

Adapting Engagement e-mails to Users' Characteristics

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Abstract. Although some online communities have been able to produce high quality products and to engage thousands of users, community designers usually struggle to engage new users and increase the level of contribution of current users. Some researchers have explored approaches to persuade users to collaborate. An important strand of this research area is based on sending messages to the current users and manipulate the content of the message in order to evaluate their effectiveness. Mentioning the benefits of contributing has been tested, however the results of different studies have been contradictory. One of them have reported a positive effect in the contribution rate, but other one found that mentioning benefits has depressed the level of contribution. Our hypothesis is that the effectiveness of messages may depend on other users' variables and not in the content message only. To test our hypothesis, we performed a study to evaluate the effect of messages mentioning community and personal benefits in different users' cohorts. Levels of previous participation in the system and demographic data were tested in order to explain differences in the effectiveness of this engagement strategy.

Keywords: online community, engagement mechanisms, demographic data

1 Introduction

Several well-known online communities have demonstrated the potential of producing high quality products, enable people all around the world to share content or collaborate in geographically distributed teams. However, many other online community projects have failed in engaging enough users to achieve critical mass. Researchers have explored different ways to find out what motivates users to contribute, and how to increase their levels of contribution. Previous work has been mainly focused on using messages and manipulate the message content in order to encourage people to contribute to the community. Some studies have reported the effect of mentioning the benefits of contributing as a motivator, however the results in different studies has been contradictory. Mentioning the value of contributions has increased the level of contributions in one study, but it has decreased the contribution rate in another one.

We think that these contradictory results hint that the impact of a message may be affected by users' characteristics, not just by the message content itself. Users may have different motivations to collaborate, so different strategies that match with these diverse motivations may generate more effective results. These observations motivated us to explore adaptive engagement mechanisms in online communities. Our overall goal is to explore several ways of adaptation such as adapting to demographic data of users, user knowledge, past levels of contribution, and the navigation patterns.

This paper reports our attempt to evaluate the effectiveness of adaptation to one aspect of user demography: user cultural background. Our initial hypothesis is that the effect of appealing to private vs. community benefits may be different for users with different cultural backgrounds. For example, given the popular belief that people from Asian countries are more community-oriented, they might get more motivated to work for community goals. In contrast, people from Western countries are more concerned with personal benefits and thus could be better motivated to do work for their own goals. This popular belief has been also supported by a multinational survey in [9]. We test this hypothesis by measuring the impact of mentioning community or personal benefits to users of different cultural background, i.e., graduate students from different home countries. Our results showed, however, that the community message was more effective in general, moreover the private benefits caused more contributions in users coming from Asian countries. The level of contribution, the academic program in which the user were enrolled and in some cases the gender also generated significant differences in the level of contribution after the message.

The rest of the paper is organized as follows: Section 2 will describe general background about online communities, and related work on using benefits in the content of engagement messages. Section 3 will present the study design and the system that was used as testbed; Section 4 will detail the results of the study; Section 5 will include the discussion and future work and Section 6 will present the conclusions.

2 Related Work

2.1 Background: Online Communities

The term online community was first defined by Rheingold in 1994 [16] as cultural aggregations that emerge when enough people bump into each other often enough in cyberspace. Since then, the Web has enabled geographically distributed people to socially interact and create different kinds of communities. Discussion forums (e.g. BreastCancer Forum), Question and Answers sites (e.g. Yahoo Answers and Aardvark), sharing online social networks (e.g. Facebook, YouTube, Twitter and Flickr) and online community projects (e.g. Wikipedia, ClickWorkers and Open Source Software projects) are good examples of successful online communities that have been able to congregate thousands of active users. Collaboration among these (mainly volunteer) users has enabled fast world-wide information transfer

of fun videos as well as breaking news, and produced high quality products such as a well-known encyclopedia and a secure operative system (i.e. Linux).

Along with these well-known online communities, many others starting online communities were never able to take off. Only 10.3 % of the Open Source projects that have been created in SourceForge have more than three members [15]. A third part of mailing lists get inactive over a four-month period [2]. Researchers argue that these successful examples have been possible because of intuitive and insightful design decisions, but we still lack of evidence-based, scientific guidance in building and maintaining online communities [10]. Several problems challenge the survival of online communities: 1) the cold start problem: there is few users that can create content, and there is little content to attract new users; and 2) managing the community: develop commitment, encourage contributions, reduce rate of user attrition, recruit and socialize newcomers, develop leaders, regulate behavior, manage coordination [10].

Several research groups have focused their efforts on finding out ways to maintain online communities alive longer. Several strands of work have been studied such as:

- how to socialize newcomers [4],
- how to encourage commitment to the community [17, 14],
- how to encourage more contributions [1, 11], and
- understanding people motives to be engaged in an online community [19].

One of the main strands of research has focused on how to encourage contributions. The main goal is to create the required amount of content (e.g. videos in Youtube, pages in Wikipedia, code in Open Source systems) to provide benefits to the whole online community, including casual visitors. Section 2.2 will details several findings related to encouraging contributions to online communities. Simply asking by contributions is the most popular strategy. Several different ways to do so has been reported:

- broadcasting an email asking for contribution [1] or a list of needed contribution [5],
- asking to specific people to do specific tasks [1, 4],
- emphasizing uniqueness [1, 12],
- asking people who is willing to contribute [5],
- providing social information and feedback [3, 13],
- assigning people to groups [1, 6] and
- setting goals [1, 6, 18] helps to increase the positive effect.
- reduce the effort required to know what needs to be done by by task routing (i.e. recommend possible tasks to users by matching users with tasks that they are more likely to want to do) [8, 5].

2.2 Using Benefits as Motivators in Engagement Messages

In 2004, Beenen et al. [1] reported an innovative study that used social psychology knowledge to create messages asking for more contributions in MovieLens, a

movie recommender site. They run two experiments to test hypothesis borrowed from different psychological theories. The first experiment tested the effect of making salient user uniqueness and mentioning the benefits of collaborating in the community. The learned lessons are that sending a message asking for contribution boosts the number of contributions, at least during one week. Salience of uniqueness encouraged more contributions and the mention of benefit depressed ratings. The authors provided a discussion about why mention to benefits didn't work. They argue that reminding other reasons to contribute may undermine intrinsic motivations, for example user may like to rate because it is fun, but not to help others so mentioning that could have a negative effect. Other possible explanation is that the population was already committed, and the message undermined their commitment by contradicting their prior beliefs regarding who get the benefits of each contribution. An additional feasible reason was that the messages were too long, thus the effort required to understand the message about benefits may have drawn users attention away.

Another study in MovieLens [13] tested the effect of displaying the value of contributions as a GUI message. The lessons were that showing the value helped to increase the contributions. They also tested the effect of different kind of value: value to self, to the whole community, to a group of similar people, and to a group of different people. The message describing the value to groups was more effective than the one mentioning the value for the whole community. People also contributed more if the benefits are for similar people than for dissimilar people.

We believe that the reason to explain this contradictory results might be related to user's characteristics and its sensitivity to the kind of benefits that were mentioned in the messages, more that to the content itself.

3 The Study

Building upon current knowledge in the effectiveness of messages to encourage contributions, this study tested the effect of sending emails with different information to users with different cultural background and different levels of participation.

3.1 The System

We used CourseAgent system and its users as testbed of our studies. CourseAgent [7] is a community-based study planning system for graduate students of the School of Information (iSchool) at the University of Pittsburgh. CourseAgent allows students to plan their studies and rate courses that they have taken reflecting workload and relevance to personal career goals. CourseAgent serves as a communication platform and a source of knowledge about the suitability of iSchool courses to specific career goals.

Membership is restricted to the iSchool graduate students only. A new account is created for each new student who is enrolled in a graduate program at the iSchool. Recently, the system started to record when the students get their

degree. So, there is partial knowledge about the student status. When we started the studies there were 1256 registered users. 123 users were already graduated according to the data in the system, 517 user had unknown student status and 616 were current students.

Out of 1256 registered users, 175 users (13,9%) have added at least one taken course to their study history. This is the most popular kind of contribution, others were done by fewer users. By the volume of contributions, the most successful feature is adding course evaluations in respect to a specific career goal. There were 1085 contributions of this kind. These numbers show that CourseAgent is a community that is in its early stages, and that is has not achieved a high number of contributions yet.

3.2 The Study Design

The study was designed to test the impact of messages appealing to community benefit versus messages appealing to a personal benefit to the behavior of students with different cultural background. The sample was a subset of current iSchool graduate students. The cultural background of students was modelled by their home country (represented as a part of student demographic data). The impact was measured by monitoring the changes in the database (such added course ratings) and tracking user actions through the system log mechanism. The latter allowed to observe the the level of previous and current users activity in the system even for the users who havent contributed any information that is stored the system database.

The experiment manipulated the kind of message and the cohorts that received each message. A user only received one message during the study, and the users activities before and after getting the message were tracked and analyzed. Cohorts were defined according an equally distributed users home country and the level of participation in the system before the message was sent.

The first execution of the study was run during Fall 2010, when the Spring term registration period begun. The message asked users to rate 3 courses in they have taken before Fall 2010, thus all the users who have started their programs in Fall 2010 were removed from the subjects sample. The second round of emails was sent after the end of the Fall 2010 semester (but before Spring 2011 registration is finished) to users who had started their programs in Fall 2010, so they were now able to rate courses they took in their first term. The messages that were sent in these two rounds are shown in Table 1.

The study was replicated in a slightly different form with newcomers. Students whose start term was Spring 2011 received a welcome email that mentioned community or personal benefit of contribution and asked to provide career goals and courses to be taken.

In total, e-mail messages were sent to 574 users. Six students received duplicated emails because they were students in the iSchool before, but started a new program in Fall 2010 or Spring 2011 so they were considered twice in the subject selection of different executions of the study. These users were removed from the analysis.

Table 1. Example of Community Benefit and Personal Benefit Messages

<i>Community Benefit Message</i>
CourseAgent enables the students to receive recommendations from other students, as well as advice from faculty, regarding their course of study, workload, and relevance of courses. The usefulness of CourseAgent recommendations for the student community increases as users provide more information including courses they have taken, their career goals, and their ratings of courses.
We are trying to enhance the utility of CourseAgent before Spring registration starts. Please help your fellow students by adding and rating three courses you have taken and completed in the past by November 22th. Your contribution will empower the system to better recommend courses to all of the iSchool students just in time for their Spring registration.
<i>Private Benefit Message</i>
CourseAgent helps you to plan your course of study wiser by keeping track of your progress towards selected career goals and by offering advice from faculty and peer students about workload and relevance of courses. The usefulness of CourseAgent increases as you provide more information about courses taken, career goals, and your ratings of courses.
We are trying to provide the best support for you before you start your Spring registration. To help us with that, please add and rate three courses you have taken and completed in the past by November 22th. Providing three course ratings by November 22th will help the system to present you a more complete picture of your progress (through the Career Scope tab) and better recommend you relevant courses just in time for your Spring registration.

The students who received these messages came from 30 different home countries to pursue their graduate degrees in the iSchool. Note that in our context, the home country is not just a country of birth, but a country where students lived and studied at least until finishing their high school. Moreover, with just a few exceptions, home country is also the country where iSchool graduate students received their undergraduate degree. As a result, in this context, student home country was used as reasonable indication of students cultural background. For this study, 6 groups of countries were defined considering their geographic and cultural similarities, and the number of iSchool students who came from those countries. The categories were defined as follows:

- Undefined: Students whose home country was not available at the moment of the study.
- United States: Students whose home country is United States.
- Asia: Students whose home country is China (PRC), Taiwan, Republic of Korea, Japan, or Thailand.
- India: Students whose home country is India.
- Middle East: Students whose home country is Islamic Republic of Iran, Turkey, Saudi Arabia, Kuwait, or Egypt.

- Others: Students whose home country is Mexico, Libyan Arab Jamahiriya, Trinidad y Tobago, Puerto Rico, Slovakia, Singapore, Nepal, Viet Nam, Canada, Chile, Russian Federation, Poland, Ukraine, Afghanistan, Uganda, Niger, Netherlands, Bangladesh, or Yugoslavia.

4 The Results

As a result of the study, 32 out of 568 message receivers used the system within one week after receiving the encouragement message (0.056%): 18 students who received the community benefit message and 14 who received the personal benefit message. Table 2 shows a detailed description of the results by country category. In our analysis of engagement we distinguished *contributions* (i.e. adding taken or planned courses and evaluation registration of courses) and *actions* that included both contributory actions and exploratory actions such as navigation through pages. Contributions add new information to the "community wisdom" and can measure the community-beneficial part of user engagement while the total volume of actions measures overall user engagement into working with the system. As the table shows, overall, the community message generated more actions in the system and more contributions.

Table 2. Number of Engaged Users and Level of Activity

		# Messages		# Engaged Users		# Actions		# Contributions	
		Message		Message		Message		Message	
	Total	Comm.	Pers.	Comm.	Pers.	Comm.	Pers.	Comm.	Pers.
Unknown	56	33	23	0	0	0	0	0	0
Asia	66	27	39	2	4	91	78	42	50
India	18	9	9	0	1	0	12	0	11
Middle East	11	6	5	1	1	8	8	3	7
Other	12	5	7	0	0	0	0	0	0
US	405	205	200	15	8	234	119	108	54
Total	568	285	283	18	14	333	217	153	122

The goal of the study was to test if the community benefit message could be more effective in people from Asian countries, and the personal benefit message more effective when sent to students from Western countries. Table 3 compares the numbers related to these two specific cohorts. To our surprise, bottom-level data showed the opposite effect - community benefit message engaged more users and produced more contributions among US students while personal benefit message engaged more Asian students and produced more contributions. However, a detailed analysis of the level of actions does not produce a clear picture. Asian users who received the community message executed more actions and contributed more to the system than Asian students who received the private message. US users provided a similar level of contribution and action when

receiving the community benefit and the personal benefit message. A factorial logistic regression was run considering country category and kind of message as factors, and the fact of visiting the site within a week as the dependent variable. Although it seems that community message was able to engage more US and the personal benefit message engaged more Asian users, the predictor model using these factors didn't fit significantly better than the null model. However, the study results were still able to show significant differences in more specific cases that will be described below.

Table 3. Ratio of Engaged Users in US and Asia

% Engaged Users		
	US	Asia
Community Benefit Message	15/205 (0.073%)	2/27 (0.074%)
Personal Benefit Message	8/200 (0.04%)	4/39 (0.103%)
Mean Action Rate per Engaged User		
	US	Asia
Community Benefit Message	234/15 = 15.6	91/2 = 45.5
Personal Benefit Message	119/8 = 14.875	78/4 = 19.5
Mean Contribution Rate per Engaged User		
	US	Asia
Community Benefit Message	108/15 = 7.2	42/2 = 21
Personal Benefit Message	54/8 = 6.75	50/4 = 12.5
Mean Evaluation Rate per Engaged User		
	US	Asia
Community Benefit Message	31/15 = 2.07	8/2 = 4
Personal Benefit Message	16/8 = 2	26/4 = 6.5

Since the number of contributions and actions do not behave normally according to the normality tests, non-parametric tests were used to assess the significance of the difference of mean number of actions in different cohorts. All of the following reported results are based on non-parametric tests.

Table 4 illustrates the figures related to engaged users only. Asian students executed more actions in the system than US students for both kind of messages ($p < .049$), however the difference regarding number of contribution was not significant. Furthermore, users who have already contributed to the system provide significantly more contributions than newcomers (i.e. this includes current students who hasn't used the system before as well as new students - "No, but new" in the Table) ($p < .003$).

Table 5 shows the mean number of actions executed for users with different characteristics and the significance of mean differences considering the whole sample, not only engaged users. The number of actions executed for users who received the community benefit message was higher the number of actions done by those who received private value. The number of contributions was also higher,

Table 4. Users' Variables and Activity Level per Engaged User

Variable	Values	Action Mean	SD ¹	Sig.	Contribution Mean	SD	Sig.
Home Country	Asia	28.17	8.64	p<.049	15.33	6.048	p <.145
	US	15.35	2.452		7.04	1.576	
User has visited information before	No	20.15	3.840	p<.113	10.50	3.305	p <.003
	Yes	18.33	4.485		15.00	3.512	
	No, but new	10.22	1.234		2.22	.969	

however these differences were not significant. Since 53 out of 568 emails were sent to new students, and 9 of them were finally engaged in using the system (7 community message and 2 personal message). The mean actions of this sample is much higher than the other 2 cohorts: current student who haven't visited the system and those who have visited the system before ($p < .001$). This can be explained by the information needs of new students. New students usually require to get as much information as possible to make decisions, however most of them are recently arriving to the city so they do not have enough social contacts to get all the required information. The system offers them easy to access information about courses, and they spent most of the time looking for data in the system. However, they contribute less than current students. They do not have enough knowledge about courses to share, so their navigation pattern is more focused on browsing than contributing. Users who have contributed before to the system also contributed more after the message ($p < .001$). This can be related to the perception that the new time investment for contributing is low due to they have already invested time in the system before. They just need to partially update their profiles in order to get the benefits. On the other side, newcomers have to invest more time in the system to achieve the same benefits.

Regarding the students who received the community benefit message, only the previous fact of lurking or contributing to the system were factors with a statistically significant differences in the level of activity. However, as the results have suggested before, the mean number of actions and contributions are higher than those computed when considering both messages. Table 6 shows these figures.

The analogous analysis for students who received the personal benefit message was executed, and the the fact of contributing to the system before is the only factor that is significant in this case. See Table 7 for a detailed description of the data.

5 Discussion and Future Work

Our hypothesis that community benefit message will be more effective with Asian students and the personal benefit will engage more US students was not confirmed. Unexpectedly, we found that the message appealing to the community

Table 5. Users' Variables After Receiving a Message

Variable	Values	Action Mean	SD	Sig.	Contribution Mean	SD	Sig.
Kind of Message	Community	1.17	.358	p < .468	.54	.198	p < .996
	Personal	.77	.250		.43	.149	
User has visited the system before	No	.89	.86	p < .001	.46	.142	p < .106
	Yes	.86	.518		.70	.422	
	No, but new	1.80	.589		.39	.202	
User has contributed information before	No	.77	.216	p < .005	.36	.122	p < .001
	Yes	2.12	.801		1.22	.453	
Home Country	Asia	2.56	1.253	p < .339	1.39	.745	p < .183
	India	.67	.667		all	.61	
	Middle East	1.45	.976	p < .249	.91	.667	p < .130
	US	.87	.223		US vs. Asia	.40	
Gender	Female	.79	.241	p < .128	.34	.120	p < .259
	Male	1.51	.486		.84	.292	

Table 6. Users' Variables and Activity Level After Receiving a Community Benefit Message

Variable	Values	Action Mean	SD	Sig.	Contribution Mean	SD	Sig.
User has visited the system before	No	1.08	.428	p < .000	.57	.240	p < .658
	Yes	.55	.552		.41	.414	
	No, but new	2.50	.892		.39	.269	
User has contributed information before	No	1.06	.360	p < .823	.43	.195	p < .000
	Yes	1.12	.801		1.14	.725	
Home Country	Asia	3.37	2.678	p < .917	1.56	1.518	p < .094
	US	1.14	.349		.53	.190	

Table 7. Users' Variables and Activity Level After Receiving the Personal Benefit Message

Variable	Values	Action Mean	SD	Sig.	Contribution Mean	SD	Sig.
User has contributed information before	No	.77	.216	p < .466	.36	.122	p < .000
	Yes	2.12	.801		1.22	.453	
Home Country	Asia	2.00	1.063	p < .663	1.38	.717	p < .093
	US	.60	.276		.27	.143	

benefit message engaged more US students than the personal one, however the personal message engaged more Asian students. Although these differences were not significant, the pattern is surprising and we plan to continue replicating the study to verify it. We did find, however, one significant difference related to the demography: Asian users executed significantly more actions and added more contributions in the system than the US students without regard of the kind of message they receive.

At the same time, we found a few important differences related not to user demography, but to their past experience and status in the system. Most importantly, users who have contributed to the system before contributed significantly more than the newcomers in the system. We think this is due to the fact that these users need to invest less time to improve their user profiles and get the benefits of the system. On the other side, newcomers can be discouraged by the fact that they to create their profile before getting personalized recommendations, so they quickly decide to stop contributing and start looking for useful information that can be obtained without a complete user profile.

Being a new student is also a significant factor of the number of actions to be executed in the system. Regarding the entire samples (not only engaged users), new students execute significantly more actions than the other cohorts. However, they do not contribute more than the others. We believe that this reflects an information seeking behavior. As new students they probably lack if information as well as social contacts within the iSchool, so the system offers them a way to explore information that they might need. However, they do not have enough information to share yet. We see this as an opportunity. We think that engaging new students might be easier than re-engaging those that have already decide not to use the system.

6 Conclusion

Online community designers usually struggle to encourage users to contribute enough content to make the site sustainable. One of the most common engagement mechanisms is to send messages to current users asking for contributions. Previous research has used the salience of benefits in the message as a motivator, however this has produced contradictory results in different studies. In this paper, we proposed that the difference could be explained by users' characteristics more than the message itself. We designed an experimental study to test the effectiveness of messages mentioning benefit and personal benefits of contributing in different cohorts. The subjects were assigned to different cohorts according to their home country and level of contributions in the past. We reported the results of the execution and replications of this study in an online community. Our original hypothesis that community benefit message would be more effective in Asian users, and the personal benefit message more effective in US users was not confirmed (in fact, the observed trend was rather opposite). Moreover, we were not able to register almost no reliable differences in actions and contributions when dividing students by demography. The only exception is the larger volume

of actions performed by Asian students. However, even this observation may not be considered reliable since the overall number of engaged Asian students was low.

At the same time, we discovered that the student status in the system (new or past user) and overall level of activity (active or passive users) appear to be more reliable factors to predict student behavior. The fact of being a newcomer in the system, having contributed before to the system or being a new student are the most significant factors that predict the level of contribution that the messages generated.

While we are still interested to explore the value of demographic factors in personalizing engagement strategies, we want to shift main focus of our work to adapting the engagement messages to the level of participation in the system. Another venue of research will evaluate the survival rates of the subjects of this study considering factors such as the kind of message they received and their navigation patterns. The ultimate goal is to propose adaptive engagement mechanisms as a way to increase the effectiveness of the engagement strategies.

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