the content generated on Facebook Group, a popular feature on Facebook has not been analysed yet. Also, few studies have been done on the educational use of Facebook. Therefore, in this paper, three specific research objectives are examined:

1. Does the use of the Facebook Group feature in a class setting make a difference in a student’s academic achievement?

2. Is there a significant correlation between a student’s participation frequency on Facebook Group discussions and his academic achievement?

3. What is the effect of teacher facilitation and marking criteria on student participation in Facebook group discussions?
2. Literature Review
Facebook’s impact on college students has received a lot of attention and interests from researchers. It started out as a social networking site targeting the college-aged students [8], attracted users mainly through social motivation [9], and was used often for social interaction [7-8,10]. It has been found that Facebook usage improves a user’s self-esteem by increasing his sense of belonging [11].

Furthermore, Facebook is also playing an important role in student academic performance. It can provide many pedagogical advantages to teachers and students. Facebook creates a comfortable learning environment for students, and allows teachers to provide students’ guidance on group assignments and direct useful online educational resources to students [12-13]. Moreover, it was found that the use of Facebook as a communication tool can be beneficial in both social and academic settings [14].

Some researchers state that Facebook has positive effects on student academic performance [15,16] while others claim the opposite [17,18]. Hunley et al. find that there is no correlation between computer usage and academic achievement [19]. Therefore, it is expected that Facebook, with users mostly being college students, can enhance interaction related to educational purpose.

Different methods are employed to investigate issues of using Facebook as an educational facilitation tool. In order to investigate the effect of Facebook usage in learning, online questionnaires were created [6,20,21] to examine the relationship of frequency and duration of Facebook usage with the academic performance of Facebook users. A study done by Forkosh-Baruch & Hershkovitz suggested that social networking sites promote knowledge exchange through the facilitation of informal learning [15].

From the literature review, Facebook was recommended as a tool for quality educational act [20]. Bicena & Cavus suggested it might be worthwhile to integrate the use of Facebook into education and teaching [14]. Using Facebook for collecting and sharing information was positively correlated to academic performance [6].

Motivation is another important factor related to the academic performance. Motivation influences student' involvement and academic achievement [22]. Spending excessive time on the Internet can affect school performance [17]. For example, in a recent study, teachers of a high school as mentors may provide educational support on a Facebook Group discussion page, and promote a stronger relationship between the student members and the mentors. Most students believe that they learned more because of the use of Facebook group discussion page [23].

We can see the students using technology on campus all over the world. The teacher needs to think about how to integrate it into a curriculum. There are many ways of using technology in the classroom, such as some software programs, distance learning, multimedia and the Internet. Choosing the right tool for the classroom is important. Sturgeon et. al. found that there is an indirect correlation between the use of Facebook in a classroom setting and student academic performance [24]. They cited a professor who interviewed, "The more relaxed the student is, the more relaxed the faculty member is and the more learning can take place. If the relationship that exists is what makes for a better learning experience for the student, then Facebook most certainly has an indirect impact.”

Evaluation criteria have an effect on students' learning [25]. The researchers suggested that adopting Facebook as an education enhancement tool could be beneficial to students, because it facilitates comfortable learning conditions and provides students a sense of community [26]. Furthermore, the research found that the faculty believed that grades were an important motivation for students [27].

So far studies on Facebook usage for educational purpose is still minimum, and the studies are done in various countries including America, Europe, and Asia [6,15,17,20,21,28]. It is believed that more studies on this subject can help find better ways to facilitate student learning, as well as improve student-educator interaction.

3. Methods
3.1 Participants
Fifty third-year undergraduate students (31 females, 19 males) in the Department of Industrial and Commercial Design participated in this study. Because it is too many students in a class to discuss, the students were divided into two groups on Facebook, B Group (13 males, 14 females) and F Group (6 males, 17 females).

3.2 Measure
The researchers made some categories of the data so as to make them easy to read and analyze. Two faculty members were asked to review these categories. The agreement between the faculty members varied from 85% to 90%.
The data collected was categorized into three categories: (1) active participation, (2) passive participation and (3) total participation counts in both Facebook discussion groups.

The pre-test scores are defined by the GPA received in the first semester in the same course before starting the two Facebook Groups and the post-test scores are defined by the grades received for this ten-week Facebook discussion group assignment.

Four evaluation criteria were included in the study were to (1) come to class on time, (2) post news in the field of industrial and commercial design, (3) post events related to building professional skills and (4) write a reflection after each class.

3.3 Procedure
For the sake of design exhibition on June 17, 2011, the students were asked to create Facebook Groups to discuss how to make it successfully.

It took the students two academic semesters to complete the required course, Product Development. The students’ interaction and conversations on the Facebook discussion pages are recorded and evaluated according to the evaluation criteria.

There are 3035 Facebook conversation records for B Group from April 12 to June 17 and 2279 records for F Group from April 15 to June 17 in 2011.

3.4 Analysis
The data collected were analyzed using SPSS Statistics 20.0. Descriptive statistical analyses were conducted to illustrate the demographic characteristics of the participants. Correlations were examined to evaluate the frequency of participation in Facebook discussions, the pre-test and post-test. The Independent sample T-test, the Chi-square test for independence and Goodness of fit were also used.

The mean frequency of active participation in B Group was 19.00 (SD=42.68) and in F Group was 18.58 (SD=22.06). The mean frequency of passive participation in B Group was 89.39 (SD=116.39) and in F Group was 76.37 (SD=58.87). The frequency of active participation in B Group was 532 and that in F Group was 446. The frequency of total participation in B Group was 2503 and that in F Group was 1883.

4. Results

4.1 Facebook Group discussions and the academic performance
4.1.1 Academic performance of groups
Before launching discussions on Facebook Group pages, we first checked whether there was a difference in the academic performance between the two student groups. The T-test was used to compare the academic achievement (pre-test) of the B group (M=67.00, SD=14.15, N=27) and that of the F group (M=66.00, SD=16.45, N=23). The result showed there was no significant difference (T-value=.230) between B group and F group.

We then compare the academic performance between the two groups post FB discussions. The T-test was again used to compare the academic achievement of B group (M=67.93, SD=14.59, N=27) with that of F group (M=72.48, SD=7.93, N=23). The result indicated there was no significant difference (t=-1.40) between B group and F group after the ten-week discussions on Facebook Group pages.

4.1.2 Participants’ improvement in academic performance
The academic performance of the two groups in the pre- and post-Facebook discussions are shown in Table 1. As Table 1 indicates, in the academic achievement of participants in B Group improved, but it was not significant (T=-.317). The academic performance of the participants in the F Group improved and was statistical significant (T=-2.405). However, the total academic improvement of both groups was not statistically significant (T = -1.712).

<table>
<thead>
<tr>
<th>Group</th>
<th>M</th>
<th>N</th>
<th>SD</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pre-test</td>
<td>67.00</td>
<td>27</td>
<td>14.15</td>
<td>- .317</td>
</tr>
<tr>
<td>post-test</td>
<td>67.93</td>
<td>27</td>
<td>14.59</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pre-test</td>
<td>66.00</td>
<td>23</td>
<td>16.45</td>
<td>-2.405</td>
</tr>
<tr>
<td>post-test</td>
<td>72.48</td>
<td>23</td>
<td>7.93</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pre-test</td>
<td>66.54</td>
<td>50</td>
<td>15.10</td>
<td>-1.712</td>
</tr>
<tr>
<td>post-test</td>
<td>70.02</td>
<td>50</td>
<td>12.10</td>
<td></td>
</tr>
</tbody>
</table>

*P<.05

4.2 Participation frequency of the Facebook Group discussions and the academic performance
After the students were engaged in the Facebook Group discussions for 10 weeks, they had an exhibition and received grades. The correlation coefficients between variables are listed in Table 2. As shown in Table 2, coefficients of the frequency of active participation, passive participation, and total participation on Facebook Group discussion
pages, as well as the academic achievement, including both the pre-test and the post-test, were all found to be significant ($p<.01$ & $p<.001$). The correlation between active participation and the pre-test was .367, and it was .434 between active participation and the post-test. The correlation between the total participation, the pre-test and the post-test varied from .406 to .410. These results showed that there is a significant positive relationship among the variables. The frequency of student’s participation on Facebook discussion pages can explain 15% to 19% of the variance in the academic performance for the post-test/exhibition.

Table 2. Correlation matrix of variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Active participation</th>
<th>Passive participation</th>
<th>Total participation</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active participation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passive participation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total participation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>.367**</td>
<td>.406**</td>
<td>.459**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-test</td>
<td>.943***</td>
<td>.992***</td>
<td>.992***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** $p<.001$  *** $p<.0001$, N=50

4.3 Evaluation criteria and Facebook Group participation

In this study, four evaluation criteria were also investigated with the use of a Chi-Square Test. As shown in Table 3, the contents of active participation on Facebook Group between B and F group were different in the evaluation criteria ($\chi^2=37.303$, $p<.001$). It was found that the students from two Facebook groups posted the information differently. The students in F group (86.6%) offered more news in the field of industrial and commercial design than B Group did (63.5%). The students in B group (17.6%) posted more events related to building professional skills than F group did (1.1%). Students in the B group (8.88%) had a higher rate of coming to class on time than did students in the F group (3.2%). The difference in the frequency of writing a reflection after each class was not statistically significant between the groups.

Table 3. $\chi^2$ Test for the evaluation criteria in Groups

<table>
<thead>
<tr>
<th>Evaluation criteria</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>148</td>
</tr>
<tr>
<td>2*</td>
<td>117(100%)</td>
</tr>
<tr>
<td>3*</td>
<td>335</td>
</tr>
<tr>
<td>4*</td>
<td>32(100%)</td>
</tr>
</tbody>
</table>

$\chi^2=37.303$, $p<.001$. Note: 1* Come to class on time. 2* Post news in the field of industrial and commercial design. 3* Post events related to building professional skills. 4* Write a reflection after each class.

Teacher participation was also examined in the study to clarify whether it was different between the groups. As shown in Table 4, there was no significant difference in teacher participation in the two groups ($\chi^2=1.852$, $P=.174$). However, the frequency of teacher passive participation (74.36%) was significantly higher than that of active participation (25.64%) ($\chi^2=27.769$, $P<.01$).

Table 4. $\chi^2$ Test for the teacher’s participation

<table>
<thead>
<tr>
<th>Group</th>
<th>active participation</th>
<th>passive participation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>16(32.0%)</td>
<td>34(68%)</td>
<td>50(100%)</td>
</tr>
<tr>
<td>B</td>
<td>14(20.9%)</td>
<td>53(79.1%)</td>
<td>67(100%)</td>
</tr>
<tr>
<td>Total</td>
<td>30(25.64%)</td>
<td>87(74.36%)</td>
<td>117(100%)</td>
</tr>
</tbody>
</table>

$\chi^2=1.852$, $P=.174$

5. Discussion and Conclusion

Although the analyses showed that splitting students from the same class into two Facebook discussion groups resulted in no difference in the grades they received for their exhibition projects, it was found that the frequency of student participation in Facebook Groups could explain 15% to 19% of the variance in their exhibition project grades. Encouraging the students to participate in the discussions in Facebook Group has some beneficial effect on their academic performance. The researchers analyzed the contents discussed in the two Facebook Groups, and found that the discussion pages fostered collaboration among the students, and allowed them to share knowledge and exchange ideas with each other. Facebook Group also encouraged students to become active learners [29]. The students were stimulated to discuss and do well by the healthy competition resulted from having more than one discussion group. Furthermore, it was found that the students tailored their discussions around the evaluation criteria given by the teacher. This finding that the evaluation criteria leads students’ discussions is consistent with the previous research [25]. Facebook Group promotes a small-group development. Tuckman suggested that a group goes through a five stage development process that includes forming, storming, norming, performing, and adjourning. Further research is recommended for understanding group development on Facebook [30].

The participation frequency in the Facebook discussions can show the students’ interests in learning from each other about the topics. This study revealed that B Group participants did not improve significantly in the academic performance for the exhibit. However, the participants in F Group made great improvement in the academic
achievement. It seemed that student interactions on Facebook Group were more beneficial to the students in F Group.

Furthermore, it was found that the groups posted different types of information on their discussion pages. F group students offered more news in the field of industrial and commercial design (86.6%) than B Group did (63.5%). This may explain in F Group make more improvement in their academic performance. The information they shared with Facebook Group helped F Group to gain better grades. However, looking from another perspective, it is possible that students in B group can make use of the learning opportunity and perform better in the future because they posted more discussions related to building professional skills (17.6%) than F group did (1.1%).

Returning to the second research question, we can definitively state that there is a positive relationship between the participation frequency in Facebook Group and the academic performance. Facebook group appears to play a role in the process by which students prepare for the design exhibit. It therefore can be considered as a teaching tool to motivate learning and facilitate student discussions.

Interactions between the students and the teacher on Facebook are another factor considered in the Facebook usage for educational purpose. In the study, there was no significant difference in the teacher’s participation frequency between the two groups. However, the teacher had a higher rate of passive participation than did active participation in both groups. Whether the teacher’s role is a facilitator in the online discussions needs to be further investigated.

Students’ motivation is an important factor contributing to the participation of Facebook Group and their academic achievement. Motivation influences students’ involvement and academic achievement [22]. Critical thinking skills, interactions among students and interactions between students and faculty members are important variables related to motivation [31]. In the study, the students followed what the teachers demanded and had successful exhibits. They might care about the grades and devote their time to participating in the Facebook discussion then got good grades. Besides, there are other factors related to academic performance and worthy to be considered, including personality characteristics, self-efficacy, self-esteem, interest and competence.

In summary, this study is a report, rather than a survey. The data collected were objective because they were obtained after the course was finished. The experimental bias might not be found. Three conclusions are drawn: (1) The students in one of the groups on Facebook made much improvement in academic performance after ten-week discussions. (2) There is a significant positive correlation between a student’s online participation frequency and his GPA. And the frequency of students’ participation on Facebook Groups could explain 15% to 19% of the variance in his academic performance. (3) The evaluation criteria and teacher facilitation in discussions can have an effect on the direction of online discussion.

The present results may not be generalized to other populations. The students participated in this study might be unique, and the sample size might not be large enough. Whether these results can be generalized to all the other students depends on the uniqueness of the sample. Further research on a larger and more representative sample is suggested. Also exploration of the structure of student interaction and other qualitative research about the use of Facebook Group are recommended.

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