
Greenify: Fostering Sustainable Communities Via Gamification

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Abstract

At Teachers College, Columbia University, the Games Research Lab has created *Greenify*, an online social platform designed to foster flourishing sustainable communities. Gamification elements facilitated the creation and completion of user-generated missions, encouraging interaction between geographically proximate communities of peers. Three elements were identified as necessary components to achieve sustainable communities: a healthy climate and environment, social well-being, and economic security. This paper describes our approach in addressing these elements through a crowdsourced, gamified system. Implications for HCI are also discussed.

Author Keywords

Gamification; sustainability; sustainable HCI; sustainable communities; persuasive computing; crowdsourcing; social networking; environmental awareness

ACM Classification Keywords

H.5.3 Group and Organization Interfaces:
Asynchronous interaction, Computer-supported cooperative work, Synchronous interaction, Web-based interaction

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Figure 1. Essential elements of sustainable communities.

Introduction

Many approaches in Human Computer Interaction (HCI) to foster sustainability have relied upon an individual's internal sense of right and wrong, messages centered on resource usage and conservation, or data derived from sensor-based systems [3]. To date, few approaches have considered how to foster sustainability through gamification elements and strategies (e.g., points, badges, leaderboards). Gamification works by harnessing the motivating aspects of gameplay in order to increase user engagement with a task or subject matter [10], motivating real-world actions such as exercising (e.g., Nike Plus), shopping (e.g., FourSquare), and learning (e.g., Code Academy). Can gamification-based systems be designed to engage users toward building sustainable communities?

At Teachers College, Columbia University, the Games Research Lab has created *Greenify*, an online social platform incorporating gamification mechanics, designed to foster flourishing sustainable communities via individual actions and user-created missions communities of peers [11]. We follow Ehrenfeld (2009) and Grant (in press) in their view that sustainability is the possibility of *all of life flourishing together* [4, 5]. Based upon our review of the literature, it is important to frame sustainability as a positive vision that leverages autonomy, intrinsic motivation and self-determination [5] and to leverage the social power of the group rather than the individual [13]. Communities that share values and worldviews can more effectively exchange ideas for sustainable living [12, 14, 15].

Therefore, sustainability can be best accomplished by and within communities [16].

How Greenify Fosters Sustainable Communities

The Institute of Sustainable Communities (1997) defines *healthy climate and environment*, *social well-being* and *economic security* as the three essential elements of a sustainable community (See Figure 1) [6]. Greenify addresses these three elements in the following ways:

- *A Healthy Climate and Environment:* user missions and game mechanics
- *Social Well-being:* game dynamics to strengthen social bonds
- *Economic Security:* virtual currency and local rewards

A Healthy Climate and Environment: Missions and game mechanics

To promote a healthy climate and environment, the Greenify system challenges users to create and complete missions in their local communities. These missions are personally relevant, real-world actions categorized in five areas: energy, food, consumption, home, and transportation. For example, the *Oh! Organic Challenge*, a food mission, challenged users to purchase and eat organic food for a week. Upon successfully completing missions, users receive points and badges, upgrade their in-game avatars, and increase their rankings on the leaderboards.

Greenify also includes a crowdsourced, knowledge-sharing space, including educational materials such as news articles, personal stories, and interactive media. For example, a user can post items such as videos on household energy conservation to allow other users to learn practical tips. This shared space facilitates users' knowledge acquisition of how to foster a healthy environment through peer-to-peer education of climate issues.



Figure 2. Missions in the Greenify system.

Social Well-being: Game dynamics to strengthen social bonds

As mentioned above, Greenify users tackle missions and share knowledge as members of self-selected geographic communities, strengthening the social bonds between peers. Through gamification elements, Greenify fosters and validates users' identities as eco-friendly members within a sustainable, flourishing community by promoting desired behaviors through badges, increased status, and social reward systems. These game elements make peer action visible, creating a sense of "positive peer pressure" to promote desirable behaviors and values in a group [11]. In addition, peer validation, including elements such as up-votes, likes, and other symbols of popularity, is one of the strongest driving forces of long-term engagement and community building [7].

Additionally, *group missions* require the coordinated efforts of peers as opposed to the actions of an individual, promoting teamwork and unity. For example, the *Central Park Cleanup Party* group mission

requires the participation of at least ten users as a condition for success. By enabling users to set specific community missions, the system encourages users to align individual achievement with goals relevant to their locality. Furthermore, users can tailor these goals to timely needs of their communities. These goals are the context within which missions are created and progress is tracked. In effect, they allow users to share their visions for the community and collectively track their progress as they work together to realize these visions.

Economic Security: Virtual currency and local rewards

For successfully completing missions, users receive *Tree Points*, the system's virtual currency tied to local retail incentives. Virtual currencies elicit motivation, competition, and playfulness from the user [1, 9]. These points are then tied to local real-world incentives, inextricably connecting Greenify to the community. Not only is the establishment of a regionalized rewards system a benefit to the user's local economy, it is an opportunity to educate and encourage those businesses to promote sustainable consumption. Incentives to purchase locally-produced goods, refillable personal care products, and foodstuffs from area growers typify the premiums offered by Greenify business partners. Optimally, Greenify will enhance the economic security of the local community by supporting small businesses and environmentally-friendly shops through greater visibility via the website and user incentives for buying local.

Users interact with Greenify in a variety of ways, as gamified systems are used varyingly by different types of individuals [8]. Additionally, users may have different goals and motivations for participating in a virtual economic system. Rewards are perceived differently for each user, depending on personal interests, goals for using the system, and level of engagement within the system. Casual users, for instance, may be most interested in earning discounts from local businesses, discovering new places to shop,

and interacting with friends. In contrast, intrinsically motivated users such as the student leader for a campus green organization may be more interested in creating missions, raising awareness, and increasing participation for local events and programs. Local business owners tend to be most interested in using the system to attract new customers and advertise their eco-friendly products. Importantly, the system is flexible enough to support these different kinds of users.

Discussion

Greenify was assessed using design-based research (DBR) methods [2]. Overall, preliminary results for our sample suggest that the system increased personal relevance of sustainability issues, empowered users to create content and actions for others, and increased heightened awareness of both climate change and its connection to lifestyle choices [11]. Participants indicated that the crowdsourced, social interactive aspects of the system were motivating, and participation affected behaviors beyond the scope of missions. Furthermore, players found the experience fun and engaging. The study concluded that: (1) gamification principles are congruent with needed changes to educating individuals about sustainability issues; and (2) social media technologies can enable peer-to-peer education and can motivate behavior change effectively. Detailed results of the pilot study have been published elsewhere [11].

Next steps for our project include: enhancing the mobile user experience, establishing corporate and local partnerships, and deploying the project in selected communities within higher education. Ultimately, we envision a system capable of supporting geographically proximate communities worldwide.

So why does this work matter for sustainable HCI? DiSalvo, Sengers, Brynjarsdóttir (2010), in describing the landscape of sustainable HCI, remarks that:

we frequently address individual consumers, but now need to find ways to address collectives and regional and national contexts; that we frequently rely on users' moral conscience, but need to find other ways to engage users... or that we frequently design from a position of experts, but we need to find ways to help users become experts on sustainability on their own terms [3].

Greenify attempts to address the aforementioned needs by focusing on the community in addition to the individual, engaging users through novel, grassroots experiences, and empowering both novices and experts to participate in and learn how to promote sustainability. How to align the motivational and cognitive aspects of online systems that incorporate gamification mechanics, social networking, and crowdsourcing remains an open question that warrants additional study. Based upon our preliminary work, these strategic directions possess the potential to motivate communities to become more engaged and better equipped to take action towards a sustainable future. By embracing the theme of changing perspectives and realizing new visions of human-computer interaction, we hope that the HCI community can seek a better understanding of how communities can achieve sustainable futures. DiSalvo et al. (2010), in describing the landscape of sustainable HCI, remarks that design strategies are rarely empirically-backed in enforcing behavior patterns [3]. Greenify seeks to better understand how a social game-layer can facilitate positive community impact through sustainability initiatives.

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