

Predicting Influence in an Online Community of Creators

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ABSTRACT

This paper introduces the concept of Online Communities of Creators (OCOCs), which are a subset of social network sites in which the core activity is sharing personal, original creations. Next it defines two distinct types of influence, Project Influence and Social Influence. Project influence is a measure of the degree to which the community recognizes members' work. Social influence is a measure of how much a member is a social bridge between otherwise unconnected members. These two types of influence are studied in an online programming community called the Scratch Online Community. Two multiple linear regressions determine the factors that predict each of the two types of influence. The factors predicting each were distinct, suggesting that these are two distinct constructs in this community.

Author Keywords

Online communities of creators, content creators, influence, sns, social media, creative work.

ACM Classification Keywords

H.5.3 [Information interfaces and presentation]: Group and Organization Interfaces.

General Terms

Measurement, Design, Theory.

INTRODUCTION

Some social network sites focus on sharing personal creations. When members post projects on these sites, their work becomes part of a public self for others to consider. Thus, they are conscious of what they share, the attention it might garner, and how they hope others will react. Through their public persona and supported by their creations, they build online relationships with other members.

This subset of social network sites poses unique challenges for designers. Social network sites, such as Facebook and Twitter, are profoundly social spaces where connecting, finding, and watching other members are a core activity [1].

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Online communities that are designed specifically for people to share creations must find a balance between supporting the social system and project sharing. If the design and use of the community focuses too much on the social system and not enough on projects, it risks losing its core mission. If the community focuses upon the projects without allowing for personal recognition and social interaction, it can seem a dry, undesirable place.

In this paper I define a subset of social network sites called *Online Communities of Creators* (OCOC). These sites provide features that emphasize [2]:

- the sharing their own original creations (such as photographs, music, writing, or computer programs);
- the discussion of one another's work;
- the association of creators with their creations.

Many well-known community sites have these three attributes. Flickr, a site for photograph sharing, allows people to comment on each other's work, create basic profiles, tag their work, and join groups. Vimeo provides similar features for video. Booksie allows writers to get feedback on their work, as well as publish and promote it.

Other community sites have some, but not all of these features. Sites like Etsy, ArtFire, and Ponoko, which allow makers and crafters to sell their wares, are interesting boundary cases. Here members' personal contributions are obvious, but there is limited commenting and a greater emphasis on selling. Compare these to a place like devianART with its highly developed culture of critique. Even huge social network sites like Facebook, though focused on keeping up with friends, allow people to develop applications for the site.

THE CURRENT INVESTIGATION

This paper addresses influence in Online Communities of Creators. In the previous section it defined what an OCOC is. Next it describes two distinct types of influence and presents an argument as to why both are important to these communities. It presents and discusses what factors predicts these two kinds of influence in one particular OCOC. Finally it suggests why these two types of influence may be distinct constructs.

Defining Two Types of Influence

One reason people find OCOCs interesting is that they can get recognized for their work [3]. Because these communities are fueled by member participation and recognition of work [4], it is important to understand what predicts influence in these communities. One way to approach understanding influence in OCOCs is to examine their most important features, specifically, the original creations and the social system.

The first key element in these communities is the original projects that people share. If a community's focus is the sharing of a particular set of materials, those members whose materials are most cited should be influential. These members are important because they set the bar for the quality of the work in the community.

OCOCs are fundamentally social spaces with strong social network site components, such as discussion forums and profile pages. Members who are socially influential may greatly affect the tone of community in several ways. First they may enrich the community by engaging other members in discussion and building relationships with them. Second they may connect members with other people, discussions, and projects they might not otherwise find.

This paper proposes that influence in OCOCs can take on two primary forms: *Project Influence* and *Social Influence*.

The first, project influence, is a measure of the degree to which the community recognizes members' work. It is a reflection of members of status based on their work. Members who exhibit this trait are influential because of the work they create. Project influence can be defined as how much a particular member's work is cited by other members.

In the field of Social Network Analysis influence is often measured by *betweenness centrality*. Betweenness centrality is the degree to which a particular member is a social bridge between otherwise unconnected members. Members who have a high betweenness centrality are important brokers of social connections and the information passed between them [5]. Thus, social influence can be measured by betweenness centrality.

Some users may be influential in one way but not the other, while others are influential in both ways. Still what makes people influential via their work and social connections? This is the question this paper addresses through multiple linear regressions for each of these two types of influence.

The Community Studied

This paper investigates one OCOC: the Scratch Online Community (Figure 1) [6]. Scratch is a visual programming environment that lets users create their own animations, games, and interactive art [7]. The Scratch Online Community is the place where Scratch programmers explore others' work and share their own [8].

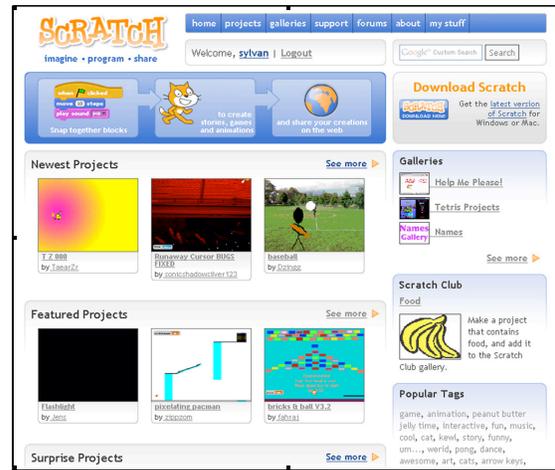


Figure 1: Scratch Online Community

Users create programs locally on their own machines. To build a program, they drag jigsaw-puzzle-like programming blocks to a scripting area (see Figure 2.) To run the program, they click on the green flag and watch what happens in the stage. They can upload the program to the Scratch Online Community where it is immediately shared with all members and visitors.

The Scratch Online Community is a forum for people working with Scratch to share their projects and ideas. People can play each other's projects within the browser. Any member can put their projects in galleries, join groups, and have a profile page. The web site has many features typical of social network sites, such as friend lists, tagging, commenting, project appreciation flags, and inappropriate content flags. What is of particular importance to this paper is that members are able to learn how projects are made by downloading the source materials to their local machine.

Methods

Data in the current investigation were archived from the website database in June 2007 after the site had been live for about 4 months and public for two. Project influence was measured by how many times a particular member's projects were downloaded by other members. Social influence was operationalized as betweenness centrality. It was measured by how many times a particular member is part of the shortest path between two other members in a given community [9]. Factors in the regressions were selected using a mix of forward and backward selection methods: first a forward selection was done of potentially relevant factors and then factors that were no longer significant were removed.

Who the Members Are

In this investigation Scratch had 16,478 users who had created 10,705 projects. The mean reported age of members was 25.61 and the median was 20 with a standard deviation of 16.29. Fifty-two percent report they were 21 or younger. For these members, the mean age was 12.76 with a standard



Figure 2: Scratch Software Guide from the website

deviation of 3.78 and the median age was 12. Twenty-nine percent were female. Forty-six percent of users were from the United States, five percent from India, and two percent each are from Australia, Canada, Costa Rica, Israel, Mexico, and Vietnam. Many other countries are represented in small numbers as well.

Predicting Influence

Project Influence

In the Scratch Online Community people can run other people’s projects in the browser, but to see how it is built, they must download the source code. When someone downloads another person’s work in this community, they are likely to be interested in the inner workings of the project. As a result, the number of times someone’s work is downloaded can be used to measure project influence in this community.

Project download counts were regressed on number of friends, number of comments, number of times a user’s project was featured, days since first project, days since last project, number of projects, date the user joined, and date of last login (see Table 3). These eight predictors accounted for a little more than half of the variance in the project influence values ($R^2 = .53$), which was significant, $F(2781) = 392.73, p < .0001$. All measures demonstrated significant effects on project download counts.

By far the biggest predictor of having one’s project downloaded was being featured by administrators. Other forms of participation (number of projects and comments) were also significant factors, as were having friends. Getting in to the site early and participating recently also mattered, as can be seen by the impact of the days since first project, last project, user joined and last login.

Social Influence

In the Scratch Online Community members can request to be friends with one another. Social influence was measured by members’ betweenness centrality in this friendship network. In other words, people who commonly acted as bridges between members would have higher social influence than those who rarely acted as bridges.

Variable	Coefficient	T-value
Number of friends	.07	4.28**
Number of comments written	.20	7.90**
Times project was featured	97.08	38.30**
Days since first project	.18	2.76*
Days since last project	-.22	-5.03**
Number of projects	.73	9.93**
Days since user joined	-.44	-4.38**
Days since last login	.45	4.78**

* $p < .008$, ** $p < .0001$

Table 1. Regression on what predicts Project Influence

Betweenness centrality values were regressed on number of comments made, number of galleries the user participated in, number of “love-its” received, and number of tags added to people’s projects. These four predictors accounted for over one-third of the variance in the betweenness values ($R^2 = .37$), which was highly significant, $F(5050) = 755.01, p < .0001$. All measures demonstrated significant effects on the betweenness centrality of the friendship network.

Social influence was predicted by four factors. The first two factors —participating in galleries and writing comment— had the most sizable impacts.

On the site galleries were not commonly used. Only 11% of all account holders and 20% of users who posted projects use galleries. So gallery participation may predicts social influence because people who use galleries may be motivated to engage with the community. In addition, sometimes users created galleries without putting projects in them; instead they used them as a discussion mechanism.

Writing comments was not only predictive of social influence but also important for project influence as well. Comments are used for a variety of purposes including socializing, supporting, insulting, critiquing, and requesting assistance, collaboration, or information. Some of these uses are mechanisms for building relationships while others are more project-focused so it is not a surprise this factor predicts both types of influence.

The third most impactful factor on social influence was having projects “loved” by others. What is interesting about this feature is it is something that neither the individual member nor the administration controls. It is truly an artifact of the social network itself.

The factor that had the smallest effect is tagging which has a negative effect: the most socially influential people don’t tag as much as less socially influential. Projects were tagged primarily by Scratch administrators and other adults. Perhaps many young members were less interested in adults as they were in other young members.

Variable	Coefficient	T-value
Number of Galleries	1.51E-4	26.65**
Number of Comments	1.61E-5	29.42**
Number of Tags	-1.64E-6	-3.06*
Having projects “loved” by others	9.01E-6	9.51**

p < .005, ** p < .0001

Table 2. Regression on what predicts Social Influence

Two Constructs

When the factors that were predictive of either project influence or social influence were added to the other construct’s regression, none, except number of comments, were found to predict the other. Though more extensive investigation is warranted, this evidence suggests that these two types of influence may be distinct constructs.

DISCUSSION

As social network sites become more enmeshed in people’s lives, it is increasingly important to understand how they work. These sites highlight social forms of influence. OCOCs have the additional challenge of presenting the materials the members create. Having the tools to understand both social and project influence helps to understand why particular individuals garner attention while others do not.

By understanding social influence, designers, as well as members, may be able to know how to strengthen the internal relationships in the community. Additionally, it may help to understand how information moves through the social network so that administrators or members can get ideas out where they want.

Project influence might be useful in different ways than social influence. Since project influence is primarily predicted by whether administrators highlight the work of a particular member, administrators can consider featuring particular work to clarify which is most valued or to take the community in new creative directions. Additionally, social network sites can be dauntingly large and hard to navigate, particularly for outsiders. Understanding project influence in OCOCs can be used to help external visitors and newbies digest the contributions of a community.

The current work is part of a larger research project that explores multiple Online Communities of Creators and the ways the communities’ members support, influence and learn from one another. The current work is a small and focused study with some limitations. To address these limitations a more extensive analysis of influence is planned. This study will work to clarify issues regarding the small effects and large sample size in the current study.

Also breaking the commenting variable into different categories of comment types might help to better understanding how comments are used for different purposes. Beyond addressing the limitations of the current study, next steps include presenting more extensive description of what OCOCs are and how they fit within the broader research on social network sites.

CONCLUSION

This paper introduces the concept of Online Communities of Creators (OCOCs). These are social network sites where people share their creations. It discussed two kinds of influence important to these communities: project influence and social influence. In the current investigation, each kind of influence is predicted a different set of variables, suggesting that they may be two distinct constructs.

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