

## Proposal and Evaluation of Online Community Which Are Modeled on School Club Activities for Promoting Pro-Environmental Behavior

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**Abstract:** In order to solve our energy and environmental issues, it is important not only to make the efforts by industrial fields but also to promote pro-environmental behaviors (PEB) in our daily lives. It is however difficult for us to keep doing PEBs for long time. In order to keep it, it can be effective that they join an online community because a group norm of continuous PEB is expected to be fostered in such community. In this study, an online community named “eco club” has been proposed which is modeled on a school club activity where the group norm works well. When joining the community, participants have to play a role of senior/junior student of “eco club”. The community also introduces Sakura who is an active participant to arouse a good atmosphere and create a positive relationship among community members. The proposed community was evaluated through a subject experiment and the effectiveness was confirmed.

**Keywords:** pro-environmental behavior, online community, school club activity, group norm

### 1. INTRODUCTION

In Japan, energy consumption of residential sector has risen because both number of households and household energy consumption have increased. As a result, energy saving in this sector is recognized as one of pressing issues by the government [1]. Residential Pro-Environmental Behavior (PEB) of people is a concrete way of energy saving in residential sector. A goal of promotion of PEB is habit formation and continuation of PEB of people.

Doing PEB together in a small group is an effective way for continuation of PEB. Members in a group can continue PEB even if each member cannot continue PEB individually. This is because they can exchange knowledge or know-how about their behavior change, cheer up and complement each other, and group norms emerge and work as promoting factor for members' behavior change.

In addition to that, utilization of distributed computer mediated communication (CMC) is useful for a group to continue PEB [2]. It allows participants to communicate each other from remote places, and make participation very easy. This is an online community for continuation of PEB.

Nevertheless, online community for continuation of PEB has a challenge. A group norm which enforces continuation of PEB or other social actions often forms in such kind of online community. This group norm has both advantage and disadvantage. It promotes continuation of PEB of members. On the other hand, enforcement by group norms is sometimes disliked and avoided by members, and emerge dropouts from the community. This problem is a general issue for community. For instance, users of Mixi, a famous social networking service in Japan,

have a psychological problem, the so-called *Mixi tsukare* (fatigue) [3]. They drop out from the service because they dislike a group norm which promotes reply for other users' social action such as *ashiato* (others' view trace) or posting comments for journal.

In this paper, the authors have proposed a method for promotion of continuous PEB with an online community named “eco club” has been proposed, which is modeled on a school club activity where the group norm are accepted and works well.

### 2. PROPOSAL OF ECO CLUB

#### 2.1 Approach of this study

Group norms are not always disliked by group members. Members may accept a norm and spontaneously follow it in appropriate situations. Some sorts of human relationship have been known as factors which promote acceptance of social power from others, such as psychological and spatial immediacy, social strength or number of people [6], friendliness and frame of reference [7]. According to these studies, a kind of close and friendly relationship of members can be an effective way to promote acceptance of group norms in online community for behavior change.

There have been some online communities or services for PEB or behavior change [8-11]. All communities utilize something for promotion of activities. E1-grandplex is an example of gamification approach, promotes users' competition to drive efficiently by analogy of car racing [8]. Quit smoking marathon introduces a mailing list system for consulting and getting advice and cheer [10]. Nevertheless, group norms are not focused as both obstructive factor and promoting factor for

community activity and behavior change. In addition, relationships in these communities are superficial, not close bond.

How to build a close and friendly relation in people in CMC environment is a concern for us. This is because many social cues are lacked in CMC environment; relation-building is more difficult than face-to-face environment for communication [12].

Based on these discussions, the authors have proposed a type of online community for continuation of PEB, which enhances acceptance of a group norm promoting participation to online community and PEB. This community fosters a relationship between members, which is modeled on Japanese school club activities of sports. The proposed online community is named “eco club” and characterized by two relationships among members below.

- (1) Junior/senior relationship (*Senpai/Kohai kannkei*) of members

Generally, senior students in Japanese school club activities are regarded as a model for junior students and are requested to teach and lead them, implicitly and explicitly. On the other hand, junior students are requested to follow senior students.

It is a kind of close bond where members are connected to each other with a sport. This close bond of club activity members and role expectations about junior/senior students are common knowledge for Japanese, because club activities are broadly prevalent in Japanese school. It will make it easy for people to accept enforcement of actions of some sort if they are in junior/ senior relationships.

This is because junior/senior relationship which is modeled on school club activities is fostered in the

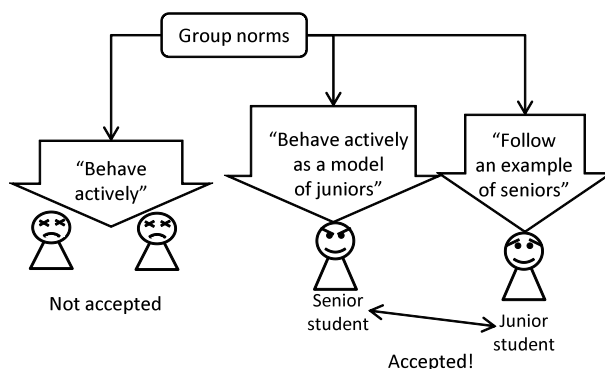


Fig. 1 Basic concept of enhancing norm acceptance with senior/junior relationship.

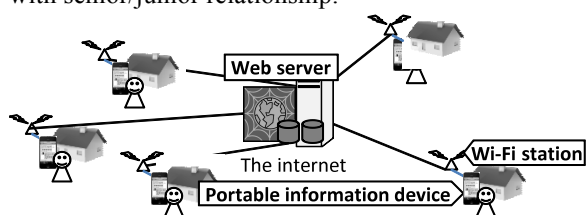


Fig. 2 Overview of remote communication of eco club.

proposed community. Basic concept of improving norm acceptance with senior/junior relationship is shown in Fig. 1.

- (2) Friendly relationship where members give positive comments to each other

Japanese school club activities sometimes have hazing problem. Senior students sometimes give junior students an overloaded workout. If hazing occurs, atmosphere of the community will become unfriendly, and it is inappropriate for promotion of acceptance of group norms. This is because participants of the community have to give appreciating and positive comments to each other.

Generally, people favor someone who gives positive comments to them [13]. Such a favorable relationship will enhance acceptance of group norm.

## 2.2 Basic framework

Basic frameworks of the proposed community are described below.

- (1) Participants of community are people who do not continue PEB in their daily lives even if they have environment-friendly attitude [4]. This is frequent situation of people in Japan.
- (2) The number of participants is limited to ten in order to avoid begin buried of each participant.
- (3) Participants are at their own homes which are geographically distributed.
- (4) Participants use nickname in the community in order to promote casual participation.
- (5) A period of community activities is a month. This is because habit formation is said to need a month [5].

## 2.3 Main activities

Main activities of eco club are described below.

- (1) Carrying around a portable information device at home

Participants carry about a portable information device (iPod touch or iPhone) if they are in their houses. They remotely communicate each other using this device through Wi-Fi networks and the Internet as shown in Fig. 2

- (2) Reporting practice of PEB

Participants report the fact that they practiced PEB whenever they do PEB. They select a kind of PEB which they did from a list of PEB displayed by client software in a portable information device, and then their practice of PEB will be recorded by the software.

The client software shows each participant’s number of PEB practices in a day as shown in Fig. 3 (a). Therefore all participants can know how many times others have done PEB in that day. This



Fig. 3 Screenshots of the client software for the proposed community.

information will form a group norm or group pressure which say “do PEB like others”.

In addition, each participant can freely add kinds of PEB to the PEB list in the client software. Twelve kinds of PEB, which are easily done by people, are prepared on the PEB list at the beginning of the community activity.

### (3) Posting comments to “eco club journal”

The client software has a function of BBS-like asynchronous communication, “eco club journal” as shown in Fig. 3 (b). Participants can communicate each other freely using the function. A design of this function is to enable posting positive comments.

## 2.4 SAKURA for norm of active posting

*Sakura* is a kind of special participant, who is requested to behave following a given action

guidelines in order to foster a desirable relationship and desirable group norm in the community. It is not known to other participants that *sakura* is in the community. Others regard the *sakura* as a normal participant.

Main action guideline of *sakura* is (a) to post many positive, favorable comments to eco club journal, (b) to report many PEB practices. *Sakura*’s actions will be good examples for other participants, and participants will follow *sakura*’s behaviors. Finally, a group norm which promote doing PEB will be formed and a relationship whose members give positive comments to each other will formed.

## 2.5 Role-play and entrance/graduation system

Two groups are always participated in the community; junior participants and senior participants. They are assigned to one of the roles which correspond to the length of their participation period. In other words, all participants will experience role of junior and senior students in series.

Basic concept of role-play and entrance/graduation system is shown in Fig. 4. They are assigned to role of junior students when they begin to participate in the community. It is an entrance of eco club. Next, junior participants are changed to senior participants two weeks after their beginning participation in the community. At the same time, participants who were senior until this time finish participation in the community. This is graduation of eco club. This process of entrance, change of role, graduation is repeated as well as schools.

The purpose of this role-play system is to enhance acceptance of group norm which promotes active posting of comments and reporting PEB practices, assuming that a social norm which says “senior students lead and show good examples to junior students, and junior students follow them” is broadly accepted by Japanese society.

The purpose of role change every two weeks is to improve a reality of role-play. “Senior students” in this community really have more experience about

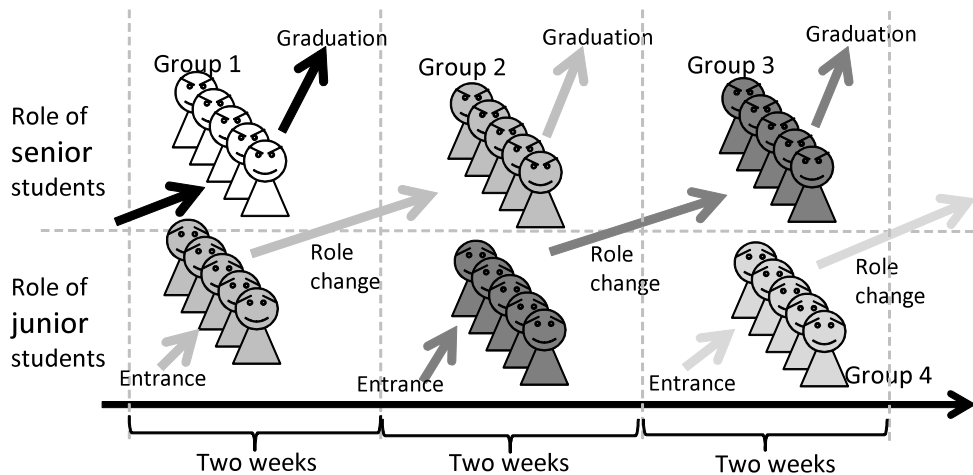


Fig. 4 A concept of role-play and entrance/graduation system

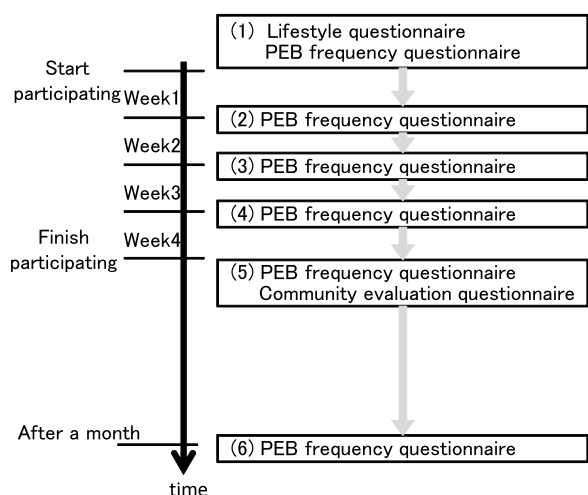


Fig. 6 Questionnaire timings of the experiment.

the community than “junior students.” Another purpose is to avoid getting tired of activities of the community.

### 3. EVALUATION OF ECO CLUB

#### 3.1 Purpose

An experiment was conducted in order to evaluate effectiveness of the proposed community for promotion of PEB.

#### 3.2 Method

##### Participants and Sakura

Participants of the experiment were sixteen people; Eight younger participants who were in their 20's and eight elder participants who were in their 50's. Eight females and eight males were included. Eight *sakuras* also participated in this experiment. Younger participants and elder participants separately formed two communities and participated in community

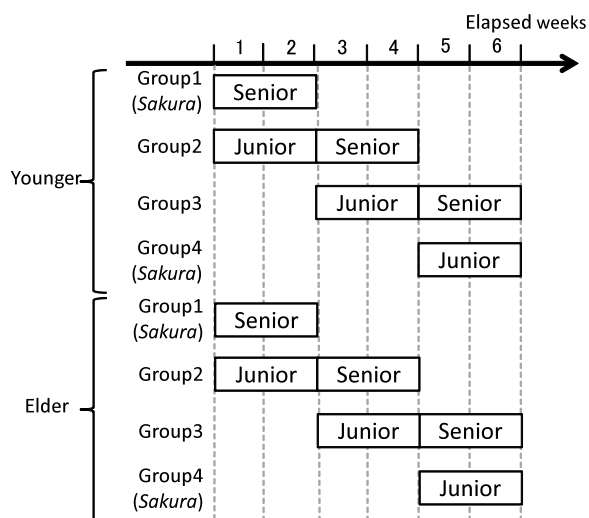


Fig. 5 Participant groups and their role in each weeks.

activities independently.

The participants and *sakuras* were divided into eight groups which consisted of five participants or *sakuras*; Group 1 in each community consisted of five *sakuras*. Group 2 in each community consisted of four participants and a *sakura*. Group 3 in each community consisted of four participants and a *sakura*. Group 4 consisted of five *sakuras*.

The participants got reward after their participation in the community. They were informed about reward before the beginning of participation, and not informed about amount of rewards.

#### Period of participation of each group and their roles

The period of the experiment was six weeks from 14 November 2011 to 25 December 2011 Fig. 5 shows groups of participants and their roles in each week.

Group 1 as senior students and group 2 as junior students participated in the community at first two weeks. Group 2 as senior students and group 3 as junior students participated at next two weeks. Group 3 as senior students and group 4 as junior students participated at the last two weeks.

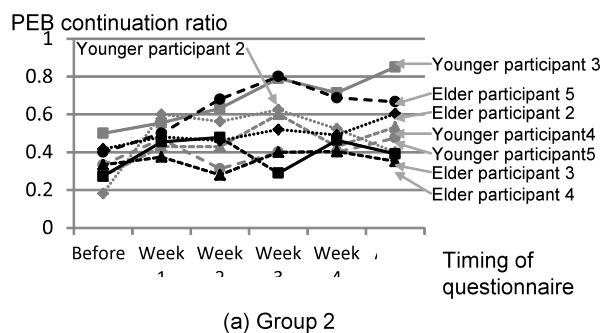
#### Collected data and questionnaires

Fig. 6 shows timings of conducting questionnaire of the experiment. (1) Before beginning the participation, questionnaire about participants' profiles and lifestyles, and frequency of PEB in daily lives were asked. (2)-(4) Frequencies of PEBs were asked once a week in the period of participation. In addition, the detailed operation log of the client software, such as contents and timings of reporting PEB practice of each participant were recorded in order to evaluate the community. (5) Just after the participation period, their PEB frequency and subjective evaluation of the community were asked. (6) A month after the participation period, PEB frequency was asked again in order to confirm continuation of PEB.

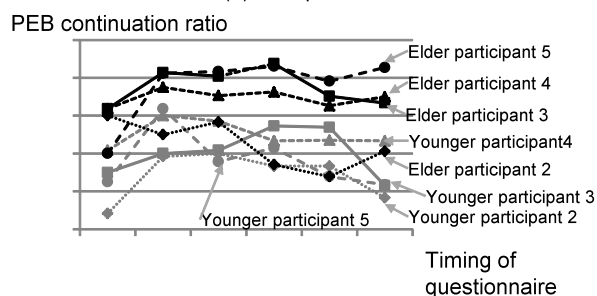
#### Information system for evaluation

An information system for the proposed community was developed and used in the experiment. This system consists of portable information devices, Wi-Fi stations, and other Internet connection devices, web server on the Internet, and dedicated software for these devices. Japanese rental server of SAKURA Internet Inc. was used as a web server service. Server software was developed using PHP and MySQL database. iPod touch and iPhone of Apple Inc. were used as portable information devices. The client software was developed using Objective-C. Wi-Fi router WHR-G301N of Buffalo Inc. was used.

### 3.3 Results and discussions



(a) Group 2



(b) Group 3

Fig. 7 PEB continuation ratio of each participant.

#### Pro-environmental behavior

Fig. 7 shows PEB continuation ratio of each participant in each group. PEB continuation ratio is a summary of results of questionnaire about PEB frequency, and is defined as ratio of PEB items which are continued by a participant to all PEBs in the PEB list.

PEB continuation ration of fourteen participants increased between the beginning of participation in the community and a month after the participation period. In particular, nine participants show over 10% increase of PEB continuation ratio during the period. This result suggests that participation to eco club increase participants' continuation and habit formation of PEB. This effect however is not so large for some participants. Some improvements may be demanded for the community to increase promotion of PEB.

#### Reporting PEB practice

Fig. 8 shows the number of PEB practice in each week. Elder community reported more PEB practices than younger community. This is considered to be because of difference of their lifestyle patterns. In elder community, three participants mainly reported PEB practices. They were females and did not work outside their houses and stayed in their house during daytime hours. They were considered to be homemakers and had many occasions to do PEB in

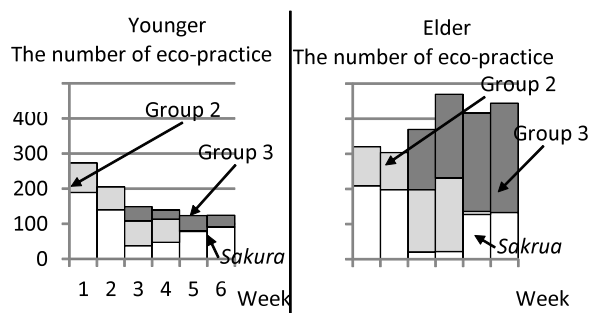


Fig. 8 The number of reported PEB practice.

their houses. On the other hand, there were no homemakers in younger community. This might be because difference of the number of PEB practice emerged between younger community and elder community.

Another factor of difference between younger community and elder community is a difference of actions of *sakura*. Fig. 8 shows that PEB practice of *sakuras* in younger community clearly decreased after week 1, even if that of elder community maintained the number of practice. If *sakuras* in younger community maintained the number of PEB practice, younger community might reported more PEB practice because of social influence from *sakuras*.

Next, Table 1 shows correlation coefficient between the number of PEB practice and PEB continuation ratio. The number of PEB practice in each week and PEB continuation ratio of the corresponded week are not clearly correlated. Nevertheless, the number of PEB practice in each week is correlated to PEB continuation ratio of pre-participation. This result suggests that the number of practice depends on participants' occasions to do PEB in their daily behavior patterns and it is not easily changed.

In this experiment, *sakuras* were acted by some experimenters. It was not a realistic situation for practical use of the proposed community. Nevertheless, this knowledge about PEB practice can improve the method of *sakura* in the proposed method. The result suggests that we can employ some number of real participants who are expected to report many PEB practice as *sakuras* because we can expect the number of PEB-practice from PEB continuation ratio before starting the community activity.

#### Contribution of *sakura*

Fig. 9 shows the number of comments which were

Table 1 Correlation coefficient ( $R^2$  value) between the number of PEB practice and PEB continuation ratio

	Week 1	Week 2	Week 3	Week 4
And PEB continuation ratio of pre-participation	0.40	0.43	0.34	0.42
And PEB continuation ratio of each week	0.27	0.22	0.16	0.19

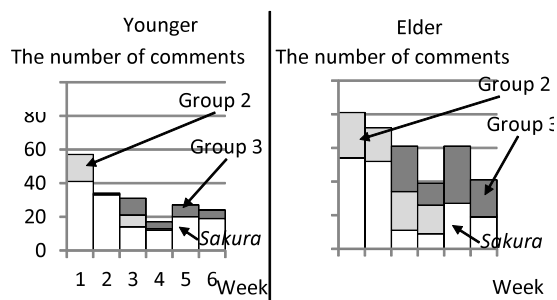


Fig. 9 The number of comments which were posted to eco club journal.

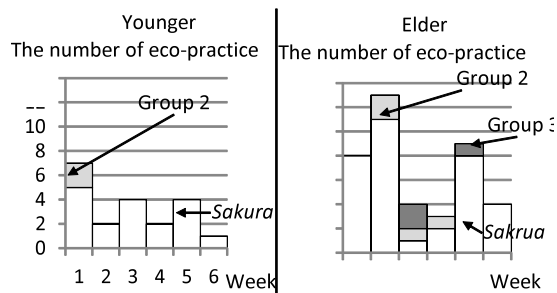


Fig. 10 The number of positive comments which were posted to eco club journal.

posted to the eco club journal. More comments were posted to elder community than younger community. In particular, a few comments were posted in younger community by participants after week 4. Nevertheless, *sakuras* made effort to activate the community and posted many comments, and it was partly successful.

Fig. 10 shows the number of positive comments which were posted to the eco club journal. Participants posted few positive comments in both communities. Although *sakuras* posted some positive comments, the participants however didn't follow them. Relationship where participants posted positive

comments was not fostered.

### Role-play

Fig. 8 indicates that PEB continuation ratio and the number of reporting PEB practice characteristically increased between week 2 and week 3. Table 2 shows the number of participants who reduce PEB continuation ratio compared with the previous week, and average PEB continuation ratio in each week. It was found that decrease of PEB continuation ratio between week 2 and week 3 was the smallest.

These results suggest that change of roles of participants affected their behavior because role of junior students was changed to senior students at that time. This can be called as role-change effect.

Table 3 shows the number of participants who agree to questionnaire items about junior/senior relationship in post-participation questionnaire. Twelve participants thought that they had to join the community activities more actively when they became senior students. This result is another evidence of role-change effect. The participants accepted a group norm which promoted their active participation by role-change. Therefore, it can be said that the approach of this community was successful.

Nevertheless, the community has a challenge and some improvements are required. Average PEB continuation ratio of week 4 in Table 2 is the smallest, and the number of participants who decreased PEB continuation ratio was the largest in week 4. This result suggests that many participants reduced their PEB frequency during week 4. It means that the role-change effects were not maintained.

Therefore, some interventions are demanded in week 4 in order to maintain PEB continuation ratio. For example, if *sakuras*' reporting PEB practice redoubles in this week, it can promote others' PEB

Table 2 The number of participants who decrease PEB continuation ratio compared to previous week.

	Week 1 from pre-participation	Week 2 from week 1	Week 3 from week 2	Week 4 from week 3	A month after from week 4
Average PEB continuation ratio	0.17	-0.02	0.03	-0.05	-0.01
The number of participants who decrease PEB continuation ratio	1	8	4	11	9

Table 3 The number of participants who agree to questionnaire items about junior/senior relationship

	Younger		Elder	
	Group 2	Group 3	Group 2	Group 3
When my role was senior student, I thought that I have to report PEB practice more actively than juniors.	2	4	3	3
When my role was senior student, I thought that I have to post messages to eco club journal more actively than juniors.	1	3	3	3
When my role was junior students, I thought that I have to follow seniors and report PEB practice actively.	3	4	1	2
When my role was junior student, I thought that I have to follow seniors and post messages to eco club journal more actively.	2	2	2	2

frequency.

If the community can maintain PEB continuation ratio through week 4, effectiveness of the community will be improved greatly, because PEB continuation ratio did not so decrease between week 4 and a month after participation period. It is considered to be important to maintain PEB frequency at high level at the end of participation. In addition, the results suggest that some interventions are required to maintain effectiveness of role-change effect.

#### 4. Summary

In this study, a method for promotion of continuous PEB with online community which is characterized by promotion of norm acceptance utilizing analogy of Japanese school club activities was proposed. The proposed community was evaluated through the experiments with sixteen participants. The results showed that fourteen participants could promote their PEB frequency and role-play of junior/senior relationship could enhance acceptance of a group norm of doing PEB despite a result that *sakura* could not effectively foster positive relationship among community members.

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