

DESIGNING A SOCIAL NETWORKING PROTOTYPE: AN ACTION RESEARCH APPROACH IN BUILDING A USER-CENTRIC WEB 2.0 SYSTEM

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Abstract

In this paper we explore the possibility of using Web 2.0 technology to build a social networking tool, where users are the main participants during the design and implementation phases. Although Web 2.0-related research has gained momentum in recent years, much of the research focuses solely on studies where users only use the system instead of playing an integral part in the design process as well. Our study relies on both users' input and usage patterns to drive each step of the design and implementation cycles. Hence, we employ both Soft System Methodology and Action Research to diagnose, evaluate, and provide guidelines and research instruments to examine various types of Web 2.0 technologies and services. We present a prototype, the purpose of which is to help users accomplish networking within a small group. We also discuss lessons learned from the project's life cycle from the perspectives of both the system's users and its designers.

Keywords: Web 2.0; Soft System Methodology, Action Research, Design

1. Introduction

The growing in popularity of Web 2.0 technology has garnered much worldwide attention from both researchers and practitioners [2]. The popularization of the Internet and the earlier generation World Wide Web ("Web 1.0") during the 1990's ushered in a new era, with several new and exciting ways for people to communicate and network with one another. Email, file sharing, and online chat were some of the main instruments that represented the first wave of technology starting to gain usage during the beginning of the Information Age [11] Rapid advances in both information and communication technologies have transformed almost every aspect of people's lives. The Information Age has seen a leveling of the playing field in terms of information creation and dissemination, as Friedman documented in his revolutionary book, *The World is Flat* [6]: Information is being created, synthesized, and disseminated by the average layperson as well as professionals.

Electronic social networking services such as MySpace, Twitter and Facebook have rapidly gained popularity in recent years. The protocol of yesteryears where people used the web only as a decentralized search engine to look for information or communicate with others is becoming obsolete. Instead, people harness network effect by using social networking tools to formulate their own personal network. People create a personal space where they are the centralized node – the center of their own universe in which everyone and everything revolves around them – instead of being bombarded with information overload, examples of which include spam and other unwanted services that show little or no value to their needs. The main difference of having such a personal space instead of joining or belonging to a public domain – such as discussion forum – is that having a personal space gives users a sense of ownership over their online persona. [10] [12]

Although, the trend in how people use Web 2.0 technology provides exiting ways for people to communicate, it is also very challenging for both researcher and practitioner alike in dealing with the puzzles one is confronted with in the new communication paradigm. Web 2.0 technology provides users with a personalized and integrative platform, which relies on mostly asymmetric information being exchanged through different technologies. People enjoy mimicking their persona online as a centralized node, which connects with others through the different channels of their mutually-shared online social networks. This phenomenon very much resembles the way people network in real life. In addition, the popularization of advanced IT gadgetry (e.g. smart phones) and new local networks (e.g. Metropolitan Area and Cellular Network) have led to a tremendous increase in the number of different communication channels available to people to start and build conversations ubiquitously. This represents a paradigm shift in how people use technology to further improve how they achieve communication in everyday life. Web 2.0 technology emphasizes how people converse, collaborate, and share knowledge amongst one another, instead of simply having a discussion within the public domain ala public discussion forums. Web

2.0 technology also focuses on user driven content, where whatever messages users convey within their conversation may not represent goal-oriented communication as it does in e-mail or chat. Simply put, people can use Web 2.0 technology to communicate in different ways, some of which do not require a receptor node to reciprocate the conversation back at the original node where the conversation start. Online diaries such as blogs, and micro-blogging such as Twitter, are some examples of the aforementioned technology. The emergence of different Web 2.0 technologies and the way people utilize them in their everyday lives provides several daunting tasks for both researcher and practitioner to postulate on how to deal with these fast-evolving types of technology.

1.1 Overview of this paper

This paper is organized as follows: First, the researchers examine the potential of using different Web 2.0 technologies within the realm of education. Second, we report on the research process where different technologies were designed, built, and used by a group of users. Lastly, we report on the lessons learned during the two Action Research cycles and suggested

2. Social Technology and Electronic Social Networking

The concept of ubiquitous computing, a model of human-computer interaction in which advanced IT artifacts, cloud computing infrastructure, and the popular middleware of Web 2.0 technology thoroughly integrates information processing into everyday activities as an anytime-anyplace network, is inching towards reality. Society and its inhabitants are more than ever connected to one another. The transformation of the world as-we-know-it into the Global Village envisioned by Marshall McLuhan advances ever onward because of easy-to-use technologies that allow people to achieve socialization via electronic means.

The concept of Global Village coined by Marshall McLuhan, who portrays the world as a small village where its residents are connected and communicate via electronic mean. In addition, [8] classified the trend in which people utilize different types of social technology to get the things they need (i.e. information goods) from each other rather than from an established entity such as a company or classroom as a phenomenon called The Groundswell. This phenomenon display the two Web 2.0 characteristics as first the users recognize the web as a service delivery platform and second the web as collective wisdom of the crowd [7]. People from all over the world can now-more-than-ever communicate with one another. People fully

embrace the usage of new technology to connect with one another through services like MySpace, iTunes, Wikipedia, Facebook and Twitter. These technologies are few examples of the familiar technologies that have gained momentum in recent years. Others referred to them as Social Technology serving different purposes by its users. These technologies allow people to use their services to accomplish many things that have never been done before. People can upload their pictures or post updates on their life with just a few touches of their Internet-equipped mobile phones. An online personal space has become increasingly important, wherein people have their friends and family within their network.

Whatever purposes people use these services for in their lives, Social technology represents an undeniable force that builds and expands people's ability to communicate and foster relationships with one another. Naturally, these technologies also attracted attention from many various disciplines. Educators attempts to use Web 2.0 technology to enhance learning for their students. Business practitioners use different application to increase sales, market share, and productivity in their organization. Although, the implementation of Web 2.0 technologies in many fields are still in their infancy, it is clear that the trend of Web 2.0 adoption will continues as long as there are needs for people to socialize.

2.1 Social Technology in Academia.

Educators have always been early adopters in using new or up-and-coming technology within academia. For years, educational technology such as Content Management Systems (CMS), Blackboard, and WebCT were used to help students perform better, as well as increase their productivity within the classroom. The aforementioned technologies enabled educators and students to better manage, distribute, and exchange information. Educators used technology such as file uploading and chat room services to streamline their work processes. Simple tasks and services such as giving out assignments electronically, online grading, and class note repositories were available through the usage of the web. These technologies were mainly designed and implemented to improve student learning in the classroom. However, the learning process in today's world has becoming increasingly more complex. Learning not only occurs within the traditional classroom, but students as well as educators also reach out to the abundance of information and knowledge outside the classroom. For example, students can listen to a podcast being distributed from iTunes University (iTunes U), one of the largest educational podcast databases in the world. Universities worldwide such as Stanford, UC

Berkley, and Claremont Graduate University create and store their class lectures and distribute them free-of-charge through the iTunes Store. Student can download class lectures in MP3 format, watch videos of lectures online, or even review class materials at their leisure.

Another example is the possibility for learning that exists within the virtual classrooms of SecondLife [5]. Students can mimic a real-life learning environment by attending and participating in the learning process as it happens within a virtual classroom. Participants can interact with their teacher as well as other students through virtual personas called Avatars. This allows educators from different locations to attend class, converse, exchange knowledge, and learn within a common cyberspace as if they had gathered together in a brick-and-mortar classroom.

The aforementioned technologies such as Blogs, Virtual Classrooms, and Podcasts serve a common purpose in providing additional channels for students to network as well as to achieve learning electronically. Furthermore, they can be used to extend and reach out to learners who might not otherwise have a chance to be actively involved in the regular learning process. These tools can be used by potential learners who maybe less involved, introverted, or simply unable to show up to class. Hence, Web 2.0 technology serves as a terrific tool to reach out to those students who might otherwise have a difficult time getting involved in the learning process – in other words: a tool to reach out to the Long Tail of learners.

2.2 Social Learning and The Long Tail.

One of the main focuses of using technology to enhance learning is reaching out to an untapped demographic of learners. These students may be the ones that are uncomfortable with participating inside the classroom. Or, they could be parents, long-distance commuters, part-time students, etc. who simply do not have the time or resources to attend the class. Hence, these types of students cannot fully participate in the learning process. This problematic situation is akin to the concept of the Long Tail, a term famously coined by Chris Anderson [1].

The concept of the Long Tail, usually applied to the world of E-Commerce, refers to how given a large consumer population and high freedom of choice, the selection and buying pattern of the population results in a power law distribution wherein the upper 20% of items (the head) are favored over the other 80% (the long tail). Hence, the usage of Web 2.0 can enable the educators to reach out to as many learners as they possibly can: While 20% of a given classroom might already be willing to participate in class, there is 80% that are unwilling or unable to do so, but who might

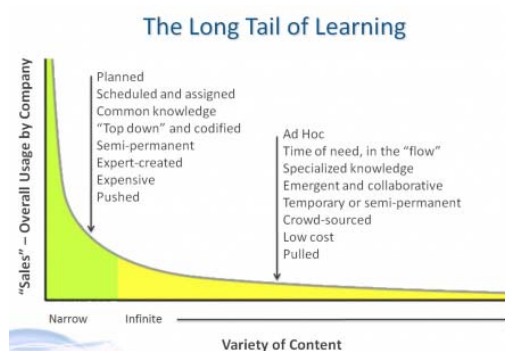


Figure 1: Long Tail

Source:

<http://dwilkinsnh.wordpress.com/2009/03/15/social-learning-and-the-long-tail/>

be able to via different Web 2.0 channels. Ullrich, et al. [11] suggested that students with common interests can use Web 2.0 technologies to achieve networking both inside and outside of classroom. Examples of the educational usage of Web 2.0 technologies to achieve such connections include iTunes U and Second Life, where university courses are being offered through different electronic channels. In this instance, we can imagine that long tail is the number of students who may not be able to speak up in class, or the one that don't have the channel to communicate effectively. It is the 'out crowd' that will not be able to participate due to various reasons, such as being introverts or living far away from the school.

The research will start by looking at how Social Technology can be designed to satisfy the users. For our research purposes, we look at the Long Tail as the students who we could prospectively reach out to in order to build a communication channel between their educators and themselves. The system will be of a design based upon what the users are familiar with and use in their everyday lives. With this in mind, the researcher attempted to build a Social Technology system from the ground up. Every step of the way, the researcher received input from the users. To assist in molding the conceptual model, we used the Soft System Methodology (SSM) to identify the research problems and research scope. After the problems are identified and a conceptual model is built, the researchers will follow the Action Research cycles in designing the artifacts from the ground up. Throughout the research process, users will be directly involved in helping to design the user-centric social technology system. This system will go through several iterations, incorporating each of the lessons learned from prior cycles. Finally, the prototype will be tested with the bigger group of users, where research results of the artifact will be analyzed and discussed.

3. Research Framework

This study aims to provide guidelines for building an educational system utilizing different Web 2.0 technologies. The system design and implementation focuses on a problematic situation existing within a group of graduate students. These users expressed their concerns about the lack of a centralized system where they can form a group and work with each other. They wished to have a centralized network system where they could share research insights, ideas, and progress with one another. The tentative timeframe for using such technologies is expected to be 8 months (July 2009 – May 2010). After the first brainstorming session, all users decided that they wanted to use existing technologies that they are already familiar with. The reason being that the users did not want to be burdened with learning a new set of technologies. By using the technology that most users were already familiar with, a smooth transition and a shallower learning curve for everyone involved is ensured. The research team had the users try different technologies to see which one fit the best with this criteria. Given all the potential requirements of the group, a Soft System Methodology (SSM) and an Action Research approach were chosen as research protocols. This methodology and approach allowed both the researchers and users to remain fully engaged and define the desired outcomes that best reflected users' needs.

The researcher was an initiator and remained involved throughout the process. Users too, participated thoroughly throughout both the design and the implementation of the system. System prototypes were designed guided by theoretical concepts and user input. Actions and interventions led the changes during the intermediate versions and the final version of the system.

3.1 Soft System Methodology

Soft System Methodology is “an approach to inquiry into problem situations perceived to exist in the real world”[3] In our case, the researchers enter the situation as “actors,” whose main tasks were to identify and analyze a problem. Our main goals were to identify problems that existed before our entrance, inquire data and inputs from users, and complete two different analyses of the problems: 1) logic-based analysis and 2) cultural analysis of the problems. Equipped with an analysis tool in mind, the researcher worked closely with participants and gained insight by conducting both formal and informal interviews with all of the participants. Our goal was to generate a conceptual model of the situation. The model represents the conceptual findings from each of the SSM's seven steps. Further more, the initial model was used to raise some questions regarding the troublesome situation, then it

was used to suggest difference courses of action for change. After the model was developed, we decided to experiment with different existing Web 2.0 technologies. A series of interventions and iterations of the model and technology use would be implemented. As the researchers started, this research approach followed these steps:

1) Enter the situation and identify the unstructured problems. We conducted a brainstorming meeting with the users. Together we examined the problematic situation: A lack of a centralized system where graduate-level students rely on a traditional apprenticeship model of learning where teacher and student relationship were strictly one-to-one and instead of a one-to-many relationship where everyone in the same group can easily help or collaborate with each other. Instead of helping each other both inside and outside of classroom, there was no easy way for each individual to network with each other and thus exchange knowledge and subsequently learn from each others.

Some of the problems were raised at the meeting. A student said:

“Each one of us are so busy with our works, family and also our commitment to other classes. I wish we would have a system that allow us to share what we learn as well as our research progress together. After all, everyone of us are doing this for the first time”

Another student noticed:

“I know that getting in touch with you (advisor) would be difficult since our working schedule are not match, can we try to have some kind of communication channels to communicate with each other effectively?”

These problems were written down as research notes and provide us with inputs for the following step.

2) Identify and express problem situation. After hearing the concerns raised by participants during our first session, we were able to identify a total of 4 original sets of problems: 1) the users' inability to talk with their friends outside of classroom, 2) an inability for students to easily get in touch with their advisor, 3) the lack of a common place to setup and schedule meetings, 4) the existing systems were too time-consuming and had a high learning curve. Afterword, we decided to normalize the set into two problematic situations: 1) Lack of networking tools and 2) Lack of a knowledge sharing system among members. After the two problematic situations were identified, we held a second meeting to inform the users as well as inquire further inputs.

3) Formulate root definitions of relevant systems. Users came up with the idea of using existing

technologies to remedy the two problems. Instead of completely abandoning existing technology, all users decided to use existing services such as email and Instant Messaging (IM) as complementary to the new set of technologies. A Weblog was chosen as a knowledge sharing tool, and Facebook was chosen as a networking tool. The main reason for users to choose these technologies was familiarity. All users expressed their desire towards using a system that is familiar to them and that also allows them to network amongst themselves on a regular basis.

4) Build conceptual model from the system derived from root definitions. A conceptual model (figure 2) was developed to show how different technology can help users to lessen the problems they faced.

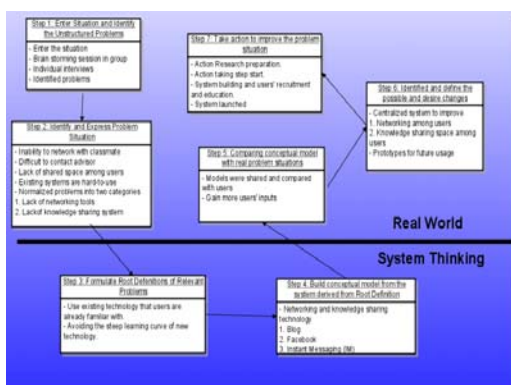


Figure 2

5) Comparing conceptual model (step 4) with real problem situations (step 2). We compared the conceptual model with the situations that we drew from the users from Step 2.

6) Identify and define the possible and desired changes - mainly, users want to have some positive changes in the way they can communicate amongst each other, both for networking and knowledge sharing.

7) Take action to improve the problem situation. After we achieved the above steps using SSM, we created a blog to be used among the users. Also, all users were encouraged to use Facebook and MSN Chat to network with each other. An email was sent out to remind users about the communication protocol.

3.2 Action Research

The goal of Action Research (AR) is to improve a problematic situation through change. At its core, AR relies on a different set of user-defined actions and several iterations to initiate changes according to the researcher and how the research participant desires. Essentially, AR is an iterative approach that allows the research team to be dynamically involved in the problem situation and the project, collaboratively changing experiments as the research team applies knowledge obtained in one iteration to the next.

Forth and Axup [4] suggested that AR usually “benefits from ‘soft’ methods that tend to pay particular attention to the fuzziness of research involving humans.” First, the problems must be identified and diagnosed (Step 1) by the researcher. Then, the next step in AR is Action Planning (step 2), where a series of actions are planned and ready to be implemented. The third step in AR involves action being taken, where researchers input different actions as well as make interventions in guiding the research outcome. Then, the researcher evaluates the results of actions and its intervention on the system (Step 4). The lessons learned during the first four steps are used as a foundation to provide iterations where additional actions are taken and evaluated. The researcher gains some insight and understanding of the action taken and its effects. These findings provide additional inputs for the researcher to achieve a reiteration of the earlier steps to further improve the situation. Finally, learning from all the steps are specified, and lessons learned are explain in the research findings, from which they become the researchers’ contribution to the knowledge field.

4. Research Findings

This study involved two AR cycles. In the first cycle, we diagnosed the problem situation following SSM protocol, enabling the researchers to utilize the SSM to identify the problems, build a conceptual model of the problem situation, design a set of expected changes and outcomes, and then begin series of actions and interventions to insinuate change.

The researchers started by entering the situation and getting involved with the different participants. We work closely with all participants throughout the research inquiry stage. All of the participants were eager to utilize different types of Web 2.0 technology to solve their problems. At the first meeting, they decided it would be best to come up with a way to use the technology to share and help each other to discuss their ideas and problems that they might have during their research process (i.e. knowledge sharing activities such as discussing about research problems and questions, literature review and research methodology) Also the technology was used to facilitate communication amongst one another. In addition relying on email and phone calls, the participants wanted to have a centralized system where they can collaborate together. Although each one of them had individualistic goals, due to their nature as graduate students many of them worked full time or had varying schedules, making it extremely hard to get together to discuss and help each other.

4.1 First Cycle

4.1.1. Knowledge Sharing Through Blog

The researchers created a Blog (<http://msmis.blogspot.com>), the main purpose of which was to serve as a common space for the users to share knowledge amongst one another. An invitation email was sent out to inform users regarding the common space. We encouraged all users to check the blog on a regular basis for updates, as well as to use the blog as a means to discuss and consult each other. In addition, the blog provided the users the chance to comment on each other's blog postings. Initial activity started out on a high note, however, after the first month, usage levels had decreased. Hence, the researcher inquired about the reasons for this from a few users at one of our weekly meetings. Two of the users cautioned:

"I would read the blog more if more people keep updating their progress, but since most of us are so busy with our works and schools, we hardly have time to work on our progress, let's alone to share with others"

"The blog is not update on a regular basis, so I prefer to get-in-touch with others through other means such as IM or Facebook"

We concluded that while the blog served the purpose of Knowledge sharing. However, by having a blog with a very small user base, compounded with the inability of participants to update the content on their blog often, usage levels would be unmaintainable and would die down over time.

4.1.2 Networking through Facebook

During the first brainstorming session, most of the users felt comfortable with using Facebook as a networking tool. Thus, we sent out emails asking all users to add each other on Facebook. Facebook allows users to post their research progress, which is similar to what they can do via a blog. Hence, majority of users started using Facebook to communicate with each other instead of email. Once the early adopters started using the medium, they started to 'refer' their friends and encourage others to use Facebook as well. In total, seven out of ten users migrated from using a blog to Facebook

A user commented on using Facebook at an individual meeting:

"Facebook is very convenient for us to communicate with each other. You (the advisor) seem to be on Facebook a lot and I can always chat with you and leave some message on the Wall post where I can get respond quickly"

Another user voiced her approval of using Facebook to network with others during her leisure:

"I don't have an access to computer at work, since my boss does not permitted it. I have to use the computer at home, at night and nobody seem to be online at night. So I prefer using Facebook to contact you and others"

Another example on how a user uses Facebook to post a research progress is:

"At Thammasat University Meeting with A.Peter (thesis advisor) : How to write the chapter 1 of thesis He suggest me that 1. Use the dialogue from interview who involve the project (Lecturer staff at CHRSD, Mahidol University).

4.1.3 Symmetric Communication Through Instant Messaging

In addition to using Blogs and Facebook, users wanted to be able to achieve instant communication through instant messaging (IM) as well. Some of the users wanted an instantaneous way to communicate. Thus, we sent out an email informing all users that Facebook also has a Chat feature, and encouraged them to use it to communicate with each other. A user voiced her preference on not having to post something on a public forum, but rather to communicate symmetrically with others through Instant Messaging.

"I like to be able to be able to chat with my friend and you (advisor) instead of posting something on Facebook and wait for the respond"

4.1.4 First Cycle Lessons Learned

The lessons learned from the first cycle allowed us to narrow down the scope of the research project. User feedback was obtained from interview sessions using both group and individual meetings. We learned that instead of using many Web 2.0 technologies to accomplish many tasks, it might be more convenient to use just a centralized social software platform – in our case, Facebook – to act as a centralized portal where users can share knowledge, network, and achieve symmetric communication. By limiting the software of choice to be just one platform, we are able to keep the original user requirements for a system that allows users to share knowledge and network with each other.

A user also voiced his concern regarding the privacy issue in using Facebook. Hence he proposed that instead of having the group communication on the public forum, a private group should be created so only the people in the same group can communicate in private. He added:

"Instead of having each other as only friend, we should create a research group so we can be group together and thus use Facebook as a knowledge

sharing tool instead of a Blog. This way, it'll be very convenient to just come to one site and we can accomplish everything."

Time management is also a very important issue that most users faced during our first cycle. Having multiple venues for users to use would only be too complicated, time-consuming, and cumbersome for most users. Thus, at the third group meeting, we agreed to use Facebook as the main tool to communicate with each other.

During the third meeting a user also cautioned that:

"It is very difficult for us to schedule a time for our individual meetings, since we don't know each other schedules and sometimes our available times are overlap. Also, when we can't make it to the meeting, we are unable to synchronized our appointment. So we should also have a centralized system where we can use for the scheduling purposes as well."

Hence, taking from what we learn during the first cycle, we decided to shift our focus to complete the next two objectives: 1) Group building in Facebook and 2) Time management through Google Calendar.

4.2 Second Cycle

4.2.1 The Switch

Our group switched to Facebook as our centralized communication tool. We were able to achieve knowledge sharing and networking amongst members of our group. As per request by users, we also created a subgroup called "MSMIS," enabling all users to be able to work privately inside a subgroup. An email was sent out to inform the users about the subgroup and encourage them to add themselves into the system. Once all the users joined the group they were able make a post, update, and chat with each other within the Facebook subgroup page.

4.2.2. Scheduling System through Google Calendar

Many users were concerned with scheduling individual meeting with their advisor. All participants have a full time job and have only a limited time table within which to meet with their advisor. Usually, they would call and make appointments over the phone. However, with the use of online scheduling systems such as Google Calendar, the advisor opens up different timeslots where he is available, and each student can electronically choose and update the appointment. Hence, all users can collaborate in choosing the time slots that are available to them, thus getting rid of the appointment overlap as well as streamlining the

scheduling system where all users can see what others' time slots are.

Another reason that Google Calendar was chosen was because most users already have a Gmail account, thus their familiarity with the technology was high.

4.2.3 Web 2.0 Appropriation

Table 1 shows how participants actually used different types of Web2.0 technology. Although all of the technology was chosen by the users, only Facebook and Google Calendar seemed to be the only two systems that all members used on a regular basis. These two technologies most consolidated the users' needs for knowledge sharing, networking, and appointment scheduling.

Technology	Number of Active Users	Usage
Google Calendar	10	Second Cycle
Facebook	7	First and Second cycle
Instant Messaging	5	First and Second cycle
Email	6	First and second cycle
Blog	2	First Cycle

Table 1

4.2.4 Second Cycle Lessons Learned

The lessons learned from the second cycle reflect the users' preferences in technological usage. Although there were many alternatives for users to use for educational purposes, users only want to use one single centralized system, which they are most familiar with. A user said:

"I like using Facebook to do all of the thing that I can do, since I already use them at my office and at home already. It's a great way to communicate with you (advisor) and others in the same group, since once I made a short wall post, the rest can see and respond to them as well. "

Facebook was chosen by users as a system-of-choice. Most users already use Facebook and Google Calendar. However, they did not have a chance to use both applications for educational purposes. Mainly, they had used it for networking with their friends. During the first two research cycles, users experimented with using Facebook and Google Calendar to share knowledge on each other through features such as wall posts, and worked together in

the MSMIS subgroup. They were able to reach out effectively to others within their group.

5. Conclusion

5.1 Knowledge Contributions and Future Research

This paper made the following contributions: we showed that at the early stage, Web 2.0 can be used effectively as a networking tool within a small group of users. However to be successful, the main strategy in designing and building such system relies heavily on building the applications in such a way that it harnesses the network effects amongst its members. Simply said, applications such as Facebook, Blogs, or Google Calendar are only useful to their users if they can see value in networking with others in the same group. Thus, our next step is to use this model and our lessons learned within a bigger group. Facebook will be used as a knowledge sharing and networking system in three undergraduate courses during the second semester (November 2009 – February 2010.) During the courses, Facebook would serve as both a knowledge sharing device and networking tool for more than 100 students. Additional data will be collected using both surveys and interviews. Additional usage data and system iterations will be further examined and reported after the next round of data collection.

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