CommunityConnect: An Interactive Display for Educational Residential Settings

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Abstract
We examine how a public interactive display in the lobby of an undergraduate residence hall engages residents and contributes to a sense of belonging. The display projects questions onto a wall and users indicate their answer with a body action, which is read by a Kinect. The responses are aggregated and displayed in real-time. We describe our design process and the results of a preliminary field trial examining how the system affects students' perceptions of a shared geographic place and provides the opportunities for them to learn more about their hall's community.

Author Keywords
Public display; interactive display; undergraduate; residential; community; user centered design

ACM Classification Keywords
H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces—Theory and Models

Introduction
Technology is an integral part of the college experience, both in and out of the classroom. We explore the idea that technology can be leveraged to connect students who are geographically collocated. Our tool, CommunityConnect, is intended to help foster a sense

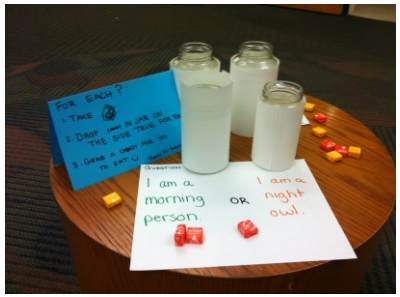

Figure 1. Low-resolution prototype

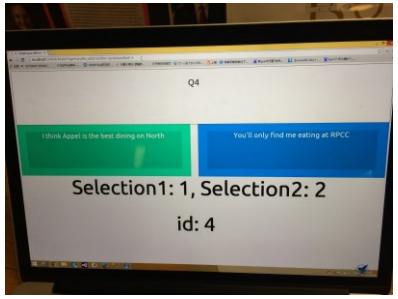

Figure 2. Digital prototype- UI

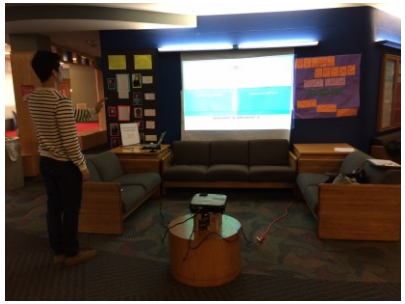

Figure 3. Digital prototype in lobby

of community among first year students residing in the same residence hall. Traditional community building for first-years focuses on organized programs, for example pizza study breaks. CommunityConnect promotes the same goal with enhanced convenience; one can connect in a quick trip through the lobby. It builds on previous work in HCI in public spaces and interactive design, as well as research in the field of education on the impact of a college student's sense of belonging.

Related Work

There is a broad range of previous technological installations designed to connect members of a community or public space. For example, FunSquares is a touchscreen installation that sought to engage passersby in a public square and library to engage with facts about the local community [6][7]. ArtLinks is a standalone display in an art museum that shows past visitors' reflections in a word cloud [3]. Participation can be boosted by the "honeypot effect": once a crowd has formed around a display, it draws additional attention and interaction from others [2][8].

CommunityConnect brings lessons from technology in public spaces into an educational residential setting, with the goal of a fostering a sense of belonging among first year students who are transitioning into university. Our display helps connect members of a residence hall, with the long-term goal of creating a greater sense of belonging to the academic community, which in turn impacts persistence toward degree [5][11].

Design

We employed an iterative process with looping and refining of many prototypes and user testing to reach the current design [1][9]. We first met with the residence hall director (RHD) and roughly a dozen resident advisors (RAs: peer leaders in the residence hall) to identify a list of questions for quick polling. The questions focus on topics socially relevant to the residents; e.g. their satisfaction with social life in the hall. Care was taken to ensure that no questions created privacy concerns [4][10]. We selected our test site because it has a central lobby and the RHD was a supportive host. We observed the residence hall lobby during evening hours to familiarize ourselves with the space's use and our intended users, followed by gathering user feedback on low-resolution (Figure 1) and digital prototypes (Figure 2) of CommunityConnect.

The lobby area of our target site, a co-ed residence hall for 450+ first year students, included a library, lounge, multi-purpose room, piano, and clusters of couches and chairs. We observed a variety of activities in this lobby during evening hours. Most commonly people were passing through (alone or in small groups), though others were playing piano, reviewing homework with friends, working alone, grabbing a snack, having a cell phone conversation, or sitting and chatting. This is a multiuse space where social interactions are common.

Prototyping and Evaluation

Several rounds of prototyping were carried out in the lobby to learn more about specific elements of the CommunityConnect design. In the first prototype, people passing by were invited to read the questions and indicate their response by placing candy into a jar. This acted as a proxy to see if students were open to interacting with a lobby display and to see if a quick polling strategy made sense. Residents were happy to take part. Some continued to discuss the question as they walked away. In one case, two residents continued

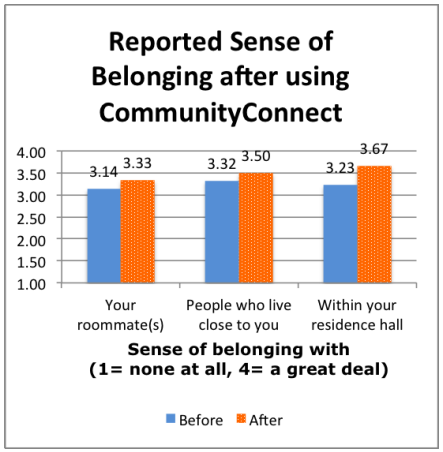

Figure 4. Sense of Belonging

to talk about slides from a class after choosing one of the following statements: "I love my notebooks" or "I hope the PowerPoint slides are posted."

The second prototype used the same set up as above, but rather than verbally inviting students to participate, we left a sign on the table with simple directions on how to interact with the written question, candy, and jars. Residents did interact with it and observations revealed residents were reading the question aloud, but not to a specific person. There were other residents in proximity to the display who could hear this, but the commentary appeared to have no intended audience.

In the third prototype the clear glass jars were covered; this took away information about others' responses and level of participation. We wanted to see if that would change behavior. As expected, we observed a drop in participation, but the sample was too small to know if it was statistically significant.

In all of the prototyping activities, we observed the honeypot effect: once one person had taken interest in the display and was standing near it, others were more likely to approach and interact as well. One notable example of this was when one female resident came to chat about the project and in less than a minute there were seven others crowded around. This sensitivity to engagement will be an interesting area of research to pursue with higher resolution prototypes of this design.

Based on our initial rounds of prototyping, we developed a digital prototype (Figure 3) that uses a Microsoft Kinect, MacBookPro running Windows 8, and Epson projector together to project questions onto a wall. The Kinect captures the user's outstretched hand motions; a Zigfu Chrome browser plugin is used so JavaScript can analyze the data flow (developed in the Microsoft Kinect SDK v 1.7.0). A web-based application based on ASP.NET, the user interface (UI) uses a NVelocity template engine to create a dynamic HTTP webpage to pull data from Microsoft SQL Server. Once a user has hovered over a selection for 2 seconds, their response is logged, and aggregated response data is updated. Users swipe to advance to the next screen.

The UI was designed to allow users to answer multiple questions and see the real-time aggregation of responses and skip questions, reflective of earlier prototypes. Skipping was included as some users could not decide on one response and wanted to pass. The large response selection areas in the UI accommodate the imprecise Kinect cursor control. As before, we set up near the student walking routes for maximum visibility.

With the digital prototype set up in the lobby (Figure 3) we observed that modifications were necessary to make it easier to use: it was too sensitive to left/right swipe actions, too easy to accidently answer questions twice, and the cursor was not accurate enough. However, once users got the hang of it they enjoyed flipping through the questions and responding. The installation caught the eye of passersby, some watching their friends try it, although many still had to be invited to interact. Because the Kinect could only read one user at a time, there was forced turn taking that was not present with the low-res prototypes. This lessened the honeypot effect.

We asked users of the digital prototype to answer three questions about how connected they felt to roommates,

nearby individuals and fellow residents of the hall. Preliminary results show those surveyed after using CommunityConnect (n=6) reported a greater sense of belonging when compared to students surveyed the previous day in the same lobby using public intercept without the installation present (n=25) (see Figure 4). The small number of students who were surveyed reflects the small scale of our first installation and that users declined the paper survey. Users also had positive feedback about the novel use of a Kinect. There was familiarity with Kinect technology, but users hadn't seen one used this way before.

Conclusion

Initial results from our prototypes and survey suggest that CommunityConnect was successful in creating a greater sense of belonging among first year students living in the same residence hall. The observed increase in sense of belonging could have been from various elements of the installation, or originated in the presence of other residents nearby. Our next steps are to conduct a larger scale analysis of CommunityConnect in other residence halls with an improved UI and to work with student staff to generate questions.

Acknowledgements

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