Building Social Capital in a Higher Educational Institution Through the Use of a Mobile Online Social Networking App with a Recommender System

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2017

APPROVAL OF THE DISSERTATION COMMITTEE

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Abstract

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This dissertation details Design Science Research that examines the design, development, and deployment of a mobile social media application for a higher education institution. Social capital in higher education “commuter” institutions may be decreasing because fewer students stay on campus. Social capital is defined as a network of relationships in a group. Higher social capital is derived from more complex and broader networks. Social networks can grow because individuals who belong to a particular group have a sense of community. If students spend less time on campus their sense of community, or the feeling that one is part of a social structure, may decrease because they are less likely to participate in the network. This puts higher education “commuter” institutions at an immediate disadvantage in terms of generating social capital. It may be possible, however, to combat this disadvantage by actively promoting participating in an online social network.

Specifically, my research project focuses on the use of a recommender system in an online social network to determine the effects a mobile application that uses recommendations has on a scholarly community: How does it affect the sense of

community amongst the users of an online social network? How does it affect the level of social capital in an alumni community? How does it affect the ability of students and alumni to harness the social capital that exists in their social network? This dissertation suggests that introducing a purposefully-designed online social network has the potential to facilitate creation of structural and relational social capital. The design artifact is for iOS mobile devices. It was coded from the ground up in Objective C, using a Parse framework for data storage, push notifications, and analytics. The app uses a recommender system via push notifications to connect users with similar or complimentary skills or research interests. The design artifact's validity was tested through a series of 5 focus groups consisting of 28 current students and alumni from a graduate university setting who used the artifact for different tasks during the focus group sessions. Results show that users responded positively to the design artifact and its constructs, and that it has potential to increase structural and relational social capital in a higher education setting, but that might not have an effect on cognitive social capital.

Acknowledgements

I began my academic journey here at Claremont Graduate University when I was just a teenager. As I reach the end of an endeavor that has occupied more than a third of my life, I would like to thank all those who have supported me along this incredible journey.

I would like to thank the students, faculty, and staff of CGU and the Center for Information Systems and Technology. First and foremost, I would like to thank the members of my dissertation committee. Dr. Lorne Olfman, who has consistently guided me since my first days as an out-of-his-depth teenager trying to acclimate to life as a PhD student. Even when I seemingly disappeared from my department, he always kept me on his radar, knowing just the right way to push me to get me to this point. During my proposal defense, he suggested alternative methods of conducting my research – advice that was a tremendous help towards completing my study. I would also like to thank Dr. Brian Hilton and Dr. June Hilton for their insight and suggestions for my dissertation: Brian, for all his help when I was developing my research artifact; and June, for all her advice for how to conduct focus group research. I would like to extend a deep-hearted thanks to Dr. Xuesong "Sonya" Zhang: You were the first friend I made at Claremont. You were there with me at the very beginning, all the way to the very end. Like the older sister I never had, you watched me grow from that shy little boy (who looked like Harry Potter) to the man I am today. Thank you, for all the years of support.

I would like to extend a big thanks to my co-researchers: Rebecca Hatkoff, who approached CISAT for an alumni networking app and who helped pin down the initial requirements for this project; and especially my co-developers, Kittisak "Meng" Sirisaengtaksin and Joe Tawan Roberts. Both Meng and Joe had their hands full with so much already: school work, Meng's own dissertation, full-time jobs, and married life. Yet still, they both dedicated big portions of their schedule just to volunteer and help me with coding. I'm especially grateful for having known Meng for almost my entire time here at Claremont: Like the older brother I never had, we've been through everything together, and there isn't a single milestone in my academic life that he was absent for. Thank you too, for all the years of support.

I would like to thank the CISAT student body – Mark Brite, Brian Thoms, Nicole Lytle, Nathan Botts, Trudi Miller, Srimanth Sanbaraju, Angela Chen, Frank Moss, Rosemary Kim, Hafsa Aasi (who helped me find my dissertation topic), Maria Ashna, Yu-Ting "Karen" Sun, Kuo Lun "Bill" Tang, Shweta Lokur, Shaimaa Ewais (who kindly provided me with camera equipment for my focus groups) – for making CISAT such an amazing place to learn and socialize. I'd especially like to thank Sumonta "Gate" Kasemvilas, not only for her unending support (especially when I was first trying to get published), but also for introducing and indoctrinating me into the Thai Club at CGU. More than anyone else, you gave me a family at Claremont.

I'd like to thank that extended "family" at Claremont: Narongdej Watcharapasorn, Siwaraya "Gift" Rochanahusdin, Suppaleuk "Bird" Sarpphaitoon, Sachaporn "Aam" Tungsong, Ob Sapwarobol, Pat Thammachote, Thana Sompornserm, Sam Pariyate, Ung Kingkanok, Thipnapa Huansuriya, Nuch Pimpaka, Sayamon Saksmerprome, Sucheng and Suleng Soeung, Thiraput "Poom" Pitichat, Kitti "Aoy" Thanakornmonkonchai, Wiphu Youyen, Sarun "Te" Seepun, Nicha "Ink" Rittisen, June Vichulada, Sasimas "Por" Katanyutanon, Pornpat "Tang" Sirithumgul, Witisada "Wit" Wattananimitgul and her sister Nat, Kusuma "Koi" Kongkrith, and countless others. Even though I wasn't Thai, you accepted me as part of the group. Moreover, I was only able to complete my dissertation because so many of this extended family were always willing to offer a helping hand at every step of the way, whether it was crunching code, debugging for hours on end, testing my app, providing me with sage advice on my dissertation or my defense slides, or merely (especially) offering encouragement when I needed it most. I'd especially like to thank Sukanya "Pai" Suksak and Manassinee "Ui" Moottatarn, for always inspiring me.

I'd like to thank all the members and volunteers of the Graduate Student Council, past and present – Tharon Smith, Gerard Pacificar, Soomi Lee, Shawn Williamson, Terry Crandall, Kiriko Komura, Jan Andres, Shanna Livermore, Heather Carr, Arianna Leigh, Sean Dixon, and many others – for providing me with countless opportunities to learn, research, and socialize. I'd especially like to thank

Gar-Wei Lee and Anastasia Artemis Bailey, for being as unabashedly nerdy as me. I'd specifically like to thank Chelsi Dimm for being someone I could trust.

I'd like to thank the excellent staff of CGU's Writing Center: Shamini Dias, Katya Fairbanks, and Jung-Hsien Lin, for helping me prepare my dissertation proposal. I'd also like to thank Tiffany McBride: she wasn't affiliated in any way with the CGU Writing Center, but she nonetheless helped me prepare my dissertation pro bono.

I'd like to thank the students of the Drucker School of Management (CISAT's "sister department"), especially Tiffany Lam, Chen Jiang, Garen Aliksanian, Lusine Verdanyan, Matthew Diamond, Nicholas Hsu, Viri de la Riva, Yun-Wen "Bella" Chen, Jackie Ngo, Shuchin Luo, and Nancy Liu. But I'd especially like to thank Steven Dunbar: You got me my job at L.A. Care. That by itself is one of the best things a friend has ever done for me. People always asked me how I managed to juggle my work and my dissertation the same time. I tell them I wouldn't've been able to complete the latter without the former. Entering the "real world" and having a real job gave me the structure and discipline to finally finish my dissertation, and you helped make that happen.

I'd like to thank Muquxi La, Song Lingxiao, and Jonathan Cham, for being there for me during the most uncertain times of Dissertation Hell.

I'd like to thank Chen "Mona" Liang, for nearly making me believe angels exist.

I'd especially like to thank Pattaramon "Net" Kanishthanon, who – in my darkest moment, when it looked like my dissertation would never get finished – kept me from bailing out on my dream: On the day you left Claremont, you told me that if I ever felt that discouraged again, I should look out at the Moon and think of you, knowing that you would be off in your little corner of the globe doing the same; and I promised that I would finish my dissertation and graduate. I've spent everyday since then working to make sure the changing seasons wouldn't break the promise I made to you. You are the reason I stare at the sky with blurry eyes.

I'd especially like to thank Yetta Liao: Of all the things I've seen and done during my time at Claremont, some of my fondest memories are still the times we simply hung out at your apartment, drinking wine, talking about anything and everything; or even just working on our dissertations together in silence occasionally punctuated by the tapping of a keyboard or the turn of a page. But it's more than just the fond memories I'm thankful for: We were practically kids when we first met – young, reckless, and carefree. Since then, you've been a constant presence in my life. Even when we were unable see each other often, we both knew we could always reach out to one another to confide, vent, and cheer each other on. We've had our ups and downs, and we've grown older and wiser. We got jobs, matured, maybe got a little more cynical, but definitely a lot more appreciative, and celebrated each milestone along that long winding road together. I don't think anyone's changed me like you have: You make me want to be a better man.

Most importantly, I want to thank my family. I'm extremely thankful for all my cousins: Yen, Tin, Jeannie, Nhi, Minh, Michelle, Vincent, Mikey, Ngoc, and Hanh. Everyone at Claremont knows I brag about you guys all the time. What can I say? How many families are there as close-knit, interesting, caring, and aggressive as ours? I'm extremely grateful for my parents; especially my Mom, who sacrificed so much so I could complete my education. Since as long as I can remember, she always taught me to reach for the pinnacle. To that effect, she never stopped pushing me. A lot of times (most of the time) it was frustrating as hell. But once the pinnacle was in sight, I never stopped pushing myself because she never stopped believing in me. Thank you, Mom.

And finally, I'd like to thank the most important person in my life: My little sister, Verena. There's no easy path to a PhD, and the uncertainty was definitely an emotional roller coaster for my family. But at every step of the way, my little sister was always there to cheer me on, refusing to let doubt and disillusionment take hold of me. There's nobody in the world that inspires me quite like her. All my life, she's always admired and looked up to me. And all my life, I've always strived to be worthy of that admiration. Thank you for everything.

Table of Contents

1. Introduction

This dissertation details Design Science Research that examines the design, development, and deployment of a mobile social media application for a higher education institution. The purpose of this application is to address the problems of low sense of community, lack of social capital, and the inability of many students to harness what social capital currently exists in their institution. Social capital in higher education "commuter" institutions may be decreasing because fewer students stay on campus. Social capital is a network of relationships in a group; higher social capital is derived from more complex and broader networks. Social networks can grow because individuals who belong to a particular group have a sense of community. If students spend less time on campus, their sense of community, that is, the feeling that one is part of a social structure, may decrease because they are less likely to participate in the network.

Specifically, this dissertation focuses on the use of a recommender system in an online social network to determine the effects a mobile application that uses recommendations has on scholarly community. The research questions related to this artifact are: How does it affect the sense of community amongst an online social network? How does it affect the level of social capital in an alumni community? How does it affect the ability of students and alumni to harness the social capital that exists in their social network?

From the perspective of constructivism, an experiential learning theory, social capital is important because if it grows, then so too does the capacity of the community

to create intellectual capital. Online social networks can create virtual campus presence. This dissertation suggests that introducing a purposefully-designed online social network has the potential to facilitate the creation of structural and relational social capital.

"The center of a college is in great conversation and out of the talk of the college life springs everything else." These are the words that James Blaisdell, first president of Claremont Graduate University (CGU), used to summarize the ideals CGU would carry through subsequent administrations (Blaisdell, n.d.). According to recent CGU President, Robert Klitgaard, what Blaisdell had in mind were "conversations outside class among students and professors, perhaps over coffee or a meal. These 'Claremont Conversations' help forge an intellectual community that is the hallmark of a liberal education" (Klitgaard, n.d.). As founding principles of CGU, conversation, collaboration, and social interaction guide much of the research done here. CGU's status as a small graduate-only university has helped the university follow these principles.

However, there have been many long-standing problems that continue to erode and threaten the future existence of the close-knit atmosphere of both the University and its alumni community. The CGU community has experienced factors that threaten its social capital. In the past, students were required to live on campus, but CGU has become more of a commuter campus, where many students live far from campus – sometimes with commutes of several hours. Such students oftentimes manage their schedules so they only have to travel to campus once a week, and miss most campus events. Also, a large proportion of students also have commitments from work or family that limit their presence on campus. It has become more common for students to

seemingly disappear once they finish their coursework, divorcing themselves from the everyday talk of campus life. In addition, though CGU is part of the Claremont Colleges - a consortium of 7 colleges – 2 graduate and 5 undergraduate – there is not much communication between students of CGU and students of the other colleges in the consortium.

In this regard, CGU serves as an example of the lack of a strong sense of community often seen in higher education "commuter" institutions. A strong sense of community, affiliation, and togetherness are prerequisites for an intellectual community that positively influences the community's social norms towards knowledge sharing and knowledge creation (Bock, Zmud, & Lee 2005). Social relationships, trust, and mutual interdependencies need to be built and sustained to allow members in a community to effectively collaborate (McGrath & Hollingshead 1994). Informal communication plays a very critical role in effective collaboration. It provides random groups of individuals who have no prearranged agenda with interactive, rich content, and an informal language (Kraut, Fish, Root, & Chalfonte 1990). In other words, community building is a prerequisite for successful collaborative knowledge construction, and a stronger, more productive student and alumni network.

In past surveys (Ractham 2008), CGU community members reported various concerns with regards to the lack of a strong sense of community: difficulty participating in important events such as research seminars or school retreats, whether because of time conflicts or because of the distance they must travel to get to campus; lack of a sense of identification with other colleagues, classmates, or alumni; and an inability to remain up to date with current events within the community. Many members highlighted

the lack of a common space, whether online or offline. They expressed having a difficult time keeping track of the academic output of their department, and CGU and the Claremont Colleges in general; e.g., conference publications, journal articles, research seminars, and faculty and student activities. They also lamented the lack of a direct outlet for students or alumni to announce their academic achievements to the greater community. According to the study by Ractham (2008), most students rely on their school's website to keep track of the research being conducted in their community (results were inconsistent through the various schools that make up CGU). Community news is often overlooked or reprioritized in the high volume of other emails students and alumni receive. Ultimately, community members oftentimes must rely upon other classmates for a recap of activities, if they are interested at all. These concerns highlight the need to design and implement a community-minded information system for CGU.

While universities like CGU become commuter institutions, information technology has stepped in to extend their reach to the computers and mobile devices of students. Drucker (1993) predicted that the traditional model of the university-as-a-residential-institution would quickly become a relic of the past in an era when colleges were already starting to deliver lectures and courses off-site cheaply via streaming content or two-way video. Since then, many predicted the rise of the "New University," in which scholars can engage in academic conversation, without the need for a "same-place same-time" requirement (Preece 2000). Two-way video technologies like Skype™ and iChat™ can help to render the same-place requirement moot as blogs, message boards, discussion groups, and other asynchronous Web 2.0 discussion tools

have done to the same-time requirement. Furthermore, a newer trend has been seen in which public officials at various levels of government, from Governor Jerry Brown to President Obama, have pushed online courses as a way to drive down the costs of higher education.

According to Preece (2000), these new forms of social interaction and human-computer interaction need to be addressed before society can create an effective and vibrant online community due to the blending of social and technological aspects in the developmental process. This is especially true for technologies that facilitate social networking. Mobile web technology has the potential to extend a university's sense of community beyond its physical brick and mortar buildings to ensure that its level of social capital does not decrease as its geographical reach increases.

Thus, this dissertation reports an instance of Design Science Research, with social capital and sense of community as the kernel theories, that developed and evaluated a software artifact that was designed to enhance the scholarly community at CGU. Previous research suggests that properly deployed IT can strengthen the sense of community in a higher learning institution (Ractham 2008), that a strong sense of community will lead to an increase in social capital in a scholarly community (Suthers et al. 2009),l and that this will further strengthen the intellectual output of that community (Tsai & Ghoshal 1998).

The artifact, titled "Claremont Connection," was designed to connect Claremont Graduate University's alumni and facilitate professional transdisciplinary networking between alumni and current students, and as such, to enhance the value in CGU's social networks. It aims to facilitate the creation of new connections and strengthen

existing connections, which in turn could increase the social capital of the alumni and students. It enables alumni to find other community members with similar research interests or complementary skills, and to provide advancement or career opportunities for current students. A recommender system sends push notifications to users, notifying them of other students or alumni with similar research interests, or of professional opportunities based on matched skillsets. Increasing access to social resources is beneficial to the career success outcomes of those in the community, because this facilitates better access to information and resources, and increases opportunities for career sponsorship (Seibert, Kraimer, & Liden 2001). The design artifact can be generalized as a design theory that can be used by other universities and colleges to create customized versions of the application.

Previous research on recommender applications focuses mainly on ways to improve accuracy, mostly ignoring the effect of the application on the users, or the social media system as a whole. In addition, previous research on push notification systems focuses mainly on their ability to affect users' motivation to participate. Unlike those previous studies, this study will focus on the effect of the design artifact on the entire community in which it is deployed by adopting an Action Design Research methodology with the intent of changing the status quo in the direction desired by the key stakeholders.

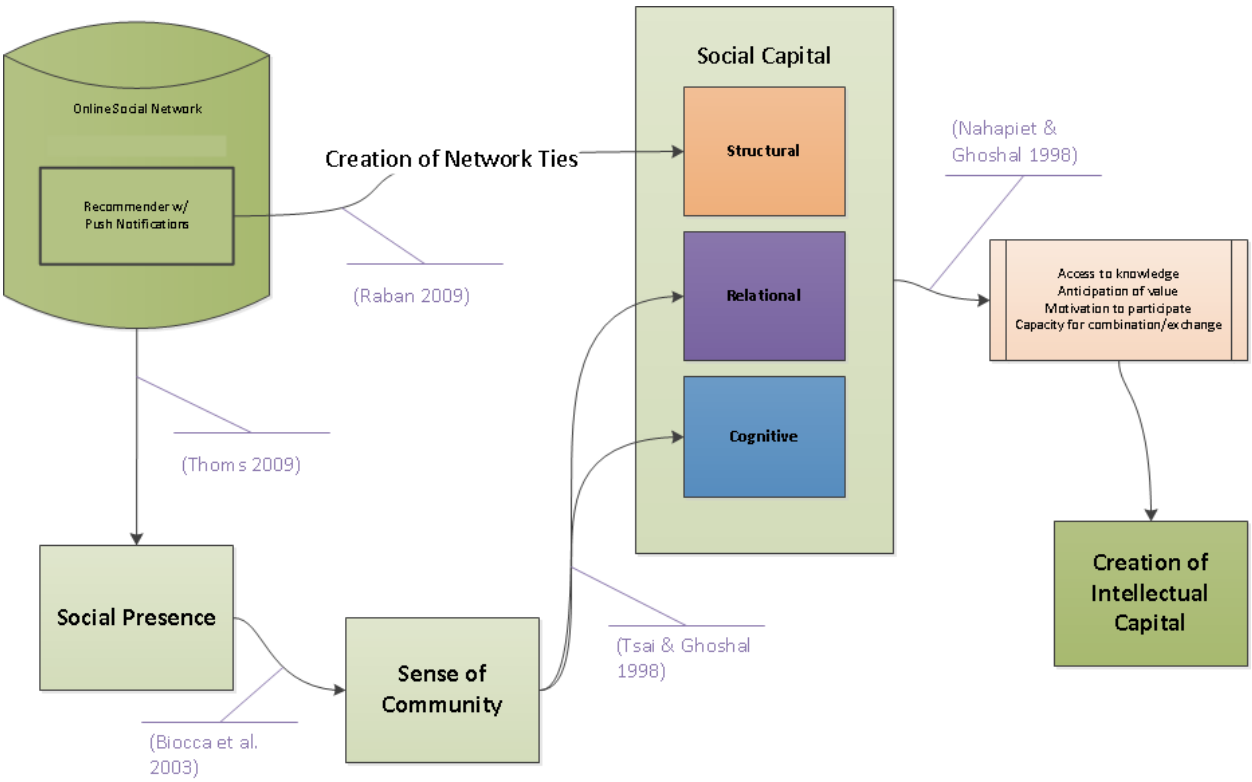
Though other universities have applications (apps) or artifacts that provide similar services, their goals are usually geared more towards enabling simple social networking (Acquisti & Gross 2006; Ellison, Steinfield, & Lampe 2007; Raban 2009), whereas the

artifact proposed herein aims to facilitate social networking with a stronger emphases on academic, scholarly, and professional networking.

This dissertation has five chapters. This first chapter described the problem statement and introduced the research questions. Chapter 2 provides a literature review on the design constructs and kernel theories of the proposed Information System Design Theory (ISDT). Chapter 3 discusses the research methodology, including: an ISDT for an online higher education social networking app for mobile devices that utilizes push notifications and user recommendations; development of a mobile app based on the ISDT; the process for prototype validation; and how the app will be evaluated. Chapter 4 analyzes the results and draws conclusions. Finally, Chapter 5 summarizes the findings, and discusses study limitations and avenues for future research.

2. Literature Review

The model shown in FIGURE 1 will guide the evaluation of the proposed ISDT.



(FIGURE 1) Scholarly Community

In today's educational environment, it is common to see higher learning institutions attempt to leverage computer-mediated communication and online social networks to build stronger scholarly communities. These technologies can build social capital in different ways. They increase structural social capital directly via social matching apps that directly recommend users to other users (Raban 2009), or they can increase social capital by building a sense of community (Tsai & Ghoshal 1998). Previous studies have shown that online social networking software can create social presence (Thoms 2009). In the field of computer-mediated communication, social

presence is the degree of feeling, perception, and reaction to other community members within a computer-mediated environment (Tu & McIsaac 2002). High feelings of social presence within such an environment shape and strengthen the sense of community amongst participants (Biocca et al. 2003). A strong sense of community correlates to high relational and cognitive social capital (Tsai & Ghoshal 1998). High levels of social capital create more opportunities for the creation of intellectual capital (Nahapiet & Ghoshal 1998).

Regarding the model, this literature review will first discuss similar online social networks in higher education, as well as the specific design constructs of recommender systems and notification systems. It will then describe social presence, how it can be created by online social networks, and why it determines a social network's success in creating a strong sense of community. Then, it will describe the kernel theories of psychological sense of community, and social capital. Finally, it will describe how high levels of social capital lead to the creation of intellectual capital.

2.1. Online Social Networks in Higher Education

Today, online social networks utilize the power of social ties to foster increased levels of interaction and community. While some online social networks rely on advertising to help sustain the community, most require a strong psychological sense of community, whether from collaborating on general interests or finding solutions to complex issues together, to remain self-sustainable. These networks utilize the latest in information technology – such as blogs, streaming video, and/or mobile apps – to provide an interactive and engaging multimedia environment, and reach out to as many potential users as possible. General sign up rates for social networks have steadily

increased, with some reports estimating that in 2014, 74% of internet users have signed up for at least one online social network (Pew Research Center 2014).

There are many reasons why users use online social networks (OSNs). OSNs can foster both weak and strong ties. Weak ties are loose connections between individuals through which useful information or new perspectives are shared (Granovetter 1982). Meanwhile, strong ties refer to close-knit relationships through which emotional support is provided (Ellison, Steinfield, & Lampe 2007). OSNs can fulfill the informational needs of users, which is a key factor in fostering weak ties and promoting collective action (Kenski & Stroud 2006; Shah et al. 2001). Online social networks can strengthen existing ties and communities or support strong ties by helping users stay constantly updated about the current affairs of their contacts (Hargittai 2007).

Online social networks allow users to join groups based on common interests and occupations. This need can be even more directly addressed if the OSN has a recommender system that recommends other users or collaboration opportunities. Increased participation in online and offline groups tends to foster relationships among members based on trust, a key factor in increasing social capital (Kobayashi et al. 2006).

Online social networks can also serve purely recreational purposes. However, previous research has shown that social networks purely related to entertainment are negatively associated with social capital production (Nyland, Marvez, & Beck 2007).

Finally, people join an online social network for integration and social interaction: a sense of identity and belonging, a basis for conversation and social interaction, a connection with society, and gaining insight into the shared narratives of others

(McQuail 2005). Tapping into needs such as these allows online social networks to foster norms of reciprocity and opportunities for collective action (Valenzuela, Park, & Kee 2009).

Previous research on online communities in higher education have demonstrated that students are motivated to join these communities to maintain strong ties with friends and colleagues, and to strengthen connections with new acquaintances, but not as much to make new connections online (Acquisti & Gross 2006; Ellison, Steinfield, & Lampe 2007).

2.1.1. Mobile versus Traditional OSNs

Prior research (Ractham 2008, Thoms 2009) focused on the needs for each aspect of an online space. For the community space on an online social network, generating a strong motivation to participate amongst users was a key necessity. Both Ractham (2008) and Thoms (2009) used desktop-oriented blogs for their design artifacts. Participation in such forums is limited by the passive nature of the medium in that users need to regularly follow their social network for new content (Hill 2003, Hill & Roldan 2005). Reaching the “critical mass” of user participation for a healthy online community was dependent on how many community members were motivated to absorb or create content on the medium. If users could not be sure that they would receive a response if they reached out to another community, or if they could not be sure that there would be new content whenever they checked the OSN, their motivation to continue to participate would dramatically decrease (Hill 2003). Previous studies (Ractham 2008) used administrator-driven interventions – large one-off events – to artificially stimulate user participation. However, this dissertation proposes that a mobile-

based online social network, compared to a desktop-based one, can address the problem of motivation to participate because it provides more opportunities for active participation and timely responses (Hill & Roldan 2005). That is, since participant responsiveness is a key driver of the overall success of an online social network: a mobile-based design artifact would allow users to participate at their convenience, using a device that they carry around at almost all times (as opposed to whenever they happened to be sitting in front of a workstation or laptop), further cutting down on the barriers of time and space needed for communication (Callum & Kinshuk 2008)

2.1.2. Recommender Systems

Previous research (Thoms 2009, Sirisaengtaksin 2016) has suggested adding a recommender system to an OSN to aid communication and foster new connections. A recommender system presents users with information and automated assistance to decide what products or services to choose; the recommendations of these systems are usually based on the users' evaluations via some sort of rating mechanism of these products or services (Schafer et al., 2001). Recommender systems can help users deal with information overload, as they use these evaluations or ratings to sift through large amounts of data in a timely manner to find products, services, or content that would be relevant to the current user (Abel et al. 2010; Roda & Thomas 2006). Recommender systems not only mimic subject-matter experts, they also take the current user's preferences into account (Buder & Schwind 2012). There are three types of recommender systems: content-based, collaborative-based, and hybrid systems (Burke 2002). Content-based systems recommend items or services similar to ones the user has preferred in the past (e.g., an online store that recommends products based on

prior purchases) (Adomavicius & Tuzhilin 2005). Collaborative-based systems recommend products that others with similar tastes and preferences as the current user liked or purchased in the past. Collaborative systems have been used by companies such as YouTube and Netflix (Funakoshi 2000; Lo 2006). Finally, a hybrid recommender combines approaches of both content- and collaborative-based methods in an attempt to provide more accurate recommendations than a system based on only one approach (Adomavicius & Tuzhilin 2005). In many of these systems, users provide evaluations by inputting their preferences or via a rating mechanism and are in turn provided with a list of recommendations (Sarwar 2000).

Recommender systems are most commonly used in e-commerce, but they have been introduced into collaborative and e-learning settings (Bobadilla, Hernando & Arroyo 2011; Buder & Schwind 2012). Although recommender systems are most-commonly used to recommend products to individuals (Tarveen & McDonald 2005), Adomavicius and Tuzhilin (2005) argue that recommending users is no different than recommending items: i.e., a social matching system will still count as a recommender system since it uses recommendations to address the issue of information overload. Recommendations are oftentimes features of online social networks, e.g. recommendations and wish lists are features of Amazon.com. Furthermore, previous studies (Zhang & Hilitz 2003; Thoms 2009) have used recommender systems in higher education contexts as social matching systems. Zhang and Hilitz (2003) proposed a recommender system to match users with similar research interests, and Thoms (2009) used one to match users who rated intellectual content similarly. However, neither of these systems was mobile-based. A mobile platform-based online social network might

have an advantage over traditional platforms as their convenience, high portability, and more constant presence within the users' general vicinity can lead to faster response times (Hill & Roldan 2005). One particular reason why is the higher efficiency of Push Notifications on mobile platforms. One particular advantage of using push notifications in a mobile-based platform is the increased efficiency with which users may be presented with relevant information.

2.1.3. Push Notification Systems

As opposed to the traditional "Pull" model of information retrieval where the user consciously seeks out new information, Push Notification systems deliver information to users without direct request based on predefined rules or triggers (Latif, Hassan, & Hasan 2008). Push notification is advantageous because it reduces the time needed for users to browse for relevant or critical information, without having to sift through large amounts of information. Also, in general, it is easier with digital environments to ignore others' communications or to neglect contributing to an online community (Dennis 1996, Kiesler et al. 1984, Robert, Dennis, & Ahuja 2008). With push notifications, users are always aware of any update in content and can respond immediately. As such, push notifications are one solution for reducing long delays in response time, and for maintaining use of an app over its lifetime (Wojciechowski, 2007). Push notification systems can deliver messages and information to users instantly after a trigger condition is met, or at a set specific time (Hornsby et al. 2010). These notifications are designed to help users become aware of events occurring outside their current task, and take the form of a small amount of information (usually a short sentence or a link to more substantive content) delivered to a display area outside or in front of the current

application area. Examples include emergency warnings, email alerts, chat messages, and social media activity updates (Carroll et al. 2003). Push notification systems are not without disadvantages, however. Too many notifications can cause information overload, and potentially increase the amount of useless or irrelevant information a user must handle (Eppler & Mengis 2004). Other times, too many notifications can simply irritate the user (Latif et al. 2008), and receiving too much information without request can lessen the users' feel of control over the app (Bawden & Robinson 2009). However, users may endure and overlook these distractions if they feel the information delivered by the push notifications contain value: Any successful system with push notifications has to consider the tradeoff between utility benefits and attention costs (McCrickard & Chewer 2003). Guo, Tjondronegoro, and Roe (2012) looked at push notifications in an online social network for mobile devices. Their system sent push notifications when new content was posted, or when other users were physically nearby. Their study found that push notifications can maintain users' interest in continued participation with a social network. This demonstrates the usefulness of Push Notifications for an online social network. Sirisaengtaksin (2016) looked at push notifications in a higher education setting. His study found that when used in course discussions, a recommender system with push notifications can increase awareness of other community members' postings, while also reducing information overload.

2.2. Social Presence

According to social presence theory, when community members perceive others in an online community to be real, they are more willing to build trust (Short, Williams &

Christie, 1976). They are also more willing to see the community as a valid channel for social interaction, and a valid source for knowledge and information.

According to Short, Williams, and Christie (1976, p. 65), social presence is the "degree of salience of the other person in a mediated communication and the consequent salience of their interpersonal interactions." That is, social presence is the degree that one senses being with one or more other individuals in a mediated environment (Biocca, Burgoon, Harms, & Stoner 2001). Social presence has a strong effect on the degree to which an individual's perception of an online community affects his or her level or participation with that community. It was originally thought that social presence was an aspect of the community environs or that of the underlying medium, as per Daft and Lengel's (1986) Media Richness Theory; that communication mediums varied in their degree of social presence and that participation across the medium was determined by these variations (IJsselsteijn, Baren, & Lanen 2003). Later research however demonstrated that social presence is variable amongst different members in the same community using the same medium (Shih & Swan 2005).

There are several factors to take into account when measuring social presence among community members, a community as a whole, or the communication medium. These factors include the community's attitude towards online communication, or each community member's personal attitudes concerning privacy (Tu 2002). Any restrictions in communication channels will lead to a decrease in social presence within a group. Meanwhile, higher levels of social presence will lead to higher levels of group interaction, connectedness, involvement, and engagement (Short, Williams, & Christie 1976). In mediated communication, social presence is the degree to which community

members believe themselves to be useful members of their community, along with the degree to which they feel about, interact with, and participate with others as intellectual entities (Tu & McIsaac 2002).

The perception of other community members as real entities leads to the establishment of trust in the community. Tthe community comes to be viewed as a valid outlet for social interaction, allowing individuals using computer-mediated communication to effectively communicate and collaborate with one another as real intellectual entities without the need for same-time, same-place restrictions (Sarbaugh-Thompson & Feldman 1998).

Certain technologies can help establish social presence in an online community. For example, Thoms (2009) demonstrated that a recommender system can establish social presence in an online social network for higher education. Prior studies have used social presence to evaluate community members' ability to connect via computer-mediated communication (Rice 1993, Walther 1996). Gunawardena (1995) examined the implications social presence has for computer-mediated communication, and demonstrated that while online communication lacked the social cues usually found in in-person conversation, social presence can still be established in online mediums. A follow-up study (Gudawardena & Zittle 1997) demonstrated the effectiveness of high levels of social presence when it comes to improving instructional effectiveness and building a sense of community within an online scholarly community. Previous research on online social networks in educational settings demonstrated that the establishment of social presence is one of the most significant factors in fostering online communication and a strong sense of community (Stacey 2002). Previous research (Ractham 2008;

Firpo 2009; Firpo 2010) has also demonstrated the ability for online social networks, especially those with a high degree of social presence, to establish a strong sense of community in a higher educational institution.

2.3. Psychological Sense of Community

Sense of community is “the perception of similarity to others, an acknowledged interdependence with others, a willingness to maintain this interdependence by giving to or doing for others what one expects from them, and the feeling that one is part of a larger dependable and stable structure” (Sarason 1974, p. 157). There are four elements that make up sense of community: membership, influence, integration and fulfillment of needs, and shared emotional connection (McMillan & Chavis 1986).

The Sense of Community Index (SCI) measures the sense of community construct (Chipuer & Pretty 1999; Long & Perkins 2003). The SCI was adapted for educational communities by Wright (2004), who developed the School Sense of Community Index (SSCI). The SSCI expands on the SCI by adding “sense of purpose” as a fifth element.

Sense of purpose refers to the context in which participants are willing to sustain community cohesion for individual and community outcomes. In addition, the SSCI also combines “influence” from McMillan and Chavis (1986) and “trust” from McMillan (1996) into one element: “Influence and trust.”

The elements that make up the SCI directly correlate with the relational and cognitive dimensions of social capital. That is, if the amount of SSCI in a scholarly community increases, its social capital will increase (Ghoshal & Tsai 1998) although this does not mean that there is a causal connection.

2.4. Social Capital

Social Capital is the key kernel theory for thisdissertation. Social capital is defined as “the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit” (Nahapiet & Ghoshal 1998, p.243) It is the goodwill available to groups or individuals. Its source lies “in the structure and control of the actors’ relations,” and its effects “flow from the information, influence, and solidarity it makes available to the actor” (Adler & Kwon 2002, p.18). Prior to the advent of social capital research, much attention had been paid to the development of Human Capital, and its effects on how individuals obtain, develop, and nurture the skills and knowledge required to be productive in a competitive labor market. However, over the course of the 20th century, social capital gained acceptance from sociologists and economists as a way of explaining the differences in individual success besides through individual characteristics alone (Coleman 1994). Social capital deals with the value of social networks, following the folk wisdom that “more people get their jobs from whom they know, rather than what they know,” (Sander 2002, p. 213) or rather, the goodwill that others have towards each other is a valuable resource (Adler & Kwon 2002).

The term “social capital” was first used around 1916 in discussions of rural school community centers to describe the “tangible substances [that] count for most in the daily lives of people.” (Hanifan 1916) Hanifan (1920) used social capital to describe the good will and fellowship amongst those that make up a social unit. Almost half a century later, the concept of social capital was revived in literature to describe the relational resources within personal connections that lead towards the development of

individuals within communities and social organizations (Loury 1977). Further research would specifically look at social capital as embodied within social groupings of all shapes and sizes, big and small, from nations to family units (Coleman 1988), organizational firms (Burt 1992, Baker 1990), public contemporary society (Putnam 1993, 1995), in urban life (Jacobs 1961) and all other groupings in between (Tsai & Ghoshal 1998).

Social capital is a measurement of the value of concrete personal relationships and the web of social relationships that influences individual behavior, and allows for individual and societal growth (Penner 1997). Its central concept is that relationships matter, and social networks are a valuable asset: interaction allows people to build community and commit to each other, and create a sense of belonging (Field 2003). It is what turns trust between individuals into trust between strangers, and trust in a broad fabric of social institutions – a "shared set of values, virtues, and expectations within society as a whole" (Beem 1999, p. 20). Unlike other forms of capital, like intellectual capital, social capital is mainly created and disseminated through cultural mechanisms such as religious institutions or cultural tradition (Fukuyama 1995).

In the development of social capital theory, three names stand out: Pierre Bourdieu, James Coleman, and Robert Putnam (Carroll & Stanfield 2003; Lang & Hornburg 1998). Pierre Bourdieu is credited with bringing the concept of social capital into contemporary discussions: His 1979 book, *La Distinction* (1984 US, under *Distinction: A Social Critique of the Judgement of Taste*), has been cited as the origin of the modern definition of social capital (Adam & Roncevic 2003). Bourdieu distinguished between four different forms of capital: economic, cultural, symbolic, and social

(Bourdieu, 1972). Writing from a Marxist perspective, Bourdieu defined social capital as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (p. 51) and sought to explore its function in the processes that lead into class formation and the creation of elites (Bourdieu 1983). To him, the possession of social capital is, like economic capital, a method by which certain groups or networks hold onto power. Examples include long-lasting obligations resulting from mutual friendship, gratitude, and respect; or from rights guaranteed by exclusive membership in a class, school, organization, or family (Bourdieu 1986).

Coleman (1988) sought to explain how those who were not amongst the elite also benefit from the possession of social capital. Defining social capital by its function, he argued that social capital was not a single attribute, but a variety of attributes – such as norms, obligations, and trust – with two commonalities: "they all consist of some aspect of a social structure, and they facilitate certain actions of individuals who are within the structure." (Coleman 1994, p. 302). Between the two, Bourdieu's treatment of social capital is more pessimistic – as the thesis that "privileged individuals maintain their position using their connections with other privileged people" (Field 2003, p. 23) – while Coleman's is more optimistic – as a public good almost completely benign in function. Coleman widened the scope of Bourdieu's analysis of social relationships from that of the elite to encompass the relationships of non-elite groups (Schuller et al. 2000).

The concept of social capital gained popularity in the 1990's in no small part due to the work of Robert Putnam. Putnam began exploring the concept of social capital in 1993 with *Making Democracy Work*, in which he and his colleagues explored the

differences in regional governance in northern and southern Italy using civic community as the explanatory variable (Putnam et al. 1993). Here, he used it to explain the features of communities – trust and norms – that facilitate coordinated actions and improve the efficacy of society. Putnam (1995) would next turn that same lens on America with "Bowling Alone", in which he examined the decline in America's civic engagement. Drawing from earlier works such as De Tocqueville's *Democracy in America* (1835) and contemporary authors like Coleman, Putnam examined social capital through the lens of political science. Putnam viewed the decline in membership in voluntary organizations as indicative of a decline in social capital, using the example of bowling – a highly associational activity – that represented a source of social interaction (a component of social capital) as well as a recreational activity. Putnam (2000) compared social capital with civic virtue, noting that the difference was that social capital highlights how civic virtue is "most powerful when embedded in a sense network of reciprocal social relations" (p. 19). A community whose members are virtuous but isolated would not necessarily have high levels of social capital.

Woolcock (1998), a social scientist for the World Bank, furthered the discussion on social capital by distinguishing various types of social capital. Woolcock was one of the first to attempt a presentation of a unified conceptual framework for social capital (Piazza-Georgi 2002). He identified bonding social capital, the ties between those in similar situations (family, close friends, and neighbors); bridging social capital, between more distant social ties (loose friendships and coworkers); and linking social capital, the ties between unlike individuals in dissimilar situations (Woolcock 2001). Putnam followed up on these definitions by comparing bonding and bridging social capital,

suggesting that bonding capital is more exclusive and reinforces homogeny amongst groups, while bridging social capital is more inclusive and encompasses people across different social spheres: “Bridging networks … are better for linkage to external assets and for information diffusion” (Putnam 2000, p. 22). According to Putnam, bridging social capital allows community members to solve collective problems more easily, greasing the wheels that allow communities to function – a “sociological WD-40” (p. 23) – and widening community members’ awareness of the myriad ways in which their fates are linked: when people have a connection to others, they are better able to test the veracity of their views, whether it be through casual conversation or in a more formal setting. (Putnam 2000).

There are many ways in which social capital differs from other forms of capital, as well as many ways in which it resembles other forms. Like all other forms of capital, social capital is a long-term resource, into which other resources can be invested with the expectation of future benefits; it is both appropriable (Coleman 1988) and convertible (Bourdieu 1986); it can either be a substitute for other resources, or it can complement them; and it requires maintenance in order to retain and preserve its value. However, social capital differs from other forms of capital in the following ways: Some forms of social capital are collective goods, in that they are not the private property of those who benefit from them; are not located in the actors, but in their relations with other actors; and investments in development oftentimes do not seem amenable to quantified measurement (Adler & Kwon 2002).

2.4.1. Dimensions of Social Capital

Social Capital is a multi-dimensional concept - comprised of attributes such as trust, rules and norms, types of social interaction, network resources, etc. - with each attribute contributing to the whole definition of the concept but not fully capturing the concept on its own (Haan et al. 2003).

Nahapiet and Ghoshal (1998) created a model that hypothesizes the relationships between different dimensions of social capital, and the process through which this leads to the creation of intellectual capital. It has become one of the most commonly used conceptualizations of social capital (Robert, Dennis, & Ahuja 2008).

Nahapiet and Ghoshal (1998) define three dimensions of social capital: Structural, Relational, and Cognitive. The structural dimension refers to the layout and overall pattern of connections between actors (Burt, 1992) – that is, “who you reach and how you reach them” (Nahapiet & Ghoshal 1992, p. 244). The relational dimension refers to the assets created and leveraged through relationships, and the relations that community members have that affect their social behavior (Nahapiet & Ghoshal 1998). The cognitive dimension refers to “those resources providing shared representations, interpretations, and systems of meaning among parties” (Nahapiet & Ghoshal 1998 p. 244).

Structural Dimension

The structural dimension is comprised of network ties, network configuration, and appropriable organization. Network ties refer to the information benefits from the people an actor knows – the channels for information transmission. These information benefits occur in three forms: access, being able to receive valuable bits of information and

knowing who can use it; timing, the ability of one's social ties to provide information sooner than would be the case without; and referrals, the processes that provide information on available opportunities to actors within the network (Burt 1992). Network configuration refers to the arrangement of an actor's network ties: the density, connectivity, and hierarchy of network ties all impact how information is channeled through one's social channels (Ibarra 1992; Krackhardt & Hanson 1993). Appropriable organization refers to the ability to transfer social capital developed in one context from one social setting to another, e.g., translating trust developed from personal relationships into business exchanges (Coleman 1990), or from religious affiliation into work situations (Fukuyama 1995).

Relational Dimension

The relational dimension is comprised of norms, obligations and expectations, member identification, and the level of trust in a community.

Norms refer to the degree of consensus in a social system (Nahapiet & Ghoshal 1998). Norms support discussion, and the likelihood that discussion will be cordial, i.e., suppressing the likelihood of personal attacks on those engaged in communication (Wittenbaum et al. 2004). Strong norms promote a cooperative and motivational community environment that encourages risk taking and tolerance of mistakes (Caldwell & O'Reilly 2003; Robert, Dennis, & Ahuja 2008)

Obligations and expectations refer to a "commitment or duty to undertake some activity in the future" (Nahapiet and Ghoshal 1998). Meantime, member identification refers to the process through which an individual sees him/herself as one with a group (Nahapiet & Ghoshal 1998). High levels of identification in a community mean that

members will be more motivated to help maintain a positive group identity (Hogg et al. 2004; Abrams & Hogg 1990), feeling a sense of mutual responsibility for their community's success (Blau 1964; Shore & Barkdale 1998), and associating their community's success with their own, establishing a perceived connection between their actions and their community's achievement (Alles & Datar 2000; Robert, Dennis, & Ahuja 2008).

Two of the most important barriers to the transfer of knowledge within a community are the mental and psychological barriers between the source and the recipient (Szulanski 1996). Thus, trust is a crucial aspect of the relational dimension of social capital. Indeed, it is difficult to build social capital in a community unless there is a prevalence of trust within (Fukuyama 1995). Trust is the willingness to let oneself be vulnerable to or depend on another party that arises from a belief in one's peers' good intent (Ouchi 1981; Pascale 1990; Ring & Van de Ven 1994), competence and capability (Sako 1992; Szulanski 1996), reliability (Giddens 1990; Ouchi 1981), and perceived openness (Ouchi 1981; Mishira 1996; Nahapiet & Ghoshal 1998), irrespective of the ability to monitor or control that other party (Mayer et al. 1995, p. 712). Trust is strongly tied with cooperation in a community: "trust lubricates cooperation, and cooperation itself breeds trust" (Nahapiet & Ghoshal 1998). Trust is one of the most important components of social capital's relational dimension. Many studies of social capital use trust by itself as a measure of the relational dimension (McKnight et al. 1998; Tsai & Ghoshal 1998; Jarvenpaa, Shaw, & Staples 2004).

Cognitive Dimension

The cognitive dimension (Cicourel, 1973) is comprised of a community's shared language and codes, and its shared narratives (Nahapiet & Ghoshal 1998). A shared language is the means through which individuals discuss, ask questions, and share information in a community; it influences perceptions (Berger & Luckman 1966; Pondy & Mitroff 1979); and it enhances a community's capability to combine knowledge (Nonaka & Takeuchi 1995).

2.4.2. Benefits of Social Capital

There are many ways a community benefits from increases of social capital. Social capital is an essential factor of group formation (Oh et al. 2004). Social capital has two defining characteristics: it constitutes some aspect of the social structure, and it facilitates the actions of individuals within the structure – that is, it allows the achievement of outcomes that without it would be impossible or achievable only at an extra cost (Coleman 1990; Nahapiet & Ghoshal 1998).

There are two major themes to the consequences of social capital: allocative efficiency and adaptive efficiency (Nahapiet & Ghoshal 1998). Allocative efficiency refers to the extent to which social capital increases the proficiency of action (North 1990) or reduces the costs of transactions (Putnam 1993). Adaptive efficiency (Fukuyama 1995; Jacobs 1965; Putnam 1993) refers to the creativity and learning social capital brings in encouraging "cooperative behavior, thereby facilitating the development of new forms of association and innovative organization" (Nahapiet & Ghoshal 1998, p. 245).

Previous studies have shown that social capital facilitates resource exchange and innovation (Gabbay & Zuckerman 1998; Hansen 1998), and the creation of intellectual capital (Hargardon & Sutton 1997; Nahapiet & Ghoshal 1998). Previous studies have also demonstrated a positive relationship between social capital, and knowledge integration and transfer (Rhodes et al. 2008; Robert, Dennis, & Ahuja 2008). Other studies have demonstrated a positive relationship between social capital and knowledge activities and knowledge acquisition: high levels of social capital are related to group cohesiveness, eventually supporting collective behavior (Yli-Renko, Autio, & Sapienza 2001).

In communities with higher levels of social capital, members have an easier time finding jobs (Granovetter 1995; Lin & Dumin 1996) and there is a richer pool of recruits for organizations or research groups (Fernandez, Coastilla, & Moore 2000). Social capital directly benefits knowledge transfer within and between communities (Nahapiet & Ghoshal, 1998; Adler & Kwon, 2002), with organizational culture, learning capacity, and intention as the prime knowledge transfer processes (Calvert et al. 1994; Nonaka 1996; Rhodes et al. 2008).

Communities accrue the benefits of social capital in three different ways: through information; influence, control, and power; and solidarity (Adler & Kwon 2002). First, social capital increases the access of community members to more sources of information, as well as information of better quality and relevance. An example of this is a researcher who is able to stay abreast of recent research in his or her field through everyday informal conversations with colleagues and associates (Coleman 1988). More importantly, network ties help community members gain access to information about

potential job or research opportunities (Boxman et al. 1991; Burt 1992; Fernandez & Weinberg 1997; Granovetter 1973; Lin et al. 1981; Meyerson 1994).

Benefits from information gained at the small group level can accrue to the larger community: Social capital enables exchange activities which give an actor information from other actors, and as long as this exchange activity relies on a reciprocal flow of information, the greater community will benefit from this diffusion of information (Burt 1997).

Second, social capital increases the influence and power of actors in a community (Adler & Kwon 2002). For example, some actors have more influence in a community because they have spent time building up obligations from other community members, and can cash in on these obligations to achieve their goals or carry out research projects (Coleman 1988). These powerful benefits especially help those who bridge disconnected groups (Burt 1992), e.g., transdisciplinary researchers who have access to and can bridge important actors in different disciplines with valuable skills and experience.

Finally, social capital increases the level of solidarity in a community (Adler & Kwon 2002). Association in a community instills in its members habits of cooperation and solidarity, and lead to higher levels of trust (Putnam 1993). A network of trust with a strong culture and high levels of solidarity can transmit more sensitive and richer information than other networks (Krackhardt & Hanson 1993). A strong culture encourages compliance with rules and customs, and lessens the need for formal rules. Strong social norms and a high degree of closure of social networks have been credited with phenomena like the effectiveness of certain organizations over others, or the low

dropout rate in certain private schools. Solidarity can also result from the weak ties that bridge unconnected groups.

Granovetter (1982) looked at studies of large communities that integrated subgroups with strong internal ties, and found that even weak ties between subgroups led to a higher degree of integration of the larger aggregate. So, for example, a higher level of solidarity could emerge in a university from bridging together the institution's many different disciplines, or even different groups and research labs within the same department.

2.4.3. Building Social Capital through Online Social Networks

There has been a wide range of scholarly opinion on use of the Internet, and its effect on social capital (Chiu, Hsu, & Wang 2006). Putnam (2000) suggested that - by "individualizing" leisure time - use of the Internet decreases social capital. Meanwhile, Wellman et al. (2001) concluded that use of the Internet can supplement social capital by strengthening and extending social capital that already exists in face-to-face and telephone contacts. Finally, other studies (e.g., Uslaner 2000) have linked internet use to both increases and decreases in social capital.

Studies have demonstrated the importance of internet-based linkages in the formation of weak ties, one of the key factors in fostering bridging social capital (Elison, Stienfield, & Lampe 2007). Social networking technology is well suited to maintaining such weak ties easily and with little effort from the community members. As such, social networking sites can potentially increase the number of weak ties community members could form and maintain (Donath & boyd 2004; Elison, Stienfield, & Lampe 2007).

Users of online social networks differ from users of the Internet in general in that online social networks are brought together by shared goals, needs, interests, and practices. A healthy social network is one in which the social capital is strong enough to motivate members to overcome the barriers of the knowledge sharing process, even when – or especially when – no explicit reward is provided (Chiu, Hsu, & Wang 2006).

Since network ties and hierarchy are some of the major factors of social capital, an online social network can build social capital directly by connecting users with each other across the digital medium (Robert, Dennis, & Ahuja 2008). This effect becomes even more pronounced with the use of a recommender system (Thoms 2009).

Several studies have shown that online communications have a positive effect on community members' trust, as well as their participation in community life (Kavanaugh, Reese, Carroll, & Rosson 2005; Kobayashi, Ikeda, & Miyata 2006; Räsänen & Kouvo 2007). Furthermore, studies have found positive links between certain motives for internet use (e.g., gathering information, communication, and recreation) and social capital (Shah et al. 2001; Beaudoin 2008; Raacke & Bonds-Raacke 2008; Valenzuela, Park, & Kee 2009).

The impact that social networking sites have on social capital is also contingent upon what the users hope to get out of their participation (Valenzuela, Park, & Kee 2009). The type of relationships with a social network can determine what kind of social capital they produce: weak-tie bridging networks connect people from different life situations, and broaden the information and opportunities for community members; strong-tie bonding social networks provide emotional support based on interdependencies and a common set of values of shared history (Williams 2006).

Online social networks are more strongly associated with maintaining and fortifying existing offline relationships, rather than with meeting new people (Valenzuela, Park, & Kee 2009). This seems to suggest that online social networks are more suited towards building and maintaining strong-tie bridging social capital (Ellison, Steinfield, & Lampe 2007). However, Donath and boyd (2004) also hypothesize that online social networks are better at increasing a user's weak ties than strong ties because the technology is better suited to maintaining that sort of structural social capital cheaply and easily. Both of these conclusions have been empirically tested by Ellison, Steinfield, and Lampe (2007).

The type of online social network also has an effect on how and what kinds of social capital can be built. Social capital becomes much more important for knowledge integration and creation when a community communicates through lean digital networks. Communication through lean mediums poses greater coordination challenges (Jarvenpaa et al. 1998, Piccoli & Ives 2003), reduces meaning due to the loss of verbal and nonverbal cues (Daft & Lengel 1986), and increases the cognitive load required to coordinate or collaborate (Graetz et al. 1998; Straus 1996). Strong levels of social presence and social capital help counteract the shortcomings of the digital medium on users' capacity for knowledge creation and integration (Robert, Dennis, & Ahuja 2008). The medium on which an online social network is built affects the levels of each of the three dimensions of social capital differently.

Communication Medium and Structural Social Capital

Communities with established structural social capital would be able to import prior communication structures into new communication environments (Straus 1996;

Zack & McKenney 1995). Structural capital plays a critical role in the ability of a community to harness its social capital to create intellectual capital even more so when communicating through lean digital environments, wherein users can easily move from topic to topic without noticing which members have contributed to decision-making or collaborative processes. Structural capital becomes more important to intellectual capital creation when users communicate through lean digital networks (Robert, Dennis, & Ahuja 2008). Since network ties and hierarchy are some of the major factors of the structural dimension, an online social network can build structural capital directly by connecting users with each other across the digital medium (Robert, Dennis, & Ahuja 2008). This effect becomes even more pronounced with the use of a recommender system (Thoms 2009).

Communication Medium and Relational Social Capital

In terms of relational social capital, there is a vast literature about the effect online social networks have on trust (Valenzuela, Park, & Kee 2009). Although some studies consider trust as a stable personality trait (Uslaner 2002), it may be dynamic. Since trust is the belief that other community members will not knowingly or willingly do harm, it is built upon imperfect knowledge, and can fluctuate depending on the actions of others in the network. In the field of online social networks, the prevailing view is that trust has direct positive effects on cooperation and knowledge creation (e.g., Iacono & Weisband 1997; Jarvenpaa et al. 1998; Jarvenpaa & Leidner 1999). Users can obtain detailed information (e.g., background, interests, expertise, and location) about their fellow community members via online social networks, enabling them to reduce uncertainty about the intentions of their peers. This is a prerequisite for establishing

norms, obligations, and expectations. Individuals are more likely to form trusting relationships if they are able to learn more about each other (Berger & Calabrese 1975). However, reducing uncertainty and imperfect knowledge will not invariably increase the level of trust in a community (Berger 1986). Learning more about peers via OSNs can lead us to trust them less (Newton 1999). One way to address this is to limit the content posted to the social network by users to focus on purely professional pursuits (Wright 2004).

Communication Medium and Cognitive Social Capital

This similarity in mental models - i.e. interpretations and systems of meaning - allows members of a community with high cognitive capital to collaborate and create intellectual capital, even if communication is problematic or restrictive (Mathieu et al. 2000). Shared context helps reduce the cognitive load needed to reach a shared understanding, reducing the negative impacts of communication through lean digital networks that make it difficult to convey context-related information. Similar interpretations and systems of meaning allow community members to predict what information is important to others, enhancing coordination and efficiency of communication.

Shared context also requires less communication to convey and share the same amount of information, and reduces the length and complexity of communications (Maznevski & Chuboda 2000, Cohen et al. 1996), reducing the cognitive load required to communicate or collaborate on tasks (Robert, Dennis, & Ahuja 2008). Shared context also provides meaning to information exchanged between community members,

making up for the loss of verbal and nonverbal cues one often sees when people try to communicate through a lean digital network.

Sense of Community and Social Capital

Finally, elements of the Sense of Community Index as well as the Scholarly Sense of Community Index, directly correlate to aspects of the relational and cognitive dimensions of social capital. As such, increasing the sense of community will directly increase relational and cognitive social capital in an organization (Nahapiet & Ghoshal 1998).

2.5. The Effect of Social Capital on Intellectual Capital

The theoretical model of Nahapiet and Ghoshal (1998) identifies four ways in which high levels of social capital correspond to the creation of intellectual capital: increasing access to knowledge resources, anticipation of value from collaboration, motivation to contribute to or participate with the larger community, and capacity to combine and exchange knowledge.

In a follow-up study, Ghoshal and Tsai (1998) tested parts of Nahapiet and Ghoshal's (1998) theoretical model in a large multinational electronics company and found that social capital had a significant effect on the levels of resource exchange and combination within the firm, which further led to the creation of intellectual capital in the form of product innovation. Each dimension of social capital has a different effect on knowledge integration and intellectual capital creation.

2.5.1. Knowledge Integration and Structural Capital

There are many ways to conceptualize and measure structural capital (Zack & McKenney 1995). Network intensity represents the extent to which a community utilizes

its available ties to interact (Robert, Dennis, & Ahuja 2008). A community's intensity represents the amount of social interactions among community members. (Rulke & Galaskiewicz 2000). Prior research has shown that intensity is an important precursor to knowledge combination and exchange in both online (Ahuja et al. 2003) and offline (Brass et al, 2004, Borgatti and Cross 2003) communities. Network decentralization refers to the distributed pattern of social interactions. Communities with more decentralized networks will have information exchanged amongst more community members, i.e. These networks will not show patterns of one or two members dominating discussions (Rulke and Galaskiewicz 2000). Decentralization is important to knowledge integration, since the structure of social interactions is capable of both constraining and enabling access to a network's information sources (Sparrowe et al. 2001, Ibarra 1993).

2.5.2. Knowledge Integration and Relational Capital

Trust makes people more likely to contribute and exchange useful information (Brewer 1981; Kramer & Goldman 1995; Kramer et al. 1996), and enables them to freely exchange information critical to the success of collaboration (Davenport & Prusak 1998). Higher levels of trust lead to an increase in the amount (Dirks & Ferrin 2002) and types of information exchanged (Andrews & Delahaye 2000). In addition, higher levels of trust mean that community members will perceive such information they receive to be credible, and will be more likely to consider using such information (Robert, Dennis, & Ahuja 2008).

In the field of higher education, it has been empirically demonstrated that higher levels of relational social capital enhance knowledge exchange among scientists (Bouty 2000). This is because high levels of relational social capital will compel community

members to not only feel a sense of mutual responsibility for their community's success (Blau 1964; Shore & Barkdale 1998), but to also see their community's success as their own personal success (Hogg et al. 2004; Abrams & Hogg 1990).

2.5.3. Knowledge Integration and Cognitive Capital

When a community has a high degree of cognitive similarity, members are more able to accomplish tasks collaboratively with less need to communicate overtly (Cannon-Bowers et al. 1993). This similarity is a bonding mechanism that eases the integration and combination of knowledge (Inkpen & Tsang 2005; Robert, Dennis, & Ahuja 2008). Shared language, code, and narratives ease the sharing of information, and foster the exchange and combination needed for knowledge creation (Li 2005).

Cognitive capital provides team members with a cognitive map on where and how information should be organized in order to collaborate with each other. This allows community members to rapidly process information, increasing the efficiency and effectiveness of communication amongst them (Marks et al. 2002).

In a higher education institution, these shared narratives can take the form of the natural camaraderie that results from having gone to the same university, taking the same courses, learning from the same professors, and enduring the same academic responsibilities (e.g., qualifying exams, conducting research, attending conferences).

2.5.4. The effect of Social Capital on Intellectual Capital in Education

In the field of education, correlation between the social capital and intellectual capital of learning institutions has been demonstrated. Coleman and Hoffer (1987) conducted a study in which they collected quantitative data from 28,000 students in 1,015 different public, Catholic, and private high schools in America during a 7-year

period, and determined that social capital in students' families and communities was attributed to the much lower dropout rate in Catholic high schools, as opposed to the higher dropout rates seen in public schools. In addition, Aslam et al. (2013) looked at the social capital development process in higher education institutions and found that high levels of social capital led to more knowledge exchange and combination.

2.6. Scholarly Community

The interplay between online social networks, social presence, sense of community, and social capital form the basis for this proposal's model of scholarly community. Previous studies have shown that OSNs can also increase relational and cognitive social capital by developing a strong sense of community (Ractham 2008) or by creating social presence (Biocca et al. 2003; Thoms 2009). Woolcock (1998) refers to these forms of strong-tie social capital as bonding social capital. OSNs can also increase structural social capital directly by recommending connections to other users (Raban 2009). This is the most basic form of social capital creation, and this is done by fulfilling the information needs of users and fostering weak-tie connections. Woolcock (1998) refers to this as bridging social capital. Putnam (2000) compared bridging and bonding social capital, suggesting that bridging networks are better for information diffusion and linking to external assets.

Previous research regarding social capital in online social networks has mainly looked at social capital in relation to motivation to join online communities (Acquisti & Gross 2006; Ellison, Steinfield, & Lampe 2007), rather than how to build it. The literature that looks at how to build social capital (Nahapiet & Ghoshal 1998; Ghoshal & Tsai 1998) almost universally focuses on organizational settings, rather than scholarly

settings. As mobile-based applications are better suited to OSNs dependent on active participation and prompt response times (Hill & Roldan 2005), the proposed study posits that a mobile OSN can solve some of the problems of lack of motivation to participate seen in other studies (Ractham 2008). Furthermore, there is not much prior literature on the effect of mobile online social networks and social capital. Prior studies on using recommender systems to facilitate weak-tie formation mainly focus on the accuracy of the recommender rather than its effects on the community. This dissertation's unique contribution will be an ISDT for developing a mobile online social network with a recommender to increase social capital in a scholarly community.

3. Research Methodology

This chapter describes the research methodology, including the development of the design artifact. The name “Claremont Connection” was chosen for the design artifact to reflect its goal to facilitate growth of social capital at CGU. This chapter will first discuss an ISDT for a mobile app with a recommender system for the improvement of the scholarly community of a higher education institution. It will next discuss “Claremont Connection,” an expository instantiation of the ISDT, and how the kernel theories were ingrained in its design. Finally, it will discuss the process for prototype validation and the means through which the proposed app was evaluated.

3.1. Information Systems Design Theory

An Information System Design Theory (ISDT) is an integral part of design science research. An ISDT is a: “Prescriptive theory which integrates normative and descriptive theories into design paths intended to produce more effective information systems” (Walls, Widmeyer, & El Sawy 1992, p. 36). In other words, it is “the unambiguous establishment of design knowledge as theory,” providing “a sounder base for arguments for the rigor and legitimacy of IS as an applied discipline” (Gregor & Jones 2007, p. 312).

According to (Hevner et al. 2004, p. 79), “design science addresses research through the building and evaluation of artifacts designed to meet the identified business need.” As opposed to natural science, which places emphasis on understanding reality, design research emphasizes the science of the artificial, which is concerned with the ways things ought to be. In order to achieve a certain goal, the design research

practitioner builds an artifact to solve a concrete and specific problem (Simon 1996). An artifact is defined as any hardware or software design that "encapsulates the structures, routines, norms, and values implicit in the rich contexts in which the artifact is embedded" (Bebasat & Zmud 2003, p. 186). Again differing from natural science research, which consists of two main activities, namely, discovery and justification, design science research consists of an iterative build-and-evaluate loop. Design science research chooses theories from the social sciences and incorporates them as kernels, along with the goals of the stakeholders and users, into the design of the artifact in order to produce new design theories (Walls, Widmeyer, & El Sawy 2004).

According to Gregor and Jones (2007), there are eight components of an ISDT: purpose and scope, the construct(s), principles of form and function, artifact mutability, testable propositions, justificatory knowledge, principles of implementation, and expository instantiation. The eight components for Claremont Connection are listed in TABLE 1.

3.1.1. Purpose and Scope

The purpose of this research project is to develop a mobile app to improve the scholarly community of a higher education institution. In Gregor and Jones's (2007) model for ISDT, the purpose and scope of an ISDT refers to "the set of meta-requirements or goals that specifies the type of artifact to which the theory applies and in conjunction also defines the scope, or boundaries, of the theory" (p. 325). This does not refer to the requirements for a specific instance of a mobile app for higher education. Instead, the aim is to develop a design theory suited to the entire class of mobile applications typified by the design requirements. A mobile app typified by these

(TABLE 1) Information Systems Design Theory for Claremont Connection

Component	ISDT for Claremont Connection
Purpose and Scope: What the system is for	The purpose is to develop a mobile app to improve the scholarly community of a higher education institution
Constructs: Representations of the major entities in the theory	An online social network, a recommender system, and a push notification system
Principles of form and function: The architecture of the design artifact	The artifact design is discussed in Section 3.2. Through an online social network, users can update their profiles and post opportunities for other users. Based on pre-defined triggers and criteria, the IS artifact will push recommended social connections or relevant opportunities to users.
Artifact mutability: The degree to which the artifact can be modified to accommodate its state while still remaining theoretically sound	The artifact can be modified to fit in the academic units in which it is deployed. Different departments or schools within different universities might vary with respect to demographics, subject matter, academic focus, etc.
Testable propositions: Hypotheses (propositions) that can be verified by research	P1: An online social network can increase the sense of community for an academic unit within an educational institution. P2: An online social network with a recommender system can increase the level of social capital in a community, namely, an academic unit within an educational institution. P3: An online social network with a recommender and notification system will increase the effectiveness of a community's (i.e., an academic unit within an educational institution's) social capital
Justificatory knowledge: The kernel theories that inform the artifact design	Social capital and psychological sense of community are discussed in Chapter 2 as kernel theories that guide development of the artifact.
Principles of implementation: The process through which the design artifact is implemented	The design process will follow Sein et al.'s (2011) action design research methodology. The design process and research design are further discussed in Sections 3.2 and 3.3
Expository instantiation: An implementation of the design artifact through which hypotheses can be tested	The mobile app prototype is developed as an instantiation of the ISDT for the purpose of testing the hypotheses.

requirements is expected to improve the social capital and sense of community of any higher education academic unit or a scholarly community in which it is deployed.

3.1.2. Constructs

The representations of the entities of interest in the theory (i.e., the constructs) are at the most basic level in an ISDT (Gregor & Jones 2007). The major constructs for this research are an online social network, a recommender system, and a push notification system. Online social networks utilize the power of social ties and computer-mediated communication to foster increased levels of interaction and community. In this research a social network will be used to connect alumni and students based on shared or complementary professional and academic pursuits. A recommender system presents users with information to help decide which products or services to use based on user inputs (Shafer et al. 2001). In this research, it is used to inform users of other users or professional/academic opportunities based on research interests or skills. Push notification systems deliver information to users without direct request based on predefined logic (Latif, Hassan, & Hasan 2008). In this research, push notifications are sent out through the recommender system (NARS – notification and recommendation system) when certain triggers are met.

3.1.3. Principles of Form and Function

Principles of form and function refer to the blueprint (or meta-design) that describes how the constructs fit together to define the structure, organization, and functioning of the design artifact. In the architecture for a mobile app to improve scholarly community in a higher education setting, users have access to an online social network. Through this social network, users can update their profiles and post academic or professional opportunities for other users. Based on pre-defined triggers and user-submitted data, the IS artifact will automatically send recommendations for social

connections or relevant opportunities to users via push notifications, potentially allowing students to form connections.

3.1.4. Artifact Mutability

Artifact mutability refers to the changes in the state of the artifact anticipated in the theory, that is: “what degree of artifact change is encompassed by the theory” (Gregor & Jones 2007, p. 322). Different departments or schools within different universities might vary with respect to demographics, subject matter, academic focus, etc. Some educational institutions might be more focused on research, while others (for example, MBA programs) might be more focused on professional opportunities and finding careers after graduation. The kinds of opportunities users can post, and the criteria on which the recommender functions are variable enough to accommodate whatever is the primary function of the institution in which the IS artifact is deployed.

3.1.5 Testable Propositions

A proper ISDT contains testable propositions about the IS artifact to be constructed. For testable design product propositions, there is a need to test whether the meta-design (i.e., the principles of form and function) satisfy the meta-requirements (Gregor & Jones 2007). A set of hypotheses were specialized from the design propositions in Table 1 which were derived from the kernel theories specified in the next section. The hypotheses appear in Section 3.3, that is, after the definition of the construct measures.

3.1.6. Justificatory Knowledge

A proper ISDT and its propositions are all informed by kernel theories – underlying knowledge from the natural or social or design sciences which guide the

design of the IS artifact (Gregor & Jones 2007). As detailed above in the literature review, the kernel theories for this research are social capital, psychological sense of community, and - to a lesser extant - social presence.

3.1.7. Principles of Implementation

This study's approach regarding implementation combines design research and action research methodologies (i.e., it used the Action Design Research methodology of Sein et al. (2011)). Action Design provides a model for combining action and design research approaches (Cole et al. 2005). The action research methodology allows the researcher to be dynamically involved in the project, collaboratively change experiments, and actively apply knowledge obtained from one iteration to the next. The ADR method seeks to rectify the problem of sequencing and separation in design research (i.e., the "build then evaluate" cycle) by wedding design research frameworks like Hevner et al. (2004) to action research frameworks like Baskerville (1999). ADR does this by interweaving the three activities of building the design artifact, intervening in the target organization, and evaluating it concurrently.

The ADR method is a four-stage process (Sein et al. 2011). In the first stage – problem formulation – the development team identifies and conceptualizes the research opportunity (in this case, the opportunity to develop an OSN to build social capital and a sense of community at a higher education "commuter" institution) and formulates initial research questions. This process parallels identifying the scope and purpose of an ISDT: the principle of "practice-inspired research" emphasizes that the intent of the development team should not necessarily be to solve the problem, but to generate knowledge that can be applied to the entire class of problems of which the case herein

is a specific example. The deliverables of this stage are securing long-term organizational commitment and the setup of roles and responsibilities.

In the second stage – building, intervention, and evaluation (BIE) – the development team[1] designs an artifact based on the user requirements obtained during problem formulation, and iterates through cycles of building updated versions of the design artifact, intervention in the target organization, and evaluation (Sein et al. 2011). The problem and artifact are continually evaluated throughout the BIE process. A key principle of ADR is that evaluation is not a separate phase of the research process, but runs concurrent to building and intervention. The outcome is the realized design of the artifact.

The third stage – reflection and learning – is a continuous stage that runs parallel to the first two stages (Sein et al. 2011). This stage involves reflecting on the design and redesign during the project, evaluating its adherence to principles, and analyzing the results of intervention against the project's stated goals.

The final stage – formalization of learning – abstracts and articulates the outcomes of the project into generalized solutions for a class of problems (Sein et al. 2011).

3.1.8. Expository Instantiation

A realistic implementation of the meta-design can bring about the identification of potential problems in the architecture, and in demonstrating that the architecture is worth consideration (Gregor & Jones 2007). In order to test the propositions, the

[1] While this is my own independent research, the complexity of the design artifact and the number of person-months required for its implementation necessitated the recruitment of two volunteers from CGU's Center for Information Systems and Technology to aid development: Kittisak "Meng" Sirisaengtaksin, and Joe Tawan Roberts. The three of us will henceforth be referred to as "the development team."

Claremont Connection was developed as an instantiation of the ISDT. Development of this design artifact is described in Section 3.2, and the methods through which the propositions were tested are described in Section 3.3.

3.2. Design Artifact

3.2.1. Design Choices

During the 2013-14 academic year, this researcher along with other students were approached by a representative of the School of Educational Studies (SES) at CGU to investigate the possibility of designing and implementing a community-based mobile app to address the problem statement. For this purpose, user requirements and critical functionality were identified with representatives of SES, and possible software platforms were assessed for their viability in implementing the app, with the idea of eventually expanding beyond SES to all CGU units, and perhaps the Claremont Colleges community.

Working with the stakeholders during the problem formulation stage of the action design research process (Sein et al. 2011), the development team identified various problems to address (see TABLE 2). SES wanted to especially address all these problems for “commuter” students and alumni who live far away from campus, stressing the desire to expand the borders of the campus electronically and overcome the same-time same-place restrictions for communication and collaboration. With these goals in mind, and informed by the kernel theories of social capital, psychological sense of community, and social presence, the team designed an architecture for the design artifact. The team decided on the name *Claremont Connection*, highlighting the long-

(TABLE 2) Identified Problems with the CGU Community

Identified Problems
The need for a better means to share academic output from the university.
The lack of an outlet for CGU students and alumni to share news of their academic output and/or career achievements with each other.
A means through which CGU students and alumni could meet each other, and find likeminded members of the community with similar research interests or skills.
A means through which CGU community members can find others within the community to collaborate with on projects.
A means through which CGU students and alumni can help each other find ways for career and/or academic advancement.
A means through which CGU community members exchange and combine knowledge.
A way to facilitate collaboration on research projects and potentially increase the intellectual output of CGU.

term goal of the design artifact's portability to other academic units of CGU and possibly in the future, all of the Claremont Colleges.

Most of the off-the-shelf or open source software options available to the research team were not adequately compatible for all the design constructs' requirements. Rather than use these options, the research team decided to build the design artifact from the ground up. The group also made the decision to forego development of a discussion board for the app[2], since Raban (2009) demonstrated that a social networking app can still generate social capital without a discussion system. The software was coded using Xcode, Objective-C, and SQL. The prototype app is currently native compatible with all Apple iOS devices. The development team combined the best practices of previous online communities at CGU while remaining well aware of the lessons learned from each previous project team. Additionally, for the

[2] Users can send messages to each other via the app and respond to posted Opportunities, but discussion threads are not supported.

look and feel of the interface, the development team followed the layout of other social networking apps like Facebook and EverTrue, as well as previous studies conducted on utilizing features and mechanisms of social networks to forge social connections or a sense of community in higher ed settings (Ractham 2008, Thoms 2009, Sirisaengtaksin 2016). The research team established the requirements for various functions for the app (see TABLE 3). These were refined into three main constructs: a Newsfeed, User

(TABLE 3) Requirements and Constructs for the App

Constructs	Requirements
Newsfeed	• A newsfeed that broadcasts the academic output of Claremont faculty, students, and alumni.
User Profiles	• A way for students and alumni to create, update, and maintain their own electronic profiles and share news of their academic output or career achievements with each other. • A way for students and alumni to find others within the community based on research interests and skills.
Opportunities*	• A way for students and alumni to solicit help on research projects. • A way for students to share teaching or job openings with the CGU community. • A way for interested students or alumni to respond to these opportunities.
Recommender System	• A way to broadcast information regarding relevant User Profiles and Opportunities to other users.

* For the purposes of this app, “Opportunities” refer to any open solicitation for collaboration on a research project or group project (e.g., “I’m working on a research project that involves the development of a mobile app. I’m looking for a student/alum with experience in software development,” “I’m working on a paper for an upcoming conference, and I am looking for co-authors with a background in qualitative methods.”), or to any posting of an open position (e.g., “There’s an adjunct faculty position open at my University,” “My company is hiring, and they are specifically looking for potential hires with experience writing grant proposals.”).

Profiles, and Opportunities, as well as a Recommender System for User Profiles and Opportunities supported by a Push Notification system.

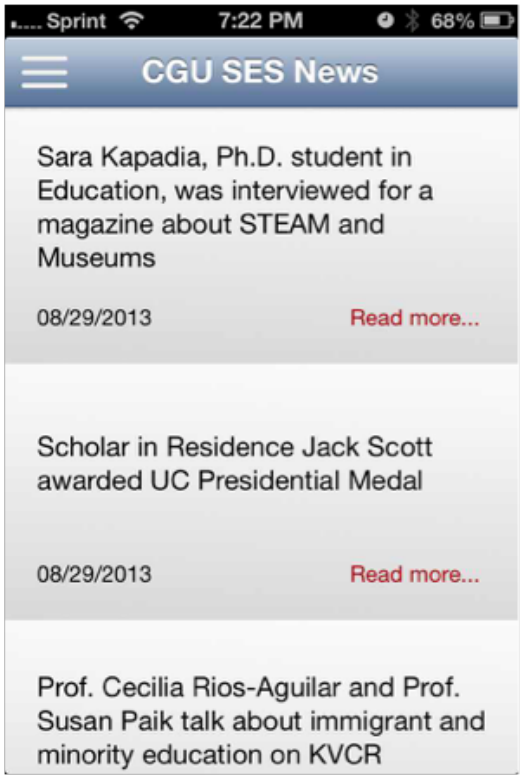
Patterns of Web 2.0 use that relate knowledge acquisition and community building are positively associated with individual production of social capital, while

patterns of use concerning entertainment, recreation, and diversion are negatively associated with social capital production (Norris & Jones 1998; Wellman, Haase, Witte, & Hampton 2001; Shah, Schmierbach, Hawkins, Espino, & Donavan 2002; Valenzuela, Park, & Kee 2009). As such, based on this prior research it was decided to avoid any diversionary features: the focus of the app would be on making connections and collaborations in a purely professional and academic manner. The Opportunities page would be reserved purely for professional purposes (e.g., "there's a teaching opportunity at my school" or "there's a position open at my firm"), and not non-academic activities (e.g., "I need help moving out of the dorms" or even "graduate mixer downtown").

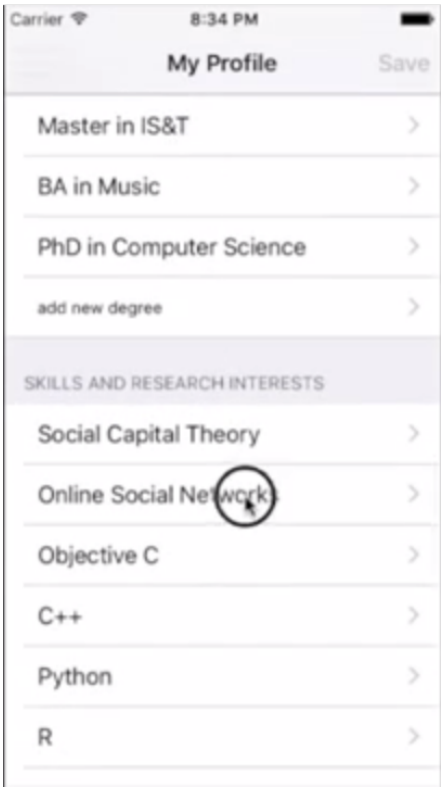
3.2.2. Design Artifact Constructs

The Claremont Connection provides users with a community space (Newsfeed) (FIGURE 2.a), which aggregates news from CGU's RSS, Facebook, and Twitter Feeds. Content on the Newsfeed is not user-generated. Instead, a community aggregator displays news of upcoming events on campus, such as lectures, meetings, and conferences with CGU professors. This feed would also display publishing/submittal deadlines for upcoming conferences and journals relevant to the Claremont Colleges.

In addition, there is a personal page (User Profiles) (FIGURE 2.b) to display community members' education and work information, their research interests, and their skills, as well as a community space. The users' personal space – their profiles – includes information such as their name, contact details, current employment and title, professional affiliations, and geographical location. They can also upload information about their research areas, skills, and subjects of interest.



(FIGURE 2) (a) Newsfeed

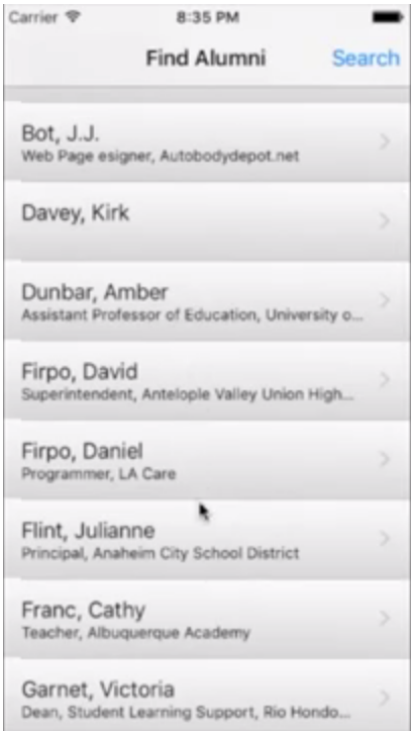


(b) User Profiles

The app also has a directory of Claremont Colleges alumni and current students (FIGURE 3.a), displaying their names and areas of study. Each name links to the profile information provided by those who have joined the app. Users can search for other user profiles by skills and research interests. From each alumni profile, the user can contact that particular person (FIGURE 3.b). The theoretical underpinning for these design decisions is that by making professional interests the main criterion for finding other users, it would help the design artifact better instill a sense of purpose (Wright 2004) – a key indicator of school sense of community – in the user base.

The online social networks developed by Ractham (2008) and Thoms (2009) used Newsfeeds and User Profiles. However, to achieve the goal of enhancing the value of the student networks formed within CGU's online community and increasing the level of social capital at CGU, the development team implemented two additional

features: the Opportunities page and a Recommender System with push notifications. They both serve a similar function: to build bonds, and thus structural social capital, between community members with similar skills and research interests, or between those with divergent but complementary skills and interests, which would not otherwise exist without the design artifact. The two functions diverge in the strategy they utilize to achieve these means: the Opportunities page generates a sense of community through a sense of purpose and fulfillment of needs (Wright 2004), while the Peer Recommender and Opportunities Recommender Systems both uses Push Notifications to generate focus and awareness, and thus create social presence (Cameron & Anderson 2006).

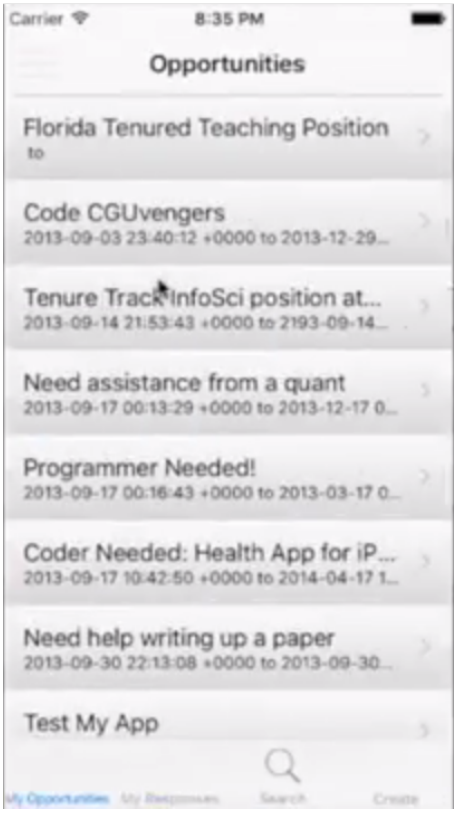


(FIGURE 3) (a) Alumni Search *(b) Contact Alumni*

Opportunities Page

The Opportunities page (FIGURE 4.a-b) gives users a dedicated section in the app where they can post openings, or a request for aid or services. The page also allows other users to respond to these opportunities, almost like an electronic job board for students and alumni. This function was designed with two main categories of use-cases in mind:

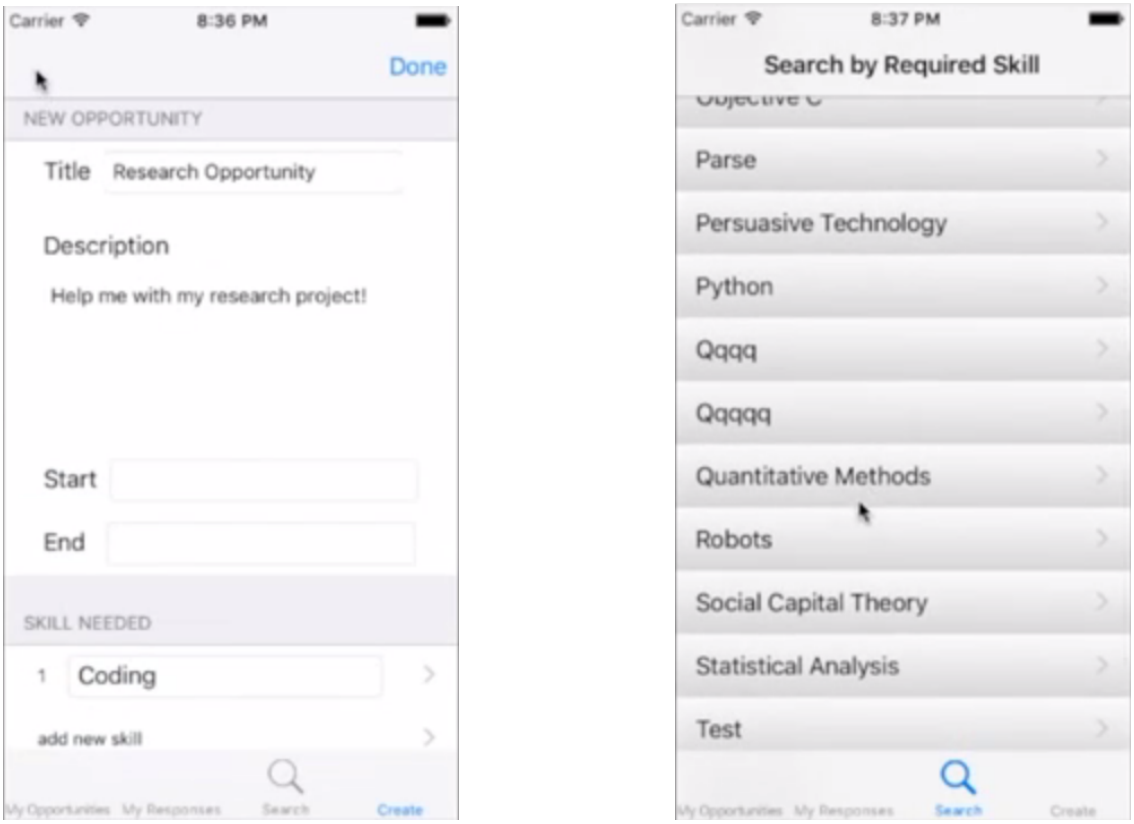
1. *Charitable postings*: A community member posts job openings for students. For example, an alumna might have an opening at her place of work, and would like to notify others in the Claremont community. Or another user might know of an opening for a teaching position at his or her educational institution. Users can post these opportunities to notify fellow members of the Claremont community.
2. *Reciprocal postings*: A community member posts to solicit help on a project. For this use-case, the Opportunities page follows the model of classified ads. For example, a student might have created an app design but needs a programmer to build it. Or another student might be in the process of writing a research paper but needs the assistance of a statistician to help conduct a proper analysis of his/her data.



(FIGURE 4) (a) Opportunities Page

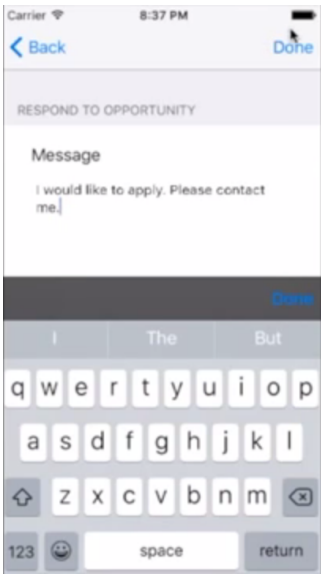
(b) An Opportunity

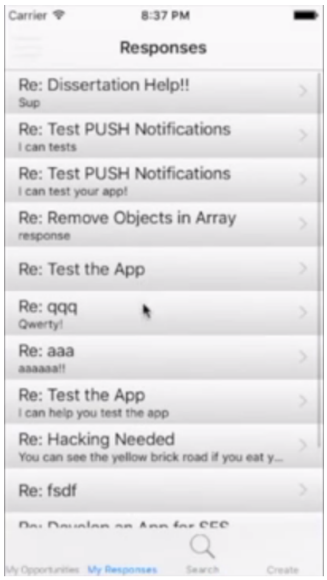
The community members can make a public posting on the Opportunities page so that connections can be formed among students based on complementary fulfillment of needs. When posting Opportunities, users are required to post the prerequisite skills that the opportunity requires (e.g., “Mobile app development,” “Statistical analysis,” “Quantitative methods,” etc.), or what research interests are preferable (e.g., “Online Social Networks,” “Constructivist Learning Theories,” “Social Capital,” etc.) (See FIGURE 5.a). In turn, users will be able to search for Opportunities based on these criteria (FIGURE 5.b). By connecting users through professional and academic Opportunities, the design has the potential to strengthen elements of a sense of community, including integration and fulfillment of needs (McMillan & Chavis 1986) and a sense of purpose (Wright 2004).

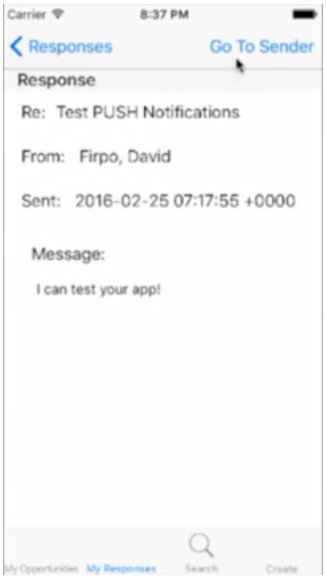


(FIGURE 5) (a) Create Opportunities *(b) Search Opportunities by Skill Needed*

If a user finds an Opportunity that s/he is interested in, s/he can respond with a personal message (FIGURE 6.a). In turn, users can see the responses made to their Opportunities, view the responders' profile information, and contact them in return (FIGURE 6.b-c).







(FIGURE 6) (a) Respond *(b) My Responses* *(c) A Response*

Recommender System

The Recommender System was also implemented to form connections between students, but while some online social networking applications follow a "pull" strategy (i.e., the community members request the social connections and pull them through the medium), the recommender system follows a "push" strategy (i.e., the artifact pushes the social connections towards the user via push notifications) These notifications could make students aware of other students with similar research interests, or who have posted opportunities relevant to their interests or skills. The app sends push notifications to users when certain *Triggers* are satisfied (FIGURE 7). The push notifications and their triggers are based on the goal of recommending users with similar

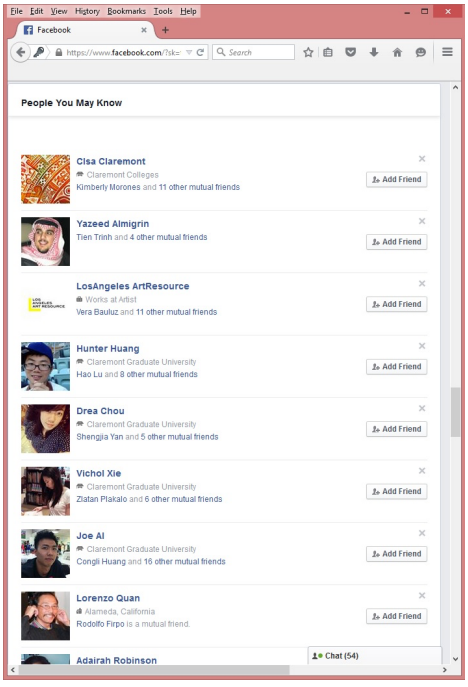
or complementary skills or research interests. Recommender trigger conditions were based on simple match criteria: Whenever a new or updated peer profile or new opportunity was entered into the system, a notification would be pushed out to everyone that had matched on "research interest" or "skills needed." When a trigger condition is met, a *Notification* is sent out to a *Target* population. There are two types of notifications that the recommender system will push to users.

(FIGURE 7) Screenshot of Push Notifications

1. *Users*: The Recommender notifies users about other community members with similar research interests. Other social networking systems that recommend user connections, such as dating site eHarmony, suggest personal connections based on compatibility (see FIGURE 8.a). Those sites require users to provide information about their core traits, values, characteristics, and beliefs. Matching algorithms are used to recommend people to potential partners based on how many of these traits and values they share. Other sites, such as Facebook, recommend personal connections by the number of mutual friends (FIGURE 8.b). The Claremont Connection utilizes a similar system for recommending personal connections, however, instead of pushing user connections for personal networking, the app uses them for academic networking.

a. The trigger for user recommendations occurs when any user adds or edits the “Skills and Research Interests” section of their Profile. The targets include all other users who had listed the same Skill or Research Interest that the triggering user had just updated. The notification pushed out is a message stating “<User> is also interested in <Skill or Research Interest>.”
b. Another trigger for users occurs when any user sends a message to a fellow community member after clicking the “Contact” button of the User Profile page (FIGURE 3.b). The target is the user being contacted through the profile page. The notification pushed out states “<User> would like to contact you.”

2. *Opportunities*: The recommender also notifies users of Opportunities. Opportunity notifications trigger under the following conditions:
   a. The first trigger occurs with the posting of any opportunity. The targets include all users for whom there is a match between their skills and research interests and those required by the posted opportunity. The notification that is pushed out is a message stating “<Opportunity Name><User> has just posted an Opportunity that requires expertise in <Skill or Research Interest>.”
   b. The next trigger occurs whenever any user responds to a posted opportunity. The target is the original poster of that opportunity. The notification pushed out states “<User> has just responded to <Opportunity Name>.”



(FIGURE 8) (a) eHarmony’s recommender *(b) Facebook’s recommender*

It’s possible that when the Skills and Research Interests created and updated are trivial

(e.g. “Objective C” or “Python”) other users with same skills and interests will be flooded

with frequent notifications on their mobile phones. Due to the small sample size of this study, this was not a major concern. However, future large-scale versions of the app would require a means of filtration.

3.2.3. Theory-Based Design

The decision to not include a chat messaging system in the app was made because users can contact each other via the app. Messages are not stored by the app, except for responses made to Opportunities. The design artifact also focuses and limits communication to knowledge acquisition and professional or academic community building, and excludes discussions of unrelated diversions (entertainment and recreation) that Valenzuela et al. (2009) has demonstrated would limit social capital production. Furthermore, Raban (2009) has demonstrated that a social matching system with a restrictive profile exchange interface can be just as effective (or even more so) as one that implements a chat interface.

The development team believed focus on academic or professional pursuits would aid the app in maintaining a strong social presence since Focus is one of the dimensions of online social presence. Focus is the ability of community members to find others with which to discuss subjects that interest them. Other online social presence dimensions (Cameron & Anderson 2006) are:

- Ownership, the ability for community members to control their environment and communication;
- Identity and Style: the ability for community members to nurture their own personal voice, whether through the content of their online communications, adoption of a formal or informal tone when communicating, stylistic decisions, or customization and personalization of their online persona; and
- Safety: defined by Putnam (2000) as a community member's ability to feel secure when participating in his or her community.

The app constructs all provide focus. Being able to search for other community members and their posted opportunities, supported by a push notification system brings focus. Users can find others with which to discuss subjects of interest using the Search feature, which displays a list sorted by research interest or area of expertise. The Opportunities page also connects users to engage in knowledge exchange and combination. Finally, the recommender system, supported by a push notification system, gives the app another means through which community members can find other users or their sponsored projects. Meanwhile, ownership, identity, and style are all facilitated through the ability of the users to post their academic and professional achievements to their personal profile, to choose which opportunities to share with others in the community, and to reach out and begin communication with others. Safety is achieved by the fact that this community will only be open to and accessible by CGU students and alumni.

The constructs of the app are also tied to components of the School Sense of Community Index (SSCI – Wright 2004).

- Membership is generated through emotional safety, a sense of belonging and identification (association with CGU and its alumni through the *Newsfeed* and *User Profiles*), and personal investment (e.g., students and alumni sharing their background and their opportunities with the community, expecting in return stronger relationships or recognition from their peers).
- The opportunities page and its recommender notifications facilitate and reinforce influence and trust: Users might make a *Charitable* posting because they believe it would be of benefit to the CGU community, and users might feel comfortable soliciting help from the community *Reciprocal* postings.
- The opportunities page (along with its notification triggers) also serves integration and fulfillment of needs by attending to the desire of community members to be rewarded for their participation within the community (Rappaport 1977).
- The newsfeed might generate a shared emotional connection by underscoring shared histories (Sonn 2002) of the users.

- The opportunities page might also generate a sense of purpose by facilitating collaboration, thus increasing the willingness of users to sustain community cohesion for individual and community outcomes (Wright 2004).

The recommender system can directly build structural social capital by facilitating the creation of more network ties, and by facilitating appropriable organization. Appropriable organization is the ability to bring social capital developed in one context from one social setting to another (Nahapiet & Ghoshal 1998). In the case of the app, via the opportunities page, trust developed from a network formed through the app can translate into knowledge exchange and combination, e.g., translating trust developed from personal relationships into business exchanges (Fukuyama 1995). Meanwhile, many components of relational and cognitive social capital directly correlate to components of the SSCI. Membership and trust are components of relational social capital, and a shared emotional connection is a major component of cognitive social capital (Wright 2004; Nahapiet & Ghoshal 1998). Thus, any increase in sense of community created by the app will result in the creation of social capital. Meanwhile, use of the opportunities page can create relational social capital by establishing obligations and expectations (Nahapiet & Ghoshal 1998).

In addition to building social capital, the design artifact can increase the ability of community members to harness the social capital that exists in the network[3]. By recommending and connecting community members, the design artifact creates access to knowledge resources, and provides the capability to exchange and combine knowledge (Nahapiet & Ghoshal 1998). An effectively designed app will maintain

[3] An anecdote from CGU involves two researchers from two different research labs working independently on nearly identical research projects. They were not aware of each other's research, or their potential for collaboration, despite working down the hallway from each other in the same building. This was a personal communication to me by a CGU professor.

community members' motivation to continue using it, and create an anticipation of value for its use.

3.3 Research Design

To determine whether an online social network with a recommender system and push notifications can foster a better sense of community, increase the community's social capital, and allow users better access to the network's social capital, this research project sets out to test the following propositions:

- **P1**: A Mobile OSN with NARS can yield higher levels of sense of community.
- **P2a**: A Mobile OSN with NARS can yield higher levels of structural social capital.
- **P2b**: A Mobile OSN with NARS can yield higher levels of relational social capital.
- **P2c**: A Mobile OSN with NARS can yield higher levels of cognitive social capital.
- **P3**: A Mobile OSN with NARS can yield greater exchange and combination of knowledge.

The app and the survey instruments were pilot tested over a four-week period after coding on the app had been frozen.

A qualitative approach was used to collect data.[4] In the Spring 2016 semester, I conducted five focus groups to better understand what aspects of the design artifact were successful and why (or why not). Back-end analytics were used to collect quantitative usage data that would complement the qualitative data of the focus group transcripts. The five focus groups each had five to six participants. Conducting five focus group sessions allowed the researcher to place participants that knew one another as acquaintances or colleagues into separate focus group sessions. Since CGU

[4] Study submitted to the Institutional Review Board at Claremont Graduate University. IRB on 2017.10.26.
Title of Study: Building Social Capital in a Higher Ed Inst. Via a Mobile Online Social Network App
Determination: EXEMPT from IRB Coverage on 2017.10.27.
IRB Authorization #: 2590

is a small school, there were a handful of cases in which some of the participants knew each other.

Each focus group sessions lasted around two hours. Focus group sessions were semi-structured. Descriptive questions, where participants would have to explain their answers in some detail, could provide a greater understanding than what could be derived from survey data alone. Participants were asked their thoughts about the design artifact and its constructs, including perceptions of the app's features and their effectiveness, and what other features the users would like to see. Participants were also asked to discuss ideas based on the kernel theories, e.g., their beliefs about the sense of community at CGU, and the level of social capital in their academic units. Participants were also asked about the social structure, their relations with their community members (how they identify with each other, their level of trust, and norms of reciprocity), and the shared narratives of the community. Finally, participants were asked about their assessment of the intellectual output of their academic unit, e.g., research output with other community members, career and advancement opportunities, and how these are affected by their sense of community and their social ties with the community.

It was constantly emphasized that users were free to criticize the app if they did not like it, or if they did not feel it provided value. Group discussion among participants was encouraged so that each participant could voice his or her opinions. These opinions could help explain usage patterns that appear counterintuitive or conflicting by exploring the processes at work in the academic unit or why a community member feels a certain way.

3.3.1. Sample

The population for this study included students from CGU (and one from the Claremont School of Theology – CST – who was taking courses in CGU's Religion Department). A convenience/snowball sample was selected. I acquired subjects from students by coming to their classes and computer labs, and soliciting their participation. Additional subjects were acquired through the Graduate Student Council. Prospective participants encouraged to spread the word to other potential participants. Focus group participants were recruited based on a wide range of demographic characteristics such as age, gender, occupation, alumni versus current students, etc. Data was collected late in the Spring 2016 semester at Claremont Graduate University.

3.3.2 Kernel Theory Constructs

Appendix A includes the detailed questionnaires on which focus group discussions were based.

School Sense of Community Index (P1)

Focus group discussion topics and questions were adapted from previously published studies measuring scholarly sense of community and social capital. Sense of Community was discussed using questions from Wright's (2004) School Sense of Community Index, a survey instrument that measures Membership, Influence and Trust, Integration and Fulfillment of Needs, Shared Emotional Connection, and Sense of Purpose.

Social Capital

Structural Social Capital (P2a) was discussed using questions from a survey instrument, Social Interaction Ties, created by Chiu, Hsu, and Wang (2006). Relational

Social Capital (P2b) was discussed using questions from another survey instrument created by Chiu et al. (2006), including Norms of Reciprocity – utilizing questions adapted from Wasko and Faraj (2005), Identification, and Trust – utilizing additional questions by Valenzuela et al. (2009). Cognitive Social Capital (P2c) was discussed using two instruments, one adapted from Chiu et al. (2006) and one adopted from Wasko and Faraj (2005). Chiu et al.'s (2006) survey instrument has two measures for cognitive social capital, Shared Vision and Shared Language.

Combination and Exchange of Knowledge (P3)

Combination and Exchange of Knowledge was discussed using questions from the Quality of Knowledge survey instrument developed by Chiu et al. (2006).

3.3.3. Focus Group Agenda

The focus group agenda is detailed in TABLE 4. To ensure that each participant was exposed to the notification and recommendation system (NARS), a push notification (a peer recommendation based on shared research interests) would automatically trigger early in the focus group sessions. Thus, even if a participant had not met any of the normal conditions that would trigger a push notification, s/he would still be aware of the feature, its interface, and how it works. Additionally, the NARS feature and how it works was explained to each participant, and further discussed in a group setting with other participants who did receive push recommendations. Thus, even if students had not used the feature, they would still have been indirectly exposed to it.

Coding

I transcribed the recordings of each focus group session, then developed and defined a set of coding categories. Relevant information was classified by assigning category codes to applicable phrases and sentences. To classify these phrases and sentences into defined categories, tables were created where the row headings represented the participants' codes and the column headings represented the category codes. Relevant sentences and phrases were copied into the appropriate cells when any participant provided feedback or dialogue pertaining to that category. For example, someone expressing skepticism that other users are actually proficient in the skills they listed would be categorized under trust as a prerequisite (as in "Trust required to facilitate use of the artifact"). Codes were revised as redundant or unclear coding was uncovered. For example, it was decided that sense of purpose overlapped entirely with cognitive social capital. Therefore, the two codes were categorized as cognitive social capital. The goal of the data analysis was to look for patterns across the sessions and evaluate the potential of the artifact to foster social capital. To further ensure the internal validity of the coding and data analysis process, I repeated this process a couple months after the initial analysis. Many themes emerged from the five focus groups. The results and analysis are discussed in Chapter 4.

(TABLE 4) Focus Group Agenda

Agenda Topic	Time	TET[4]
Introductions Welcome. I want to thank you for coming today. My name is Daniel Firpoand I will be the facilitator for today's focus group discussion. I am a PhD student at Center For Information Systems and Technology, Claremont Graduate University. We invited you to take a part in the group discussion because you are all students or alumni of the Claremont Colleges. We would like to talk with you today about the sense of community at Claremont. Before we begin, I would like to review a few ground rules for the discussion. • I am going to ask you several questions; we do not have to go in any particular order but we do want everyone to take part in the discussion. We ask that only one person speak at a time. • Feel free to treat as a discussion and respond to what others are saying, whether you agree or disagree. We're interested in your opinions and whatever you have to say is fine with us. There are no right or wrong answers. We are here to learn from you. • If there is a particular question you don't want to answer, you don't have to. • We will treat your answers as confidential. We are not going to ask for anything that could identify you and we are only going to use first names during the discussion. We also ask that each of you respect the privacy of everyone in the room and not share or repeat what is said here in any way that could identify anyone in this room. • We are recording the discussion today and also taking notes because we don't want to miss any of your comments. However, once we start the recorder we will not use anyone's full name and we ask you do the same. Is everyone OK with this session being recorded? • We will not include your names or any other information that could identify you in any reports we write. • You will be asked to use a mobile app on your iPhone, or one of our provided iPhones. You will be asked to provide some personal information (i.e. research interests, areas of study, occupation, etc.), but we will not share that information nor any other information that could identify you in any reports we write. • Finally, this discussion is going to take about two hours and we ask that you stay for the entire meeting. Does anyone have any questions before we start?	5	5

[5] Total elapsed time

(TABLE 4) Focus Group Agenda (Continued)

Agenda Topic	Time	TET
Group Discussion Topic 1 • General (CGU community), e.g., "It is important to have high levels of social interaction in the Claremont community." • Online Social Networks and community, e.g., "An online community will increase interaction with my fellow Claremont community members." • Recommender Systems and community, e.g., "A recommender system will increase interaction with my fellow Claremont community members."	20	25
Demonstration Video	5	30
User Profile Walkthrough • Trigger recommendations when users add or edit the "Skills and Research Interests" section of their Profile.	10	40
Find Users Walkthrough • Trigger notifications when any user sends a message to a fellow user after clicking the "Contact" button of the User Profile page.	10	50
Create Opportunities Walkthrough • Trigger recommendations when any user posts an Opportunity with a match between a user's Skills and Research Interests, and those required by the posted Opportunity.	10	60
Find and Respond to Opportunities Walkthrough • Trigger notifications when any user responds to a posted Opportunity.	10	70
Free experimentation with the Claremont Connection	15	85
Group Discussion Topic 2 • Online community, e.g., "Would such a tool would increase my interaction with my peers?" • Recommender system, e.g., "Would you use the Claremont Connection to check for peer/opportunity recommendations?" • Technology acceptance, e.g., "Is learning to use the Claremont Connection easy?" • Social interaction ties, e.g., "I maintain close social relationships with some members in the Claremont community." • Norms of reciprocity, e.g., "I know that other members in the Claremont community will help me, so it's only fair to help other members." • Identification, e.g., "I feel a sense of belonging towards the Claremont community." • Trust, e.g., "Members of the Claremont community will not take advantage of others even when the opportunity arises." • Shared Vision, e.g., "Users of Claremont Connection would share the vision of helping others solve their academic and professional problems." • Shared Language, e.g., "Users of Claremont Connection would use common terms or jargons." • Quality of Knowledge, e.g., "The communications shared by users of Claremont Connection would be relevant to the topics." • School Sense of Community, e.g., "There is a sense of purpose in my program."	30	115

(TABLE 4) Focus Group Agenda (Continued)

Agenda Topic	Time	TET
Final Thoughts, Review, and Wrap Up Those were all the questions that we wanted to ask. Does anyone have any final thoughts about sense of community at Claremont, and the mobile app? Thank you for coming today and for sharing your opinions with us. We hope you enjoyed the discussion today.	5	120

4. Analysis and Results

This chapter describes the findings of the focus group data. The procedure used in these focus groups was described in Chapter 3.

The participants were 28 graduate students between the ages of 20 and 50 (see TABLE 5). Most students were in their 20's or 30's, with three students over the age of 40. Fourteen of them were female and the other 14 male. Nine were Master's students, and the other 19 were Ph.D. students. All were students of the Claremont Colleges: 27 were from Claremont Graduate University, and one was a student of the Claremont School of Theology (CST, another graduate school in the Claremont Colleges. Though separate from CGU, students from CST often take classes with CGU students, usually with CGU's School of Religion) as did this individual.

In order to answer the research questions of this study, focus group transcripts were coded and analyzed as explained in Chapter 3. This section describes the participants' perception of the design artifact, the effect its use has on social capital (and vice versa), and its potential for knowledge exchange and combination; Section 4.1 explains students' perceptions regarding the benefits or advantages and disadvantages of the App as an Online Social Network, Section 4.2 clarifies students' perceptions regarding the advantages and disadvantages of the Notification and Recommender Systems, and Section 4.3 discusses students' perceptions of sense of community and social capital at the Claremont Colleges and the effects – if any – the App and the Recommender systems would have on them. Section 4.4 discusses the artifact's

potential (or lack thereof) to facilitate the exchange and combination of knowledge.

Finally, Section 4.5 reviews and summarizes the findings of this analysis.

(TABLE 5) Participant Demographics

Name	Ethnicity	Age	Gender	School	Department	Degree	Status
A1	Asian	30s	F	CGU	CISAT	PhD	Current
A2	Asian	20s	M	CST	Religion	PhD	Current
A3	Asian	30s	M	CGU	CISAT	PhD	Current
A4	Asian	40s	F	CGU	Religion	PhD	Current
A5	Asian	30s	F	CGU	DBOS	PhD	Current
A6	Asian	20s	F	CGU	DBOS	M	Current
B1	Middle Eastern	30s	F	CGU	CISAT	PhD	Current
B2	Asian	20s	M	CGU	Drucker	M	Current
B3	Hispanic	30s	M	CGU	DBOS/ DPE (Dual)	PhD	Current
B4	Asian	20s	M	CGU	Math	PhD	Current
B5	Asian	30s	M	CGU	CISAT	PhD	Current
C1	Indian	20s	F	CGU	DBOS	M	Current
C2	Hispanic	20s	F	CGU	Drucker	M	Alumna
C3	Hispanic	40s	M	CGU	Drucker	M	Alumnus
C4	Asian	20s	F	CGU	Drucker	M	Alumna
C5	Caucasian	30s	M	CGU	CISAT	PhD	Current
D1	Asian	20s	F	CGU	DBOS/ CISAT (Dual)	PhD	Current
D2	Caucasian	20s	M	CGU	Art	M	Current
D3	Asian	30s	F	CGU	DPE	PhD	Current
D4	Asian	30s	F	CGU	DPE	PhD	Current
D5	Middle Eastern	30s	M	CGU	CISAT	PhD	Current
D6	Middle Eastern	30s	M	CGU	CISAT	PhD	Current
E1	Indian	20s	F	CGU	CISAT	M	Current
E2	African American	20s	M	CGU	Religion	PhD	Current
E3	Caucasian	20s	F	CGU	Religion	M	Current
E4	Middle Eastern	30s	M	CGU	CISAT	PhD	Current
E5	Hispanic	30s	M	CGU	DBOS	PhD	Current
E6	Caucasian	40s	F	CGU	Education (M) & Public Health (PhD)	PhD	Alumna

4.1. Perceptions of an Online Social Networking App

4.1.1. Advantages of an OSN App

Participants were instructed to create at least a couple Opportunities. There was a wide variation in the types of Opportunities posted through the app (see TABLE 6)

(TABLE 6) Sample Opportunities

Title	Description	Creator
Job Opening at Stanford	Stanford University is hiring an adjunct lecturer for an undergraduate intro to philosophy course	A2
Observation opportunities	Taking notes of observations during lab teaching sessions. Sessions are two hours long, held at research center in the city of Duarte	B3
Do an interview, win $100 gift card	I'm desperately trying to finish a class project and I'm looking for 4 people who grew up in America and are willing to do a 20min survey for a chance to win a $100 amazon gift card	C5
web dev job opportunity	Full time salaried bonus eligible position available immediately with Fortune 500 company	D1
Performance project	I need a videographer and photographer to document my performance art piece	D2
Need research assistant	I'm doing a research on Data mining tools. I need someone who is good with academic writing	E1
Collaboration with Religion Student	Looking to talk to a religions student about a collaboration with cultural studies regarding religion in America	E3

Twenty-one participants – a clear majority, with at least one from each of the Focus Groups – had positive responses towards the app (see TABLE 7. Statements like "I like it," "I think it would be very useful," or "I would use it" were rated as "Positive." Statements like "I don't have any interest in using this app" or "this is not something that is very enticing" were scored as "Negative"). These participants articulated that they found the app useful, and that they would use such an app if made available by the

University. Student A1 said of the app, “it’s like an alternative way to find jobs and make connections.”

(TABLE 7) Participant Perception of Artifact as an OSN

	Oppor-tunities Posted	# of Times Messaged Others	# of Responses to Oppor-tunities	**Participant Perception of Artifact as an OSN**
A1	2	2	6	**Did not state**
A2	3	1	2	**Positive**
A3	3	2	3	**Negative**
A4	2	3	3	**Positive**
A5	1	0	3	**Negative**
A6	1	3	2	**Positive**
B1	3	1	2	**Unsure**
B2	2	0	3	**Positive**
B3	3	1	1	**Positive**
B4	3	1	0	**Positive**
B5	2	1	1	**Positive**
C1	2	0	0	**Positive**
C2	2	4	1	**Negative**
C3	2	7	2	**Negative**
C4	1	0	2	**Negative**
C5	3	0	1	**Unsure**
D1	5	1	1	**Positive**
D2	4	0	1	**Positive**
D3	3	6	6	**Positive**
D4	2	1	4	**Positive**
D5	3	3	2	**Positive**
D6	1	1	0	**Positive**
E1	2	1	0	**Positive**
E2	3	1	0	**Positive**
E3	3	2	1	**Positive**
E4	2	1	1	**Positive**
E5	2	1	0	**Positive**
E6	3	0	0	**Positive**

Student E6 – who had spent several years as an alumna between finishing her Master’s in Education at CGU and returning as a PhD student – said of the app:

> I like it, I think it’s going to be particularly useful, at least in my mind, for connecting current students to alumni. I think that’s a big deal for career transition out of grad school to ‘the real world.’

Four of these participants (A2, B4, D5, and D6) noted that the app could be useful for short-term last-minute connection building, e.g., a last minute project or opportunity that needs someone's attention quickly. Said Student B4:

> It's very easy to use. It's not that formal. So even if it's a small job you post, like 'you need a math tutor. One hour. Really quick. $15 per hour.' I think students would use it a lot.

Six of these students – at least one from each of the Focus Groups save Focus Group C – compared the app favorably with LinkedIn and Facebook. Student B5 said the fact that the opportunities were local, or exclusive to the Claremont community, set it apart from other OSNs:

> Job opportunities, and local jobs, differentiate [the app] from LinkedIn or Facebook. I can see local opportunity. That people might be able to share some common interests. Local means something that's specific for [the] Claremont community or [the] Claremont Colleges.

Student B2, who was open to the app, but with reservations, said:

> "I think people will use it. I don't know how successful it'll be, because right now I don't even use [current online social networks]. So using this, I may be more likely to be interested in using it to figure out different people's research, or find research on my own, or finding opportunities and jobs that I might not know of [through existing means].

Four participants articulated that they thought the app could lessen the amount of energy and willpower needed seek out and make connections. Student B1 and B4 said of the app:

> B1: Especially if I need help, I would [use the app]. For example, if I need to use Matlab, and I don't know anyone around who knows Matlab. If this notification came to my mobile, I would look at it. I would send him a message. Maybe make an agreement. Go to him and start a conversation. It's really useful.
> B4: Yeah, I think it's helpful. Like when someone pops up and it says this guy's interested in Matlab. It's for sure you'd go check on him. 'Who is this guy?' And then you keep in mind: 'This guy is interested in Matlab. Okay, maybe sometime we work together.' It's good to know.

The app's ability to abbreviate and take the formality out of the process of making connections was articulated by participants in Focus Group B (B1 and B4). They discussed Opportunity push notifications as a way to lessen the hassle of constantly having to tailoring their resume or CV and quickly reach out to and respond to others to make purpose-driven connections. Student B1 said:

> Sometimes you feel lazy. You know, going through the process when you get a job offer email. Sometimes I feel like, 'No, I have to write my resume.' But if you can respond quickly, that's kind of important for connection.

When discussing his willingness to respond to Opportunity notifications, B4 said:

> I think I will send a message because it's easy and you don't have to be formal. You don't need to send CV or anything, just 'Hi, I'm interested. What do I need to do? Thank you.' That's it! That's all of it! It's really fast. You don't need to submit a CV, like I said. If it comes from the email, from the school, like for the job and then you got it from the school, you need to spend some time to write the email. A very formal one. And here it's very informal.

This again suggests that by lessening the time and work investment required to reach out and make social connections, the app has the potential to help build structural social capital.

While some participants discussed the app's potential for creating new connections, others noted the app's potential for maintaining existing connections. Two students from Group C (C2 and C4) said the app could be good for maintaining connections outside the classroom.

Student C2, despite saying she personally wouldn't use such an app, still said:

> We usually hear connections while we're in school. So after that, it'd be really good to know that we can contact alumni even though I didn't get to interact that much in the classes I took as a student.

4.1.2. Disadvantages of an OSN App

While most current students had a positive reception to the app, seven of the participants were unmoved. Two of these students expressed skepticism towards the app. Student C5 said:

> It feels distant, using this. It makes me hesitant, like 'would I get responses?'

Student B1, meanwhile, questioned how many people would use the app, if its appeal was limited only to those who are interested in jobs and in research. The other five stated outright that they most likely wouldn't use the app, or that they did not see much value in it.

Student A5 had a lukewarm reception to the Opportunities feature:

> I help my friends because they're my friends and they help me because they're my friends. I see no reason that I'd help a stranger.

Student A3, a current student, said

> I don't find any strengths compared to LinkedIn, so actually I don't have any interest in using this app. I can find my job in LinkedIn, but I don't know what is the benefit of this app.

He cast further doubt that students would continue to use the app after graduating:

> I don't know why alumni would use this app. I think alumni should include their job opportunities and things like that so others can find, … but I'm not sure because I don't find any benefit for alumni.

Alumni Perceptions

Though A3 is a current student, this sentiment about usefulness was echoed by the actual alumni who participated in the focus groups. It was noticed that for the most part, alumni had a far cooler reception to the app than current students. Except for Students E5 and E6, all alumni (Students C2, C3, and C4) who participated in the study

stated outright that they would not use such an app, stating that they felt it was mainly for current students, and that they were too busy with their careers to seek out connections or respond to opportunities within the Claremont community (see TABLE 8). Group C, with a 3:2 alumni-to-current-student ratio, expressed the most skepticism out of all the groups. Student C2 said: “You get to the point where this is not something that is very enticing for alumni.” C2 felt that the app would be geared primarily towards current students.

(TABLE 8) Alumni Perceptions of the Artifact as OSN

	School	Degree	Status	**Perception**
C2	Drucker	M	Alumna	**Negative**
C3	Drucker	M	Alumnus	**Negative**
C4	Drucker	M	Alumna	**Negative**
E5	DBOS	PhD	Current*	**Positive**
E6	Education (M) & Public Health (PhD)	PhD	Alumna	**Positive**

*E5 was a then-current student who was about to graduate, and had already started working off-campus

Even some current students, e.g., Student A3, B2, and B3 expressed skepticism that alumni would continue to use such an app after graduating. Student B2:

> I don’t see why alumni would go to this app. … I just don’t see what’s for alumni. Because if I were an alumni – let’s say I was an alumni for Drucker [CGU’s MBA school] right now – I probably would go towards the Office of Career Services.

Unfortunately, none of the participating alumni were PhD graduates with academic careers, so this study cannot determine if this sentiment would be shared by alumni working in academia, as opposed to alumni in the corporate world. However, Student B3 hypothesized that an alumni working as faculty at another University would have that

school's student body from which to find potential research partners, rather than mine the Claremont alumni network.

Of the current students who discussed the possibility of continuing to use the app after graduation, only Student A6 thought it would be useful for alumni:

> Not necessarily my peers, but in professional development type of people. For alumni, that would be more useful that way: Networking with other people. In my case, researchers that have similar research interests with me.

Student A6 was in her last semester and – knowing that she would move out of state after graduation – stated that such an app would let her remain a part of the alumni network despite the geographic separation.

Besides Student E6, the only one of the alumni who said he would consider using such an app was Student E5, a PhD student who had just graduated earlier that semester. Student E5 works off campus, and stated that he'd use the app to post jobs that open up at his company:

> I might use it, let's say when jobs become available at the company where I'm at. That's one time I might use it. I might also use it for internship opportunities where I work. I might also use it if there's some type of skill that I need for work but I might not have, and I can connect with somebody who has that skill.

Additional Criticism

One student who expressed skepticism towards the app (Student C3) said that there would have to be constant content to draw people in besides just what the students and alumni were posting:

> We have to be actively involved in using the app. I guess the way Facebook works: The more you're on it, the more you see people. So there'd have to be a draw to keeping constant communication.

Other participants also noted that there would have to be at least a critical mass of students using the app for it to provide any use at all. C5 wondered out loud if he would be willing to post content if he wasn't sure he'd get a response. Meanwhile, the alumni tied some of their reservations towards using the app to their perceived lack of alumni outreach. This is in line with Ractham's (2009) study about use of social networking software to foster community in a university setting which showed that a strong administrative presence was necessary to stimulate the motivation for continued use.

4.1.3. Social vs. Professional Networking

Student B1 said:

> I think that motivation, or those who will use the app, will only be those who are interested in jobs and in research, but not for all students. With what you have, like this version so far, that's the only combination of people I see using it.

This gets to another factor that all of the focus groups discussed: Whether casual socialization would be compatible with the purpose of the app. Only three participants (Students B2, B3, and D1) voiced support for keeping the app's focus on purely academic and professional pursuits.

Even so, a greater number of the participants, nine – representing all Focus Groups save Group B) – said they would prefer if the app could also support more casual networking opportunities. Student A2 said: "I think career development is one thing, but if we're trying to build a sense of community here we need more social interactions and opportunities."

The alumni of Group C all came down hard on the seeming lack of importance of social/casual connections and an active administration presence in fostering a sense of community. Student C2 said:

> The school doesn't really have much of a community in a way. So this is like you don't know who it is, who's behind it. You don't see them putting on interactions between different departments and new people or socials. … The school itself doesn't foster a sense of community. So this is kind of hard to buy into.

Map Feature

The importance of casual social connections as an important component of scholarly community came up when some of the users noticed the Map Feature. This was an unfinished feature that remained in prototype form in the demo app the focus groups used. When users select "Map" on the app's Main Menu, it displays a map with several pins placed on it. These pins correspond to where other users have listed their ZIP code (though not their actual address, out of privacy concerns). Even though this feature was not a part of the Focus Group exercises, some of the participants in Focus Groups A and D stumbled upon it during the "free experimentation" portion of the Focus Group agenda. This was the part of the agenda between the directed use of the app features and discussion, when users were given more time to play around with the features of the app on their own. Even though it was an incomplete version, three of the four participants who discussed experimenting with the feature (A4, A6, and D1) all thought it would be useful for finding connections. Some, like Student D1, thought it would be a good feature for finding opportunities in her general vicinity:

> It could definitely help. Especially seeing the locations of the alumni is pretty interesting – I was looking at the map. If each pinpoint is a person, you can see if you want to live in a specific area, if there are job opportunities.

Some thought it would be good for finding new social connections in a new or faraway location. Student A6, who was in her last semester at Claremont and planning to move out of state upon graduation, said of the feature:

> Yeah, I like the idea, the maps feature is supposed to be locating all the alumni in the States or around the world, right? Yeah, I think that part can be useful. No matter where I go I can just locate/search alumni that are registered on this map and I can look for job opportunities, even if just like hanging out.

Meanwhile, Student C3, who did not use the Map feature during the demo, suggested support for socialization features for the app that paralleled what had been planned for the Map feature: "There could be a regional CGU Downtown Los Angeles Alum Association, or one in San Diego, San Francisco, New York..." So even though such features were intentionally entirely excluded from the design – and prior research showed that casual socialization could be a distraction for a scholarly community (Raban 2009, Valenzuela, Park, & Kee 2009) – it might be prudent for the app to include purely social content to foster a sense of community, the means to share narratives, and a sense of purpose amongst.

Community Awareness

Students B3 and E6 noticed and commented positively on another feature that was not part of the scripted Focus Group activities; the Newsfeed feature. The Newsfeed was a partially implemented aggregator of the Facebook and Twitter feeds of the University and its different departments and schools (only the School of Education's feeds were implemented). However, some students commented positively on it, noting that it could be another useful channel to promote events (both social and professional) and groups within the community. Student B3 pointed out that it could serve as a virtual equivalent to the bulletin boards people post flyers on around campus:

> ...as a replacement for the boards, like sometimes career services or somewhere else have them full of stuff and people hardly stop and see. And actually I have seen a couple that are really interesting but I did not know that they were there, because I hardly go there. 'Oh, I never knew.'

> So if they were there in the app – which would with the nature of the app that it's dynamic – it would be good.

Others noted that the newsfeed – and the app in general – would be useful to promote clubs and groups on campus. Students E2 and E3 discussed a group in which they're both participated.

> E2: I would definitely use it. I know some buddies in SPARC ["Society of Philosophy and Religion for Claremont]" which is a club in CGU's School of Arts and Humanities, mainly comprised of Religion and Philosophy majors. One of the things they want is to network and try to promote teaching opportunities. Something like that. It's a lot easier like this. They can reach out in this app, put that stuff on there. You can connect to other people and spread the word and utilize that more. If somebody sent me that about research or lab writing, stuff like those topics, there's a lot of opportunity there. I definitely like it.
> E3: I'm glad that you mentioned SPARC because I did one of those teaching aid things from SPARC. But it's not something most people even know exists. So that would be a good. … I've never actually gone to one of those meetings, but I've gotten emails, one of those mass emails about 'teaching opportunity'. So this would help.
> E2: That's what they try to do.
> E3: Yeah, sometimes its PhD students who are already teaching and want a teaching assistant, because they're still working on their dissertation and need someone to grade their papers or things. Or teach… See? Nobody knows what SPARC is!

Regarding another unimplemented feature, three students (A1, C5, and E1) suggested that even something as simple as adding Profile Pictures can help make students more aware of each other. Although the ability to upload Profile Pictures was disabled for the demo, it had existed in earlier iterations, such that there were still a few dummy profiles that had Profile Pictures. Student A1 suggested that being able to see other student's faces would at least give her a surface-level reference from which to establish social presence and trust.

4.1.4. Affect on Transdisciplinary Networking

Siloization seemed to be a continuing theme among the responses, with mixed reactions. Nine participants – out of 28 – would prefer to use the app to reach out to those outside their groups. Meanwhile, Student C1 expressed concern about opening the app to the entire university without the ability to filter or categorize by department. She said "I can see it working for each department, but for the whole [university] it'd just create chaos" (though she also suggested having the univeristy post "bigger events for all CGU students, not just one department" through the Opportunities page). Students C4 and C5 suggested adding the ability to filter searches by department. This suggestion was echoed by Student E1. Many of the participants noted the difficulty in grad school of making connections with people outside their department, stating that most of their social connections come from their classes (7 participants), their research labs (2 participants), their department (9 participants), or community housing (1 participant).

Many of the participants expressed the desire to make connections outside these insular groups. Student D2, a student from CGU's Masters of Fine Arts program, said:

> I looked at departments I would never talk to – I was like 'that exists??' … The thing about opportunities, there are a lot I could do with people from other focuses. I could collaborate with someone into music, do a piece. It's amazing.

One student suggested integrating use of the app into the Transdisciplinary courses to foster inter-departmental connections: Student C5 said:

> What do you think if it was integrated in with the T-courses? I just remember how long the background was for the people that were in the T-course. In this part of the T-Course we all filled it out and talked a little about what we were doing and what directions we were heading. Some leadership or management stuff, there were problems I would run across.

> I would have at least thought about going back to those people if I had a way to contact them. I've lost track of all of them at this point.

One of the students (E1, an International student from India) wanted the app to be able to let her filter her searches to find other Indian students outside her department, using the app to cross group boundaries based on one identity (field, major, or academic department) to maintain another insular group based on a different identity (ethnicity/ nationality).

Summary

The suggestions compiled from participants regarding the design artifact as an Online Social Network are summarized in TABLE 9.

(TABLE 9)

Suggestions for OSN
Filter by department
Implement the Newsfeed feature
Implement the Map feature
Allow casual social networking
Maintain strong administrative presence
Integrate into the Transdisciplinary courses
Add profile pictures

4.2. Perceptions of a Notification and Recommender System (NARS)

4.2.1. Usage patterns

Over the course of the study, 44 Push notifications were sent out when users contacted each other directly through the app (via the “Contact User” screen). In addition, 48 Push notifications were sent out when users responded to opportunities

posted by other users. Of the notifications triggered on matched skills or research interests, only 14 Push notifications were sent out for Peer Recommendations, and only 7 Push notifications were sent out for Opportunity Recommendations (see TABLE 10. Statements like “I think it’s helpful” or “I would respond back” were rated as “Positive.” Statements like “I’m not looking for more to do” or “I wouldn’t use it” were rated as “Negative.”).

While many participants did not receive a push notification because they or another user met one of the Trigger conditions, the app was hard-coded so that all the participants would get at least one push notification for a peer recommendation over the course of the exercises (this hard-coded Push notification was not included in the tally in TABLE 10). In addition, the NARS was explained to them during the demo, so each participant understood its function and purpose.

One of the difficulties in meeting the Trigger conditions was the wide variation in which users listed skills and research interests in their profiles or the opportunities they created. Potential matches would be missed because a user misspelled a keyword, because of case sensitivity (“INFORMATION SYSTEMS” versus “Information Systems”), or because of slightly different verbiage (“Religious Studies” versus “theology and bible”), leading Student C5 to exclaim: “I think I have to change the way I list my skills…” Student E3 suggested using a Word Bank to solve this: When inputting skills or research interests, users can check to see what other keywords already exist in the database, and either choose an existing one or create a new one.

There was no correlation between the number of Push notifications or recommendations and participants’ perceptions of the NARS. Focus Group C did not

see a single Pushed Opportunity from the Recommender, and had the most indifferent attitudes towards the NARS. However, Focus Group B only saw one Pushed Opportunity, and – based on the participants who answered – had mostly positive attitudes towards the NARS.

(TABLE 10) NARS Use

	Sex	Department	Deg	Status	PUSH Profile Match	PUSH Direct Message	PUSH Opp Match	PUSH Got Opp Reply	**NARS Opinion**
A1	F	CISAT	PhD	Current	0	4	2	5	**Positive**
A2	M	Religion	PhD	Current	0	2	0	6	**Positive**
A3	M	CISAT	PhD	Current	0	1	0	2	**Positive**
A4	F	Religion	PhD	Current	0	1	0	3	**Did not state**
A5	F	DBOS	PhD	Current	0	2	1	1	**Positive**
A6	F	DBOS	M	Current	0	1	0	2	**Unsure**
B1	F	CISAT	PhD	Current	2	1	1	1	**Positive**
B2	M	Drucker	M	Current	0	1	0	2	**Positive**
B3	M	DBOS/DPE (Dual)	PhD	Current	0	0	0	2	**Positive**
B4	M	Math	PhD	Current	2	1	0	2	**Positive**
B5	M	CISAT	PhD	Current	0	1	0	0	**Did not state**
C1	F	DBOS	M	Current	6	1	0	0	**Positive**
C2	F	Drucker	M	Alumna	0	4	0	2	**Negative**
C3	M	Drucker	M	Alumnus	2	2	0	2	**Negative**
C4	F	Drucker	M	Alumna	2	2	0	2	**Negative**
C5	M	CISAT	PhD	Current	0	2	0	0	**Negative**
D1	F	DBOS/CISAT (Dual)	PhD	Current	0	2	0	5	**Negative**
D2	M	Art	M	Current	0	0	0	2	**Positive**
D3	F	DPE	PhD	Current	0	4	1	1	**Unsure**
D4	F	DPE	PhD	Current	0	3	0	0	**Positive**
D5	M	CISAT	PhD	Current	0	1	0	3	**Positive**
D6	M	CISAT	PhD	Current	0	2	0	3	**Unsure**
E1	F	CISAT	M	Current	0	0	0	0	**Positive**
E2	M	Religion	PhD	Current	0	3	0	1	**Positive**
E3	F	Religion	M	Current	0	1	1	0	**Positive**
E4	M	CISAT	PhD	Current	0	1	0	1	**Positive**
E5	M	DBOS	PhD	Current	0	0	1	0	**Positive**
E6	F	Education (M) & Public Health (PhD)	PhD	Alumna	0	1	0	0	**Positive**

4.2.2. Advantages of a NARS

When asked for their opinions on the NARS, 18 participants – a clear majority, representing all five focus groups that used it – stated that they would find the Notification and Recommender System useful. Student E2 said:

> I think that that would be very useful. I think that on either side, to have the ability to put something out there and advertise it, some would respond to that. You can connect without making an appointment and having to shift schedules and all that in order to have access to them. Especially for commuter students too. Alumni as well.

Student E6 said:

> I like both. At first I was thinking, 'okay, Opportunities was the primary thing.' But then I thought it over a little bit more; I can see how beneficial it could be to build community even with your own school. I just got together with a group of people in one of my classes who I knew, I had interacted with, and we just happened to do a group exercise together. And it involved something that led us to a similar organizational structure that we had all thought about, that we were all kind of on the same path with, but had never connected. And there was no feasible way for us to connect, we just – by pure happenstance – happened to start talking about the same stuff in this group exercise in class, but if we had put some of those key terms into this app we may have connected much sooner. So both would be excellent.

Some users preferred certain notifications more than others. For example, Students C5, D3, and D4 stated they preferred Peer Recommendations to Opportunity Recommendations.

Trust and Recommendations

Trust was a big factor in how the recommendations would be perceived. Students A5, B1, B3, D2, and E3 said they would trust the notifications the app pushes to them. Student B2 said that peer recommendations would be a good introduction to people who share the same interests, and suggested that knowing there are mutual social connections (functionality not supported by the demo app) would lead him to trust other

users of the app. Some participants (Students B1, B3, D2, and E3) said that knowing the user base is Claremont-only would motivate them respond, i.e., knowing that an opportunity was submitted by a fellow community member establishes trust. The type of institution Claremont represents as a graduate school also played a part in this trust for others. Student D2 said of his willingness to reach out to before-unknown CGU peers recommended by the app:

> I think we have a good group: it's not a group for undergrads, which I wouldn't trust. There would be more trust in a grad school of people having actual skills, not doing a keg stand. People are more professional.

Meanwhile, Student D5 suggested that knowing the pushed recommendations were based off shared professional interests served as a substitute for the kind of trust that comes from identification with Claremont:

> I don't have to trust. We trust, but it gives me an option to see other peers. … I like the Peers [recommendations]. It gives you other people who at least have the same interest.

Student D6 suggested an element of reciprocity in building trust:

> In the beginning, I wouldn't trust unless I start and use it and find someone who can help me. Then I will trust.

Trust in Self-Reported Proficiency

Another way in which trust played a role was in students' lack of willingness to trust that their peers were being honest about their skills. This sentiment was expressed by 10 participants representing all Focus Groups except Group A (see TABLE 11). Student D3 - who was ambivalent to the NARS, but believed the app had the potential to foster trust - said: "It's hard to distinguish the quality: If they say they can do big data work, I don't know if he's a beginner or not." A surprisingly large number of participants independently arrived at the same solution: Endorsing or rating other users.

(TABLE 11) Users Reluctant to Trust Self-Reported Skills

	PUSH Profile Match	PUSH Direct Message	PUSH Opp Match	PUSH Got Opp Reply	NARS Opinion	**Reluctant to Trust Self-Report Skills?**
A1	0	4	2	5	Positive	
A2	0	2	0	6	Positive	
A3	0	1	0	2	Positive	
A4	0	1	0	3	Did not state	
A5	0	2	1	1	Positive	
A6	0	1	0	2	Unsure	
B1	2	1	1	1	Positive	
B2	0	1	0	2	Positive	
B3	0	0	0	2	Positive	
B4	2	1	0	2	Positive	**X**
B5	0	1	0	0	Did not state	**X**
C1	6	1	0	0	Positive	**X**
C2	0	4	0	2	Negative	
C3	2	2	0	2	Negative	
C4	2	2	0	2	Negative	
C5	0	2	0	0	Negative	
D1	0	2	0	5	Negative	
D2	0	0	0	2	Positive	**X**
D3	0	4	1	1	Unsure	**X**
D4	0	3	0	0	Positive	
D5	0	1	0	3	Positive	**X**
D6	0	2	0	3	Unsure	**X**
E1	0	0	0	0	Positive	
E2	0	3	0	1	Positive	
E3	0	1	1	0	Positive	
E4	0	1	0	1	Positive	**X**
E5	0	0	1	0	Positive	**X**
E6	0	1	0	0	Positive	**X**

Student B5 said:

I would recommend to have endorsements like LinkedIn, that this guy is good in mathematics or Matlab. And people endorse him and then the people that would give him a job say ‘Hey, this guy; 10 people endorse him at Matlab.’ It’s going to solve the problem of ‘Hey, we don’t know if this guy’s good or not.’

Student B4 agreed, suggesting the implementation of a way to prove that users have the skills they claim:

> 'Hey, 20 people or 30 people say..: Yeah, he's ok.' Because by endorsing, then you can know that guy's good. Because in the Opportunity maybe you can post a quick thing like 'I have a quick problem about this.' Maybe it's not about a job opportunity. You post by asking someone, 'I dunno what is 2+2,' and someone says 'Oh, it's 4.' And then you go endorse this guy: 'Ok, he's good at Math.' Maybe you can implement that.

Participants E4 and E5 independently arrived at a similar solution. Student E5 said:

> In terms of any recommendations, people have talked about getting endorsed by someone and saying 'this person, yes they have an expertise in this area' or 'they're beginners.' But I would also recommend that you yourself set that somewhere, where you say 'I have research skills, I'm a beginner, intermediate, or expert,' so that if I see that I can contact you knowing that yes, you do consider yourself a beginner or you consider yourself an expert. Obviously, that doesn't always equate what they are, but at least you have a good idea of how they see themselves, and at what level.

Students in Focus Group D semi-seriously joked that perhaps a future version of the app would let users rate other people like is available in the Uber app. Online higher-ed social networks where users can rate, rank, and recommend other users have proven to be successful at fostering new connections in a community (Thoms 2009). However, it wasn't discussed - neither in Thoms (2009) nor in the course of these Focus Groups - whether the knowledge that one could be assigned a rating based on "trustworthiness" would make some reluctant to use such an app. This could be one major downside to implementing such a feature.

4.2.3. Disadvantages of the NARS

Not all saw usefulness in the NARS, however. Eight students expressed skepticism about it, five of whom outright disliked the feature. Student C2 cited lack of time as an impediment to finding any use from Opportunity recommendations:

> I still feel iffy about it. I feel this is more for current students. I know I wouldn't check it; I have too much to do during the day. I wouldn't use it.

Student C5, who generally liked the app and saw usefulness in the NARS, echoed Student C2's sentiment:

> I feel the same way. Where I am in my education, I'm not looking for more to do. I'm just trying to survive.

Alumni were skeptical about the NARS. The three alumni in Focus Group C all expressed reservations. Student C3 said he didn't think it was for alumni, suggesting:

> For alumni, it would be up to a development office to actively promote it. To send a Flame [a CGU publication] saying 'Please don't forget to log in and register if you haven't already to look at opportunities for our graduation class,' 'If you know of any job offers.' It would have to be administered by someone.

Student C2 echoed this need for active promotion for the app to be useful, citing the lack of outreach from CGU to its alumni as a reason to be skeptical towards the app's usefulness.

Six participants – including some of those who liked the NARS – expressed some reservations on Push notifications. A5 said Push notifications could get "kind of spammy". Many students said they would need a way to filter (Students B2, B3, and C4) or turn off (Students A2, A5, and D1) Push notifications. Student D1 said that if she couldn't turn off Push notifications, she wouldn't keep the app installed.

4.2.4. Perceptions of NARS Triggers

Student D1 preferred using mutual professional interests (rather than mutual social connections as networks, like Facebook, do) as the trigger for pushing peer notifications to users, saying that if the recommender had been "based off being connected to a person 3 links down, then not really."

Meanwhile, five participants (Students A1, A5, A6, B2, and E1) expressed that they also wanted peer recommendations based off factors that were not purely academic or professional. One student – Student B2, contradicting the sentiment expressed by Student D1 – suggested using mutual connections as a trigger for peer recommendations: "Like in LinkedIn where you click on someone and then 'there's a connection to [Student X]' and then you ask yourself 'Oh, my friend knows them; I'm assuming this works out.'" This suggests a relation between structural and relational capital, in that connections to someone on a social network increases trust, and that – if not used as a trigger condition – at least being able to see the number of mutual connections would better help the app establish relational capital.

While stating that the NARS would be "pretty useful stuff," student A5 stated "I don't think a connection is just sharing research interests with an alumni."

Student A1 said of shared interests:

> I'm not sure it should be the only thing you try to use for the notification module … I agree that interests area could be one factor, but there could be some other factor.

Several students suggested different or additional filters for triggering push notifications. Student B2 suggested proximity (e.g., was this pushed opportunity posted by somebody on or off campus?) and number of mutual connections. Student C4

suggested being able to filter by category. Student E1, being an International student, recommended nationality or country of origin.

Student A6 said she would also like pushed connections based off factors that were not career-related, saying that even things that were not immediately career-related could turn out to be so down the line:

> It could be just hanging out or just talking about stuff in Claremont, and maybe it could turn into something different in the future. Like something more. The potential, career-related or not career-related.

Students C2 and C3 (both alumni) suggested having an administrator profile run by the school itself (or even several profiles administered by clubs or labs on campus) sending out Push notifications for alumni outreach events.

4.2.5. Willingness to Respond to Recommendations

Eight participants indicated a willingness to respond to notifications they get, either by reaching out to peer references pushed to them or reaching out to potential opportunities pushed to them. Student C5 said:

> If I could be pretty specific (e.g., Big Data, etc.), I would definitely check a reminder that popped up. Since I work full time, if there were people wanting to do a qualitative project I was interested in, or in industry, I would be interested in coordinating with them.

Of these 8 participants, six said explicitly that knowing that the peers or opportunities pushed to them was based on the interests or skills they listed would make them more likely to respond (this included Students D5 and D6, who had expressed minor reservations about trusting the recommendations made by the app).

However, the quality of the Push recommendations was mentioned as a factor in their willingness to respond. Student D1 said:

> If the [pushed] opportunities matched what I was looking for, what I was interested in, I would respond. Not someone just trying to get their homework finished.

And Student C3, who said that he found little use in the app as an alumnus, conceded that he would use it if he were still a student: “As students, you're looking for opportunities, so that's something I would probably frequent.” He was the only one of the alumni in Focus Group C who conceded this.

Summary

The suggestions compiled from participants regarding the design artifact as a Push Notification and Recommender System are summarized in TABLE 12.

(TABLE 12)

Suggestions for NARS
Push History
Ability to shut off or limit notifications
Being able to see multiple connections
Add endorsements
Add categorizations
Add filters
Recommendations for things besides shared skills
Recommendations based on country of origin
Active promotion by the Advancement Office
Add a Word Bank

4.3. Relationship between an Online Social Networking App and Social Capital

This section discusses the focus group responses with regards to the relationship between social capital and use of the artifact. Section 4.3.1. discusses structural social capital. Section 4.3.2. discusses the different components of relational social capital, and Section 4.3.3. discusses cognitive social capital.

4.3.1. Structural Social Capital

4.3.1.1. Perceptions of Existing Structural Social Capital and the Study Environment

When asked about the perceived level of structural social capital in the Claremont community, most participants, 16, said there was a sufficient level (see TABLE 13. Structural Social Capital ratings were based on participants' responses to questions pertaining to the Social Interaction Ties construct in Appendix A: Whether they maintain close social relationships with community members, spend lots of time interacting them, whether they know some community members on a personal level, or whether they have frequent communication with others in the community).

Others perceived their structural capital as more limited: eight participants expressed that they do not have as many social connections as they would like. Fifteen participants – more than half of the total – said the structural social capital available to them was limited by factors ranging from department size, department siloization, and commute distance, to lack of time. Ten participants said their social circle exists almost entirely within their own academic department. Student D1 noted the constraints time places on making connections: "I used to [have time] until I started working! Time is a huge factor. I need to pay my tuition!"

(TABLE 13) Structural Social Capital in Current Community

Name	Age	Gender	School	Department	Degree	Status	Structural Social Capital in Current Community
A1	30s	F	CGU	CISAT	PhD	Current	**DId not state**
A2	20s	M	CST	Religion	PhD	Current	**Mid**
A3	30s	M	CGU	CISAT	PhD	Current	**Did not state**
A4	40s	F	CGU	Religion	PhD	Current	**Low**
A5	30s	F	CGU	DBOS	PhD	Current	**DId not state**
A6	20s	F	CGU	DBOS	M	Current	**High**
B1	30s	F	CGU	CISAT	PhD	Current	**High**
B2	20s	M	CGU	Drucker	M	Current	**High**
B3	30s	M	CGU	DBOS/DPE (Dual)	PhD	Current	**High**
B4	20s	M	CGU	Math	PhD	Current	**Mid**
B5	30s	M	CGU	CISAT	PhD	Current	**Did not state**
C1	20s	F	CGU	DBOS	M	Current	**Mid**
C2	20s	F	CGU	Drucker	M	Alumna	**Low**
C3	40s	M	CGU	Drucker	M	Alumnus	**High**
C4	20s	F	CGU	Drucker	M	Alumna	**High**
C5	30s	M	CGU	CISAT	PhD	Current	**Low**
D1	20s	F	CGU	DBOS/CISAT (Dual)	PhD	Current	**High**
D2	20s	M	CGU	Art	M	Current	**High**
D3	30s	F	CGU	DPE	PhD	Current	**High**
D4	30s	F	CGU	DPE	PhD	Current	**High**
D5	30s	M	CGU	CISAT	PhD	Current	**High**
D6	30s	M	CGU	CISAT	PhD	Current	**High**
E1	20s	F	CGU	CISAT	M	Current	**Low**
E2	20s	M	CGU	Religion	PhD	Current	**High**
E3	20s	F	CGU	Religion	M	Current	**High**
E4	30s	M	CGU	CISAT	PhD	Current	**High**
E5	30s	M	CGU	DBOS	PhD	Current	**Low**
E6	40s	F	CGU	Education (M) & Public Health (PhD)	PhD	Alumna	**High**

Student B3 said “I would say I do [have social connections], but that sum means a few, for me. Not for lack of interest, just for lack of time.” Student C5 said he makes connections “only for class or research. I live 40 miles away.” Student B4 said he had few social connections “because I work in the Math Department. And the Math

Department, as you know, is very small. So I know some of the CGU students because of classes, but not that close because when class is done, it's done."

Student E6 echoed this feeling of departmental siloization: "I think at this point in my academic career, I've probably given in to the silo of the school that I'm in. Each of the schools here is very about itself, very self-contained, so I think at this point I'm mostly interacting and networking with people within my own school, and not reaching out to anyone else." Student A2 expressed feelings of persistent siloization despite efforts to reach out: "I tried more to reach out to people in different departments, but it just seemed like people kind of stick with their own departments. I just decided I'm going to stick with mine too." Student A3 lamented the lack of transdisciplinary communication: "Even though the school seems to emphasize transdisciplinary study, we don't have any tools to connect other departments together."

4.3.1.2. Relationship between the Artifact and Structural Social Capital

In terms of building Social Capital in the target community, the app was perceived to have the biggest effect on Structural Capital. Fifteen participants – a majority of the sample population – stated outright use of the app would increase the number of users' social connections (see TABLE 14. Statements like "It's better than LinkedIn" or "I can look around at people who are interested in things that I am, and approach them" were rated as "Yes." Statements like "I don't think it would really affect my personal life" were graded as "No."). This could be due to the nature of the app and the NARS, which directly pushes potential social connections to users. Most participants thought the app would boost structural capital. Student D1 said:

> I think it would increase my number of social ties. I think I'd be more inclined to go into the CGU [app] than Facebook.

(TABLE 14) Users who indicated they believed the Artifact could facilitate the creation of Structural Social Capital

	Status	Oppor-tunities Posted	# of Times Msg'd Others	# of Responses to Oppor-tunities	PUSH Profile Match	PUSH Direct Msg	PUSH Opp Match	PUSH Got Opp Reply	ATM Struc Soc Cap	**App Create Struct Capital**
A1	Current	2	2	6	0	4	2	5	*	**Yes**
A2	Current	3	1	2	0	2	0	6	Mid	**Yes**
A3	Current	3	2	3	0	1	0	2	*	**No**
A4	Current	2	3	3	0	1	0	3	Low	**Yes**
A5	Current	1	0	3	0	2	1	1	*	**No**
A6	Current	1	3	2	0	1	0	2	High	**No**
B1	Current	3	1	2	2	1	1	1	High	**Yes**
B2	Current	2	0	3	0	1	0	2	High	**Yes**
B3	Current	3	1	1	0	0	0	2	High	**Yes**
B4	Current	3	1	0	2	1	0	2	Mid	**Yes**
B5	Current	2	1	1	0	1	0	0	*	**Unsure**
C1	Current	2	0	0	6	1	0	0	Mid	*
C2	Alumna	2	4	1	0	4	0	2	Low	*
C3	Alumnus	2	7	2	2	2	0	2	High	*
C4	Alumna	1	0	2	2	2	0	2	High	*
C5	Current	3	0	1	0	2	0	0	Low	*
D1	Current	5	1	1	0	2	0	5	High	**Yes**
D2	Current	4	0	1	0	0	0	2	High	**Yes**
D3	Current	3	6	6	0	4	1	1	High	**Yes**
D4	Current	2	1	4	0	3	0	0	High	**Yes**
D5	Current	3	3	2	0	1	0	3	High	*
D6	Current	1	1	0	0	2	0	3	High	*
E1	Current	2	1	0	0	0	0	0	Low	**Yes**
E2	Current	3	1	0	0	3	0	1	High	**Yes**
E3	Current	3	2	1	0	1	1	0	High	**Yes**
E4	Current	2	1	1	0	1	0	1	High	*
E5	Current	2	1	0	0	0	1	0	Low	**Yes**
E6	Alumna	3	0	0	0	1	0	0	High	**Yes**
* Did not state										

Student D3's response suggested that a certain level of cognitive social capital supports the creation of structural social capital:

> Yeah, it's better than LinkedIn! Because it's based on CGU community. LinkedIn is all people. Here, we share the same complex, the same courses and professors, and we have things in common.

Because the pushed connections were based on shared interests, participants perceived the potential connections as more likely to take root and be more lasting than connections based on other factors. Student A1 said “I think it’s a good way to build a community of interest, which means if this tool can help me make connections with people, maybe in the same department but they share the same interests as mine, I will use it.”

Student E1 said: “I can look around at people who are interested in things that I am, and approach them.”

Student E5 said: “If I logged in and became aware of other people who were working on/in similar areas – have similar interests – I think it [my number of social connections] might increase it a bit.”

Student D4 specifically cited the Opportunity NARS: “It [my social connections] will increase because with the Recommender, it will send me Opportunities.”

However, six students – including all three alumni in Focus Group C – said the app would not increase the number of their social ties. Additionally, another student (B5) said that the ability to increase a user’s social connections would depend on their needs: “if I already have a job, I don’t want to go to this app.”

As stated earlier, during the focus groups, a Push notification (specifically, a peer recommendation based on shared research interests) would automatically trigger early in the demo. That way, even participants that did not met any of the normal conditions that would trigger a Push notification would still be aware of the feature. Furthermore,

the NARS feature and how it works was explained to each participant, demonstrated in a tutorial video shown to all participants, and further discussed as part of the Focus Group agenda. Thus, even students that did not receive a Push notification would still have been indirectly exposed to the feature, and their recommendations should still benefit in improving the artifact.

One reason many participants believed the app would increase social capital was because they perceived the app as having the ability to abbreviate the process of making new connections and finding like-minded people within the community. Some students who said they would like to have more social connections in their community (Students B3, C5, and D1) cited time and distance as a reason they did not (e.g., Student C5's 40-mile commute to campus). A few said the app and the NARS would help them make connections despite these factors. Student C5 said: "For commuters, something like the app would work." This implies the app has potential to increase structural social capital by decreasing the time and work investment needed to make new connections.

The app's potential to remove the distance between some community members was also articulated by Students A6 and B2. Student A6 said she could potentially use the unfinished Map feature to connect with alumni in faraway cities to which she might move. Student B2 articulated the idea that once a connection is made, the distance between the two nodes becomes meaningless:

> if I'm going to meet a programmer, it doesn't matter if he's in New York or whatever, because I'm going to Skype, or whatever I need to get that person. … Once I connect I wouldn't need to know where they're at. I just need 'ok, can we sit down to have a conversation over Skype?'

Transdisciplinary Structural Social Capital

Student B3 believed that it could help foster transdisciplinary connections by connecting people to skills they need at that moment but lie in resources outside their department:

> Perhaps it's not the first resource at hand. Perhaps you would be doing work first within your department with someone that you know, and if you don't find something that is suitable for what you're doing maybe then you can find it. Because perhaps it is something completely strange and foreign to your own skills and they're skills people in that department already have. Perhaps that would be the first resource otherwise it would be a second resource.

Structural Capital Affecting Use of the Artifact

Aside from increasing structural capital, one student thought that establishing structural capital would in turn increase use of the app. Student B3 stated that even in the short focus group session, "from our connections from the app, that led to more use of the app." Though this was just one student, it parallels comments made earlier by other participants who said they need to perceive the app to have reached a critical mass of active users, with further use of the app contingent on their confidence that any content they post will be read by others and responded to in a timely manner.

Social vs. Professional Networking

There were discussions about the effectiveness of pushing connections based on academic/professional factors versus social factors. Student A2 emphasized that the distinction between work and social connections is blurred.

> It could help me connect with people I might never see in classes just because we have different post work. So that could be helpful in building connections through work. But for me, I don't see work and social life as completely separate compartments. So, if I get along with someone that I work with, I think I could build a social relation.

One student expressed interest in using the app to find people outside of her department specifically because they would be more casual. Student E3 said the app would help her make connections for people like her who are reluctant to make social connections with peers within their own department:

> I've just been so resistant to it… Those interactions are so performance-oriented. I feel like this would be a good way to skirt that performance aspect.

There was discussion in Focus Group A about the hard barrier between socially-oriented and performance-oriented connections, and how social interactions were still important to generating lasting connections and a sense of community.

> A6: I don't think it would really affect my personal life. I have really strict criteria of choosing my friends. I really try to separate my personal life and my professional life, and I would say whoever stays in my personal friend circle is going to continue to stay in my personal friend circle. But for those who stay outside of my personal friend circle, just like all those professional relationships I'm probably not going to maintain it that closely if we're not in the same geographic location or if we don't have opportunities or time to work together, or something like that. Of course they can be both, that's the most ideal.
> A2: Yeah, I think that's the important thing. I think career development is one thing, but if we're trying to build a sense of community here we need more social interactions and opportunities.

Student A6 was one the participants who had suggested building out the Map functionality to find other alumni in her geographic location after moving away from Claremont. Building out the Map functionality could be a potential way for alumni to find and create more connections within the alumni community, even if those connections would probably veer further towards social - rather than professional - networking.

Student B5 also emphasized that the social aspect and pushing/recommending connections based on professional opportunities alone would not be useful for someone who already has a job:

> I think the interaction for the app we can get to some extent. For example we can interact with other people in Claremont Colleges for, in particular, looking for a job. But if you look for the other half of interaction, like hang out, party, or something else, I still see little impact on that.

He followed up with his statement that someone who already has a job or a research project would have no use for the app.

This is perhaps one of the reasons why the app failed to gain as much traction among alumni. Student C2, an alumna, expressed skepticism that the app could foster social connections without active promotion of the relational dimension of social capital:

> The school doesn't really have much of a community in a way. So this [the app's social network] is like: you don't know who it is, who's behind it. You don't see them [the school] putting on interactions between different departments and new people or socials. … The school itself doesn't foster a sense of community. So this [app] is kind of hard to buy into.

This suggests that for the app to promote social capital and social connections that are structurally sound, the app should accommodate the social, as well as the academic/professional.

Summary

The findings compiled from participants regarding the design artifact and structural social capital are summarized in TABLE 15.

(TABLE 15): Structural Social Capital Findings

Structural Social Capital
Alternative way of finding connections
Enables last minute connection building
Seeing mutual connections would help

4.3.2. Relational Social Capital

4.3.2.1. Perceptions of Existing Relational Social Capital and the Study Environment

Relational social capital refers to the character (or strength) of social connections. When asked of the perceived level of relational social capital in the Claremont community, responses varied by Focus Group. Most of the participants in Focus Groups B, D, and E (3 of 5 participants in Focus Group B, all 6 participants in Focus Group D, and 4 of 6 in Focus Group E, but only 2 of 5 in Focus Group C) said there was a sufficient level. These groups assessed that the Claremont community, as is, possessed high levels of relational capital. Focus Group A believed just the opposite. (See TABLE 16. Relational Social Capital ratings were based on participants' responses to questions pertaining to Norms of Reciprocity, Identification, and Trust constructs in Appendix A).

(TABLE 16) Relational Social Capital in Current Community

	Age	Sex	School	Dept	Deg	Status	**Relational Social Capital in Current Community**
A1	30s	F	CGU	CISAT	PhD	Current	**Low**
A2	20s	M	CST	Religion	PhD	Current	**Low**
A3	30s	M	CGU	CISAT	PhD	Current	**Low**
A4	40s	F	CGU	Religion	PhD	Current	**Low**
A5	30s	F	CGU	DBOS	PhD	Current	**Low**
A6	20s	F	CGU	DBOS	M	Current	**Low**
B1	30s	F	CGU	CISAT	PhD	Current	**High**
B2	20s	M	CGU	Drucker	M	Current	**Mixed**
B3	30s	M	CGU	DBOS/DPE (Dual)	PhD	Current	**Mixed**
B4	20s	M	CGU	Math	PhD	Current	**High**
B5	30s	M	CGU	CISAT	PhD	Current	**High**
C1	20s	F	CGU	DBOS	M	Current	**High**
C2	20s	F	CGU	Drucker	M	Alumna	**Mixed**
C3	40s	M	CGU	Drucker	M	Alumnus	**Mixed**
C4	20s	F	CGU	Drucker	M	Alumna	**High**
C5	30s	M	CGU	CISAT	PhD	Current	**Mixed**
D1	20s	F	CGU	DBOS/CISAT (Dual)	PhD	Current	**High**
D2	20s	M	CGU	Art	M	Current	**High**
D3	30s	F	CGU	DPE	PhD	Current	**High**
D4	30s	F	CGU	DPE	PhD	Current	**High**
D5	30s	M	CGU	CISAT	PhD	Current	**High**
D6	30s	M	CGU	CISAT	PhD	Current	**High**
E1	20s	F	CGU	CISAT	M	Current	**Mixed**
E2	20s	M	CGU	Religion	PhD	Current	**High**
E3	20s	F	CGU	Religion	M	Current	**High**
E4	30s	M	CGU	CISAT	PhD	Current	**Low**
E5	30s	M	CGU	DBOS	PhD	Current	**High**
E6	40s	F	CGU	Education (M) & Public Health (PhD)	PhD	Alumna	**High**

Focus Group A by far exhibited the lowest levels of perceived relational capital in the current environment (see TABLE 17). Whether due to luck of the draw, or because the groupthink in their session implicitly and subtle encouraged them to talk more openly of their frustrations with the community, every participant in Focus Group A

expressed no sense of identification or reciprocity, and some of the participants said there was no trust (there were no obvious demographic factors that made Focus Group A such an outlier in that regard). When asked about whether there was a sense of reciprocity in the current environment, Student A2 stated:

> Disagree. One hundred percent disagree. Compared to my other graduate school that I attended, no. I don't think there is as much of a collegiate environment or a sense of reciprocity. I think one of the reasons is the school doesn't create enough opportunities to connect with people outside of your department. I know that at my last school any given day of the week there was something going on. One of the graduate schools that was open to all the graduate students and you'd be able to go there and interact with other people at your choosing, and that builds a sense of camaraderie and that I think lends itself to helping people out.

Student A2 is a student at the Claremont School of Theology (CST). Though not part of CGU, CST is one of the 3 graduate schools in Claremont and is affiliated with the University Consortium (CUC). Like many CST students, Student A2 has taken several classes with CGU's Religion Department:

> As someone with the School of Theology, I can say I identify with School of Theology people much more readily than CGU's Religion department people. There's more of a sense of community up there, because they have an office that is about developing community life. Even if it's not the greatest, at least there's some sense of community building going on there. Whereas, I don't know if the School of Arts and Humanities' Life Office is doing much to get people within the Religion Department to get more close with each other. I frankly am not really close with anyone from the CGU Religion Department even if I take classes with them.

This preference for other schools in the consortium was echoed by another participant in Focus Group A (Student A6), a CGU student who worked at Pomona College (an undergraduate school in the CUC):

> We identify more with our social ties than with our professional ties, and those are two different things. For me it's the same way. I work for other colleges and I find a sense of community with other colleges, and find close friends in those colleges, but I don't necessarily find the same kind

> of identification and connection. I wear Pomona College's outfits and stuff, I definitely identify myself with more of a Pomona culture than the CGU culture. Because I don't even know what CGU culture is.

All in all, 7 participants (E4 and all of Focus Group A) strongly lamented a lack of relational capital in the current community environment. The other focus groups expressed higher levels of Relational capital, although the three alumni in Focus Group C lamented that the lack of Alumni outreach had a negative effect on their sense of identification. One of the alumni, Student C3, said:

> I wish there was more interaction from the school as an alum. I think I feel loyal because I paid tuition.

(TABLE 17) Focus Group A's Perception of Relational Social Capital in the Current Community

	Age	Sex	School	Dept	Deg	Status	**Relational Social Capital in Current Community**
A1	30s	F	CGU	CISAT	PhD	Current	No Reciprocity No Identification
A2	20s	M	CST	Religion	PhD	Current	No Reciprocity No Identification
A3	30s	M	CGU	CISAT	PhD	Current	No Reciprocity No Identification
A4	40s	F	CGU	Religion	PhD	Current	No Reciprocity No Identification No Trust
A5	30s	F	CGU	DBOS	PhD	Current	No Reciprocity No Identification No Trust
A6	20s	F	CGU	DBOS	M	Current	No Reciprocity No Identification

These alumni all still identified strongly with the Claremont community, so they were not rated as having low relational capital. However, their responses hinted that the lack of outreach limited their feelings of identification with the alumni community.

Identification in the Current Environment

Identification was an important topic in discussing relational capital. Student E3 said:

> I don't know. It's a mixed bag. I guess, in some ways yes, but in other ways no. … Ultimately, I would say yes. I mean I've definitely found 'my place' in the Claremont community, I just don't think I have a lot of the same ties, certainly that [Student E2] has, I would have to say. Because I haven't done a lot of the networking things, a lot of it for me has been 'I want to be a Southern Californian', that's just a location preference though because I'm from New England, it's very different. The temperature is not my friend. So I feel like my perspective is very individualized. Because I definitely feel like there have definitely been opportunities for these things and those would definitely provide another opportunity to be engaged.

Student E6 commented on the effect the school's status as a graduate-only institution – and the difference in learning style and academic culture from an undergraduate environment – had on identification:

> I think that heavy interaction in class makes a difference instead of straight lecture style. And I think that joining certain groups on campus, like the GSC or other clubs makes a difference, like in Drucker. But like we talked about before, a lot of people are not willing to make that physical commitment to something. So I think the app kind of bridges that gap for you, where you don't have to commit to going to meetings and things like that but you can still reach out to people when you need to.

Some focus groups expressed mixed feelings on different variables of relational capital (see TABLE 18). Focus Group C expressed high levels of identification, but varied levels of trust, with Student C1 saying she had high levels of trust only within her own department, and Student C2 saying she had more trust for people outside her department:

> I wouldn't trust people from my department. Those people have issues. I prefer people outside my department. Within your department, you get to work with them and see how they are and know that you don't want to work with them.

Six participants expressed mixed feelings on different relational capital variables.

(TABLE 18) Users with Mixed Perception of Relational Social Capital in the Current Community

	Age	Sex	School	Dept	Deg	Status	**Relational Social Capital in Current Community**
B2	20s	M	CGU	Drucker	M	Current	**High Reciprocity Little-to-no Identification**
B3	30s	M	CGU	DBOS/DPE (Dual)	PhD	Current	**High Reciprocity Little-to-no Identification**
C2	20s	F	CGU	Drucker	M	Alumna	**High Reciprocity High Identification No Trust**
C3	40s	M	CGU	Drucker	M	Alumnus	**High Reciprocity Little-to-no Identification**
C5	30s	M	CGU	CISAT	PhD	Current	**High Reciprocity High Identification No Trust**
E1	20s	F	CGU	CISAT	M	Current	**High Identification Low Trust**

Some students (B2, B3, E5, E6) expressed identification more with their department than the university as a whole. Student B2 said:

> I do feel that, yeah. Drucker first, and then CGU second. Because I'm only in class with my cohort, I don't see any other classmates, I don't interact with any other classes. So am I tied to CGU at large? No. Because I'm only in certain classes, and when you're in certain classes with certain others, certain classes weigh more heavier on that than CGU.

Student B3 said:

> Well for me, I'm a first year student. It's hard right now to tell you the rate of those cohorts because I'm in two departments. One of them is very cohesive, which is DBOS, and they have a lot of interaction, a lot of events. And Politics and Economics, which is completely on the opposite end of the spectrum. They do nothing. Nobody knows about anybody else, nobody *cares* about anybody else. … Yeah, there might be two cohorts of interaction. One within your department and another one is CGU.

Meanwhile, Student A2 – the CST student – identified more with CST than CGU.

4.3.2.2. Relationship between the Artifact and Relational Social Capital

When gauging participants' perceptions of the app's ability to foster relational capital, 13 participants across 4 of 5 focus groups thought the app could accomplish

that goal (Focus Group A was the lone dissenter) (see TABLE 19. Ratings were based on participant responses on what effects the design artifact would have on the level of trust, identification, or norms of reciprocity in the community.). These users believed the app had the potential to increase at least one component of relational capital in the community. However, they also stipulated that the effectiveness of deploying the app in the community would be dependent on the NARS successfully recommending connections that lead to valid connections or collaborations. The three components of relational capital that were discussed in-depth in the focus groups were trust, reciprocity, and identification.

(TABLE 19) Students who indicated they believed the artifact could facilitate the creation of Relational Social Capital

	Dept	Deg	Status	Current Relational Capital	**Artifact Increases Relational Social Capital?**
A1	CISAT	PhD	Current	Low	**No**
A2	Religion	PhD	Current	Low	**No**
B1	CISAT	PhD	Current	High	**Yes**
B2	Drucker	M	Current	Mixed	**Yes**
B3	DBOS/DPE (Dual)	PhD	Current	Mixed	**Yes**
B4	Math	PhD	Current	High	**Yes**
C5	CISAT	PhD	Current	Mixed	**Yes**
D1	DBOS/CISAT (Dual)	PhD	Current	High	**Yes***
D2	Art	M	Current	High	**Yes**
D3	DPE	PhD	Current	High	**Yes**
D4	DPE	PhD	Current	High	**Yes**
D6	CISAT	PhD	Current	High	**Yes**
E3	Religion	M	Current	High	**Yes**
E5	DBOS	PhD	Current	High	**Yes**
E6	Education (M) & Public Health (PhD)	PhD	Alumna	High	**Yes**
***Student D1 felt use of the Artifact would increase Relational Social Capital, but would not have an effect on Identification**					

4.3.2.2.1. Effect of the Artifact on Trust

Six students (B1, D1, D2, D3, D4, and E3) believed successful use of the app had the potential to increase trust in the community. Student B1 said “Once you start using it and get responses from others your trust will increase.”

The students of Focus Group D almost all agreed that use of the app would at least increase trust within their own department. Student D1 explained: “I can attest to their skill or lack.”

Student E3 came upon the idea that use of the app and a sense of identification with the community can both increase trust:

> Each individual comes from different colleges. It doesn’t mean they won’t take advantage of you or that they don’t suck. But at the same time … if you go social networking just for people in the area you don’t know exactly at all what you’re going to get. And yeah, you don’t know that this way either. But I feel like this way you have some shared experience that you both go to this university. Especially if you’re not from here at all and you don’t have your connections outside the university, I feel like that would help.

4.3.2.2.2. Effect of Trust on the Artifact

Additionally, Student D5 said that the NARS had potential, but it would need a way to rate users to see – based on other users’ experiences working with other people – whether recommended connections were trustworthy. The issue of trust was a major factor in willingness to use the app. Including Student D5, seven participants suggested a baseline level of trust as a prerequisite for use of the app. Student A5, despite earlier expressing low levels of trust in the current environment, believed she could use the app because she trusted the peers she could find on the app:

> If I was working on research projects, and there was a very specific interest, if I find someone who has them: Sure. I would consider working

> with them. It doesn't mean I think they're going to steal my research or anything.

Student C5 said he would have to assess the trustworthiness of pushed recommendations:

> I would try to get a better sense of who the person is and what they are into. A lot would depend on my perception of how interested I was, and overlap.

Student E3 said she would trust posted opportunities, responses, and recommendations from the app, "especially because it's restricted to the Claremont Colleges, so that's not just some crazy person down the street."

Student D5 noted: "It's not easy to trust everybody, but if there's something to indicate – at least based on their experience with other people – it might help me to see if I could trust him or her."

Student D6 added: "Maybe if you could review people, so you can know whether to trust them or not."

As stated earlier, many of the Focus Groups independently arrived at the idea of rating or ranking users to establish trust in the community, and the peers and opportunities the app recommends them. One student suggesting the addition of the ability to rate users who respond to posted Opportunities like they would rate Uber drivers.

When discussing the effect of the app (or lack thereof) on any norms of reciprocity in the community, Student C5 said:

> I feel like just being at CGU isn't enough of a connection to guarantee anything. If you made a personal or professional connection in addition to that, then it works pretty well. We would go forward and work together on things.

Additionally, Student C5 felt a feeling of social presence was needed in order to believe that there was an element of reciprocity in the community:

> I definitely could see [the app] working. But I think that my feeling coming away is I can't tell who's on there or how active they are, or get a real sense of who's behind the screen. It feels distant from using this. It makes me hesitant. Like, would I get responses?

This touches previous studies that demonstrated the ability for a social network with a Recommender System to establish social presence (Thoms 2009). Social presence theory states that community members are more likely to build relational social capital (namely, trust and reciprocity) when they perceive others in an online community to be real (Short, Williams, & Christie 1976)

A solution to Student C5's lack of social presence might be found in an unimplemented feature of the app: Three students (A1, C5, and E1) suggested that even something as simple as adding Profile Pictures can help make students more aware of each other. Although the ability to upload Profile Pictures was disabled for the demo, it had existed in earlier iterations, such that there were still a few dummy profiles that had Profile Pictures. Student A1 commented positively on adding Profile Pictures to the app:

> Your face. You can be like, 'oh I like the look of this one, looks so handsome, but reliable.' Yeah, for the topic, but I can see you first. I don't know who you are anyway, right?

A previous study of an online social network in a higher education setting found that simply adding Profile Pictures can establish social presence and foster a sense of community (Ractham 2008).

4.3.2.2.3. Effect of the Artifact on Reciprocity

Nine of the students saw a positive effect on reciprocity from use of the app. Student B5 said getting a response to an opportunity he posts would make him more willing to help others: “If you post it and you get a good opportunity out of it … next time you will do it.”

Student E6 explained how the graduate nature of the community allows the app to foster reciprocity amongst its user base:

> I think most people are pretty open, especially if they’re willing to use the app to begin with and put their information in, that they’re going to be in the ‘I opted’ group. … I think people kind of realize – at least at this level in your education – that at some point you’re going to be writing your thesis, you’re going to be writing your dissertation, and you’re going to be wanting to call on people to help you out. So, you know: Sit and fill out their survey or do whatever you need to help them out.

Student D1 said: “I'd probably be more likely to help [i.e., respond to opportunities] because I could see something really quick and answer a quick question, and do a better global effort.” However, she also added: “I'd feel less bad to say No, because they could look up other resources.” This suggests the danger exists of complacency limiting the level or reciprocity in the community if too many users respond to a Push notification for an opportunity see it and say to themselves “Someone else will take care of it.”

4.3.2.2.4. Effect of the Reciprocity on the Artifact

Students C3, C4, E5, and E6 suggested that reciprocity would have an effect on use of the app, in that a certain level of reciprocity must already be present in the community for the app to work: Student E5 said:

> I think people are out there, and – let’s say I was on the app – they contact me as a former student and ask for any guidance, assistance, terms of

> knowledge about opportunities out there. I would try to help out just because I think that if you log in and you're using the system then it's because you want to help others.

Four of the participants had earlier indicated that they would use the app to look for quick help. This, however, begs the question: How is reciprocity established when many users are simply expecting quick help but there are not as many incentives to help others in return? A hint to an answer came during Focus Group E. Student E6 mentioned mentoring, citing the culture shock when students become alumni and go out into the "real world":

> I also think that's really valuable for any school that's doing mentoring programs, especially for the advanced students, the doctoral students. That's a good one.

This student had elaborated in detail on uses of the app that could establish this two-way reciprocity:

> I guess technically I am an alumna, but a current student since I got my Master's, went out, and came back for a Doctorate. But I would use it to track down current students who are in need of internship opportunities to complete their fieldwork hours, I would look for students who may be ready to graduate and are looking for a job to kind of recruit them into where I work. I would use it to connect … like I'm not planning to go the research route, but if I were I would probably use it to recruit people for specific studies. For research assistants and assistance that way. So, yeah I could see a lot of uses for it. I think it would do a lot more than what our current Advancement Office does. I know that's kind of politically incorrect to say, but the only interactions that they have with alumni are essentially to ask you for money for the school. And I think that it would help pull people back in and build more of a spirit, CGU community spirit, if that were available.

Focus Group E also discussed groups on campus, like SPARC, that serve as a catalyst for reciprocity due to the fact that these groups already seek to help others out by – for example – connecting students who fulfilled their teaching requirements to teaching assistants. What these groups rely on people physically showing up to engage

in face-to-face participation for can be achieved virtually through the app. However, this also reinforces the findings of (Ractham 2008, Thoms 2009), that this would also require administrative presence in the OSN – whether from the university itself or several individual groups like SPARC – to post opportunities or simply promote the app to those who could use it to fulfill their graduate portfolio or research requirements.

4.3.2.2.5. Effect of the Artifact on Identification

Three students (D2, E3, and E6) saw a positive effect on identification with the community from use of the app. Student D2 said: “I think it would make me prouder, that I could help other people.”

Student E3 said:

> I think it would have a really positive effect, especially if like at orientation or something they get new students at things that are required and you must be there. If these things were presented as an option it may be helpful especially if you have people coming from all over.

This is consistent with the results seen in other research involving the use of an OSN to build a sense of community in a higher education setting, where the community building artifact was used to connect new students at orientation and foster a sense of identification early (Ractham 2008).

4.3.2.2.6. Effect of Identification on the Artifact

Eight participants felt that stronger identification with the CGU community would instead have an effect on willingness to use the app: That is, more students felt identification would have an effect on usage, rather than the other way around. Student E3 stated that knowing the user base was limited to the Claremont community made her more willing to use the app. Student D6 said: “I wouldn't use the app if I didn't feel I belonged to here.”

In addition, one of these students (C3) felt that his identification (or lack thereof) with his department would affect his level of trust in recommendations made by the NARS depending on which department the connections came from ("Drucker students are the least trustworthy. I know them the most. Business people in general. If you know them, you know if you can trust them or not"), demonstrating the interplay between the different components of relational capital.

4.3.2.2.7. Other Observations on Relational Social Capital

Participant responses on the relationship between use of the artifact and the three dimensions of Relational Social Capital are summarized in TABLE 20.

Some students (A1, A2, and D1), were skeptical or ambivalent of any effect the app would have on certain components of relational capital. Students A1 and A2 were unsure the app would have any effect on relational social capital. Student A2 indicated:

> If I'm getting a benefit from the alum, you know maybe when I'm an alum and then an alum helped me out, I might help a student out in the future, but how's that going to affect me helping out other students? I'm not sure.

Student D1 outright said that using the app wouldn't make her feel any further sense of identification, though she felt it would increase her perception of reciprocity at the university and of trust in her department.

Of the three components of relational social capital discussed in-depth during the focus groups, more students thought the community's level trust and identification would impact how people interact with the app, rather than the other way around. Meanwhile, more students thought people's interactions with the app would affect the OSN's reciprocity, rather than vice versa. This is most likely due to the nature of the app. The app's focus on promoting and pushing transactions means that the biggest impact of its

functionality would be on reciprocity, the most transactional component of relational social capital. The app's focus on connecting people based on shared areas of study, and its exclusiveness to the community, means that trust and identification would be its most significant inputs.

(TABLE 20) Students who indicated a relation between use of the artifact and the Relational Social Capital Components

	Current Relational Capital	Artifact facilitates Trust?	Trust facilitates use?	Artifact facilitates Recipro-city?	Recip-rocity facilitates use?	Artifact facilitates Identifi-cation?	Identification facilitates use?
A5	Low		X				
A6	Low		X				
B1	High	X					
B2	Mixed			X			X
B3	Mixed			X			
B4	High			X			X
C3	Mixed				X		X
C4	High				X		
C5	Mixed		X	X			
D1	High	X		X			
D2	High	X		X		X	
D3	High	X		X			X
D4	High	X					X
D5	High		X				
D6	High		X				X
E1	Mixed		X				
E3	High	X	X			X	X
E5	High			X			
E6	High			X	X	X	X

Safe Spaces

When discussing the components of relational social capital, participants continued to bring up the question of including social as well as academic/professional

pursuits into the app. The feedback suggests that casual interactions are more important for establishing relational capital than structural capital, and that including support for social interactions in the app in addition to academic interactions is even more important for building relational capital. Without this social element, the app would rely almost entirely on the trust users have for peers in their community, the trust they have in the community itself, and reciprocity in order to build social capital. Relying so strongly on trust and reciprocity to foster an online social network has its downsides. Students or alumni must derive use from the app almost immediately, or they won't continue to use it. Student B3 said: "I think if you're using it for the first time you think, 'Ok, I'll give it a try,' and people will respond because they would be interested. And if it doesn't work, it doesn't work, and you don't use it anymore." This suggests the social element is needed to retain users if the app has not reached a critical mass of active users such that students can trust that any content they post would get a relevant response.

Student C4 stated: "It's weird as a search tool. For the future, to develop communication, it's good. As a business, it's just a search tool." It suggests a place for social discussion or communication is necessary to spark the creation of additional relational capital. Or else the app is just a search tool.

One way forward was hinted at during Focus Group A, the group that perceived the lowest levels of Relational Capital in their current environment. Some participants of Focus Group A (Students A4 and A6) emphasized the lack of any Safe Spaces in the community as why they didn't feel any sense of reciprocity or identification with the community. Safe Spaces are areas on a campus where students – especially those

from marginalized communities – can go to relax and socialize without fear of being made to feel unwelcome or uncomfortable, and where the rules guard each member's self-respect and dignity (Evans 2002, Johnson 2005, Poynter & Tubbs 2008).

Student A4 commented:

> I don't know whether this answer is related to your question, because in general the CGU tuition is very high, and most of students have many jobs. So in a lot of study events, especially if you're PhD, don't have time actually, and we don't even have any study space exactly. Like the computer lab, it's not open for 24 hours. There's no space for the doctoral students to study, like a personal lab or a personal locker to put their stuff. There is no space even in our department, we don't know each other after class. And you don't have enough time to talk because everybody's busy, and there's no space to get together to study or there's no sense of networking, there's no things like talking. So it's not easy. In general, the stress of the financial pressure, the job pressure, and the study pressure, the stress of coursework, lack of space and support. So how can we make the connection? We can talk only in the job environment if you have a job, right? That's the only way we can make friends even outside of the department.

She emphasized her lack of identification with her department or the school in general, clinging to her job in the community lab as a Safe Space where she can talk to fellow students who go there to study. As she noted:

> And I have a community, I feel like because I work here on campus, and that's the way like I feel connected, like with other people, because I work there I could talk with other people. If I did not have that job, probably I'd feel totally, truly disconnected. I don't have any sense of connection to my department, don't have any connection to any of the other departments, and students.

This suggests that the app would be able to draw in more participation from users and foster a better sense of community if the app could provide community members with a sort of virtual Safe Space. This could be done by implementing a messaging system, adding the ability to form groups, and giving the community owners (i.e., the university administration) a stronger administrative presence to reach out to

users and provide content. A rudimentary form of the potential for an online higher-ed social network to provide this kind of online Safe Space was seen in a previous study (Ractham 2008). One of the interventions administrators performed with this online social network to strengthen the sense of community at the department it was deployed in was a memorial service for a faculty member who had recently passed away. Students and community members were invited to post, share, and discuss memories of this professor and what he meant for the community, its sense of identity, its shared vision, and its sense of purpose.

Summary

The findings compiled from participants regarding the design artifact and relational social capital are summarized in TABLE 21.

(TABLE 21): Relational Social Capital Findings

Relational Social Capital
Exclusivity to the community means it's better than LinkedIn (Identification)
Map Feature lets users find others who identify with CGU (Identification)
Some students identify more by country of origin or department (Identification)
Knowing it's CGU-only makes students more willing to trust the app (Identification & Trust)
Let users endorse other users (Trust)
Seeing mutual connections would help users trust recommendations (Trust)
Students trust the CGU community more than an undergraduate community (Trust)
Some students would be willing to post about open jobs in their company (Reciprocity)
Good for mentoring (Reciprocity)
Alumni feel left out (Reciprocity)
Enable online Safe Spaces (Trust & Identification)

4.3.3. Cognitive Social Capital

4.3.3.1. Perceptions of Existing Cognitive Social Capital and the Study Environment

Shared vision and sense of purpose are two major components of cognitive social capital. A major factor in establishing sense of community and social capital is the knowledge that one's fellow community members are experienceing the same or similar struggles. When asked about the perceived level of cognitive social capital in the Claremont community, twelve students across all five Focus Groups said there was a sufficient level (see TABLE 22. Cognitive Social Capital ratings were based on participants' responses to questions pertaining to the Shared Vision - but not the Shared Language - construct in Appendix A:. Whether participants believed community members shared the vision of helping others solve their academic and professional problems, shared the same goal of learning from each other, or shared the same value that helping others is pleasant. Psychological Sense of Community ratings were based on participants' responses to the "Sense of Purpose" of the School Sense of Community Index in Appendix A: Whether their activities in the community include doing work that helps others, whether their program encourages them to think about helping others, or whether being in the program has contributed to their having more of a sense of value in their contribution.). Additionally, eleven students felt there was a sense of purpose in their school. There were some students who felt there was a shared vision, but not a sense of purpose. Student C3, an alumnus, felt there was a sense of purpose and community before he graduated: "As students, there are more things, more opportunities at the school, but not as an alum."

(TABLE 22) Cognitive Social Capital in Current Community

	Age	Sex	School	Dept	Deg	Status	**Shared Vision in the Current Community**	**PSOC in the Current Community**
A1	30s	F	CGU	CISAT	PhD	Current	**Did not state**	**Did not state**
A2	20s	M	CST	Religion	PhD	Current	**High**	**Low**
A3	30s	M	CGU	CISAT	PhD	Current	**Low**	**Did not state**
A4	40s	F	CGU	Religion	PhD	Current	**Low**	**Did not state**
A5	30s	F	CGU	DBOS	PhD	Current	**High**	**Low**
A6	20s	F	CGU	DBOS	M	Current	**High**	**Cannot Tell**
B1	30s	F	CGU	CISAT	PhD	Current	**Low**	**High**
B2	20s	M	CGU	Drucker	M	Current	**High**	**High**
B3	30s	M	CGU	DBOS/DPE (Dual)	PhD	Current	**High**	**Did not state**
B4	20s	M	CGU	Math	PhD	Current	**Did not state**	**High**
B5	30s	M	CGU	CISAT	PhD	Current	**Low**	**Low**
C1	20s	F	CGU	DBOS	M	Current	**Varies**	**High**
C2	20s	F	CGU	Drucker	M	Alumna	**High**	**Low**
C3	40s	M	CGU	Drucker	M	Alumnus	**Low**	**High**
C4	20s	F	CGU	Drucker	M	Alumna	**Did not state**	**Did not state**
C5	30s	M	CGU	CISAT	PhD	Current	**Low**	**Cannot Tell**
D1	20s	F	CGU	DBOS/CISAT (Dual)	PhD	Current	**High**	**High**
D2	20s	M	CGU	Art	M	Current	**High**	**High**
D3	30s	F	CGU	DPE	PhD	Current	**Did not state**	**High**
D4	30s	F	CGU	DPE	PhD	Current	**Did not state**	**High**
D5	30s	M	CGU	CISAT	PhD	Current	**High**	**Low**
D6	30s	M	CGU	CISAT	PhD	Current	**High**	**High**
E1	20s	F	CGU	CISAT	M	Current	**Did not state**	**Low**
E2	20s	M	CGU	Religion	PhD	Current	**High**	**High**
E3	20s	F	CGU	Religion	M	Current	**Did not state**	**Did not state**
E4	30s	M	CGU	CISAT	PhD	Current	**Did not state**	**Did not state**
E5	30s	M	CGU	DBOS	PhD	Current	**Varies**	**Did not state**
E6	40s	F	CGU	Education (M) & Public Health (PhD)	PhD	Alumna	**Did not state**	**High**

Some students expressed a belief that there were high levels of cognitive social capital in the community despite also lamenting low levels of relational social capital. Even if they exhibited low levels of trust or identification with the community itself, the

shared struggle of being a graduate student was enough to instill some sense of a shared narrative, a shared vision, and a sense of purpose. Student A5 said:

> I'm just going to say that my friends in my department all kind of want to see each other succeed. No one's going to be like, 'You failed that test. Huzzah!' you know?

Student A6 (who also expressed mixed feelings about the current levels of relational capital in the community) responded:

> Yeah, my department's the same. We do have those competitions, but our bottom line is, regardless of our research focus, is just: 'We hope you will succeed in your research and your study.'

Student A2, the CST student said of his school: "We go out to bars with our friends and talk about what you wrote in your term papers."

A comparable number of students – eight students across four Focus Groups – felt there was a lack of a shared vision in the community. Student C5, one of the commuter students, said:

> When you ask about the education experience, it's the person and the professor and the individual relationship. There hasn't been a place for learning from each other, or that sense of an educational journey together.

Other students (C1 and E5) felt there was not a shared vision in the community because they believe it varies from person to person. Student E5 said:

> I think it depends on the individual. Some individuals do have that goal of helping each other, and they come in with that goal: that it's not just part of being a Claremont student, but it's part of their world view. Whereas other individuals come in and just want to get their degree and do what they need to do and leave, so I don't think that they have a sense of community. So I think that's up to the individual.

In addition, seven students across all departments felt there was not a sense of purpose in the community. This included Student C2, who cited poor alumni services as a reason why. Student C5 did not say there was not a sense of purpose in the

community, but said that as a professional commuter student, it's hard to build a sense of purpose.

Siloization

Due to the often-mentioned high degree of siloization at CGU, current perception of cognitive social capital varied from department to department. Some departments are cited as much better than others for fostering a sense of community and identification.

For example, Student D2 – an Art student – commented on the specific nature of his program. Claremont's Master's of Fine Arts (MFA) department would qualify as a department with an extremely high level of cognitive social capital: In this program, students each get their own studio in the same building, in which they have freedom to create whatever comes to mind. These studios function as incubators of creativity, study spaces, a place to sleep overnight when preparing for an upcoming installation show, and as gathering spots for the MFA students, many of whom visit each other's studio spaces to converse and socialize. Through the shared experience and shared narratives, the Art Department has an extremely high level of cognitive social capital:

> We spend most of our time together in the Art Department. We're all students next to each other painting all day! I ask the other departments whether they're around each other like that.

In addition, this intimate and constant proximity to others who share the same vision has ingrained a lasting sense of purpose in the department's alumni. Alumni from the MFA program continue to return to the on-campus installation shows of current students, and successfully reach out to current students: "We get emails from alumni for their shows to go to them."

Ideally, a school with a high level of cognitive social capital would exhibit similar qualities of togetherness, in which students could share their narratives (whether explicitly, by discussing their work with each other; or implicitly, by collaborating or working purposefully in close proximity). However, such strong cognitive capital would - by its nature - be siloized, as the different experiences, requirements, and department-specific jargon in each school would make this kind of social capital difficult to share across departmental barriers, even with an app open to students of every department.

Perceptions of Transdisciplinary Students

Four of the participants of the study were either dual major students (B3, D1, and E6), or students with social connections in more than one department (Student C2, a DPE student who mainly socialized with MBA students). These students were able to comment on the varying levels of cognitive capital from department to department.

Student C2 said:

> I was in Politics, but I made friends with [MBA students from the Drucker School]. And I keep in touch. Drucker had the most social stuff. They were inclusive in their community. They actually foster it. The department I came from didn't.

Student B3 is in two schools (DBOS and DPE), and felt a far more cohesive atmosphere in DBOS than in DPE, where he says nobody knows or cares what anybody else is doing or studying.

Three students (B2, B3, and D1) who perceived a high level of cognitive capital associated it mainly or only with their specific department rather than the university as a whole. This does not include student A2, who expressed positive cognitive capital associated with CST rather than CGU:

> Sense of Purpose: I think it is a highly individualized motivation at this school, that's the culture here. Like for me, compared to my previous graduate program, I've found kind of problematic. There is in a sense that we're all going to succeed together and we're all networking, connection with one another to ensure that we're all getting to the places that we're going to get to. Here it's really that you feel like you're on your own, you just have to duke it out. Not necessarily competing with other people, but… you don't see yourself gradually willing to connect with other people.

Student B2 said of his school:

> I know for a fact that if you're working on a project at Drucker, and I know for a fact that if I needed help, someone would help me. I'm not sure if someone from the larger CGU community would help me because I don't have that interaction.

Student B1 actually associated cognitive capital more with other schools besides her own. When asked if she felt there was a shared vision at her department, she vigorously shook her head and answered:

> I think it depends on which department you are coming from. It's the culture of the department. I mean with CISAT even students in CISAT, you can't find someone willing to help. When you look to DBOS they are really helping each other and once you approach them and ask for help, they can help you. So it depends on the culture.

It was noted that when discussing shared vision, the participants tended to frame their responses in terms of reciprocity. This suggests that their feelings of reciprocity are affected by their feelings of having endured the same academic struggles and trials as their peers.

Alumni Perceptions

As already noted, the alumni registered the distance they felt from the community, suggesting there was a feeling that Claremont's sense of shared vision – if they even sensed it to begin with – stopped once they got their diploma. Student C4 did

not indicate whether she felt there was a shared vision in the community, but shared her thoughts on how to help establish or maintain one among the alumni community:

> The alumni connecting with the department could be helpful. What they have, it's limited. And the times they list [alumni outreach events] – like 3 to 4PM – we can't do it if we're working. They don't know what alumni need. They're just doing what they think is right, not what we think is right.

Shared Language

Shared language is another component of cognitive social capital, and four students (A2, A4, A6, and B3) believed there were linguistic barriers between departments due to the jargon specific to each department (or even within departments). Student A4 said: "It's totally different: CST is different, CGU is different, Claremont Colleges are different, so it's hard to say there's a medium, or the same jargon is not easy."

Student A6, a DBOS student, added:

> Even in the psychology field, social psychology is different from developmental psychology. I think that's not necessarily a 'school versus school' thing. It's more like just a general 'university and department' or 'field of study' thing.

4.3.3.2. Relationship between the Artifact and Cognitive Social Capital

4.3.3.2.1. Effect of the Artifact on Cognitive Social Capital

Only five students (A4, D1, E2, E4, and E5) believed the app could help propagate a shared vision within the community (see TABLE 23); not nearly as many as the number of students who believed the app could foster structural or relational social capital. Student D1 said: "It would probably increase the feeling of everyone wanting to help out, because you could really see it. It wouldn't negatively affect unless people do bad jobs." Student A4 said talking to others who share an understanding of life as a

grad student establishes a sense of community: “Because I work in [the computer lab], that’s helpful to at least developing sense of community, talking to random people in the lab about what I’m going through; some kind of encouragement.” She believed that the NARS had the potential to foster this sense of community by recommending social connections with those who have this shared understanding: “Only meeting people around here, randomly in the lab: It’s not enough.”

Student B1 said:

> I think it depends on the personality. You can have a well-functioning app and if you’re not willing to help, you are not going to use it whether it works or not. So it depends on the person.

(TABLE 23) Students who indicated a relation between use of the Artifact and Cognitive Social Capital

	Status	Shared Vision in the Current Community	PSOC in the Current Community	**Artifact facilitates Cognitive Social Capital?**	**Cognitive Capital facilitates Use?**
A2	Current	High	Low		**X**
A4	Current	Low		**X**	
B1	Current	Low	High		**X**
B3	Current	High			**X**
C5	Current	Low	Cannot Tell		**X**
D1	Current	High	High	**X**	
E2	Current	High	High	**X**	
E4	Current			**X**	
E5	Current	Varies		**X**	

Three students (A3, B1, and C5) were skeptical about the ability of the app to foster this cognitive capital. Student A3 expressed skepticism that the app could activate any kind of community. Student C5, who registered low levels of cognitive capital in the current environment, questioned the premise that shared narratives lead to a sense of

community. Citing struggles he had with a recent course he took, he said “It [the struggle] builds solidarity, but not the capacity to have community.”

Student E5, who much earlier had said the app had potential to foster cognitive capital, conceded:

> I think it would for the people who use it. But as mentioned before, not everyone would use it. So it doesn’t necessarily mean that it would change the whole school completely.

When discussing the app’s potential to increase cognitive capital, the four students who thought it would be effective discussed the ability to limit the prerequisites same-time same-place restrictions place on the kind of communication that fosters these shared narratives or sense of purpose. Student A4 bluntly said: “That’s why we need it: We don’t have time to communicate.”

Other students commented on the ability to make users aware of news and events going on around campus, which could be a way users or the university itself could share narratives and vision across the community. Student B3 compared the app to a Listserv:

> DBOS has so many. There’s listservs for everything. We have much stuff, and sometimes it’s not very productive because it clutters your email. … Maybe this would be a way of getting messages out there that doesn’t clutter [your inbox] with 2000 emails from CGU.[6]

Student B4 concurred:

> I agree with him when he says maybe it’s like a Claremont board. Like if there’s an art gallery [at the MFA Department] you can post it. Doesn’t have to be related to a job. It’s like ‘Art Museum Tonight.’ You can post it.

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[6] When Student B3 (and some of the other participants) first enrolled, CGU community messages were sent out via campus email. This is no longer the case, as nowadays the email they receive from the school is only for official business or for announcements at the department level. However, the perception still persists among some students that they receive too many emails from the school.

User-posted opportunities or the unfinished Newsfeed feature could both facilitate awareness of activities around Claremont to the greater community, thus maintaining a shared vision of Claremont Community.

4.3.3.2.2. Effect of Cognitive Social Capital on the Artifact

Some students believed that a sense of purpose was a prerequisite to getting students to use the app in the first place. Student A3 suggested: “If there’s some appropriate ‘purpose’ community, I think it can facilitate the sense of community.”

Student A2 said:

> Yeah, I mean if there was more of a sense of CGU pride and CGU culture I think people would be more willing to use a CGU app. Yeah. It’s a tradition that needs to be developed, I think.

Student A6 said:

> I feel like the culture, the tradition has to be in place first for the app to fully reach its potential. I definitely feel like this app is a really cool idea because right now we don’t have any school-level kind of connection thing.

Student A5 framed it as a chicken-before-the-egg question: “I don’t know what comes first, like is the app going to help build that tradition, or do we need that tradition first?”

Student E2 suggested that shared narratives and experiences would drive use of the app:

> Going back to SPARC, there’s that shared teaching experience. A lot of us within our division want to help each other out: TA experience and working together with people. You cooperate and try to find ways to get some more experience with research, internships, whatever because you tried to work on similar things before. … I just kind of think expanding on that is one thing that is similar on this app that would help out too.

This suggests that the existing cognitive capital in the community (the existing presence of groups like SPARC that gather like-minded students based on shared cognitive capital) would influence use of the app.

Five students (A2, B1, B3, C5, and E5) expressed this sentiment, meaning that more participants thought cognitive social capital would be important for driving use of the app than the other way around. Student A2 suggested a baseline of cognitive capital (e.g., a shared vision of "professional research") allows him to trust opportunity recommendations:

> I would assume that if anyone tried to connect with me through this app, that they're there for work. So I would at least assume that I would try working with them until I see if they have a problem or not. I wouldn't have any problems unless I see them messing around to me, but that is only after I connect with someone on this app.

Student B1 again cited varying cognitive capital between the departments, saying it would lead to some departments committing to use more than others:

> Well with CISAT students, I think they will only respond if they think it benefits to them. Like if they're looking for job opportunities. But for other departments I'm not sure. But I'm sure for DBOS students they are willing to help no matter what.

Student B1 had earlier expressed low feelings of cognitive capital currently in her department, and cited that as a reason she believed use of the app in her department would be more opportunistic.

Transdisciplinary Cognitive Social Capital

Regarding the distance between departments, Student B5 thought it limited the capacity of the community to share narratives as vision between silos, and believed the app might be able to foster cognitive capital if it could trivialize the physical distance between the departments on campus:

> When I look at CGU as a whole, I cannot say we have a literal sense of identity because we are in silos: Math silo, Drucker silo, CISAT silo. When people come to interact with each other, most of us interact in class. So we make friends in class. But the problem is when I try to go out from one visiting to another, I find difficulties in going to Drucker or whatever department. Why? Because we have programs exclusive, and it's very hard to get allotment in that. That leads to your application. When we live in silos, people maybe find difficulty to interact with other people, but it can contribute to the positive side of the application. Why? When we have difficulty using people in [the] physical world. We may interact more in [the] online world. Or on the other hand that because we live in different silos, so we may interact differently in online silos.

He stated that by moving communication online, it can remove an imposing physical barrier preventing people from communicating with peers in other departments.

When discussing siloization, the lack of a shared language was occasionally cited as an impediment to making connections. Student B2 said of pushed opportunity recommendations he'd potentially receive from outside his field:

> No. I don't think they'd understand it. It shuts down. If I was like 'Oh, I'm from Drucker,' and you're not a part of Drucker, that's definitely something that would get a reaction like 'Oh…' I think that first impression is 'We don't have anything in common.' Even if I'm in DBOS, and I'm like, 'I'm in DBOS, but I'm in HR.' 'Oh but, you have your own research?' I think that's going to shut down interaction. Like, the first reaction is you'll be shut down.

The lack of a shared language was cited as a potential barrier to the app's ability to achieve its goals. Students A5 and A6 said the "jargon" barrier would make transdisciplinary connections difficult. Student A5 said: "The different jargons from different fields make it harder for people to connect even if you have similar interests; because the [people from one department] use a different language than the [Psychology] people, we might share very similar interests but it might be harder to find each other on the app just because of the language we use."

For the most part, however, more students (eight) thought the lack of a shared language would not be that much of an impediment to making connections. Student C1 said she could tailor her language to get specific respondents: “I think I would tag it so that only people that were into Psychology would understand it.”

Meanwhile, Student D1 thought the app would help establish a shared language by granting the jargon and concepts students use in academic discussion greater visibility outside their department:

> I think it would give bigger visibility to those terms and maybe spark some curiosity about what it is. We could share the knowledge.

Student E3’s suggestion of a Wordbank seems to be a potential solution: If – when tagging a keyword to his/her profile or posted opportunities – the ability to see what research interests and skills other users have tagged could potentially normalize some of the jargon used across the user base. Likewise, seeing what other research interests and skills exist in the community could draw attention to new areas of study, broadening specific jargon’s use across the user population.

Social vs. Professional Networking

As noted earlier, the topic of social versus professional narratives was discussed. Student A2 had discussed the fact that he talked about his assignments and courses when going out with classmates, suggesting social settings are an important venue for propagating the shared narratives that drive cognitive capital. Of the five focus groups, only Focus Group B leaned against supporting casual social connections. Student B2 was against the idea of letting community members post non-professional opportunities (e.g., social events, mixers, hangouts, etc.):

> Wouldn't that become kind of messy? Because if you're posting other things like events like that, you're basically creating more noise. It's not research. … I mean, I think social events are valuable. I think social events will help connect CGU at large. But I'm saying: if you're using this app in order to generate interest in events, eventually it's just going to turn into [Facebook].

Most of the others in Group B expressed their agreement with B2's sentiment.

Meanwhile, most of the participants in Focus Group C were adamant that the app should be open to include social activities. Student C1 suggested either allowing students or the school itself to post "events for all CGU students, not just one department," suggesting, as an example, letting her department publicize events and conferences through the app: "What DBOS does: whenever there's a [Psychology] conference, they will have a party for all the psych students."

Student C2 suggested using the app to post and push social events, e.g., mixers, where students could potentially discuss their coursework and share their experiences of student life. Student C3, noticing the Map feature, suggested that posting social events would be a good way to get alumni involved, especially alumni in different geographical locations, suggesting regional CGU alumni associations in various cities alumni move to after graduation.

However, Student C5 cautioned that social events might not appeal as much to commuter students:

> The professional commuter students: It's not easy. It's hard to build community. I feel like if there was more, I'd be interested, and I would make more effort.

A potential happy medium between Focus Groups B and C would be the ability to filter opportunities and push recommendations based on purpose, i.e., whether they are academic, professional, or casual in nature.

Summary

The findings compiled from participants regarding the design artifact and cognitive social capital are summarized in TABLE 24.

(TABLE 24): Cognitive Social Capital Findings

Cognitive Social Capital
Users can see it working for their department, but not the whole school (Shared Vision, Shared Language)
Good for finding like-minded people (Shared Vision)
The Newsfeed can establish awareness of others and disseminate shared narratives and vision (Shared Vision)
Enable online Safe Spaces (Shared Vision)
Enable users to categorize and filter notifications and searches, and add a Wordbank (Shared Language)

4.4. Effects of an OSN with NARS on Exchange and Combination of Knowledge

Overall, eleven students from Focus Groups A, B, D, and E thought the app would allow users to utilize the social capital in the community for knowledge combination and exchange (see TABLE 25). Of the ability to use social capital to find and create knowledge that is relevant and reliable, some of the students said it depended on the quality of the app: Student B3 said: “I think it’s linked with the perception of if it works or not: If it works, it works.” Student B4 agreed: “I think it’s more like if they can see the benefit, I think they will [use it].”

(TABLE 25) Perception of the Artifact to facilitate Knowledge Exchange and Combination

	Status	Oppor-tunities Posted	# of Times Msg'd Others	# of Responses to Oppor-tunities	PUSH Profile Match	PUSH Direct Msg	PUSH Opp Match	PUSH Got Opp Reply	**App Facilitates Knowledge Exchange and Combination**
A1	Current	2	2	6	0	4	2	5	**X**
A2	Current	3	1	2	0	2	0	6	**X**
A3	Current	3	2	3	0	1	0	2	
A4	Current	2	3	3	0	1	0	3	**X**
A5	Current	1	0	3	0	2	1	1	
A6	Current	1	3	2	0	1	0	2	
B1	Current	3	1	2	2	1	1	1	**X**
B2	Current	2	0	3	0	1	0	2	**X**
B3	Current	3	1	1	0	0	0	2	
B4	Current	3	1	0	2	1	0	2	**X**
B5	Current	2	1	1	0	1	0	0	
C1	Current	2	0	0	6	1	0	0	
C2	Alumna	2	4	1	0	4	0	2	
C3	Alumnus	2	7	2	2	2	0	2	
C4	Alumna	1	0	2	2	2	0	2	
C5	Current	3	0	1	0	2	0	0	
D1	Current	5	1	1	0	2	0	5	**X**
D2	Current	4	0	1	0	0	0	2	
D3	Current	3	6	6	0	4	1	1	
D4	Current	2	1	4	0	3	0	0	
D5	Current	3	3	2	0	1	0	3	**X**
D6	Current	1	1	0	0	2	0	3	**X**
E1	Current	2	1	0	0	0	0	0	
E2	Current	3	1	0	0	3	0	1	
E3	Current	3	2	1	0	1	1	0	
E4	Current	2	1	1	0	1	0	1	
E5	Current	2	1	0	0	0	1	0	**X**
E6	Alumna	3	0	0	0	1	0	0	**X**

Focus Group C – comprised mostly of alumni – had a lukewarm reception to the idea that the app could make social capital available to them. Student C2 did not feel the concept of the app was something that would be enticing for alumni, adding that she felt it would mainly be for current students. Students from Focus Group C suggested ways to make social capital available to users of the app. Student C5 suggested the app

would be more successful in this regard “if the categories were set in a way where I could find more relevant things.” Student C4 also suggested categorizing peers and opportunities, specifically by geographic location.

With respect to the app’s ability to foster the spread of knowledge that is relevant and reliable among the community, Student D6 said:

> Maybe that would increase the visibility of some fields. I could increase my knowledge about other things. When I help someone, that will help somebody else. One of my friends asked me to help with a GIS class. So I learned something new.

Student E6 articulated that the character of the community, and it’s cognitive capital (i.e., shared narratives) would allow users to gain access to its capital via the app: “I think it would be reliable because you are dealing with a small department and you’re also dealing with a community that’s pursuing similar education paths so I think they would be relevant.”

Student B2 compared the app to “a sophisticated Craigslist.” Student B2 implied that the app would have the potential to succeed due to the relational capital in the community, “because you’re assuming ‘oh, they’re going to be from CGU.’” Knowing that the peers’ names pushed to users by the NARS and the peers who respond to content users post are all members of the same community establishes the trust required for the app to succeed.

Student D1 independently echoed Student B2’s “sophisticated Craigslist” line, along with the idea that the existing social capital would foster relevant and reliable outcomes:

> Because we're all CGU students and community members. If they post something, they're expecting it to yield something. Responses would be more reliable than something like Craigslist.

Other students in Focus Group D commented on the need for trust in the community for the app to succeed. When asked how he would respond to Push notifications from the NARS, two students from Group D responded:

> D5: The concern is how to trust. It depends on the format. Can't just be anything. Maybe after working with him more.
> D6: It depends on the person's response how much I would trust. Like, if they respond, saying 'I have experience in that field,' that would increase my trust. It depends on the information the person provides to me.

Even Focus Group A, which registered extremely low levels of belief in the app's ability to create relational social capital, thought the app had the potential to foster an intellectual community. During their discussion, Student A1 said:

> I cannot tell you what would happen in the long run, but I think the application would be helpful at the beginning. Because when I see somebody's information, I may want to connect to that person because that person shares the same interests – shares the same type of research – I may start to connect with that person.

Though the app was envisioned as something that mainly students far enough in their academic careers to prioritize research would use, many of the focus group participants saw it as something that could connect new students and help them embed themselves in the community to derive use of its social capital sooner. Student A2 saw it as a first step to creating a true scholarly community:

> I think for incoming students and younger students it might actually make sense. I'm thinking of other social media forms that younger folks are using these days to create a sense of community and connections. If the school started implementing it we might see more usage out of it, especially if it was introduced at orientation as one of the tools you could use to connect with other people.

The students of Focus Group A all agreed that Orientation would be a good place to introduce incoming students to the app, and – via the app – the larger Claremont

community. This is consistent with the results seen in previous studies of OSN's in higher educational settings (e.g., Ractham 2008). A2 continued by discussing the nature of using a mobile app as the platform for an OSN:

> So, we don't have the data but I think for someone that's young, I'd want to use something with the phone to connect with people. I don't want to look through a big school website and look for stuff through a database. That's just tedious for me. It's easier for me to be on a phone.

However, Student A1 cautioned that she would have a difficult time establishing connections with strangers:

> But again, I don't know how this person looks like, whether this person's reliable, and whether to explore further than that outside of the application. So at the short term and at the beginning I think it's very helpful. But in the long run, there are so many factors that are also important.

She suggested adding Profile Pictures as a way to establish at least a small amount of trust by seeing who looks reliable.

Student A4 agreed that adding Profile Pictures could help establish social presence, and thus trust, a hypothesis consistent with previous research (Short, Williams, & Christie 1976, Ractham 2008, Thoms 2009). Student A4 tied the app's ability to make social capital available to users to Social Presence:

> In general we don't have physical space to create a sense of community. And then cyberspace is also related to our mentality, right? So, maybe contributing to a sense of presence or the physical space might be helpful with information as a kind of research. It could be helpful for contributing to provide some kind of research space or, networking, but I don't know whether we will really create this sense of community, because the sense of community comes from infrastructure and culture, and attitude of the people of the whole school, so it's not easy.

Student A3 agreed on the importance of infrastructure, articulating that without an existing communication infrastructure or active attempts to foster community from the

university administration, the app would only remain at best “helpful just for a first step and so, because we don’t have any sense of community right now.”

Many students agreed that the success of the app in fostering community depended in part on the level that already exists in that community. Student E2 said:

> it depends on the person too. It’s where we’re at, going back to what we said earlier about ‘expert or beginner?’ How long they’ve been here, to be able to take up on that [engaging with others through the app].

4.5. Summary

Regarding Proposition 1 (A Mobile OSN with NARS can yield higher levels of sense of community), twenty-eight students participated in five focus groups, lasting two hours each. Of these participants, twenty-one - a clear majority - had a positive attitude towards the design artifact as an online social network. Seven had a negative view, stating that they wouldn’t use it, or that it was not for them. Suggested improvements to the artifact as an OSN include implementing a Newsfeed, implementing a Map feature to find alumni in the user’s vicinity, maintaining a strong administrative presence, and allowing casual social networking. Eighteen participants - a majority - had a positive attitude towards the design artifact’s Push Notification and Recommender System. Eight participants were ambivalent, five of whom disliked the feature outright. Suggested improvements to the design artifact’s NARS include the ability to filter or turn off notifications, recommendations based on things besides shared skills (e.g. country of origin), the ability to endorse other users, and the addition of a Word Bank.

With regards to Proposition 2 (A Mobile OSN with NARS can yield higher levels of social capital), fifteen participants - a slight majority - felt the design artifact could increase a community’s structural capital (i.e. the number of social ties). They

considered the app as a potential alternative means to finding connections, and a way to expend less time and effort to build social connections. Thirteen participants - a large fraction of the sample - felt the design artifact could increase a community's relational capital (i.e. the level of trust and identification, and the norms of reciprocity). Focus group responses also showed that a certain level of relational capital was necessary for community members' willingness to use the app (e.g. users needed to be able to feel that peers they could find on the app would be trustworthy). Only five participants felt the design artifact would have an effect on cognitive capital. The factors that allow community members to develop a shared vision are difficult to transfer from department to department. Furthermore, the shared narratives that lay the foundation for a shared vision are difficult to propagate throughout every subunit of a community if the design artifact exclusively focuses on formal social networking to the exclusion of the casual.

Finally, regarding Proposition 3 (A Mobile OSN with NARS can yield greater exchange and combination of knowledge) eleven participants felt the design artifact would allow users to harness the social capital within a university for knowledge combination and exchange.

5. Discussion and Conclusion

This chapter discusses the implications and conclusions of this dissertation. First, the findings of this research are reviewed and summarized with regards to the three propositions examined. Next, this dissertation's contributions to various fields of study and practice are discussed. Next, this research's limitations are explained. Finally, future avenues of research on this topic are discussed.

5.1. Summary of Findings

Claremont Connection is an expository instantiation of an Information System Design Theory (ISDT), in which an artifact constructed around a mobile Online Social Network (OSN) and a Push-based Notification and Recommendation System (NARS) – whose principles of form and function were justified by Social Capital theory – for the purpose of improving the scholarly community of a higher education institution. ISDTs provide guidelines for the architecture and design of specific information systems (Gregor & Jones 2007). In addition to the above-noted key features of the Claremont Connection application (app), several additional features that could be incorporated into the form and function of the design artifact for use in different but similar settings were suggested by study participants during focus group sessions,. These features enhance the app's degree of artifact mutability. A subset of these features could be added to the design artifact to fit in with any academic unit in which it is deployed. Different departments or schools within different universities might vary with respect to demographics, subject matter, academic focus, etc. The focus groups explored three propositions.

P1: A Mobile OSN with NARS can yield higher levels of sense of community

Most participants responded positively to the design artifact as a mobile OSN. Most participants also responded positively to the artifact's NARS, with the caveat that they would like to have the ability to filter or turn off notifications. This suggests that such an app has the potential to foster a sense of community. Most of the suggested features put forth by participants fell into two different categories: having more administrative oversight, and enabling support for casual social networking as well as professional networking.

Administrative oversight tied into the necessity for a critical mass of users or regularly-updated content in order to reach a self-sustaining community. Students said they would be reluctant to participate if they did not believe there was a sufficient baseline of activity taking place in the OSN, citing the concern as to whether they would receive a timely response to any opportunity they post via the app. Many participants suggested allowing the university itself to post opportunities and events through the app, as a way to maintain this baseline of content. This reaffirms the findings of similar studies that an administrative presence to create new content on a regular basis is necessary to motivate community members to participate in an online social network (Ractham 2008; Thoms 2009).

Although Wright (2004) suggested limiting the scope of an online social networking app in higher educational settings, feedback from this study showed more participants were in favor of broadening the scope of the OSN than those in favor of a purely professional/academic focus. In addition, as some participants pointed out, there is oftentimes a blurred line in higher education between academic and social

networking: A personal relation could eventually become a professional one, and vice versa. A social event – such as a mixer – could be posted by a university administrator, ostensibly for the purpose of socialization, but could also serve to help students expand their professional network. Adding a means of categorization (e.g., the ability to filter for purely academic or purely social opportunities) could help assuage the concerns of the few participants who said they would like the artifact's OSN to remain entirely professional.

The study also demonstrated that additional features or administrative oversight would be necessary to appeal to alumni. One of the important functions of sense of community is fulfillment of needs (Wright 2004). Alumni are less likely to need an app focused solely on professional pursuits: If they already have a job, they would have no use for an app to find professional opportunities. Social networking was cited by alumni participants (as well as several participants who were about to graduate) as a need they would like the design artifact to address. Many participants latched onto the partially-implemented map feature which is designed to find alumni within a user's geographical vicinity. Moving to a new location after graduation is oftentimes a daunting prospect, especially with the need to seek out and make new social connections. These participants expressed enthusiasm towards the idea of an app that would ease that process by allowing them to make social connections with those in their new location who also identify with the same graduate institution. In other words, while the OSN artifact was designed to shorten the perceptual distance between community members and their institution, many alumni expressed interest in the app's potential to expand the geographical outreach to wherever they may find themselves after graduation.

The design artifact could build community among alumni if it was introduced and promoted from the moment a student enrolls at a university. Some study participants suggested introducing the artifact to incoming students at orientation. A strong alumni outreach program sees all incoming students as future alumni, and begins the alumni outreach process there. Previous research has demonstrated that introducing an OSN during orientation is an effective way to get incoming students to familiarize themselves with the community and develop trust and a sense of identification right away (Ractham 2008).

P2: A Mobile OSN with NARS can yield higher levels of social capital

This research demonstrated that a mobile-based OSN with NARS has the potential to foster the creation of structural and relational social capital among current students. Due to the functionality of the peer recommender, the artifact was seen as potentially most effective at increasing structural capital, in that by pushing peer recommendations, the NARS would directly increase the number of network ties in the community.

The app was also seen as effective at creating relational social capital, especially norms of reciprocity. This could be a product of the transactional nature of the ability to post opportunities or receive opportunity recommendations, as well as the transactional nature of graduate school itself. Most graduate students understand that at some point in their academic careers, they can expect to volunteer to help their peers achieve their academic goals because they know they too will eventually need to solicit help from other students to complete their own research. Thus, a setting such as a higher educational institution is an effective target in which a design artifact like Claremont

Connection can facilitate norms of reciprocity by lessening the time and energy investment needed to seek and carry out these transactions.

The study also demonstrated that not only can the artifact increase social capital, but that a baseline level of social capital is needed in order for such an artifact to succeed. A structural baseline was necessary in that participants felt they would not use such an app unless they were certain there would be enough active users such that any content they posted would be seen and responded to in a timely manner. A relational baseline was necessary in that a significant fraction of the sample stated that their level of trust in their peers affected their willingness to participate (e.g., participants who said they trusted one department more than others, and students who suggested endorsements or peer rating systems because they did not know whether they could trust other users' proficiency in their self-reported skills). Trust and member identification were seen to be more important as precursors to use than as variables that would increase through use of the app.

The focus groups also demonstrated the importance of facilitating casual networking in addition to professional/academic networking. A potential reason the app was not perceived as capable of facilitating cognitive social capital is because cognitive capital requires an open social forum in which narratives and vision can be shared among the target community members. With the app focused entirely on professional/ academic networking, there is no means to facilitate the sharing of cognitive capital. One of the additional features suggested by many of the participants – a newsfeed maintained by the university – is the kind of feature that could promote awareness of

other community members' activities and accomplishments, and build the cognitive aspect of social capital.

However, the conversations within the focus groups also brought to attention the difficulty any OSN – even with support for personal social networking – could have in spreading cognitive social capital between departments. Due to the level of siloization in many graduate schools, the student experiences are unique from department to department, and the cognitive social capital that exists in one department may well be specific to that department alone. For example, an app that allows students to share their narratives and awareness of their activities might help build cognitive capital in the Art Department. But their shared vision would be unique to their department, and awareness of their activities most likely will not translate to higher cognitive social capital in a department such as Information Systems or Math, in which students have completely different requirements and activities. The focus group conversations suggest cognitive social capital is a resource that might be easier to build within departments rather than between.

P3: A Mobile OSN with NARS can yield greater exchange and combination of knowledge

A number of the participants felt that the design artifact could increase the effectiveness of a community's social capital. Eleven participants felt that the artifact could yield greater exchange and combination of knowledge. This was dependent on how much social capital they believed to be in the community; namely trust, identification, and shared vision. Many participants said that they would be more willing to believe content posted via the app is reliable and relevant because they trust their

fellow peers, or because knowing that every user is a member of the same community would make them more willing to trust those users. Features related to trust (e.g., peer endorsements or recommendations) were common participant suggestions. Features that establish social presence (e.g., profile pictures) were also common suggestions, recalling prior research that demonstrated that higher levels of social presence help to establish trust (Biocca et al. 2003). The belief that other users understand the same struggles as they do (i.e., coursework, research, publications, etc.) also helps establish a willingness to trust the quality of their posted content.

Their willingness to use the app was also dependent on the quality of the peers and opportunities recommended to them. Participants expressed reluctance to keep the app installed on their mobile devices if they felt the NARS was pushing inaccurate or far-too-frequent recommendations. Thus, many of the suggested features included filters to limit the amount and kinds of push notifications the app could send them. While the version of the artifact used in the focus groups used simple match criteria on shared skills or research interests, a version in a real-life setting might use more specific criteria, such as through collaborative filtering using a Pearson-correlation coefficient or other formulations that are not triggered as frequently. Thoms (2009) developed such a recommender system using similar ratings on blog postings as the criteria for peer recommendations.

5.2. Research Contribution

This dissertation makes contributions to information systems design theory, education practitioners, and the social sciences. It created and demonstrated a design theory for a customized social network application for use in increasing the social capital

and sense of community of higher education institutions, especially those that are considered commuter campuses. As such, this study's design theory will be relevant to practitioners working with similar information systems (Gregor & Jones 2007). The study does this by taking steps towards demonstrating a focused online social network for higher education that aims to connect users based on focused academic or professional pursuits, and foster the kind of networking and collaboration that leads to increased levels of combination and exchange of knowledge.

For practitioners, this study demonstrates the use of a recommender system with push notifications, with recommendations based on academic or professional skill compatibility. This study also demonstrates the potential of a recommender system for building structural and relational social capital. It also found several additional features that can be implemented in future variants of the design artifact. For similar higher education institutions, the ISDT contributes to the growing field of online social network use in educational settings, and can be a guideline for using online social networks to build sense of community and social capital in those institutions. It also demonstrates the potential of mobile-based OSNs with a NARS in a higher education institution. However, it is evident that without a compatible administrative infrastructure, such an app is unlikely to succeed.

For any higher educational institutions, the ability of students to conduct research is a key factor. Focus group responses suggest that the design artifact has potential to foster collaboration between students by lessening the amount of effort required to seek out and make connections with peers with similar research interests. Alumni outreach is also a major concern for educational institutions. Most universities would like a strong

alumni community in which current students can look to alumni for advancement opportunities, and in which alumni are willing to reach out and contribute to their alma mater. Responses from the focus groups suggest alumni who did not feel a strong sense of community at their institution are more resistant to alumni outreach efforts. While the alumni in this sample did not embrace the idea of the design artifact, participant responses suggest that a strong sense of community can be established by introducing new students to an OSN as they enter the university to help them find peers and mentors early. The interest participants expressed in personal social networking also suggests that an OSN has the potential to expand the geographical reach of a higher education institution by letting alumni find other alumni in their vicinity after completing their degree and moving away.

Much prior research the field of social capital looks at the measurement and effects of social capital in a community rather than ways to create this capital. Prior research also focuses on organizational settings rather than educational settings. This dissertation partially fills this gap by looking at methods to potentially foster social capital, and to do it in a higher educational setting. Finally, the research also contributes to the body of research concerned with how to build and utilize social capital by demonstrating the relationship between an OSN with a NARS and sense of community, social capital, and the target community's ability to use its social capital.

5.3. Limitations

A key limitation with the study was the short amount of time in which participants were able to experiment with the design artifact. An online scholarly community would normally contain content that community members had collected, reflected on, and

published over the long-term course of several semesters. It normally takes a long time for a new online social network to blossom into a meaningful, content-rich community. The participants of the focus groups engaged in a demonstration that lasted 2 hours before discussing the features. If given more time, users might be able to use the features more and develop more nuanced perceptions of perceived value, interactions with social capital, and knowledge combination and exchange.

Furthermore, when the scenarios are scripted, or users create content during structured exercises where they imagine a hypothetical community-wide rollout of the design artifact, usage patterns might differ with respect to how users would approach such an artifact in an uncontrolled setting. In this study, volunteer users were asked to imagine the design artifact was in wide use amongst the wider alumni community. The temporary quality of profiles and opportunities posted for testing purposes may have influenced participants' perceived value of the system. Additionally, it may be difficult for users to trigger push notifications when there are only 4 or 5 other users from entirely different fields in the room. If more meaningful, content-rich, and longer lasting profiles or opportunities were posted in a widely-used artifact, users might feel more compelled to explore and create more of their own content. As a result, perceived value of the artifact may differ from what was expressed in the focus groups reported in this dissertation.

5.4. Future Research

A future research project could deploy a similar app (with the additional features suggested by this focus group) over a longer period of time – at least a semester – in a higher education setting. The research design would be a field experiment (Boudreau et

al. 2001; Neuman 2005 pg. 266). Such a study would measure the effects of the updated design artifact and its system constructs on a sample population within a pre-existing organization. Data would come from back-end analytics and a quantitative survey instrument validated from previous studies that measure social capital and school sense of community. The survey instruments would determine the effects of the design artifact by measuring these variables both before and after its deployment and comparing the results. Such a research design would be characterized as a one-group pretest-posttest quasi-experimental design (Thoms 2009). This research would primarily be concerned with whether the app and its constructs provide value to the target population; thus, it will also be concerned with user experience and satisfaction in addition to how the components create social capital and a sense of community. However, there are downsides to working with a live dynamic environment such as a social network, including loss of control over how users will manipulate the software. It is for this reason that the findings from this focus group study can serve as the foundation for such a follow-up quantitative study.

Data collection in a study such as this would involve observing and collecting all Opportunity postings and responses over a much longer time-frame, allowing the researcher to see usage patterns and their effects on social capital in a live setting. The sample could include alumni and current students provided from the rosters of any academic institution.

In the prior studies from which the focus group questions and discussion topics were derived, the survey instruments were designed for regression analysis on variables relating to technology acceptance, sense of community, and all three

dimensions of social capital. A quantitative study with a large enough sample size over the course of 1 or 2 semesters in a live setting would more conclusively confirm or deny the propositions put forth in the ISDT, as well as the qualitative observations made during this dissertation's focus groups sessions.

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Appendix A: Sample Focus Group Questions

Group Discussion Topic 1

General Construct

Question: Agree or Disagree?
1. It is important to have high levels of social interaction in the Claremont community.
2. It is important to work together via group collaboration in the Claremont community.
3. It is important to exchange feedback with other members of the Claremont community.
4. It is important to build a sense of community in the Claremont community.

OSN Construct

Question: Agree or Disagree?
1. An online community will increase interaction with my fellow Claremont community members.
2. An online community will provide advancement opportunities for the Claremont community.
3. The ability for members of the Claremont community to interact through an online community is important.
4. An online community will be an excellent tool for building community amongst the Claremont community.

Recommender Construct

Recommender systems are programs that automatically present a user with information (products, news, or other users) that are likely of interest to that user. Examples include Zoosk, eHarmony, Match.com recommendations, and Facebook's "Friends you might know" feature.
Question: Agree or Disagree?
1. A recommender system will increase interaction with my fellow Claremont community members.
2. A recommender system will be an excellent tool for building community in the Claremont community.
3. I am interested in discovering potential new connections at CGU.
4. I would use a recommender system to discover potential new connections at CGU.

Group Discussion Topic 2

Online Community Construct

Question: Agree or Disagree?
1. How often would you use Claremont Connection?
2. Claremont Connection would increase interaction with my peers.
3. Claremont Connection would provide advancement opportunities for the Claremont community.
4. Claremont Connection is an excellent tool for building community in the Claremont community.
5. Claremont Connection is an excellent addition for the Claremont community.
6. I plan to continue using Claremont Connection in the future.

Recommender System Construct

Question: Agree or Disagree?
1. How often would you use the Claremont Connection to check for peer recommendations?
2. How often would you use the Claremont Connection to check for opportunity recommendations?
3. I found my peer recommendations useful.
4. I found my opportunity recommendations useful.
5. I look forward to checking for new recommendations.
6. Peer recommendations would increase interaction with my peers.
7. Opportunity recommendations would increase interaction with my peers.
8. Peer recommendations are an excellent tool for building community in the Claremont community.
9. Opportunity recommendations are an excellent tool for building community in the Claremont community.
10. Peer recommendations are an excellent addition for the Claremont community.
11. Opportunity recommendations are an excellent addition for the Claremont community.
12. Finding recommendations based on skills and research interests is an excellent way to recommend peer connections.
13. Finding recommendations based on skills and research interests is an excellent way to recommend opportunities.
14. I would continue to discover new connections in the Claremont community through the recommender system.
15. I would continue to discover new opportunities via the Claremont community through the recommender system.

Technology Acceptance

Question: Agree or Disagree?
1. Learning to use the Claremont Connection was easy for me.
2. I found it easy to get the Claremont Connection to do what I want it to do.
3. Interacting with the Claremont Connection was clear and understandable.
4. I found the Claremont Connection to be flexible to interact with.
5. It was easy for me to become skillful at using the Claremont Connection.
6. My experience using the Claremont Connection was positive.
7. My experience posting opportunities was positive.
8. My experience finding opportunities was positive.
9. My experience finding peer recommendations was positive.
10. My experience finding opportunity recommendations was positive.
11. Overall, I was satisfied with the Claremont Connection.

Social Interaction Ties

Question: Agree or Disagree?
1. I maintain close social relationships with some members in the Claremont community.
2. I spend a lot of time interacting with some members in the Claremont community.
3. I know some members in the Claremont community on a personal level.
4. I have frequent communication with some members in the Claremont community.

Norms of Reciprocity

Question: Agree or Disagree?
1. I know that other members in the Claremont community will help me, so it's only fair to help other members.
2. I believe that members in the Claremont community would help me if I need it.
3. I believe in paying back members in the Claremont community who've helped me out in the past.
4. I remember those in the Claremont community who have helped me in the past.

Identification

Question: Agree or Disagree?
1. I feel a sense of belonging towards the Claremont community.
2. I have the feeling of togetherness or closeness in the Claremont community.
3. I have a strong positive feeling toward the Claremont community.
4. I am proud to be a member of the Claremont community.

Trust

Question: Agree or Disagree?
1. Members in the Claremont community will not take advantage of others even when the opportunity arises.
2. Members in the Claremont community will always keep the promises they make to one another.
3. Members in the Claremont community would not knowingly do anything to disrupt the collaboration.
4. Members in the Claremont community behave in a consistent manner.
5. Members in the Claremont community are truthful in dealing with one another.
6. Generally speaking, members of the Claremont community people can be trusted
7. Members in the Claremont community try to be fair.
8. You can't be too careful in dealing with members in the Claremont community.
9. Members in the Claremont community try to be helpful
10. Members in the Claremont community are just looking out for themselves

Shared Vision

Question: Agree or Disagree?
1. Members in the Claremont community share the vision of helping others solve their academic and professional problems.
2. Members in the Claremont community share the same goal of learning from each other.
3. Members in the Claremont community share the same value that helping others is pleasant.

Shared Language

Question: Agree or Disagree?
1. The members in the Claremont community use common terms or jargons.
2. Members in the Claremont community use understandable communication pattern during discussion.
3. Members in the Claremont community use understandable narrative forms to post or respond to opportunities.

Quality of Knowledge

Question: Agree or Disagree?
1. The communications shared by members in Claremont Connection are relevant to the topics.
2. The communications shared by members in Claremont Connection are easy to understand.
3. The communications shared by members in Claremont Connection are accurate.

4. The communications shared by members in Claremont Connection are complete.
5. The communications shared by members in Claremont Connection are reliable.
6. The communications shared by members in Claremont Connection are timely.

Sense of Community Index

Question: Agree or Disagree?
1. I think this program is a good place for me to be.
2. People in this program do not share the same values.
3. The people in this program and I want the same things from the program.
4. I can recognize most of the people in my program (in my year).
5. I feel at home in this program.
6. Very few of the people in my program know me.
7. I care about what the people in my program think of my actions.
8. I have no influence over what this program is like.
9. If there is a problem in this program, the people here can get it solved.
10. It is very important to me to be in this particular program.
11. People in this program generally don't get along with each other.
12.I would recommend this program to others

13.a (If you are a current student) I expect to be in this program a year from now.
13.b (If you are an alumni) I expect to be active in the Claremont community a year from now.

School Sense of Community Index (i.e. Sense of Purpose)

Question
1. My activities in the Claremont community include doing good work that helps people.
2. My program encourages me to think about helping people.
3. There is a sense of purpose in my program.
4. Being in the program has contributed to my having more of a sense of the value of my contribution.

Additional Qualitative Questions

✦Would you care to reflect on any aspects of Claremont Connection?

✦Do you have any recommendations on how we can improve Claremont Connection?