
Shuffle: A Refreshing Group Integration Solution for Meeting Others

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Abstract

Trying to meet people when far from home can be a very daunting experience and coming to university is no exception. Our questionnaires revealed that students expect to make connections at university, but opportunities to make powerful connections for the future are either fleeting or missed.

Shuffle is a proactive social engagement system that allows students on a course to come together and meet others that they may not have found immediate common ground with, founded on social psychological theoretical assumptions and gamification of group integration. It is formed of the Shuffle vending machine and the Shuffle digital badge. Our interviews showed that many initiators of social interaction rely heavily on extraverted personality traits. However, our product, Shuffle, puts all students on a level playing field, gently nudging individuals to come together as a group and allowing social circumstance and gamification to do the rest.

Author Keywords

Grouping; wearable; university cohorts; social interaction; collaborative learning; social engagement.

Descriptive Statistics of University Attitudes					
	N	Minimum	Maximum	Mean	Std. Deviation
University is a place to meet others	22	1	5	4.18	1.006
My university made it easy for me to collaborate with others in my course cohort	22	1	5	3.68	.995
There is more to meet people in my course cohort	22	1	5	3.86	1.082
I would prefer to meet people from my course cohort	22	1	5	3.95	1.133
I can be shy with other people	22	1	5	3.82	1.097
I would like to meet people from my course cohort	22	1	5	4.23	1.020
I would like to meet people from different backgrounds	22	1	5	4.23	1.020

Figure 1: Questionnaire Result

Interview Findings:

- 1. The first year students are more proactive to know new people.
- 2. The third year students focus more on their own but still are interested in an engaging meeting
- 3. Current randomization grouping system is "boring and ineffective"
- 4. Would like to be grouped by "similar interests with more fun".

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

Introduction

University is a large institution where people come together sharing a common interest. Many students attend with the expectation of meeting other people and forming networks for their future, but there are still issues that prevent people from networking, such as cultural differences, hesitation and classical shyness [1]. The more hesitant of students would prefer to use the internet to meet others rather than face-to-face, indicating lesser real-life interaction with people [4,5] Therefore we sought out a way to gently bring people together in a noninvasive, subtle approach. Our interviews indicated that students in a course cohort had the desire to meet others outside of their typical social groups, but the opportunities are narrow and frequently missed.

There are numerous benefits to collaborative learning; such as more effective learning (resulting in higher grade achievement) [2], enhanced critical thinking [3] ,and providing a sense of autonomy for each individuals on learning path [6]. The contribution of our work is that these benefits can be reaped with subtle intervention.

Our research into our target users, students, heavily indicated that students were aware of the benefits when being in a group, but other social barriers prevented them from forming them. Students generally had the intention of meeting others for various reasons such as cultural exchange and dialogue over different

ideas, but felt that the university had a responsibility to aid in the forming of groups. However, it is important to concede that students did not want this pushed onto them and that we needed a more understated approach to helping them come together.

We also performed background research into current existing solutions; such as looking at how teachers randomly assigned groups and other group-creation apps. One app, 'GroupMaker', is a similar concept for creating groups in classes; however, requires the teacher to completely facilitate the creation of groups and assignment which can be time-consuming and boring for pupils. We additionally expressed concern over the social sensitivity of such apps they group children on ethnicity and class performance. Considering this, we went forward with using trivial grouping criteria.

We call our product 'Shuffle', because we want to keep group integration an exciting, different experience for everyone.

Understanding the User (Research)

Assuming that there is a common need of meeting different people when attending university regardless of age, we disseminated an online questionnaire (Figure 1) composed of 5-point Likert Scales and open-ended questions to university students. We had intended to research the following; their expectation of going to university, their attitudes to meeting with others, and experiences working with classmates.

The results provided good insight into understanding students view on the current university grouping system; the views indicate that there is an intention to



Figure 2: Personas

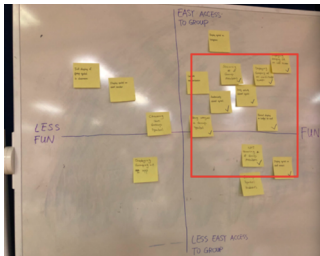


Figure 3: 2x2 Feature Pritotisation Matrix with "Fun" and "Easy Access to Group" as two criteria to pritotise the design features

DESCRIPTION	Weighting	Weighting	Weighting	Weighting	Weighting	Weighting
CRITERIA	WEIGHT	WEIGHT	WEIGHT	WEIGHT	WEIGHT	WEIGHT
Easy to implement	15	5	5	5	5	5
Cost effectiveness	10	5	5	5	5	5
Effectiveness of implementation	24	5	5	5	5	5
Building group identity	17	5	5	5	5	5
Time of use	21	5	5	5	5	5
Usability	13	5	5	5	5	5
Total		5.88	6.02	6.21	6.46	6.52

Figure 4: design options concerning forms of displaying group symbol, mechanism of grouping and locations of displaying group information

meet others but there this is contradicted by hesitation to socialise is low because there is a lack of continuous methods of grouping that prevent students from constantly meeting each other in the long term. In addition to this, we also noticed that class size and course content will affect students' ability and attitudes of meeting others. Based on these initial findings, we therefore decided to refine our primary target user group by narrowing down to specifically undergraduate students that regularly attend seminars (or classes). Our solution was to build a grouping system that brings students together, and to make the experience of grouping fun and interactive in the context of classroom, through gamification techniques that encourage individual attachment to their group identity and correspondingly, their teammates.

We conducted semi-structured interviews with seven undergraduate students (3 first-year and 4 third-year undergraduates) to explore their past grouping experience and their preferences of the gamification elements of grouping system in order to optimize our design solutions.

The aggregate findings of the questionnaires and the interviews were combined into our understanding of the user and allowed for persona generation. These personas (Figure 2) helped visualise the important findings from the interviews. Whilst cross examining the findings of the interviews and questionnaires, the engagement and efficiency of grouping experiences were notably highlighted. We then made a 2x2 evaluation matrix (Figure 3) and a weighted evaluation chart (Figure 4) for considerations of our design details. The first round of selection by 2x2 evaluation matrix determined the base of our design as a in-class system

with wearable badge and daily activity symbol to group students that can maximise the level of efficiency and engagement of grouping experience.

Additionally, the weighted evaluation chart contained two different design options for each feature selected above matrix. These helped define the system requirements to meet the user's needs.

The proportion weight and score in the table were decided by our group members through calculating the average score. The scores given were dependent on the interview results and our understanding of the users needs'. After a series of progressive user researches, "partial display of group symbol on badge screen", "automatic proximity grouping" and "in-class only grouping screen" were weighted the highest for each feature so that the users will have different feedbacks from the badge depending on whether they are close to each other. This meant that the entire process takes place in class only users will have the visual indication of group symbol and receive feedback as long as they are approaching to any group member.

In this way, our primary users' needs of having an engaging and efficient grouping experience can be met by increasing interactivity and strengthening the group identity during the grouping process.

Design

Initial design idea

After gathering user feedback from questionnaires, we explored potential solutions. As it's common that students signing in by tapping a student card, our initial



Figure 5: Initial idea of building a detachable “chip” to current student card to organise grouping activity.



Figure 6: Early sketches of the Shuffle badge.

idea was to combine the ‘grouping’ into ‘tapping’ action, i.e. students could be grouped automatically when they sign in, with group information informed through different ways (a notification on smart phones, a smart student card, etc.). We then considered about several aspects of this idea and possible solutions around following questions: ‘which kind of technology could be applied? (a detachable screen on student cards, a smart badge, a hologram display on tables, etc.)’; ‘how to group people naturally? (based on a specific topic or completely randomisation)’

Design Concept

• Design for undergraduates

The main goal is to bridge gaps between undergraduate university students, gradually creating a natural and holistic connection among classmates in the same course cohort through the long term use.

• Design for retention/continuous engagement

We aspired to design a non-invasive system that helps form groups in an engaging and efficient way.

Design Process

• In-class grouping

The whole group forming process is designed to be within classroom: students are assigned into groups when they come in to class and grouping only occurs within the classroom. This is based on participants’ opinions about not wanting to carry extra items with them. Participants expressed concern over losing items at home. At the same time, it would be transparent and fair as some students would be worried about the way how groups formed. Some students felt that groups would be formed outside of the classroom and transferred into class, posing barriers to integration and exclusivity. Our method would therefore group

members within the classroom, a concentrated period specifically for creating groups, and further allowing a stronger sense of cohesion amongst members.

• Wearable badges

We decided after multiple steps that our badges would display the corresponding group the user had selected. We supposed that with group patterns on badges on clothes, it brings intensive group identities and fits interviewees expectation in terms of getting involved in groups naturally and getting closer to group mates invisibly. We also considered that it would be more interactive and interesting to have a dynamic transformation on badges throughout the whole group forming process, with images or animations in different stages to provide more chances to start a talk and extend their conversations.

• Initial Ideas

Our initial ideas were based around a detachable ‘chip’ that could be attached and re-attached to the student card (Figure 5). This chip would feature a display of the group assignment and the current status of whether the group member had found their group. Additionally it would be used both on and off campus. We rejected this idea as feedback indicated that students preferred the grouping to occur in-class, and were hesitant to take additional items home. We re-iterated our idea into a badge that would only be used in class and made the user group easy to notice.

• Interactive guidance

We considered it would be valuable to involve series of interactive guidance in design system. In practice, it would be effortless to be guided for students to find their group mates in an about 50-student class. At the same time, it would show a positive psychology



Figure 7: The prototype of Shuffle badge with animation when user is closer to his/her teammates.

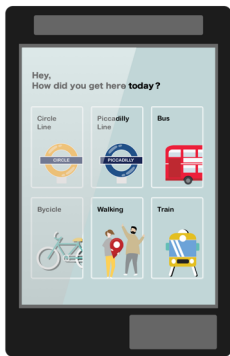


Figure 8: The prototype of Shuffle vending machine that displays grouping information and provides badge after selection of symbol.

encouragement towards to students to make more interactions in grouping process with the changing information on badges. We also decided to employ grouping questions with superficial topics based on our research, as it could naturally lead students to find people with same interest and then gradually make their network in a natural way.

Shuffle

Our final system design is comprised of an in-class badge 'vending machine' with grouping question system, and digital 'smart-badges'.

System

The 'vending machine' is designed to store and dispense badges, together with a question system which could be edited through program (Figure 8). The main components of the 'vending machine' are an access area, a returning area and a touchable screen. It would be hung on near the door of classroom for easily use. The user flow of vending machine as follows: a student come into class, choosing a group from several options on screen based on their own interest, and then get an assigned badge with relatively group information on it.

As mentioned before, the grouping question could be edited with some superficial themes according to practical situations, such as 'how did you come here today?', or 'which kind of drinks do you like?' The ideal user scene would be a 30-student to 50-student class with maximum 4 students per group for achieving best results. Also, group numbers and the bin of each group could be customised according to a certain situation.

Shuffle Badge

The badge is composed of a digital screen and a clip (Figure 7), so it could be clipped on clothes or on student cards to show group patterns. Badges could be collected from the 'vending machine' and should be returned into 'vending machine' after class. After getting the assigned badge from 'vending machine', there are three boosted states of patterns on badges with regard to different grouping stages: only partial pattern showed on badges when a student picks it up from machine; interactive animation with partial pattern when a student gets close to a group mate so that making it easy to find other group mates; whole pattern activated after all group members assigned and come close in a certain distance.

User Testing

Five London-based university students were recruited to test Shuffle, our grouping system. The physical prototype including a paper-based badge machine and badge is used for the testing. The group symbol on the badge was printed and manually replaced during the test, and a touchscreen tablet was inserted to the machine as the screen with grouping information and animation displayed to the user. This wizard-of-oz style method replicated an autonomous system that dispensed a badge when the corresponding selection was made on the tablet, and the screen on the badge changing as it was within proximity of other users in the same group.

We were interested in learning the individual experience and cognitive process while using the system in terms of the easiness and efficiency of forming group, and the level of engagement during the grouping process.



Figure 9: University students testing Shuffle Vending Machine and Badge

User Testing Feedbacks

"I like the design of the symbol. It helps find similarities and allows connections with others with more gamification of the process."

"It's straightforward but how would I know I need to look for my members with similar symbol on the badge? There should be clearer signs to inform that the symbol will change when your members are nearby."

"It feels fun to touch and allows the badge to change with a good amount of forcing but not forceful to have a natural conversation. "

Therefore, each test involved only one participant in order to avoid the interaction effect of distraction from others. Each participant was given the same scenario and task that they took circle line to school and they would need to find their teammates in class for a group project. The classroom setting was simulated during the testing, and one group member played the role of the teammate. The participant interacted with the researcher that guided them through the process. In order for the testing procedures go smoothly, another users to the badge machine when they entered the classroom and manually replaced the grouping information on the badge. Considering the various obstacles to a complete restoration of in-class grouping context for just one user, we adapted the think aloud protocol by asking the participants to express their thoughts/confusions at any point so that we could figure out any limitation of functionality and experience of our system with follow-up questions for users to elaborate their user experience. A sample of the short semi-structured interview questions is listed below with slight variation depending on different observations of various participants.

1. How easy and clear did you find system (machine & badge) to use to find your group?
2. How much did you enjoy the entire grouping process, giving the scale 1-10?
3. How did this grouping system compare to your last grouping experience? (e.g. Induction week icebreaking activity, etc)

Discussion and Implications

Shuffle aims to build an interactive but also efficient grouping system with changeable daily activity group symbol to connect people before class begins. The

entire grouping process only takes place in classroom with reusable badges and machines in order to maximise the real-time experience.

In general, the findings of our usability test show that the participants felt the entire grouping process is straightforward and efficient without becoming time-consuming to deprive their interests of grouping. The selection and animation of the group symbol also gave participants a sense of autonomy and flexibility that further encourage participants to start a short but relaxing talk with others. However, there is also downside of the intended simplification of the design. Many of the participants indicated the concern of having no prior knowledge about the instructions of finding their members without the guidance. Also, there was a mixed opinions about the type of the group symbol. Participants felt the engaging level would largely depend on the type of the symbol so that they were unsure about if they would reach the same level of engagement for other group symbols.

The findings indicate that Shuffle successfully reach our main goal of providing a gentle push to constantly bring undergraduate students together by increasing their initiatives and interactivities. There are still some details that need to be optimised for the future use. For example, the screen should continue to prompt user to find their members in order to ensure an functional consistency between machine and the badge. Also, the group symbols should be further systematically evaluated before put in practice with a similar level of attractiveness but also diverse daily themes to engage users.

Last but not least, a main challenge of the usability test

that could affect the participant behaviour was having to trade-off between having insights of individual user experience and the ecological validity of the system. In other words, it was difficult to stimulate a classroom environment to find out user's most natural response to the Shuffle system with the presence of researchers and the absence of groups of real students during the testing. An in-depth group testing is considered to be conducted afterwards with multiple participants grouping with each other by Shuffle. In this way, we can replicate a more natural classroom setting and obtain more insights into the practicability of Shuffle.

References

- [1] Vanessa M Buote, S Mark Pancer, Michael W Pratt, Gerald Adams, Shelly Birnie-Lefcovitch, Janet Polivy, and Maxine Gallander Wintre. 2007. The importance of friends: Friendship and adjustment among 1st-year university students. *J. Adolesc. Res.* 22, 6 (2007), 665–689.
- [2] Po-Jen Chuang, Ming-Chao Chiang, Chu-Sing Yang, and Chun-Wei Tsai. 2012. Social Networks-based Adaptive Pairing Strategy for Cooperative Learning. *J. Educ. Technol. Soc.* 15, 3 (2012), 226–239. Retrieved from <http://www.jstor.org/stable/jeductechsoci.15.3.226>
- [3] Anuradha A Gokhale. 1995. Collaborative learning enhances critical thinking. *Vol. 7 Issue 1 (fall 1995)* (1995).
- [4] Fu-Yuan Hong, Der-Hsiang Huang, Hung-Yu Lin, and Su-Lin Chiu. 2014. Analysis of the psychological traits, Facebook usage, and Facebook addiction model of Taiwanese university students. *Telemat. Informatics* 31, 4 (2014), 597–606.
- [5] Neslihan Keser Özcan and Sevim Buzlu. 2007. Internet use and its relation with the psychosocial situation for a sample of university students. *CyberPsychology Behav.* 10, 6 (2007), 767–772.
- [6] S. Totten, T. Sills, A. Digby, and P Russ. 1991. *Cooperative learning : a guide to research*. Garland, New York.