UNDERSTANDING USER BEHAVIORS IN SOCIAL NETWORKING SERVICE FOR MOBILE LEARNING: A CASE STUDY WITH TWITTER

Ilkyu Ha[1], Chonggun Kim[2]
[1, 2] Department of Computer Engineering, Yeungnam University, Gyeongsan, Korea 712-749

[1]ilkyuha@ynu.ac.kr, [2]cgkim@yu.ac.kr

[2]*Corresponding Author

Abstract

With the rapid adoption of smart devices, various services have been evolved in mobile environment. Particularly, Twitter has become one of major mobile social networking services. In spite of the increasing use of Twitter services by students and instructors in colleges, very little empirical studies that concern the impact of social media on the student learning environment have been published. In this paper, an experiment using Twitter is conducted for college classes to understand the effects on college student engagement and grades. The participants of experimental study comprise students of 2 college classes during one semester and only voluntary students attend this Twitter-based experiment. Network of Twitter using pattern such as community building, collaboration relationship and information sharing among students are analyzed. Some results about the relationships of seat positions, following patterns of Twitter and grades among students have been studied. By understanding the networking patterns among the students, we found that Twitter can play an efficient role of a mobile educational tool.

Keywords: Social Networking Services, Twitter, College Class Activities, Mobile Learning, Education.

1.0INTRODUCTION

Social networking services have been applied in a variety of intelligent information services. Especially, Twitter, which is a popular mobile microblogging tool, has been widely used to obtain information and to communicate with peers [20]. With the increasing use of SNS (Social Networking Service) in learning environments, some pioneering studies have been conducted on how to use Twitter in college education [1,2]. While mutual understanding-based social networking services (e.g., Facebook) is also regarded as the most popular method for global college students for collaborative learning process [3], Twitter is more amenable for public and fast diffusion dialogue than Facebook [3,4].

In spite of the increasing use of Twitter services by students and instructors in colleges, very little empirical studies that concern the impact of social media on the student learning environment have been accomplished. Fig. 1 shows Twitter activities that can take place in a classroom of colleges. A professor and students make following relationships between them and ask some questions or reply to each other in Twitter environments.Theprofessor can send class information which can help students to take a course and send some discussion topics which students can discuss with each other in short term [21,22].

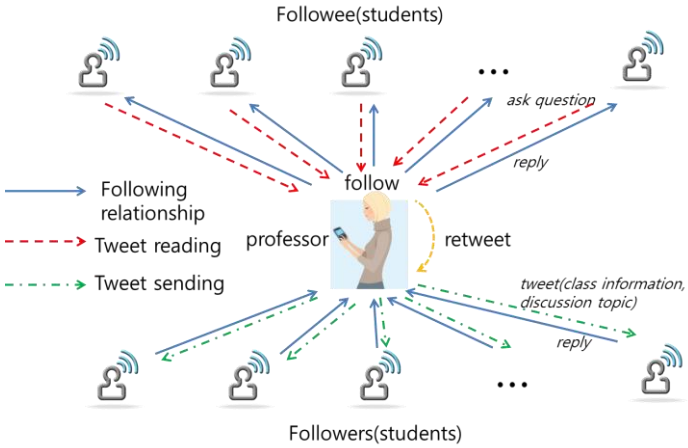

Fig. 1. Twitter activities.

1.1Research Questions and Purpose of the Study

The following questions are defined in order to attain some analytic results through this experimental study.

1) Is Twitter a helpful tool for education?
2) Is there any relationship between the networking of students based on Twitter and their grade? What are the relationships such as seat position and following relationship, seat position and grade, information sharing pattern and grade?
3) What are the characteristics of influential students in Twitter using group?

In this paper, we conduct an experiment using Twitter for students of 2 classes at YU(Yeungnam University). Some meaningful data are collected and some interesting results are analyzed.

1.2 Outline of This Paper

The outline of this paper is as follows.In Sect. 2, we review related works. In Sect. 3, we discuss the object and methods of our experiment. In Sect. 4, we analyze experimental results that take from the experimental environment in classrooms. Particularly, we discuss a relationship between seat positions and Twitter activity, a relationship between followings and grades and a relationship between seat position and grades. Finally, in Sect. 5, we draw a conclusion with a brief result of our experiment.

2.0RELATED WORKS

Recently, microblogging tools have been used as a communication tool between a student and the instructor in various educational environments[19]. Some researcheshave focused on how microblogging toolscan be used academically[2,3,19].Grosseck and Holotescu [2] show that Twitter, a microblogging tool,can be an effective tool for collaboration with students. Ebner et al. [3] show that microblogging can help students to be the members who can work on a specific problem without any restrictions of time and place.Cetintas et al. [19] show a method that classifiesthe number of questions from students to select the best questions in a microblogging-supported classroom. Though these workshaveusedvarious experimental methods in various educational environments, they agree that microblogging tools can be used as an educational tool for students and faculty.

Notably some research has focused on the relationship between Twitter as a microblogging tool and student engagement in higher education institutes.For example, Junco et al. [1] present the effect of Twitter on college student engagement and grades through a semester-long experimental study. It provides experimental evidence that Twitter can be used as an educational tool to help engage students and to mobilize faculty toward a more

active role. Stepanyan et al. [5] summarize the analyses of participant interaction within the Twitter microblogging environment and show that the higher scoring participants have more followers and follow others more. Several other studies[6,7,8,9,10] show that the use of Twitter helps to enhance and facilitate student engagement in the educational environment as a pedagogical tool.

Four other studies [11,12,14,17] show that the use of Twitter in higher education aids students learning and Twitter has a potential to introduce the learning community into higher education. Thoms [13] and Thoms [16] show that Twitter can be integrated into a Course Management System (CMS) in an online course community. Ullrich et al. [15] analyze student interaction patterns and trends of network dynamics in the Twitter microblogging environment.

But, we have doubted that Twitter can be effectively helpful to students and professors in a real educational environment. Especially, we are curious what relationship exists between students' Twitter activities and their class grade, between seat position and their grade.We want to reveal the relationships experimentally.

3.0RESEARCH OBJECTIVES AND METHODS

3.1User Groups

As experimental groups, we have selected 2 college classes and conducted the experiment for students in theseclasses in autumn semester 2012.
Table 1 shows experimental user groups.One is data communication (DC) sophomore class of the Dept. of Computer Engineering and another is computer programming (CP) freshman class of Electronic Engineering of YU.

Table 1. Two user groups

No.	Class name	Department	Grade	Num. of students
1	Data Communication(DC)	Computer Eng.	Sophomore	58
2	Computer Programming(CP)	Electronic Eng.	Freshman	47

3.2Experiment Preparation (Pre-Survey)

Prior to the experiment, we have conducted a pre-survey to investigate the current state of the students with a questionnaire composed of 12 questions. The result of the pre-survey is shown in Table 2. Courses DC and CP have 58 and 47 students, respectively. The ages of the students range from 19 to 27. Although all of the students use at least one of SNS services, the ratio of students who use Twitter service is very small. Table 2 shows the reasons why Twitter is not popular in these user groups, while Facebook is selected as the most favorite SNS.

Table 2. Results of the pre-survey

Q: The most favorite SNS		
(a)	Facebook	70.4%
(b)	KAKAO	21.6%
(c)	Twitter	6.5%
(d)	Cyworld	1.5%
Q: Reasons for not using Twitter		
(a)	Difficult to join	1.3%
(b)	Not interesting	17.2%
(c)	Inconvenient	5.6%
(d)	Prefer other SNS	63.5%
(e)	Others	12.4%

3.3Experimental Method

All of the students have voluntarily participated to this experiment. Guideline for using Twitter was explained to all students before they decided whether to participate in this experiment. Advanced consent for Twitter using experiment in class was also obtained. While students and professors have used Twitter services in the following educational situations, we have collected the meaningful data in this environment:

- Students can ask some questions to the professor anytime in the classroom or outside classroom by sending messages. A professor can answer the question and re-tweet it to all members of the experimental group. Then, the professor can post tweets about class information such as canceling a class, and supplementary lecture.
- A professor can suggest a simple and short discussion topic among the students. While the students can post their opinions, the professor can monitor their tweets and also participate in the discussion to moderate. It is necessary to make such relationships among class members for supporting users to exchange their messages.

From this environment, we can get some meaningful data that can show various using patterns such as student's degree of participation, influential and active student, etc. Also,we investigate students' seat positions in the classroom to find relationships between student's seat position and their grade. The investigation is conducted 7 or 8 times during a semester.

3.4Area Division of Classrooms

Fig. 2 and Fig. 3 show the classroom layouts of two targeted classes for our experiments. According to the distance from the screen or professor, the seats were divided into 3 areas.

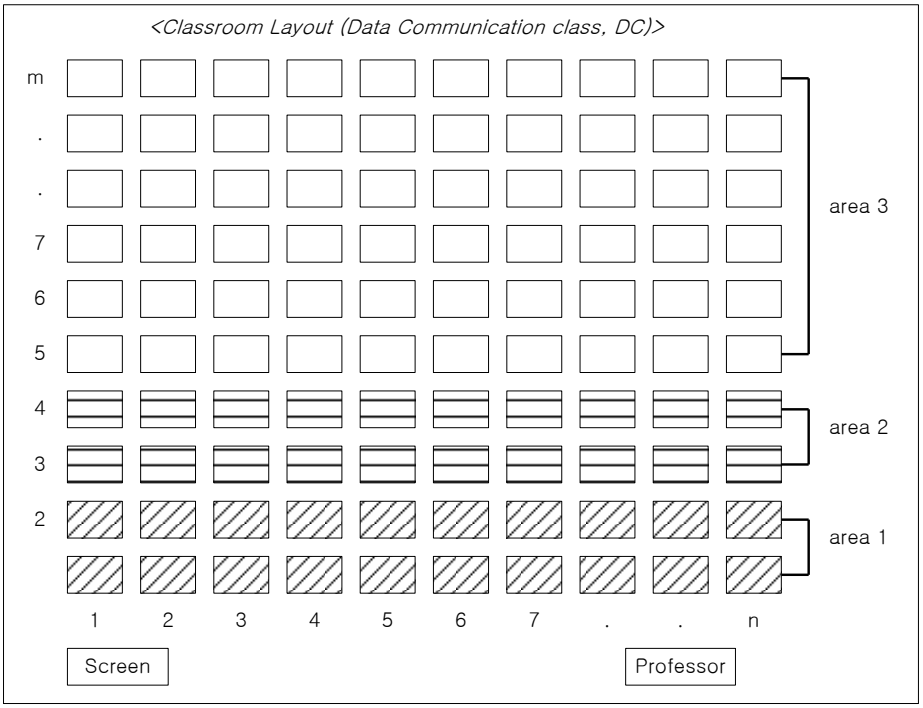

Fig. 2. Classroom layout of course DC

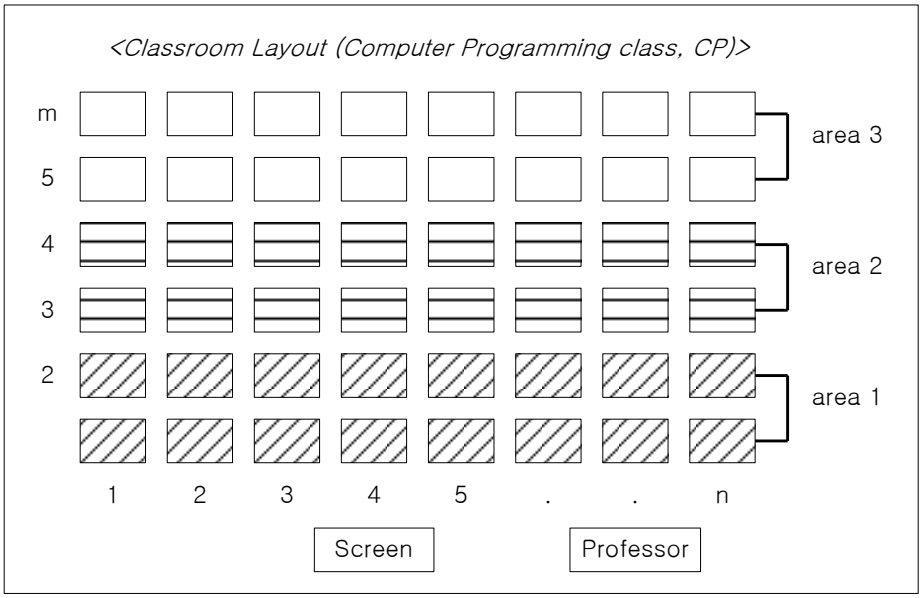

Fig. 3. Classroom layout of course CP

3.5Average Seat Position

The seat position data of each student is calculated to get the average seat position. The average seat position($\mu(X,Y)$) of a student is calculated by using Equ (1). In the equation, X and Y mean row and column number of a student's seat.We can also derive a variance(V_x, V_y) and a standard deviation(σ_x, σ_y) of the positions by using Equ (2) and (3).

$$\mu(X,Y) = (\sum_{i=1}^{n} X_i/n\,, \sum_{j=1}^{m} Y_j/m) \quad (1)$$

$$V_x = \sum_{i=1}^{n}(X_i - \mu(X))^2/n\ , \qquad V_y = \sum_{j=1}^{m}(Y_j - \mu(Y))^2/m \quad (2)$$

$$\sigma_x = \sqrt{V_x}, \sigma_y = \sqrt{V_y} \quad (3)$$

4.0 EXPERIMENTAL RESULTS

In course CP, 29 out of total 47 students (61.7 %) have participated in this experiment. In course DC, 31 out of total 48 students (64.6 %) have participated.

4.1Seat Position and Twitter Activity

The standard deviation value of the seat positions is not large as shown in Fig. 4 and Fig. 5. This means that most of the students have their preferred seating position in the classes. SD_x and SD_y mean standard deviation values of student's seat respectively.

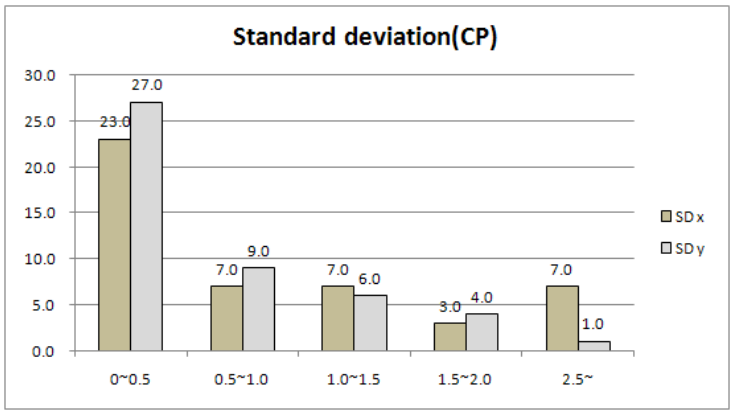

Fig. 4. Standard deviation of CP

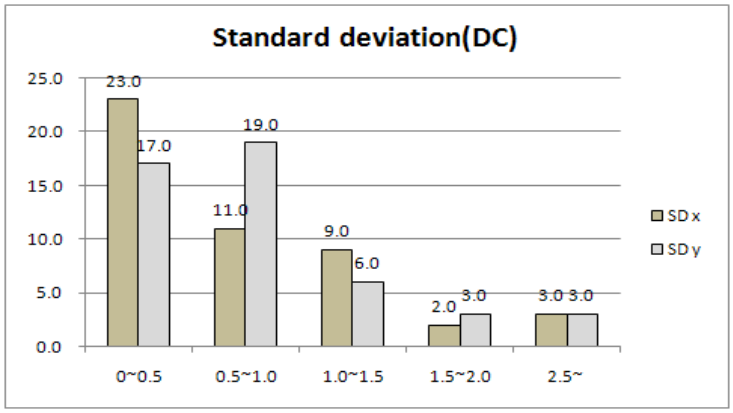

Fig. 5. Standard deviation of DC

Fig. 6 and Fig. 7 show the average position of each student who participates in the experiment. A number in a circle means a student's intrinsic number(i.e. identification number) in the class. A solid circle represents a student who participates in the experiment and a dotted line circle represents a student who does not participate. An arrow means a relationship of following or follower in Twitter communications. For example, the student of number 24 in Fig. 6 is following the student of number 3, and the student of number 24 is followed by the student of number 35.

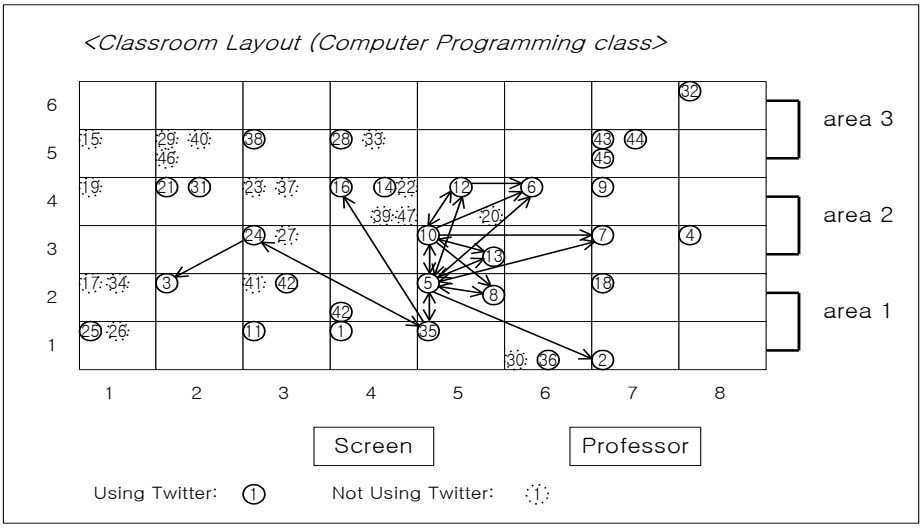

Fig. 6. Seat positions and followings in classroom of CP

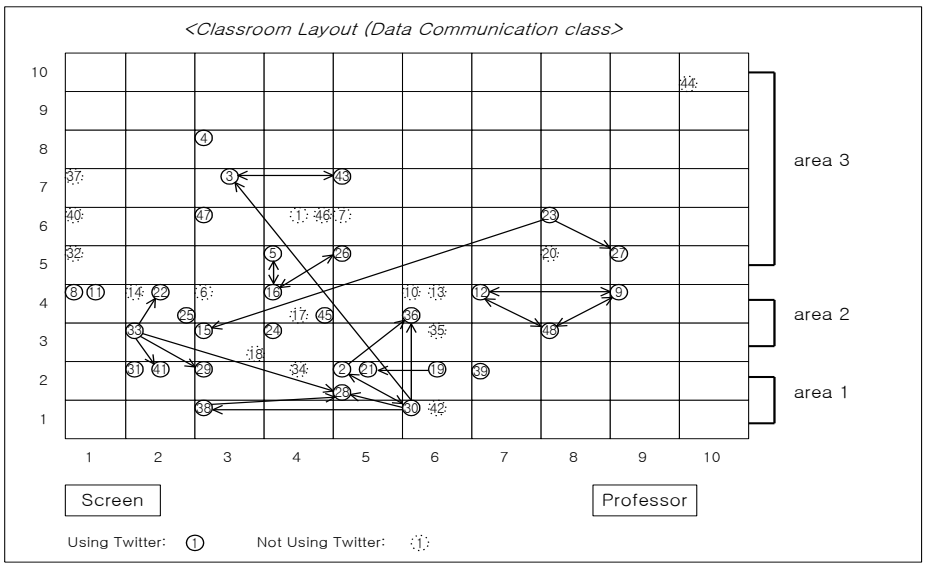

Fig. 7. Seat positions and followings in classroom of DC

In Fig. 6 and Fig. 7, we can estimate influential students such as the students of numbers 5, 10, 12, 35 of Fig. 6 and the students of numbers 30, 28, 33 of Fig. 7.

4.2Relationship between Followings and Grades

Fig. 8 and Fig. 10 show the relationships between the number of followings and grades of students. Fig. 9 and Fig. 11 show the relationships between the number of followers and grades of students. We can see the fact that the students who got a good grade have more followers as well as follow to more students.

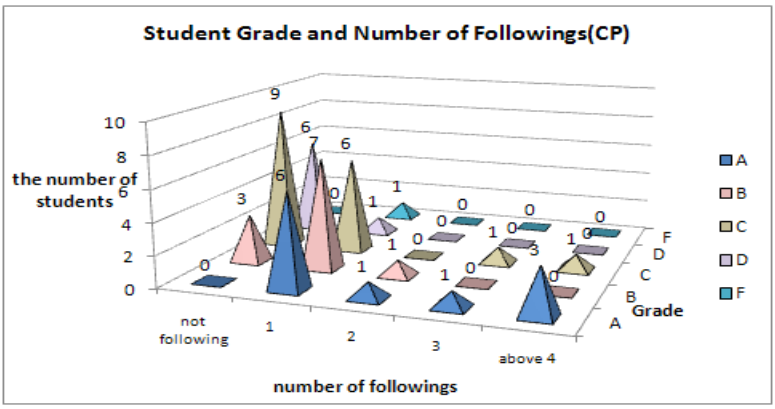

Fig. 8. Number of followings and grades

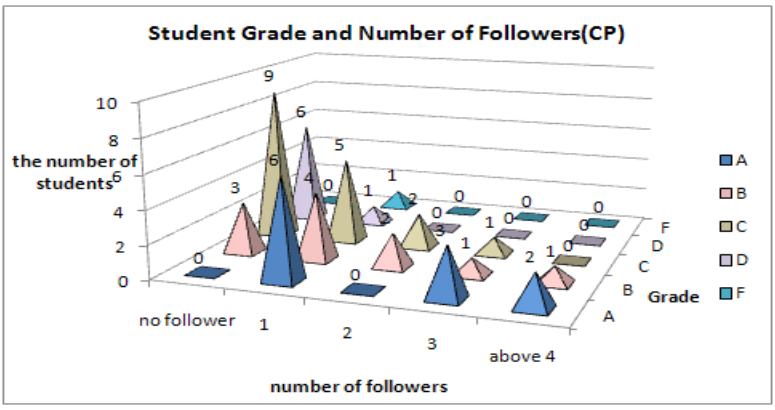

Fig. 9. Number of followers and grades

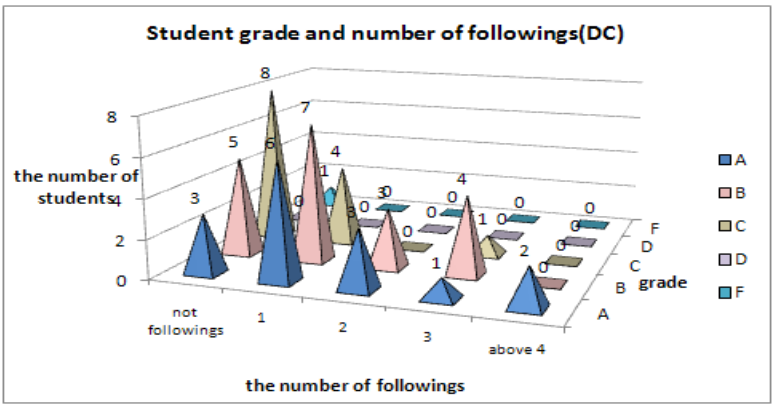

Fig. 10. Number of followings and grades

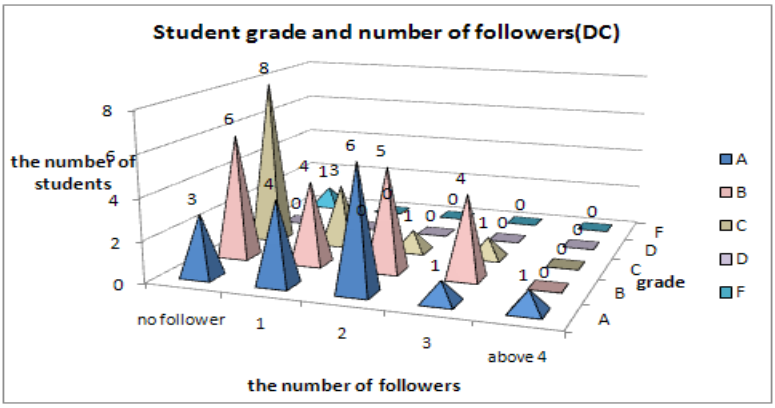

Fig. 11. Number of followers and grades

4.3Seat Positions related to Grades

Fig. 12 and Fig. 13 show the relationships between seat positions and personal grades. The ex-group of area 1 meansthe number of students who participate in the experiment ofall students who sit in area 1. The total of area 1 means the number of all students who sit in area 1. As shown in the figures, students who sit closer to thescreen or professor got better grade.

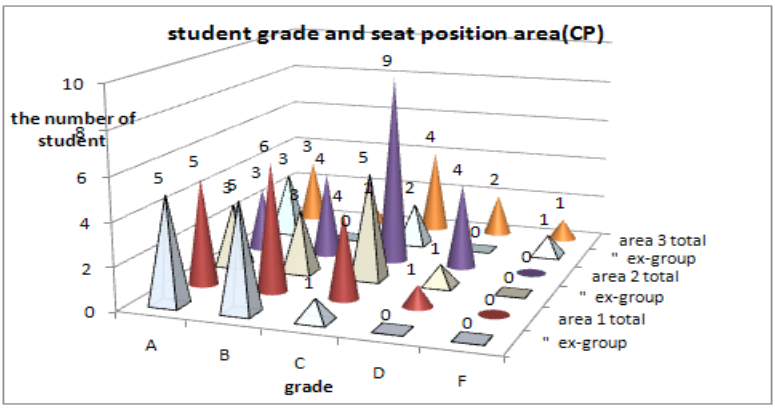

Fig. 12. Student grades and seat position(CP)

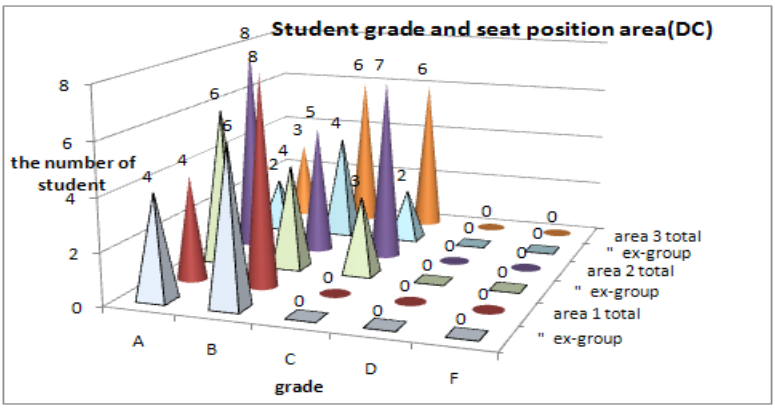

Fig. 13. Student grades and seat position(DC)

4.4Tweeting Time

Fig. 14 shows a distribution of tweeting time. The time of tweeting concentrated on daytime and evening. The tweeting time of students match up mostly with question's tweeting time of professor.

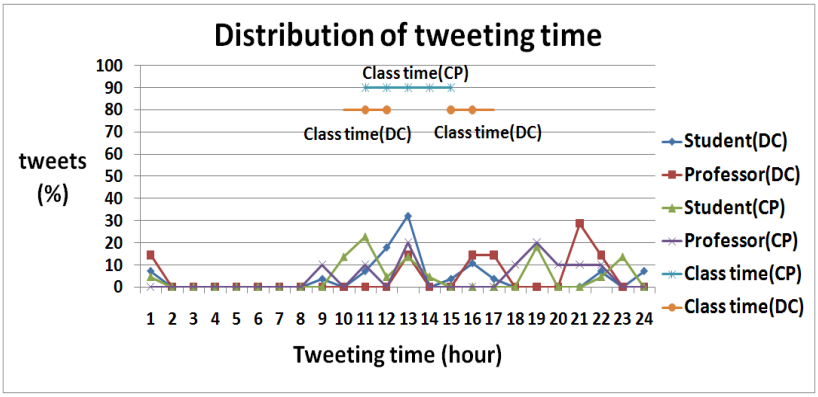

Fig. 14. Distribution of tweeting time

The results show similarity in both DC and CP classes. The class hours of DC are 10:30AM to 12:00PM on Thursday and 3:00PM to 4:30PM on Monday. The class hours of CP are 1:00PM to 3:00PM on Tuesday and 11:00AM to 1:00PM on Friday.

4.5Post-Survey

A post-survey is conducted for the students of two experimental groups to get their opinions about using Twitter as an educational supporting tool. The questionnaire is composed of 10 questions with 5-point Likert type[18] answers as shown in Table 3 (5: excellent, 4: good, 3: normal, 2: poor, 1: worst).
As shown in Table 3, the result of the post-survey shows that most of the students in the experimental group are normal satisfied with using Twitter in class. Especially, they show relatively positive opinions to question Q4 and Q7.

Table 3. Post-survey questions and the survey result

No	Questions	5 level choices(%)					Average
		5	4	3	2	1	(level)
1	Twitter is useful to study in this course	4	22	42	18	14	2.83
2	Using Twitter makes me more interested in this course	3	18	45	23	10	2.79
3	Using Twitter helped me to adapt in this course	4	27	38	22	9	2.95
4	Using Twitter helped me to communicate with my professor	9	36	30	14	10	3.19
5	Using Twitter helped me to communicate with class mates	1	9	38	34	18	2.42
6	Using Twitter helped me to get i nformation of this course	5	30	36	18	10	3.01
7	Twitter is a desirable thing for class	9	35	38	6	12	3.23
8	I will recommend Twitter as a lecture support system	8	17	27	38	10	2.74
9	Twitter is better than other SNS services for class	5	21	48	16	10	2.95
10	Twitter should be used in future classes	4	21	35	27	13	2.75

5.0CONCLUSIONS

By studying Twitter using pattern of college students in classes for the experimental groups, we could know the possibility of Twitter as a useful educational tool. Professors and students involved in experimental groups in 2 classes used Twitter in various educational purpose and environments. The Twitter using pattern through experiments was collected and analyzed. The following and follower relationships among students were examined, and their average seat positions and grades were studied as influencing factors. The following results were obtained from the experiment and analysis:

- Seat positions have some relationship with a following and follower relationship. Students sitting around a student have higher possibility to make following and follower relationships with the student.
- Students who have more followers and followings get good grade.
- Influential students have better grades than students who do not participate in the experiment or who do not actively participate in Twitter communications.
- Seat position and grade have some relationship. Students sitting close to a professor or a projection screen getbetter grades than students sitting far away from that.

Therefore, Twitter can be used as a useful tool in educational environment and activities on Twitter have some relationship with the off-line activities. For future study, more experiments are needed to conduct more meaningful results in various educational environments with various SNS services.

6.0ACKNOWLEDGEMENT

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