LEVERAGING SOCIAL MEDIA FOR LEARNING:
COMMUNITIES OF PRACTICE ON FLICKR

By

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A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILSOPHY

Media and Information Studies

2012

ABSTRACT

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Research has begun to address the use of social media sites, such as Facebook and Twitter, for supplementing and enhancing classroom-based learning. However, the use of social media platforms for less formal learning has received little attention. Study One of this dissertation presents the results from semi-structured interviews with twenty-one users of the photo-sharing social media site Flickr about their Flickr use, focusing on how participants learn more about photography through their use of the site. Utilizing the communities of practice lens, findings illustrate how Flickr Groups function as communities of practice. Participants describe solitary and interactive learning strategies they employed which allowed them to advance their photographic knowledge and skills. The role of expertise emerged as an important factor in sharing knowledge about photography.

Access to experts has been found to be a motivating factor for participation in online CoPs and expertise has also been linked to contribution in online communities. Study Two presents the results of an online survey of Flickr users (N=200), which measured three key forms of participation in Flickr CoPs (photograph posting, commenting, and discussion board posts), photographic expertise, and personality traits. Findings revealed that user expertise predicts certain forms of Flickr CoP participation, including commenting and sharing knowledge. Personality traits were also found to predict user activities, such as commenting and asking questions. The combined findings of these studies demonstrate how social media can be used as a powerful learning tool and shed light on how users leverage site affordances for learning.

For my family

ACKNOWLEDGMENTS

I would also like to thank Dr. Cliff Lampe, whose input during the proposal process pushed me to consider related research from other disciplines. His thoughtful questions led me to consider additional perspectives, which strengthened my work.

This dissertation would not have been possible without the support of the Flickr Groups where I recruited participants. All of these Groups were welcoming of my research, enthusiastic about helping me, and interested in learning about my findings. Additionally, I would like to offer my thanks to the participants of both studies, especially those from Study One. Not only were they generous with their time, but their interviews provided a source of inspiration each time I combed through the transcripts. I cannot express how much their excitement about photography and their Flickr experiences helped to reenergize and refocus me.

I also would like to express my appreciation for the friends and colleagues that I met during my time in the Media and Information Studies program. T-A-M-M-Y, Tom, Paul, Caleb, Han Ei, Robin, Bree, Jessica, Wyl, Tor, Yvette, Elif, and Jon – your camaraderie and friendship is something I'll always value. Without you, this work would not have been possible. You inspired me and pushed me to do things beyond what I thought myself capable. In particular, I would like to thank Jih-Hsuan (T-A-M-M-Y). As my officemate, she was captive to my ramblings, but was always willing to listen, provide a sounding board for ideas, and talk through problems I encountered, especially those related to statistics. I also owe special thanks to Elif, who, as a Flickr member, participated in a dry run of my interview protocol and provided early feedback, which helped me to refine my questions.

Finally, I would like to thank my family. While my parents, brother, grandmother, in-laws and other family members may not have completely understood my graduate work, they always provided encouragement and support, which has meant a great deal to me. However, my

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Chapter 1

Introduction

The growing popularity of social media has led researchers to consider the role of these technologies in learning, often focusing on how Facebook (Lampe, Wohn, Vitak, Ellison, & Wash, 2011; Selwyn, 2009; Towner & Muñoz, 2011) and Twitter (Dunlap & Lowenthal, 2009; Jensen, Caswell, Ball, Duffin, & Barton, 2010; Rinaldo, Tapp, & Laverie, 2011; Seo, 2012) can be used to enhance or supplement traditional classroom experiences. Other work has addressed the use of social media for informal learning by users who ask questions of their social network through wall posts and tweets (Morris, Teevan, & Panovich, 2010; Teevan, Morris, & Panovich, 2011). The learning-based uses of these social network sites (SNSs), in particular those that take place on Facebook, are rooted in the social interactions of users. Ploderer, Howard, and Thomas (2008) differentiate between "socially organized" SNSs (e.g. Google+ and Facebook), which focus on relationships based on offline ties (Ellison, Steinfield, & Lampe, 2007), and "passion-centric" SNSs (e.g. Last.fm and Flickr) that connect individuals without previous offline ties who share a passion for a specific topic. Given the common interests that bring people together on passion-centric sites, they seem to be uniquely suited for use as learning tools.

In particular, Flickr, a social media site focused on photograph sharing, has a number of features capable of supporting learning. Flickr users' experiences are photo-centric, with interactions revolving around shared photographs (Lerman & Jones, 2006). However, a quick visit to the site reveals that much more is occurring beyond simple photo sharing. The site hosts over 1.5 million active groups designed around a wide variety of themes. Members of these groups upload photographs to shared pools of photographs and participate in group discussion forums. Comments left on photographs range from the purely social to those involving

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composition choices and the digital processing of images. Advice is sought and received. Critiques are offered. Social relationships are formed. The evidence displayed in photograph comments, discussion boards, and on profile pages suggest that some of these friendships move offline. Indeed, a great deal appears to be going on within the virtual galleries of Flickr beyond merely sharing photographs. People are learning.

The studies presented here use the *communities of practice* lens (Wenger, 1998; Wenger, 2000; Wenger, McDermontt, & Snyder 2002; Wenger, White, & Smith 2009) to understand how the affordances of Flickr and the practices of its users influence learning experiences. Communities of practice (CoPs) are groups formed by people who come together around a shared interest and, through interactions with one another, further their expertise and knowledge related to the interest (Wenger, McDermontt, & Snyder, 2002). The CoP approach has seen limited use in the study of social media environments, with some exceptions (e.g., Bryant, Forte, & Bruckman, 2005). However, the shared-interest focus of the CoP lens seems ideally suited for studying how users leverage Flickr for learning more about photography.

While many of the features of Flickr appear capable of enabling learning, a number of questions remain unanswered about how users leverage the site for learning more about photography. For example, what types of learning strategies do users employ? How are these strategies dependent on the affordances of Flickr? What role do Flickr groups play in the learning opportunities on the site? What role do experts play in advancing the knowledge of other Flickr users? These questions are addressed here through the CoP lens in two studies. Based on semi-structured interviews with Flickr users, the first study explores how participants learn more about photography through their use of Flickr. Using an online survey of Flickr users,

Study Two considers three key forms of participation in Flickr CoPs (photograph posting, commenting, and discussion board posts), photographic expertise, and personality traits.

The remainder of this chapter will provide a brief overview of Flickr. Chapter Two presents a review of the pertinent literature on social media, including Flickr, as well as that focused on online communities. Additionally, the CoP lens and related research are reviewed. The methods used for the first study are presented in Chapter Three, followed by the study results in Chapter Four, which are based on twenty-one semi-structured interviews with Flickr users. Chapter Five presents an overview of Study Two, as well as supplemental literature. The method used for this study, an online survey of active Flickr users, is presented in Chapter Six, and the results of Study Two are presented in Chapter Seven. A discussion that synthesizes across the results of both studies, focusing on the affordances of Flickr, learning strategies, and expertise, is presented in Chapter Eight.

Flickr

Flickr is a photo-sharing social media site owned by Yahoo! Incorporated. The site has 51 million registered users and attracts close to 80 million unique visitors a day (ComScore, 2011). Users upload photos and have the option of using a number of different features that enable them to share these photos with others. Numerous site features and options for organizing photos, as well as multiple methods for interaction, allow users to search, share, and communicate with other users. Groups allow users to connect with others who have similar interests, as well as to share and comment on each other's work. As highlighted by Marlow and colleagues (2006), Flickr's success can, in part, be attributed to the variety of social interactions made possible by the design of the site, such as friend networks, interest groups, photo commenting, private messaging, and tagging. Marlow and colleagues argue that the wealth of

communication tools in combination with the various types of social organization make Flickr "a highly interconnected media ecology that can lead users to distant people and places with only a few clicks" (p. 36). As the use of Flickr tools and features are central to studies reported here, the following paragraphs outline their capabilities.

A very brief history of Flickr.

In Vancouver, British Columbia in 2002, Caterina Fake and Stewart Butterfield founded Ludicorp, a small computer game development company. With a total of six employees, the company set out to develop *Game Neverending*, a browser-based massively multiplayer online role playing game (MMORPG) (O'Steen, 2007). At the time, many popular MMORPGs, such as *Everquest*, had fantasy and battle related themes. *Game Neverending*, as described by Fake, was intended to be an excuse for socializing and was designed to be more "friendly" and not "a lot of swords and sorcery or men in tights, it was for regular folks" (O'Steen, 2007). During the development of the game, one of the software engineers created a tool that allowed players to share photos (Graham, 2006). Ludicorp began developing the photo sharing tool as a separate product in 2004, and it quickly evolved into Flickr. Work on *Game Neverending* ceased after financial difficulties forced a vote by Ludicorp employees on which project should be continued (O'Steen, 2007). In contrast to other photo sharing sites available at the time, Flickr provided the ability for users to interact. As Fake explained in a 2007 interview, "photo sharing was a loss leader for photo finishing services" (O'Steen, 2007). Essentially, photo sharing was used to entice people to upload their photos to a site with the hope that once their images were on the site they would order prints and other products. Flickr, in the words of Fake, became a "massively multiplayer photo sharing site" (O'Steen, 2007). By the end of 2004, there were over 2 million photos on Flickr (Terdiman, 2004). Flickr's rapid growth caught the attention of Yahoo, who

purchased Ludicorp in March of 2005 to acquire Flickr (Graham, 2006). Yahoo shuttered their own photo sharing application, Yahoo! Photos, in the fall of 2007 after determining that sharing digital photos had become a social activity that the static design of Yahoo! Photos could not accommodate (Graham, 2007).

Flickr accounts and profiles.

In order to upload photos to Flickr, users must create an account. Users may choose between a "free" or "pro" account. As indicated by the name, free accounts can be created and maintained at no cost. A pro account costs $24.95 per year. Both types of accounts allow users access to the same content, but have different permissions related to uploading and accessing certain tools. Most notably, a free account user is limited to uploading 300MB of photo content per month, viewing only their 200 most recent images, posting a photo to ten groups, and only having access to smaller versions of their photos. Pro account users have unlimited storage space and the ability to archive high-resolution files, to share a photo with sixty groups, to browse the site without advertisements, and to access view count and referrer statistics. Both free and pro account holders have the option of creating a Flickr profile.

Similar to other social media platforms, profiles on Flickr are created by filling in fields including first and last name, gender, singleness (relationship status), self-description, personal Web site link, IM names for various services, occupation, hometown, current city, country, and airport code. A profile photo may also be selected. Photographs taken by other users that the user has marked as "favorites" are also displayed on their profile page. Additional profile components may include a list of Flickr groups to which the user belongs, written testimonials from other users, and a link to the user's most recently uploaded photos, referred to as their "photostream."

Other users can be listed as "contacts," although, as discussed below, Flickr's conceptualization of "contacts" differs from other SNSs use of the term "friend."

Uploading, organizing, and sharing.

Users have a variety of options for uploading photographs: directly through the Flickr site; via email; by using a free-of-charge, standalone, downloadable Flickr application called Uploadr; or through a number of third party photo applications, such as Aperture and iPhoto. While settings exist for limiting who can view a photo uploaded to Flickr, by default, posted photos may be viewed by anyone who visits the site. Once a photo has been uploaded, or as part of the uploading process, depending on the uploading method being used, the user can add a title and a description to the photo. Uploaded photos can be organized into sets, which can then be grouped into collections. For example, a user could create numerous sets that document specific events they participate in over the summer (e.g., *Matt's Barbeque, Camping at Burt Lake, Fishing with Dad*) and then group those sets into a collection (e.g. *Summer 2011*).

Another method for organizing content is "tagging." Tags are keywords used to describe the photograph and serve an organizational purpose for both the user and also at the site level. These tags make images more searchable. Marlow and colleagues (2006) argue that tags serve as a central navigation tool on Flickr, allowing users to locate not only specific types of related content, but people as well. Users can add tags to their photos at any time and have the ability to add tags to photographs taken by other users, provided the user has not restricted this feature. Geo-tagging, an additional option, involves the use of tags that indicates where the photo was taken using location names, placing the image on a map, or, in some cases, latitude and longitude location data recorded by the camera. This allows users to view photos taken in a specific area by clicking on markers on a map.

While tagging allows photos to be found through tag browsing and using the search tool, a variety of other means exist for finding photos to view. For example, Flickr chooses a number of photographs to feature each day on the Explore page. Flickr uses an algorithm to choose photographs that have what they refer to as "interestingness." A few of the photos selected by this process are featured on the main Explore page, seen as a badge of honor by users (Lerman & Jones, 2006). Those that are not placed on the main page are highlighted on a number of other related pages accessible through the Explore portal.

Groups.

While sets and collections are useful solutions for organizing a user's collection of photos, sending a photo to a Flickr interest group, such as "Waterfalls of New York State," allows the user to place their photos in a *group pool* alongside similar photos, providing an organizational context outside of the user's photostream. Groups, however, serve not only as a means for organizing content at the site level, but also to bring those with shared interests together. All Flickr users have the ability to create new groups and join existing groups, although some existing groups only accept new members by invitation. Groups not requiring an invitation are called *public groups*. The content of both public groups and invitation-only groups is public. A private group option is available for users who do not want to leave their group's content open to the public. All three types of groups feature a discussion board where members may interact. Organizationally, groups have administrators, moderators, and members. Some groups choose to use alternative names for these roles. For example, some choose to re-label moderators as team leaders.

Interaction.

There are two forms of public interaction on Flickr. The first is the comment feature. Unless disabled by the user, each photograph posted to Flickr has an area for comments directly below the image. The second type of public interaction takes place within groups. Each group has a discussion forum where users can contribute to existing threads or choose to create a new thread. However, depending on the group, members may need to ask group administrators for permission before starting a new thread. Discussion forum posts cover a wide range of topics and themes, from the purely social to discussions about techniques to reviews of photographic equipment. The group type often limits thread topics. For example, discussion within the Nikon Digital Learning Center group focus on topics related to Nikon cameras. If a user were to post a question about a Canon camera to this discussion forum, they would likely be referred to another group. Private communication is also possible through the site. Each account has access to a feature called Flickr Mail which functions as an internal email system. Users can forward messages received through Flickr Mail to a regular email address.

Chapter 2

Literature Review

Social Network Sites

Scholarship on socially-centric SNSs has addressed a wide variety of topics, including impression management (boyd, 2004; DiMicco, & Millen, 2007; Donath & boyd, 2004; Fono & Raynes-Goldie, 2006; Papacharissi, 2009; Tong, Van Der Heide, Langwell, & Walther, 2008; Walther, Van Der Heide, Kim, Westerman, & Tong, 2008), social capital (Ellison, Steinfield, & Lampe, 2007; Papacharissi & Mendelson, 2011; Steinfield, Ellison, & Lampe, 2008; Valenzuela, Park, & Kee, 2009), and privacy (Acquisti, & Gross, 2006; Dwyer, Hiltz, & Passerini, 2007; Stutzman, & Kramer-Duffield, 2010). Interest specific SNSs have not received the same level of research attention or variety in focus from scholars, although a number of such sites targeting specific interests exist, such as Gurgle for first time parents, Dogster and Catster for pet lovers, Vimeo for filmmakers and video creators, Bodyspace for bodybuilders, Last.fm for music fans, and Flickr for photographers. Currently, the research addressing these types of SNSs is sparse in comparison to those socially-organized, perhaps, as Thelwall and Wilkinson (2010) suggest, because the sites are not as commercially successful. Moreover, the lack of research may be due to the relatively small user-bases of these sites in comparison to larger SNSs like Facebook.

While the quantity of studies focusing on shared interest social media sites are far outnumbered by those addressing socially-organized sites, scholars have begun to study user behavior on a variety of these sites. Ploderer, Howard, and Thomas (2008), in a study of the bodybuilding SNS Bodyspace, found that users relied on photographs and statistics to evaluate the claims made by other users about the benefits of supplements and training programs. BodySpace users also used photographs to promote themselves, track their progress, and to

evaluate their potential competition for upcoming bodybuilding events. In subsequent work, scholars have addressed the relationship between online and offline comments, dubbed *appreciation* as they often speak to physical attributes, such as the muscle definition of the body builder (Ploderer, Howard, Thomas, & Reitberger, 2008).

Previous research has found that socially organized SNSs, such as Facebook, are primarily utilized to maintain relationships with existing members of one's social network, as opposed to meeting and developing relationships with new people (Ellison, Steinfield, & Lampe, 2007). Some evidence indicates that passion-centric sites are also being used to maintain existing relationships (Miller & Edwards, 2008); however, other research has shown that they also perform the opposite function, as users meet and interact with strangers with similar interests (Baym & Ledbetter, 2009; Golbeck, 2009a; 2009b; Ploderer, Howard, & Thomas, 2008).

The existence and use of SNSs designed around a shared interest provides anecdotal evidence of similar interests leading to attraction. However, scholars have explored how similarity influences relationship formation within interest-based SNSs. Baym and Ledbetter (2009), in a study addressing relationship formation on the music-focused SNS Last.fm, found friendship pairs were close in age and frequently shared taste in music. Geographic and gender homophily were also found to exist, but to a lesser extent. From these findings, it is evident that homophily may help to explain some dimensions of friendships on Last.fm, but not all.

Flickr

The studies presented here consider Flickr use through the CoP lens, focusing on the learning behaviors of users. However, no claim is being made that all Flickr users utilize the site for learning more about photography. Account types, discussed earlier, do little in terms of differentiating between users beyond making assumptions that pro account users may need

greater storage space or desire to view statistics related to their photographs. There are numerous

ways in which users differ in their use of Flickr. For example, early in Flickr's existence,

bloggers saw the site as a tool for free image hosting for their blogs (Terdiman, 2004). However,

even among users who upload images for sharing directly through the site, there are important

differences related to their sharing behaviors.

Miller and Edwards (2007) found two different types of Flickr users, which they

classified as Kodak Culture users and Snaprs. Kodak Culture, a term adapted from earlier work

by Chalfen (as cited in Miller & Edwards, 2007) is used to refer to Flickr users whose primary

audience is comprised of friends and family. These users are also much more concerned with

privacy and are more likely to use point-and-shoot cameras as opposed to a digital single lens

reflex camera (DSLR). Snaprs are users whose site activities are rooted in interactions with

strangers, such as sharing photographs, commenting on and tagging photographs taken by others,

and, in some cases, participating in group shoots with other Flickr members for the purpose of

sharing the resulting images with the group. These events, referred to by Miller and Edwards

(2007) as photo-strolls, provide opportunities for previously online-only relationships to move

offline. Through interviews with Snaprs, Miller and Edwards discovered that the Group[1] to

which these individuals belonged coordinated multiple photo-strolls per month, with attendance

ranging from 10 to 40 people. Interviews also revealed that while a large number of the photo-

strolls were announced on the Group's Flickr page, some private meetings were coordinated

through other means of communication. Snaprs shared with friends and family as well, but saw

their primary audience as Flickr friends from their Groups and strangers who might view their

photos on Flickr (Miller & Edwards, 2007). Miller and Edwards' research also revealed that

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[1] Groups with a capital "G" is used here to differentiate between Flickr Groups and the more
common usage of the word to describe a collection of people.

Snaprs manage their relationships with fellow Group members by tagging photos, commenting on photos, participating in offline Group activities, and using a number of different forms of online messaging.

A study by Prieur, Cardon, Beuscart, Pissard, and Pons (2008) confirmed the co-existence of Kodak Culture users and Snapr users on Flickr, but also revealed that Snapr users are very active and often the leaders within the larger Flickr community. For example, according to the findings of their study, Snaprs are the users who generally form new Groups, provide comments, and purposely tag photos with the intention of creating tag-based spaces for sharing images. Specifically, in regards to Snaprs and comments, there is a high correlation between receiving comments and posting comments, suggesting that commenting may often be a reciprocal behavior (Prieur et al., 2008). The studies presented here focus on Snaprs rather than Kodak Culture users.

The large majority of research on Flickr has addressed the three site features central to accessing photographs: tags, contacts, and Groups. The tagging practices of Flickr users, while somewhat peripheral to the studies reported here, have received a great deal of attention in prior research on Flickr user behavior and warrant a brief overview. The majority of these representative studies of tagging within the Flickr environment involved downloading data directly from the site through software designed to interface with Flickr's open application programming interface (API)[2].

Understanding what motivates Flickr users to tag the way they do has been a popular theme of this research (Angus, Thelwall, & Stuart, 2008; Marlow, Naaman, boyd, & Davies, 2006; Nov, Naaman, & Ye, 2008). Using a program designed to work with Flickr's open API,

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[2] An API is a component of a software platform that enables third-party applications make use of its content or part of its functionality. Open APIs can be accessed by anyone.

Marlow and colleagues (2006) extracted data from a random sample of Flickr users who were known tag users. Analysis of user tagging behavior revealed a strong positive correlation between the size of a user's photo collection, the number of distinct tags, and their number of contacts. Findings also indicated that social and organizational motivations led to photograph tagging, a finding later supported by Angus, Thelwall, and Stuart (2008). However, Angus and colleagues do note that tags classified as being for social benefit could also be used for personal benefit and thus possibly only appear to be social, suggesting a need for additional research.

The above examples of tagging research focus on text-based tags. As discussed earlier, Flickr also affords users the ability to engage in geo-tagging, an organizational method that has also received the attention of researchers. Scholars studying landmarks and events have investigated the placing of tagged photos onto Flickr maps in relation to where they were taken, a form of geo-tagging (Rattenbury, Good, & Naaman, 2007; Crandall, Backstrom, Huttenlocher, & Kleinberg 2009). Additionally, Serdyukov, Murdock, and van Zwol (2009) studied issues related to the accuracy of geo-tagging on Flickr and suggested an alternative method that uses a complex equation combining users' text-based geo-tags, indicating place name or region, with information from an extensive, externally-located geographic database. Results of their study suggest that this alternative method may be much more accurate than users simply placing images on a map.

The indexing that results from tagging makes searching for types of photographs a simple task. As such, users seeking to learn about a certain type of photography, whether it be a technique or a particular type of subject matter, may benefit from tags. However, Groups provide another means of locating specific types of content. Groups allow for the development of niche communities (Cox, et al., 2011; Malinen, 2010; Negoescu & Gatica-Perez, 2008). Within the

larger interest of photography, Groups provide an organizational structure in which users can interact and learn from one another about a specific subset of photography, such as portrait or macro photography.

Groups allow users to share images with other members by posting them to the Group pool and participate in Group discussions. Content sharing is the primary activity in many Groups (Cox et al., 2011; Malinen, 2010). In one study of Flickr Groups, analysis of the utilization of the Group discussions feature found that 50% of the 1,000 randomly sampled groups had never had a discussion and only 9 groups had over 100 discussion threads (Cox et al., 2011). The researchers argue that this supports the idea that most interaction on Flickr takes place around the photos themselves via the comments feature. Study One will address the role of activity in Groups to determine the extent to which participants feel learning opportunities are present, as well as how activity levels impact whether or not a Group can be considered a CoP.

There are several different types of Flickr Groups (Cox et al., 2011; Davies, 2006; Malinen, 2010; Negoescu & Fatica-Perez, 2008). Broadly speaking, Groups can be placed into three categories: topic/theme Groups; competition/award Groups; and geographic Groups (Cox et al., 2011). While more specific classification is possible (Davies, 2006; Negoescu & Fatica-Perez, 2008), these three categories define the essence of most Flickr Groups. In terms of learning, these types of Groups could be utilized for learning in a number of different ways because of site affordances. For example, reading comments that critique the composition of photographs posted to the Group pool of a competition/award could result in learning about techniques for improving composition. Study One will address strategies that users employ for learning in these various types of Groups and how the affordances of Flickr facilitate these strategies.

Groups differ along dimensions other than general type. For example, in a recent study of the characteristics of Flickr Groups, scholars found that Groups vary greatly in size, with close to 50% having less than ten members, and only about 3% having over 1,000, although the largest Group in their sample had 29,021 members (Cox et al., 2011). Size can be an influential factor in CoPs (Wenger et al., 2002). Through interviews conducted for Study One, Group size will be explored to determine if and how it may be a factor that influences member participation.

Outside of Groups, maintaining *contacts* provides another avenue for learning more about photography. Contacts are at the heart of SNSs, helping to shape the experiences of users and tailoring the content to which they are exposed. The conceptualization of contacts on Flickr differs from other SNSs' use of the term *friend*, and warrants further explanation.

What it means to be someone's friend on SNSs is often unclear (boyd, 2006; Donath & boyd, 2004). As discussed by boyd (2006), SNSs users add *friends* that are truly friends in the more traditional sense of the word, but also family members, acquaintances and even strangers they find interesting. The ability for an individual to manage who can list them as a friend or contact varies somewhat from SNS to SNS. For example, on Facebook, users request to add a person as a friend and that person must accept the request for a reciprocal link to be established between the two. These types of relationships are symmetrical, as both individuals involved are added to the other's list of friends. However, Facebook also allows people to *subscribe* to users, creating asymmetrical relationships. Other social media platforms take this approach as their primary means of defining on site relationships. Twitter, for example, has opted to use the concept of following. A user can choose whom to follow, independent of whether or not the target wishes to reciprocate. Similarly, users of Google+ can add other users to their circles without sending a formal request. This type of asymmetrical linkage is also possible on Flickr.

Utilizing the generic term *contacts*, Flickr allows users to link to other users without their reciprocation. Research conducted by Lerman and Jones (2006) indicates that Flickr users take advantage of this ability, with users in their sample having equal numbers of asymmetrical and symmetrical contacts. Other research has found that users have a greater number of symmetrical contacts (Prieur et al., 2008).

Lerman and Jones (2006) propose the term *social browsing* to refer to the way in which Flickr users browse through their contacts' photostreams, a feature that displays the most recent photos uploaded by a user's contacts. Their research indicates that the number of times a photo is viewed was positively correlated with the number of reverse contacts. Additionally, Lerman and Jones addressed the role of contacts in commenting. By comparing the names of people who had commented on photos found in the Flickr Random[3] set that were not added to any Group pools to the names of their contacts, the researchers found that 55% of comments were left by asymmetrical contacts, 51% by symmetrical contacts and 38% from strangers. By comparison, when photos from the Random set were also in Group pools, the number of comments from strangers increased, while comments from reverse contacts and mutual contacts decreased. For example, when a photo in the Random set had been added to at least 20 Groups, mutual contacts accounted for 41% of comments and strangers for 49%. These commenting trends existed to an even greater extent for images posted to a popular Group. These results highlight the importance of contacts in receiving comments, as well as the extent to which posting photos to Groups increase comments by providing additional visibility, an important issue to Flickr users

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[3] The Random set was a group of close to 500 of the most recently uploaded images on Flickr on July 10, 2006. The feature has since been renamed and only features the 20 most recently uploaded images.

(Malinen, 2010, 2011). Study One will address the role that comments play in learning and in Group activity. The role of contacts in the learning process will also be considered.

Online Communities

As mentioned above, scholars have noted that Flickr Groups allow for the development of niche communities (Cox et al., 2011; Malinen, 2010; Negoescu & Gatica-Perez, 2008). Communities of practice, the theoretical lens through which Flickr is studied in the research presented here, are a specific type of community. Not all social structures labeled *communities* can be considered CoPs – most notably because of their lack of *practice*, which will be discussed further below – but there are aspects of both online communities in general and CoPs in particular that are similar. Therefore, a brief discussion of the terms *community* and *online community*, as well as research addressing online communities not using the CoP lens, is important in order to place both CoPs and this work in context.

The terms *community* and *online community* have long suffered from vague definition (Bruckman, 2006; Preece, 2001; Preece & Maloney-Krichman, 2006; Preece, Nonnecke, & Andrews, 2004; Ridings & Gefen, 2004; Zhang & Jacob, 2012). Much of the debate over the use of the term *community* is the result of researchers from multiple disciplines defining *community* in different ways (Preece & Maloney-Krichman, 2006; Zhang & Jacob, 2012). Zhang and Jacob argue that the varying and sometimes ambiguous attempts at defining the concepts of *community* and *online community* can be viewed as a result of "an ambitious endeavor to exhaust all possible variables of social phenomena so as to provide a comprehensive likeness of what community might be" (2012, p. 5). Sociologists stress the social context; psychologists focus on individual members; anthropologists address member interactions and how shared value and symbols systems develop; economists concentrate on the organizational structure and how it relates to

how goods are produced, distributed and consumed; and, finally, political scientists are interested in how common goals are achieved through collective practices (Zhang & Jacob, 2012).

In an effort to bring a resolution to the debate over the use of the term *community*, Bruckman (2006) suggests that it be considered as a prototype-based category. This approach relies on the use of prototypical members to define a category, rather than on precise definitions of what is and is not. For example, Niagara Falls is a better example of a waterfall than northern Michigan's small Alder Falls. Yosemite Falls is a waterfall, although some years it stops flowing in late summer. If Niagara Falls is a prototypical example of waterfall, then the others would be better or worse examples, judged by how similar or different they are to Niagara Falls and other prototypical members of the category "waterfalls." Bruckman proposes that *community* be used to denote a category of groups of people. She also posits that *community* is a category with *fuzzy* boundaries, meaning that many types of social structures can be considered communities. This approach would allow researchers to move away from questions concerning whether or not something is a community and focus on how a group is similar to or different from a prototypical community, as well as on pertinent features of those communities (Bruckman, 2006).

In regards to online community literature, the varied application of the term has led to a canon of work that is quite diverse. Early work focusing on online communities provided descriptions of life online, drew comparisons with offline communities, and explored issues related to identity (Rheingold, 2000; Turkle, 1995). Rheingold's (2000) use of the term *community* was a reflection of the sense of camaraderie and social support he observed and experienced on the WELL, an early Bulletin Board System (BBS). His work documenting those experiences illustrated how meaningful social ties could be developed through the exchange of information and shared online experiences. On the WELL discussion boards, information was

exchanged freely, often resulting in learning. As described by Rheingold (2000), a norm of reciprocity emerged, further cultivating a culture of sharing. Subsequent work has found that reciprocity fuels participation and that online communities are used to find encouragement, emotional support, and sense of belonging (Preece, 2001; Hiltz & Wellman, 1997; Wellman & Guila, 1999).

Other research has explored different community-level characteristics and types of activity, including motivations to participate (Koh, Kim, Butler, & Block, 2007; Lampe et al., 2010; Ren, Kraut, & Kiesler, 2007; Sangwan, 2005), factors influencing success (Butler, 2001; Goodsell, & Williamson, 2008; Iriberri & Leroy, 2009; Leimeister, Sidiras, & Krcmar, 2006; Lin, 2007; Preece, 2001), as well as leadership and other roles played by members (Butler, Sproull, Kiesler, & Kraut, 2007; Koh et al., 2007; Luther & Bruckman, 2008). For example, studying the online community Everything2, Lampe and colleagues (2010) found that users initially came looking for information, but some continued to frequent the site for entertainment purposes or to contribute information.

Koh and colleagues (2007) highlight the role of leadership for not only facilitating the building of relationships within the community, but also to promote the creation of user-generated content and to stimulate participation through promoting collaboration and trust. Organizing offline meetings is significantly related to posting activity (Koh et al., 2007). Koh and colleagues argue that this relationship suggests that solidarity and intimacy can be strengthened through offline meetings, leading to increased posting behavior.

Iriberri and Leroy (2009) synthesized previous research pertaining to online community success and developed a five-stage lifecycle model of online communities. Each stage outlines factors that can increase the likelihood of success for online communities. For example, the

creation stage includes factors such as user-centered deign, security, and privacy. During the growth stage, attracting and integrating new members as well as maintaining quality, up-to-date content is advantageous. Many of the success factors can be traced back to strong leadership, further accentuating the importance of governance in online communities.

Ren and friends (2007) highlight the importance of community design decisions that can impact participation, such as the management of new community members, guidelines governing off-topic discussion and community size. For example, new community members often ask questions and leave comments about issues that have been addressed in the past, which can frustrate established members and potentially drive them away. Additionally, new members often spend a significant amount of time lurking, unsure how to begin actively participating. Establishing practices for socializing new members into the community allows online communities to more effectively retain those members who may otherwise leave out of frustration with the newbies, as well as providing a means for new members to emerge from the shadows and contribute in more meaningful ways (Ren et al., 2007).

The development of learning communities to support online education has been another area that scholars have explored (Hiltz, 1998; Hiltz & Wellman, 1997; McInnerney & Roberts, 2004; Palloff & Keith, 2005; Swan 2002). However, less formal learning in online communities, more akin to that described by Rheingold (2000), has been found to be a key factor for participating in interest-based online communities (Baym, 2000; 2007; Baym & Ledbetter, 2009; Ridings & Gefen, 2006). Through interest-based online communities, people learn more about a topic that interests them by interacting with other members. For example, Luther, Ziegler, Caine and Bruckman (2009) studied online creative collaboration among Adobe Flash animators on Newground.com. Social structures such as these are often classified as collaborative innovation

networks (COINS) and are most often studied in professional environments. Newground users work together, motivated by learning, reputation, social support and self-efficacy, to produce *collabs*, computer-animated collaborative movies. The animators are primarily amateurs and vary in skill level and experience (Luther & Bruckman, 2010). Many collabs go unfinished for a variety of reasons (Luther & Bruckman, 2008; Luther et al., 2009), but leadership, organizational structure and activity patterns are all key factors that can predict success (Luther et al., 2009). Luther and Bruckman (2010) suggest involving more amateurs in the collab process, but supporting them through a scaffolding learning system in which they receive extensive support initially, but as they gain more experience some support should be removed. They also suggest proper acknowledgement of animators' contributions and reducing the burden placed on leaders.

The literature addressing online communities certainly has many parallels with the research presented here. However, the CoP focus used in this work differentiates it from this other research and provides a unique perspective. CoPs differ from other social structures as there are three essential elements of a CoP: the domain, the practice, and the community. In brief, the domain refers to the common interest or topic that brings people together. Practice involves the shared language, activities, and knowledge of the community, all of which are related to the domain and affect member behaviors and abilities. The community is the social structure and is built on mutual respect and trust (Wenger et al., 2002). Each of these elements is discussed in greater detail in the CoP section below. Some combination of all three of these elements must be present for a community to be a community of practice. Consequently, not all communities with a shared interest are communities of practice (Wenger et al., 2002). As an example, a person could have an interest in Detroit Tiger's baseball and frequently read posts on a fan forum, and, in doing so, learn more about baseball and the team. However, members of the

forum are not developing a practice related to the interest. No one becomes a better baseball player by reading fan commentary. Based on Wenger and friends' definition of a CoP, members of the Detroit Tiger's forum would likely constitute on online community, but not a CoP.

Flickr's focus on media creation and sharing differentiates it from many of the types of communities studied in the research cited above. The focus of Luther and Bruckman's research on Flash collabs, and others who have looked at COINs in other contexts, is less about learning than it is on the process of online collaboration and the various factors influencing success. The CoP lens offers a focus on the whole of the domain, the practice and the community – and how these three elements intertwine – resulting not only in knowledge acquisition, but the application of this acquired knowledge through practice and interaction with other members.

Communities of Practice

The theoretical concept of a "community of practice" (CoP) has suffered from ambiguous definition, partially caused by shifts in the conceptualization of CoP by co-founding theorist Wenger and his colleagues (Cox, 2005; Li, Grimshaw, Nielsen, Judd, Coyote, & Graham, 2009). CoP was first introduced by Lave and Wenger (1991), although little attempt was made to provide a concrete definition. Lave and Wenger used CoP to as a framework to describe informal social contexts for learning, simultaneously acknowledging that refinement of the concept was needed. The authors did, however, provide some insight on the use of the term "community," arguing that community, in this context, does not suggest a need for co-presence, or even a group with definitively defined boundaries. They posit that what is required is a shared understanding of a common interest that relates to people's individual lives and the community as a whole, thus providing a common bond. As will be discussed in more detail later, roles based on individual knowledge are a central part of the CoP framework outlined by Lave and Wenger (1991),

explained by the concept of legitimate peripheral participation (LPP). Essentially, people within a CoP vary in expertise related to the common interest that forms the foundation for the community. Those with little to no knowledge still participate, but peripherally, by listening to the stories told by more expert members and performing simple tasks related to the practice. Tasks like these allow the inexperienced members of a community to learn informally from the experts (Lave & Wenger, 1991).

Based on Lave and Wenger's (1991) initial CoP work, Brown and Duguid (1991) employed CoP to analyze Orr's ethnographic studies of Xerox repairmen (see Orr, 1996, for a compilation of this research). Through their analysis, Brown and Duguid show how an informal CoP comprised of copy machine repairmen had formed within Xerox, allowing the repairmen to share knowledge learned on the job and, consequently, to respond to problems their formal training did not equip them handle. This early example of CoP research showed that CoPs within organizations could promote learning and innovation above and beyond that fostered by traditional training, a strategic application reflected in later conceptualizations of CoP (Wenger, 1998).

Wenger (1998) provides refinement to the concept, defining CoPs as communities formed by individuals partaking in collective learning related to a shared interest, whose resulting practices are a reflection of those interests and the social relationships of those involved. In Wenger's view, these CoPs are largely informal, and in many cases may not be recognized by their members as being bounded entities. He also argues that while the terminology may be new, CoPs have existed since the beginning of time, serving as a way for sharing knowledge among those with interests in a common practice. For example, a group of artists gathering to share experiences about a new technique would be a CoP (Wenger, 1998).

This 1998 work largely focused on issues of personal and professional growth and an individual's level of participation within a CoP. To help illustrate these foci, Wenger presents a study of insurance claim processers in which he documents informal learning that takes place between processers. In particular, he highlights the value of the knowledge acquired through informal interactions, knowledge that was independent of that presented during formal training sessions and aided in the performance of their jobs, demonstrating the effectiveness of CoPs in the workplace.

Although Wenger's (1998) basic definition continues to be used, with minor modifications (e.g., Wenger et al., 2002; Wenger et al., 2009), the interpretation and application of CoP, its related concepts, and focus has varied. Orr's work, and subsequently that of Brown and Duigid (1991) illustrated the positive impact CoPs could have on knowledge management within an organization and, in the case of Xerox, caused company executives to respond by encouraging the growth of organizational CoPs (Cox, 2005). Other companies followed Xerox's lead, creating their own internal CoPs for knowledge management purposes. Knowledge management refers to the management of organizational knowledge for the purpose of gaining a competitive advantage (Wenger et al., 2002). This approach is rooted in the idea that people are the most valuable asset of an organization, largely because they are storehouses of information about business practices. When a person leaves an organization, much of this information may be lost. To increase organizational knowledge sharing, many companies have attempted to create CoPs (Swan, Scarbrough, & Robertson, 2002). This is viewed as a means of not only insuring against the loss of information when employees leave the organization, but also to aid in the sharing of vital information that could be of strategic advantage to the company, such as more efficient ways for completing day-to-day tasks (Wenger, 1998, Wenger et al., 2002).

Wenger and colleagues' 2002 book *Cultivating Communities of Practice*, an apparent response to the use of formalized CoPs for organizational knowledge management, promoted the use of CoPs as a structured means for managing information within an organization for the purpose of competitive advantage. This 2002 work is essentially a guide for managers to develop CoPs for the purpose of knowledge management, a far cry from the informal nature of CoPs discussed by Wenger and colleagues four years earlier (1998). Schwen and Hara (2003) argue that CoPs with required memberships are not likely to succeed. However, it should be noted that many CoPs within companies do not require employees to join, although in some cases membership may be strongly encouraged (Dubé, Bourhis, & Jacob, 2006).

The development and use of CoPs in organizations has been a popular area of study in areas ranging from the health sector (Honeyman, 2002; Lathlean, 2002; Paraboosingh, 2000; 2002) to large equipment manufactures (Ardichvili, Page, & Wentling, 2003). Central to many of these studies has been the incorporation of web-based tools, causing some to dub these groups *virtual* or *online* CoPs (Ardichvili, et al., 2002; Dubé et al., 2006; Hara, Shachaf, & Stoerger, 2009; Johnson, 2001). Interest in online CoPs for professional development among education professionals has also been popular and is reflected by a growing body of research (Byington, 2011; Hibbert, 2008; Hur & Hara, 2007; Koch & Fusco, 2008). For example, Byington details the use of blogs as a medium for creating an online community of practice for educators (2011). Blogs have been recognized elsewhere as an effective tool for maintaining online CoPs (Silva, Goel, & Mousavidin, 2008; Xu, Kreijns, & Hu, 2006).

Studies addressing organizationally based CoPs are somewhat formulaic, employing either a case study approach to understand the effectiveness of a particular CoP within an organization, or meta analysis in an effort to bring clarity to the field. For example, in an effort to

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better manage knowledge at the equipment manufacturing company Caterpillar, Ardichvili and colleagues (2002) used a case study approach to understand what made CoPs in their organization successful and also to identify barriers to CoP development. The authors studied one extremely successful Caterpillar CoP and two failing ones, all three incorporating network-based tools. Findings indicated that there were three key factors contributing to the success of CoPs within Caterpillar: integrating knowledge sharing into the organizational culture; individuals' intrinsic motivations for sharing information; and support from voluntary leaders within the CoP. Employee hesitations to share information and network security measures affecting system access were found to be the two biggest barriers. This study is typical of the case study approach employed in organizational management research.

Meta analysis efforts have provided mixed results. Interpreting the CoP concept very broadly, Johnson (2001) sought to provide an overview of online CoP research. However, Johnson's definition of CoPs encompassed online courses. While some CoPs do have required membership, as mentioned above, a true CoP lacks the type of structure and required participation found in formal classes (Wenger, 1998), making much of Johnson's review flawed.

Dubé and colleagues' (2006) completed an extensive review of the CoP literature related to knowledge management, providing a wealth of detail specific to online CoPs in organizational settings. Through their analysis of the literature they created a typology of online CoPs with four main dimensions: demographics; organizational context; membership characteristics; and technological environment. Each dimension is comprised of sub-dimensions which the authors propose can be used when analyzing organizational CoPs. (see Table 1.)

Table 1

Typology of virtual communities of practice: Structuring characteristics (Dubé et al., 2006)

Demographics	Orientation (operational ←→ strategic)
	Life span (temporary ←→ permanent)
	Age (old ←→ young)
	Level of maturity (transformation stage ←→ potential stage)
Organizational context	Creation process (spontaneous ←→ intentional)
	Boundary crossing (low ←→ medium)
	Environment (facilitating ←→ obstructive)
	Organizational slack (high ←→ low)
	Degree of institutionalized formalism (unrecognized ←→ institutionalized)
	Leadership (clearly assigned ←→ continuously negotiated)
	Size (small ←→ large)
Membership characteristics	Geographic dispersion (low ←→ high)
	Members' selection process (closed ←→ open)
	Members' enrollment (voluntary ←→ compulsory)
	Members' prior community experience (extensive ←→ none)
	Membership stability (stable ←→ fluid)
	Members' ICT literacy (high ←→ low)
	Cultural diversity (same profession, language, vision) (homogeneous ←→ heterogeneous)
	Topic's relevance to members (high ←→ low)
Technological environment	Degree of reliance on ICT (low ←→ high)
	ICT availability (high variety ←→ low variety)

Dubé and colleagues' work provides insight on the use of online tools to aide in the management and accessibility of information, while also highlighting numerous other factors that may influence the success of an online CoP. However, Dubé and colleagues' typology is limited because it is based only on research on CoPs found in organizational settings.

Research addressing open, non-organizationally rooted CoPs that anyone may join is much more rare than studies addressing organizational CoPs. While this research is sparse, studies addressing open CoPs contribute to additional knowledge to the greater understanding of CoPs (Hara et al., 2009). For example, Wasko and Faraj (2000) examined why people would

participate in three Usenet groups they deemed online CoPs. Findings indicated the primary

reasons for contributing to be community interest, a commitment to reciprocity, and a desire for

positive social behavior.

Building on the work of Dubé and colleagues, Hara, Shachaf, and Stoerger (2009) studied

three email lists that function as open CoPs: one for webmasters working at universities; one for

librarians interested in digital reference practices; and one for people interested in educational

technology in the K-12 and university setting. For each group, a content analysis of 50 messages

was performed to determine the extent to which Dubé and colleagues' typology applied to open

CoPs. Additionally, Hara and colleagues examined other CoP literature in an effort to refine the

typology. The resulting updated typology incorporates sub-dimensions unique to open CoPs,

most notably active participants, founding members, and moderators.

Fundamental structural elements of communities of practice.

As stated above, communities of practice are groups of people who come together around

a shared interest and, through their interactions, learn more about a common topic of interest or,

as Wenger and colleagues (2002) put it, "deepen their knowledge and expertise in this area by

interacting on an ongoing basis" (p. 4). Wenger and colleagues (2002) argue that this definition

does not assume that learning is an intentional goal bringing members of a group together,

although that may be the case, but rather the definition is inclusive of intentional and incidental

learning. The dimensions of CoPs outline the elements necessary in order for learning to take

place in CoPs.

CoPs were originally conceived as having five necessary structural dimensions or

characteristics: mutual engagement; joint enterprise; shared repertoire; community; and learning

or identity acquisition (Wenger, 1998). These dimensions have since been collapsed into the

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domain, the community, and the practice (Wenger et al., 2002; Wenger et al.; 2009). These structural dimensions are shared by all communities of practice and differentiate them from other socially organized groups that use the term "community."

A *domain* is the common interest that brings people together (Wenger et al., 2002; Wenger et al.; 2009). However, it needs to be something that sustains the interest of the individuals involved in order for a community to develop around it. Domains can vary greatly. According to Wenger and colleagues (2009), the definition of a domain within CoPs not only defines the identity of the community, but also provides "a set of issues, challenges, and passions through which members recognize each other as learning partners" (pg. 5). The domain can be understood in two different ways: "the domain inside" (how the members define the domain) and "the domain outside" (the significance of the CoP to those who are not members). The structure of groups on Flickr can be used to illustrate the concept of a domain. As discussed above, groups can be used to organize content related to a common topic. In CoP terms, this topic would be the domain. For example, the Flickr group U.S. National Parks (http://www.flickr.com/groups/usnationalparks/) uses the *about* description of the group page to define their domain:

> From Acadia to Zion, pictures of the 58 U.S. National Parks. Before you post, check this
> list of National Parks to a) make sure your park is one of the 58 flagship National Parks
> and b) find the correct form of the park name with which to tag your photo.
> Other types of sites run by the National Park Service, such as National Historic Parks,
> National Monuments, etc. are NOT eligible. However, they are welcome in the sister
> group, US National Parks and Places.

This description clearly defines the domain of the group, even to the extent of indicating where those with pictures of other locations administered by the National Parks Service can go to post them. If there is confusion about the domain inside of a CoP, it may cause the community to split into different CoPs (Wenger et al., 2009), making proper definition an important task. The National Parks group's "about" section defines the domain inside –the focus of the group. However, the group may be of use to non-members. For example, authors of a book on the National Parks may use the group to get ideas for the type of images they would like in their book, or even to recruit photographers. This use of the group by non-members would be related to the domain outside – how non-members could use the knowledge or content of the group.

Practice defines those stories, knowledge, language, documents, activities and techniques shared by members of the CoP (Wenger et al., 2002; Wenger et al., 2009). On Flickr, practice would include the language of photography, the skills and techniques for taking and editing photographs, sharing photographs, commenting on the photographs of others, and other related activities enabled by the design of the site. Depending on the group, there could be a specific type of knowledge being shared. For example, in a group dedicated to Nikon cameras, the knowledge being shared on the group discussion board would be specific to that brand of camera. Wenger and colleagues (2009) conceptualize the learning of a CoP's practices as learning from and with others, learning through formal and informal activities, and learning from internal community sources and external sources. There are many ways these types of learning may occur.

Learning *from* others might include shared stories, personal experiences, and tips, while learning *with* others might include making sense of new information or a problem, weighing pros and cons of a technique, and discussing new tools. Formal learning in a CoP could result from a

community leader sharing a "how to" tutorial with the membership, or assigning learning tasks to members. Informal learning could take place through observing how others compose photographs, or through critiques left as comments. Sharing knowledge acquired from sources outside of the community is also important (Wenger, 2009). On Flickr, this could come in the form of sharing links to other online photography resources, such as online tutorials. By utilizing and sharing outside resources, the knowledge within the community is able to grow beyond the constraints of the individual members.

Wenger and colleagues (2009) argue that through learning the practices of a CoP, individuals learn how to be a certain type of person through living knowledge rather than only possessing a theoretical understanding. Practice, and consequently learning, within a CoP depends on the tacit and explicit knowledge shared by the membership (Duguid, 2005). These two types of knowledge are complementary and distinguished from one another by Ryle as *knowing how* and *knowing tha*t (as cited in Duguid, 2005). According to this perspective, *knowing how* helps to enable action based on *knowing that*. However, *knowing that* does not necessarily lead to *knowing how*. Put another way, knowing what a free throw is and what it entails to shoot one is one thing (*knowing that*), but actually shooting one is another (*knowing how*). Ryle argues that people obtain *know that* through explicit, codified information and *know how* from learning through practice.

Considering the structure of Flickr, there are multiple ways that tacit and explicit knowledge may be shared. As Duguid (2005) states, an expert not only communicates through words, but also through implicitly displaying knowledge about their area of expertise. In the context of Flickr, an expert photographer could post detailed instructions to a discussion board on the use of the rule of thirds, a composition technique. This would be explicit knowledge. The

same photographer could also post a photograph, implicitly displaying skill in composition, or tacit knowledge of composition. In this example, knowing what the rule of thirds is may help a new photographer to better understand composition, but actually applying the technique requires tacit knowledge. Duguid argues that CoP membership "offers form and context as well as content to aspiring practitioners, who need not just to acquire the explicit knowledge of the community but also the identity of a community member" (p.113, 2005). New members may access explicit knowledge through instruction from veteran members and reading documentation related to practice, but it is through observing the practice of veteran members and the act of practice itself that the tacit knowledge needed to become true practitioners is acquired. Study One will explore the how explicit and tacit knowledge are exchanged in Flickr CoPs in order to better understand learning practices of users.

Of concern to the dimension of practice is voluntary sharing of information among members. Duguid (2005) refers to this as "the ethical entailments of practice" (p. 113). For example, if an individual feels that the knowledge they have affords them competitive advantage, they may be hesitant to share that information. However, that is not always the case and the norms of the community may influence decisions about sharing (Duguid, 2005).

Community is not defined as clearly as the domain and the practice, perhaps because of the multiple interpretations of the term. Essentially, "community" is viewed as a social structure in which interactions are encouraged and mutual respect and trust provide the foundation for relationships (Wenger et al., 2002; Wenger et al., 2009). Members of a CoP come together around a shared interest, so some degree of homogeneity is to be expected. As found elsewhere, interpersonal attraction is linked to similarities (Byrne, 1997; Byrne, Clore, & Smeaton, 1986; McPherson, Smith-Lovin, & Cook, 2001). The similarities that attract people to one another can

be described by the homophily principle. Essentially, the social networks that people maintain are often homogeneous along multiple dimensions, leading to attraction (McPherson, et al., 2001). However, there is still room for diversity within communities of practice (Wenger et al., 2002, Wenger et al., 2009).

Homogeneity may help to facilitate group membership, but roles within the CoP, varying backgrounds, and skill sets all contribute diversity to the community (Wenger et al., 2002). For example, a love of old barns may bring a group of photographers together on Flickr, but their own unique composition styles, preferred equipment brands, and level of technical proficiency – not to mention varying demographic characteristics – all introduce elements of diversity into the group. Provided that there is enough similarity for mutual engagement, likely provided by the topic/theme of the CoP, Wenger and colleges (2002) argue that diversity can increase creativity, enrich the learning experience, and make relationships within the community more interesting.

Varying levels of skill or knowledge related to the topic of the CoP are not only an example of diversity, but also a necessary element if significant learning is to occur within the community. These different levels of knowledge can lead to different levels of participation (Wenger et al., 2009). In online communities a small portion of the members are often responsible for the majority of the posts. Those members who do not post, but remain a silent consumers of the content of the community, have traditionally been referred to as "lurkers," a term that carries with it a pejorative connotation (Preece, Nonnecke, & Andrews, 2004). Through the CoP lens, this type of behavior is called legitimate peripheral participation and is interpreted as a method that allows novices to learn about both the community and the topic (Lave & Wenger, 1991; Wenger et al., 2002; Wenger et al., 2009).

Legitimate peripheral participation.

Legitimate peripheral participation (LPP) is one of the key concepts of a CoP. LPP is an analytical concept used to describe the process by which someone with little or no knowledge about a subject learns from observing, interacting, and working with those who have greater knowledge, eventually becoming a full member of the community (Brown & Duguid, 1991; Lave & Wenger, 1991). In respect to tacit and explicit knowledge, LPP focuses more on the tacit – learning to be a practitioner, not just simply learning about practice (Brown & Duguid, 1991; Duguid, 2005). Novices first participate in peripheral tasks. In the apprenticeship model, these are tasks assigned by the master that need completing but require little skill compared to others. Lave and Wenger (1991) use the example of a novice tailor learning the trade to illustrate LPP. Starting out, the novice works on undergarments and informal children's clothes. In their earliest work, novices are not fully responsible for the production of even the simplest children's clothes. Instead, they work on finishing touches and over time are given more responsibility, such as additional sewing and, eventually, cutting fabric. This same process of beginning with finishing touches and over time contributing more significant work to the garment takes place on increasingly more difficult garments until the apprentice has become a master. At this point, having become an expert, the tailor can make all of the clothes the shop produces and is a fully participating member of a community of tailors. Lave and Wenger (1991) argue that LPP is an essential process for novices learning a new practice. Once an individual becomes more proficient in the practice, he or she will take a more active role in the community. Additionally, those individuals in the community performing this lurking-type of role may also be more active in other related groups/communities, and thus distributing knowledge from a group where they observe on the periphery to one where they are more active.

The process of advancing from a newcomer/novice to an expert helps to ensure that the membership of a CoP will be comprised of individuals with diverse knowledge and skill levels. Bryant, Forte and Bruckman (2005) found that members of the Wikipedia community evolved over time through a process beginning with legitimate peripheral participation. Participants in their study described the transition from being consumers of content to creators of content, as well as shifts in self-perceived identity that were linked to this evolution from use to creation. Participants described initially making fairly minor edits to articles, eventually graduating to more significant contributions. Methods for engaging in LPP in Flickr CoPs will be explored in Study One. Study Two will address expertise in predicting Flickr activity to determine the extent to which certain activities are associated with greater levels of expertise.

LPP focuses on how novices advance their knowledge related to the practice of interest but pays little attention to other roles within the community, except to acknowledge that experts exist. Researchers have addressed leadership in online CoPs, although in organizational settings. Gray (2004) found that leadership was a crucial component of online CoPs' success, not only in promoting learning, but also in facilitating social interaction and dispensing technical support. Bourhis and colleagues (2005) also found leadership to be a vital component of online CoPs' success. In their study, the researchers found that strong leadership allowed CoPs to overcome multiple types of challenge, such as low levels of interest among members and technological barriers. Conversely, poor leadership, even when members were initially enthusiastic, led to much lower levels of success. According to Brown and Duguid (1991), occupational CoPs are egalitarian as the knowledge is generated cooperatively, making it impossible for one person to maintain control over that knowledge. However, these studies, as well as those from the broader online communities literature, indicate that strong leadership is still an important component of

success. Of course, "leadership" does not mean that someone has more knowledge than other

members, but rather is providing direction for the group.

Research Questions

Based on the literature reviewed above, the following research questions are proposed

in an effort to gain an understanding of the workings of CoPs on Flickr, learning among users,

and user behaviors contributing to CoP success:

RQ1a: What factors influence Group membership?
RQ1b: What factors influence activity in Groups?
RQ 2a: What learning strategies do Flickr users employ for on-site learning?
RQ 2b: Does legitimate peripheral participation take place in Flickr CoPs? If so, how?
RQ 3a: Do Flickr users share their expertise with other users? If so, how?
RQ 3b: Are explicit and tacit knowledge shared in Flickr CoPs? If so, how?

Chapter 3

Study One Method

To answer these questions, semi-structured interviews were conducted with Flickr users (N=21) over a period of three weeks. Participants were asked a variety of questions about their perceptions, experiences, and behaviors concerning Flickr.

Data Collection

As no prior research had addressed learning on Flickr, qualitative methods were used to explore how participants utilize the site for learning. Research questions developed through a review of the literature pertaining to CoPs, online communities, and Flickr helped to form a base for an inductive approach. The interview protocol included open-ended questions about participants' general use of the site as well as questions specific to Group participation, giving and receiving feedback, information sharing, and learning. Semi-structured interviewing techniques were used to make certain that all participants were asked specific questions and also to encourage discussion related to other issues relevant to the study. Questions in the interview protocol included items such as the following: do you feel that you learn through Flickr?; to which kind of Flickr Groups do you belong?; and what kind of comments do you typically receive? The full protocol can be seen in Appendix A.

Prior research has found that while there are two main types of Flickr users – those who are sharing snapshots with friends and family and those who are sharing photos with strangers and friends made through the site – these groups are not necessarily exclusive (Miller & Edwards, 2007). Users who share almost exclusively with social ties previously established offline tend to post photos less frequently than those sharing with strangers and Flickr friends (Miller & Edwards, 2007). Accordingly, as this research is concerned with active CoP members,

the researcher determined that random sampling techniques would not likely result in the recruitment of the type of participants necessary to allow for the research questions to be answered. To increase the likelihood of recruiting active hobbyists and serious photographers, theoretical sampling techniques were employed. Theoretical sampling, a suggested procedure for qualitative research, allows participants to be chosen based on relevant concepts (Corbin & Strauss, 2008). In addition to recruiting active photographers, it was also important that potential participants use Flickr for learning.

To ensure that interview participants met these basic criteria, a short screener survey was used. The survey included questions asking users to rate themselves as photographers, classify their activity, and answer Likert-type questions about their use, including learning. The full screener survey may be seen in Appendix B. Invitations to take a short online survey about Flickr use were placed by the researcher in the discussion forums of four geographically-based Flickr Groups. Rationale for selecting Groups was based on apparent Group activity levels, informally evaluated through Group pool posts and discussion posts, as well as the ease with which in-person interviews could be conducted with members. During the two weeks the screener survey was open, 42 completed questionnaires were submitted. All but one participant expressed an interest in being interviewed. Of those 41 respondents, all indicated being active photographers and had some level of agreement with the statement *I use Flickr to learn more about photography*, thus making them eligible to be interviewed. Out of these 41 people, the researcher selected and contacted 30 people via email to schedule interviews. These 30 potential interviewees were selected to provide a mix of gender and Group administrators/non-administrators. Potential interviewees who did not respond within three days of the initial email were sent a reminder. Twenty-four of the original 30 respondents scheduled interviews, although

3 were unable to participate due to scheduling conflicts. Each person was informed in the original discussion board post for the screener survey, as well as the email invitation, that they would receive a $20 Amazon.com gift card after completing the interview.

Seventy-one percent of study participants were from the Metro Detroit area, with the remaining participants coming from various regions of the lower peninsula of Michigan. Fifty-two percent of participants were male and 48% were female. Participants ranged in age from 30 to 61, although the greatest number were in their 40s. Eighteen participants had pro accounts and three had free accounts. Participant experience on the site ranged from 4 months to 5 years.

Twenty-one interviews were conducted between February 21, 2011 and March 7, 2011. Participants had the choice of an in-person or telephone interview. Three participants chose to be interviewed in-person and the remaining participants chose telephone interviews. Interviews ranged in length from 30 minutes to 87 minutes, with the average interview lasting 51 minutes.

Data Analysis

The researcher conducted all interviews, which were audio-recorded and then transcribed by the researcher. Interview transcripts were analyzed using Atlas.ti, a qualitative content analysis software program. Microanalysis of the text (Corbin & Strauss, 2008) was used to identify common themes in the interviews. Based on the themes identified, the researcher coded each transcript systematically line-by-line. Coding was performed in the tradition of grounded theory (Charmaz, 2006; Corbin & Strauss, 2008; Glaser & Strauss, 1967). Axial and open coding strategies (Corbin & Strauss, 2008) were used to relate concepts and also separate concepts into distinct categories. This process allows data to be separated into individual concepts while also allowing it to be considered as part of larger concepts. Throughout the coding process, new codes were created when necessitated by the data and transcripts previously coded were updated

when appropriate. A number of these codes were created when it became apparent that existing codes were unable to capture important nuances in the data. Additionally, the researcher collapsed codes with significant conceptual overlap. After these adjustments to the coding scheme were completed, a total of 121 codes were utilized in the analysis of the interview transcripts.

Chapter 4

Study One Results

As a social media platform, the design of Flickr allows for the natural development of

CoPs. The interview data presented here offer insight into learning strategies used by participants

to leverage Flickr CoPs for increasing their knowledge and skills related to photography. These

strategies can be grouped into two main categories: solitary and interactive learning. This chapter

reviews findings related to these learning strategies, considering Group membership, activity,

and knowledge sharing.

Flickr Groups as CoPs

Flickr Groups act as a gateway to learning for many participants. As will be discussed, it

is within the Groups that they encounter experts in specialized areas of photography, browse the

Group pool, and read discussion board posts. Groups provide a social structure in which

relationships are formed. Participants talked about how those relationships can lead to

encouragement, critique, and learning. However, not all Flickr Groups can be considered CoPs.

For any social structure to be considered a CoP, three requisite elements must be present: the

domain, practice, and community.

In a global sense, the domain of Flickr could be defined as photography. From this

perspective, each group on Flickr would have a sub-domain that is within photography, such as

macro photography, or photographs of old boats. Groups of related CoPs are referred to as

constellations (Wenger, 1998; Wenger et al., 2002). As such, Flickr could be called a

constellation of photography CoPs. Multiple participants talked about Flickr in this respect. One

summed it up well while discussing the structure of Flickr and Groups, stating:

Well, I guess it's almost the same analogy of comparing all of Flickr to all of the world,

and then there are regions, or small cities which would be one Group. You might actually

interact with that one Group more than you would with the rest of the entire community

of Flickr. (Flickr 04)

This participant's Flickr experiences, as were those of most interviewees, were closely tied to the

Groups to which she belonged and to the other photographers she had met in these Groups.

However, the types of Groups on Flickr vary. Holmes and Cox (2011) describe four basic types

of Flickr Groups: location based; award/contest; learning/critique (although, as will be discussed,

learning is certainly not limited to learning groups); and subject/theme. These categories were

reflected by many of the participants when discussing Groups to which they belonged. One

participant, in particular, organized his groups into three categories: gear/affinity; geography

groups; and scoring groups. Gear/affinity would most closely match up with subject/theme,

geography with location, and scoring somewhere between learning and award/contest. These

categories are a reflection of the domain of each Group.

Participants sought certain types of Groups for specific purposes. When asked about the

types of Groups to which they belonged, many of the individuals interviewed discussed

belonging to Groups related to their particular brand of camera, which they commonly referred

to as either gear or equipment groups:

I shoot with a D300, so I belong to the Nikon D300 Group and several different lens

Groups. I don't participate a lot in them. I post a picture occasionally and look at pictures

posted by other people. What I really see them as is my basic support mechanism. One

day that camera is going to fail. Something is going to happen and I'm going to be

wondering, "What's going on here? Is this just me?" Which is what we all wonder when

gear fails. "Is this just me or, is this everybody's experience?" And one thing I know

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from my own experiences online as a geek is every failure that can happen happens to other people, and it usually happens to somebody else first and they've probably found a solution. So it's really just finding the guy that's already solved my problem. By participating in the Groups, I think that keeps me sort-of listening to what problems people are having. (Flickr 10)

In this case, equipment Groups were seen as serving a pre-emptive support role. Although the participant's activity level in his D300 group was limited, he saw his membership as very important. The use of equipment-centered Groups for some type of support was a common theme among participants, but not necessarily for finding solutions to problems or trouble-shooting equipment malfunctions. For example, as one participant said, "joining the Olympus group taught me a lot more about how to use the camera and [how to choose] better settings." Other participants reported using equipment Groups for research prior to deciding on which model of camera to purchase, which lens to buy, or how to set up a lighting kit. Additionally, another use of equipment Groups was sharing photos taken with the equipment central to the Group. As one participant said, "If it was taken with my 35-70 lens, I'll post it to the Canon on a budget 35-70 Group because people like to see the kind of photos that can come out of these things." Participants also discussed how the equipment-based Groups tended to be active, with members frequently posting photographs to the Group pool and participating in discussion forum threads.

Whether equipment-based or focusing on a different subject, a common theme among participants Group membership choices was the desire to belong to active Groups. As one participant said, "If I see a group and there's nothing going on on their discussion boards at all, then I'm not as interested in it." Activity is essential for a Group to be considered a CoP (Wenger

1998, Wenger et al., 2002). Without the mutual engagement that takes place through discussions and comments, Groups can become, as one participant said, "just a collection of photos on a common subject." Participants referenced active discussion boards, Group pools, and comments on photos posted to the Group pool as indicators of activity. Comments were discussed as an important part of Group membership. For example, one participant talked about how comments influence her Group membership, saying:

There are some Groups that I've joined that I've been disappointed with because you post [to] them and no one comments and it's kind of like what's the point? That's why I really gravitate toward those more active Groups where people do comment. (Flickr 01)

In this respect, active Groups are attractive to participants because there is a greater chance of receiving feedback from other members. Others, underscoring the importance of Group activity, echoed this attitude about the importance of comments.

Group activity took on a different meaning in some of the Groups discussed by participants. During some interviews, when the topic of community did not come up naturally, the researcher asked if the participant saw any of their Groups as communities. Overwhelmingly the answer was yes. In Groups that were themed around a geographic area, participants spoke of member photowalks and other offline face-to-face events. In particular, location-based Groups seemed to contribute to the sense of community felt by interviewees:

It's not just a place [the Group] where it's strictly online [activity]. I mean because they [Group administrators] organize photowalks and educational seminars and social events. They actually have exhibits. I mean obviously that's going to add to the sense of community when it's not just something that you by yourself sitting on your computer in your kitchen. (Flickr01)

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In this case, the participant was a very active participant in the Group she was discussing. The offline activities that she described had provided her with the opportunity to get to know other members of the Group and helped to form a sense of community. As another participant put it, "There's personal relationships there [in the Group] that you just don't always get in a Group where you don't meet people in person."

While varying activity levels were used as a metric by some participants to gauge whether or not they might benefit from joining a Group, it also appeared to help participants distinguish between Groups they saw as communities and those that were only photo collections. In some cases, participants were very specific about the types of activity they felt made a Group a community. When one participant began talking about her Groups as communities, the researcher asked her if all Flickr Groups were communities:

> It really revolves around having an active forum and/or pool. There are some of the Groups that don't have the active forums, but are very active in their pool and you see a lot of communication going on just [in] the comments under each of those photos. But most of the communities that I'm actually getting involved with now, it's all happening in the forums where it's feedback from multiple members (Flickr 18).

One participant described a local Group he belonged to as, "active and warm and welcoming," much of which he attributed to the leadership of the Group administrators. This participant elaborated on his impression of openness of the Group:

> Feel free to do this [particpate], but no pressure. Come on in and get your feet wet and don't worry about stuff. If you don't want to say anything or don't want to comment, you don't have to, but just join us. See what it's like and if you like it, stay awhile. (Flickr12)

Groups defined as communities by participants were typically discussed as being successful

Groups. Size also emerged as a determinant of not only Group success, but also whether or not

participants would become involved with a Group.

> You know, the size affects it somewhat, but you still feel the community. It's sort of like
>
> listening to the radio. If you listen to the same radio station all the time, you sort of feel
>
> like you know the guys. Or the same TV show where you get to where you feel like you
>
> know the characters. In the really large groups there's usually going to be a core group of
>
> people that are always posting and always active and you know when one posts that this
>
> other guy's going to come along and argue with him, or not, depending what the thing is.
>
> So there's still a feeling of community, but it's not as inclusive. Here's how I look at it.
>
> The big groups are sort of like communities and the small ones are sort of like family
>
> reunions. There's more of an intimate feel because you sort of know the people - who
>
> you like, you dislike. There's more of a personal feeling that goes along with the smaller
>
> ones. Both have the community feeling, just a different type. (Flickr 12).

Another participant talked about Group size considerations when looking for a 365 Group[4]:

> There's a gazillion of them out there and I picked one because it looked like it was going
>
> to be a smaller number of people, which means you'll get to know styles a little better
>
> because you'll see the same people taking photos more often than you will in the Project
>
> 365 Group, which has like 20,000 members. Good luck following any one person in
>
> there. (Flickr 07)

This participant was concerned that he was going to have trouble keeping up with the same

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[4] 365 Groups are a type of challenge Group where the members post a new photo to the Group pool every day of the year. Depending on the Group, moderators may guide the theme for certain days.

photographers in the larger 365 Groups, and he wanted an experience in which he could follow what different people were posting. As suggested by Wenger and colleagues (2002) direct interaction can become inhibited when a community gets too large. This was reflected by the comments of another participant who talked about leaving a Group because of a substantial increase in the membership:

> It's just grown to be so big that you can post a picture and it's already off the first page [of the Group pool] by the time you get there. I just feel like there's so much being posted that nobody can really see what's being put up. So I feel like who even sees it because it's just flying by in this mass of hundreds of pictures. (Flickr 08)

Interestingly, even though this participant shied away large groups, she did remark, "That doesn't mean I don't like looking at their pictures." This illustrates that for some participants Group size influenced how they viewed the utility of the Group. In this case, looking at pictures in large groups was considered useful, but posting was not.

Conversely, other participants discussed the dangers of having too few members in a Group. As one participant commented, "If you've got five people, it's like, okay, what am I going to say today?" Another participant commented that if a Group only has twenty or thirty members it would "probably eventually die out." Although this same participant went on to say that the structure of the Group also plays an important role, remarking that small Groups can survive when they have active discussion boards in addition to a Group pool. Wenger and colleagues (2002) say that communities "need a critical mass of people to sustain regular interaction and offer multiple perspectives" (p. 35). In this example, the participant indicated that varied types of participation were important for the success of a smaller Group.

Strong leadership was frequently discussed as a key factor when participants were asked about Group success. As one participant said, "One is not going to stick around, and the Group is not going to make it, [if it] is not administered well." Participants described Group administrators as performing multiple roles, such as resolving disputes between members, starting discussion threads, posting notices, and encouraging participation. In one case, a participant mentioned being contacted by a moderator after he lost a vote to have his work featured in the Group's weekly spotlight:

> One of the moderators just sent me a note one day and said, "Hey, I just really want to thank you for participating in the group. You're very regular about it and your comments are really nice." And she said, "I really want you to know that I really fought for you this week." (Flickr 10)

In this case, the moderator used Flickr mail to offer encouragement. Other participants discussed seeing administrators and moderators offering encouragement through comments. The weekly spotlight discussed above is in itself a method used by administrators to promote activity within a Group. There are many variations on these types of Group contests, but essentially a Group administrator chooses a topic or theme and members post their submissions. In some groups, voting then takes place to determine a "best photo." Voting may be conducted by the membership or by administrators, as in the example above. Often there is no larger goal than encouraging members to take and share a photograph that fits the challenge criteria. Participants reported that there were not prizes for winning, other than being named the winner. However, these challenges can push members to try new things. For example, one participant discussed an instance where members of one of her Groups were challenged to, "try taking pictures from ground level." This participant went on to say that, "I'm learning something by doing that and

it's not something that I would have gone out and done on my own." In cases such as this, the challenge is not only promoting Group activity, but also facilitating learning.

Challenges and contests are sometimes the sole purpose of a Group. Other times, they are only one component of a Group. In discussing a Group focused on her particular model of camera, one participant described activity challenges as being both educational and inspirational in terms of seeing "what other people were doing with that same topic and that same camera, so when you see somebody do it with the same camera, you know that it's possible." Furthermore, because it was the same camera she used, she felt she could not write off the outstanding photographs as being something she could not do because of equipment limitations. Through the Group challenges, what she thought possible to achieve with her camera was being challenged and she was being pushed to try new things; in the process, she was learning more about photography.

Group administrators and other moderators also perform the role of maintaining the domain. Some Groups have very specifically defined topics. One participant, while discussing a Lake Michigan themed Group, discussed how the administrator ensures that the Group pool reflects the theme and prevents it from becoming polluted with off-topic images:

> If anything is ever put in [the Group pool] that doesn't look like it should be there the
> administrator usually knocks it down. Everything is of Lake Michigan. None of the
> photos are stop signs at Lake Michigan. None of them are a picture of an outhouse.
> (Flickr05)

While this illustrates how administrators maintain the domain of their Groups, other participants talked about the consequences poor Group administration:

If you don't moderate the group, it will be flooded with spam. It will be flooded with

porn and people will complain and then they will leave. And you see that all the time.

There are groups that just die because the moderating goes away. (Flickr 10)

Time after time, participants acknowledged the important roles that administrators and

moderators fulfill. Overall, participants saw Group leadership as integral to success. However,

other individual factors still influence Group membership. Some participants discussed leaving

Groups because of a rude behavior on the part of other members, although this was rare among

interviewees. Other times, users may leave a Group because they were merely using it to explore

a topic and learned that they did not like it. As one participant explained, "You might think

you're interested in [a Group] all about trees, and then you're like, "I really hate shooting trees, so

I don't want to post to that [Group] any more."

While participants commonly discussed issues of size, leadership, and activity in regard

to Groups that were central to their Flickr experience, and those they considered communities,

many also discussed less active Groups to which they belonged. Reasons for belonging to these

less active Groups varied, as did participant behavior in these Groups. In some cases, a user may

join a group to post a specific photo, but not return. For instance, one participant discussed

finding a vintage barber shop group for a photo she had taken:

I had one barbershop photo and I thought it would be good if I could find something like

that [a barbershop themed Group]. I posted it to that Group, but it's not like I ever did

anything with that group again. (Flickr01)

In this case, Group activity and the other characteristics discussed above were of little to no

importance. The photographer had a photo that she felt might be appreciated by a specific

audience, so she sought an audience interested in the subject matter. As illustrated by another

participant while discussing a Group to which she belonged themed on photos of old barns, sometimes high levels of activity are not sought:

> In some of my Groups, there's never even been a conversation and they're not really active groups because nobody is taking thousands of pictures of barns. So they're just small, easygoing, fun place to collect pictures of a certain type. (Flickr08)

Above, other participants viewed these types of Groups in a rather negative light. Here, and as described by additional interviewees, Groups like these are seen as enjoyable, almost lighter groups, perhaps in part because of the limited activity and engagement required. This same participant acknowledged that she receives comments from members of the old barns group, so while there may not be Group level activity in the form of discussion forum posts, she is interacting with other Group members.

Connecting with other users to learn often happens in Groups. All participants cited examples of learning that had occurred in a Group. However, Groups are not the only social structure in place providing users with the opportunity to learn. Flickr's social networking features allow users to maintain a list of contacts. All participants talked about maintaining contacts, although the utility of maintaining contacts varied. Common among many participants was adding users as contacts in order to follow their work. This was done for two primary reasons: because participants found the work of the user compelling or informative and wanted to see what they did next and/or because they had interacted with the user in some way, most typically in a Group. Adding users as contacts makes following their work easier, as contacts' photostreams can be accessed directly from a user's homepage. This prevents the user from having to sift through their Group pools to find the work of friends. Participants were not directly

asked to about the symmetry of their contacts; however, some participants did mention adding users as contacts because the participant had been added as a contact by the user.

Adding contacts and developing relationships with other users met in Groups was a common theme among participants. Several participants also mentioned that offline Group activities helped these relationships to be formed. The ability for users to track specific members of their CoPs through a site feature is something unique to Flickr as a constellation of related CoPs, made possible by the built-in social networking features.

When asked about where their learning occurs on Flickr, all users spoke of their Groups, however some felt that their learning was more of a reflection of their social network than specific Groups, even if they had met those contacts in Groups. As one participant explained, "I would say the majority of the photos that tend to influence me are [from] my closest contacts and then also the Groups I'm in." In this case, the particpant saw the photographs of their social network as being more influential than those that were in the pools of the Groups she belonged to, but the Groups were still important. For some particpants, this valuing of their social network over Groups may be a reflection of use. As one participant explained:

> I use it [Flickr] more for the contacts. The [Group name omitted] pool – I don't even go
> on it that frequently. I think because most of the people that are active on [Group name
> omitted] are the people that are my contacts anyway (Flickr 01).

In this case, the participant had gotten to know several members of the Group in question and had them listed as contacts. She felt that, because of this, she spent less time viewing photographs in the Group pool. Later in the interview, she emphasized this, mentioning that she felt she was "definitetly more active with my contacts than with the Groups." Similiarly, another highlighted the important role his contact played in his Flickr experience, saying, "The whole

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thing I do on there is all related to that circle of friends." Another commented, "The friendships that I've made through [Group name omitted] would outwiegh the amount of Groups on Flickr any day."

These examples indicate that the social networks of Flickr users are also an important aspect of user learning activities within the Flickr CoP constellation. Through the contacts feature, users are constructing a sub-group populated by members of their Groups, a structure made possible by the affordances of Flickr. Much like how a Group pool exposes a user to the photographs of other Group members, the more recent posts from contacts appear on users' Flickr homepages, creating the possibility for sustained mutual engagement through viewing and commenting on each other's new photographs. Additional interview data further reinforces the importance of social networks for some users. As one participant put it:

> You've got your own Group of friends. I've got 200 contacts. So everyday you've got 40 or 50 pictures from that Group…just your contacts' posts and stuff you're looking at and commenting on. And then you're checking the busier Groups for threads and upcoming events, and what people are saying and you kind of look at those pictures [in the pool], but not as much as your contacts (Flickr 14).

This participant went on to express a sentiment that others also shared: there is only so much time in a day. In this respect, he talked about how he spent his Flickr sessions scanning the first page of the Group pools, but not going further than that, saying, "You focus more on your contacts." The development of social networks should not be seen as a competing structure enabling learning, but rather as a function of multiple Group memberships. Additionally, this construction of active social networks may not be universal among Flickr members. For example, new Flickr users are not likely to have many contacts initially.

As mentioned above, some Groups are dedicated specifically to learning. However, interview data indicates that learning is occurring in many different types of Groups. Interviewees often cited learning as a primary reason for being on Flickr and participating in Groups. One participant attributed, "everything I've put together in the last year" as being a result of what he had learned on Flickr. He elaborated, highlighting having learned the rule of thirds (a composition technique) through his on-site interactions, as well as other techniques for composition, such as using leading lines, "by having folks say, 'well it looks like you should have cropped it here…have these lines do this and you shouldn't have this.'"

Participants frequently cited their experiences on Flickr as being instrumental in their development as photographers. Experiences discussed by participants revealed that they were utilizing multiple learning strategies in their efforts to become better photographers. Broadly, these strategies can be categorized as solitary learning and interactive learning. Regardless of whether or not Flickr users' learning experiences are solitary or take place with others, interview data indicates that Flickr is the home to thriving communities of practice through which these learning experiences take place.

Solitary Learning Strategies

Solitary learning on Flickr is comprised of strategies employed by participants to increase their photographic knowledge and skill through site use, but not through active engagement with other users. These strategies are well aligned with Lave and Wenger's (1991) concept of legitimate peripheral participation (LPP). According to LPP, full membership in a CoP is attained, in part, by performing peripheral tasks that still contribute to the goals of the

community[5]. When a novice is learning to be a contributing member of a community, observing how an expert completes tasks provides an opportunity for acquiring tacit knowledge. Through observation, the novice seeks to obtain a greater understanding of how to complete tasks that are integral to the practice of the community. With a small amount of base knowledge, novices begin to perform simple tasks, still interacting and learning from experts to further increase his or her knowledge and skills, thus eventually becoming an expert practitioner. The structure of Flickr allows users to engage in LPP before making their presence known in a Group. One participant, when asked about what Group she felt she was most active in, explained that she "stalked the Group…observing it for quite awhile." During this period, she was viewing the photos posted to the Group pool and only later began posting photos herself. As explained by Duguid (2004), both observation and practice allow people to acquire tacit knowledge. The various features of Flickr enable a number of observational learning behaviors that can be understood through LPP. The most elementary of these behaviors is viewing the photos of other users. Participants described viewing photos taken by others as an important learning activity. For example, as one participant said, "When I first discovered it [Flickr], I just spent a long time just looking at photos and being awed with what I saw. I don't do that so much anymore, but that's how it began." This seemed to be especially common when participants were novices, although viewing photos was a central activity of many users, regardless of skill level.

Through viewing the photos posted by other members, a user can begin to learn about how other photographers compose their photographs. As one participant commented, "I've learned a lot from it [Flickr]… not specifically looking for things, but just how other people take pictures." According to one participant, one of the reasons to look at photographs posted by

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[5] In this context, the term "community" is used to denote a group of individuals who engage in the same practice, such as photography.

others is "to see how different people choose to shoot [subjects]. That kind of helps you to develop your eye as a photographer." Similarly, another participant spoke in wonderment of viewing photos and being shown "angles you'd never think you could get."

Many participants discussed their early use of Flickr being comprised of viewing the photos of others, reading comments, and browsing discussion forums. These types of solitary learning provide exposure to a mix of tacit and explicit information about photography. LPP among novices on Flickr incorporates these various forms of solitary, observational learning. Interview data indicates that participants applied the knowledge gained through these processes in the taking and posting of photos. In this respect, the knowledge gained during early stages of Flickr use appears to have fueled activity. In the context of tacit and explicit information, the knowledge gained through observation resulted in the further acquisition of tacit knowledge as participants applied what they had learned and transferred, in Ryle's (as cited in Duguid, 2005) terms, *know that* into *know how*. However, advancing from being a novice is certainly not the end of observational learning. Data indicates that these observational behaviors persist, although, as illustrated above, the amount of time spent learning in this manner may wane as users' skill levels increase.

The LPP stage for users not only allows them to begin to learn how to take photographs, but also to be a member of Flickr and various Flickr CoPs. A large component of use and membership involves the viewing of work by others, a behavior that allows for continued observational learning. However, comments made by participants indicate that the learning that occurs through viewing the work of others is not necessarily intentional. The acquisition of tacit knowledge, for many participants, seemed to be an un-intentional by-product of use. As one participant put it, "I don't really know what I'm going to learn until it's thrown at me."

Furthermore, through looking at what participants felt were good photos, they believed that they were absorbing information that would help them to take better photographs in the future, although what led them to the photos may not have been a desire to learn, but rather an appreciation for the work of another user. A participant described this non-goal directed approach:

> I discovered this guy a couple days ago – this pro who does all of this really cool stuff – and last night I spent probably at least an hour going through his photostream. I mean, just looking at all his stuff – it's almost like when you take an art history course and you just look through all of these beautiful pieces of art. I mean, it helps you become a better artist, too. (Flickr 01)

However, following the work of other photographers for the purpose of learning was also a tactic employed by participants. For example, another participant spoke about adding photographers she felt were talented as contacts because "I want to see what they've got coming down the pipe because I think I might learn from them."

In addition to providing many potential learning experiences, observational learning that occurs through viewing the work of others may also serve a norming function. If the photograph viewing is occurring in a Group that features a specific type of photography, viewing also works as a means to teach newcomers what subjects are acceptable to post to the Group pool. One participant, speaking about his early days on Flickr, explained that one of the reasons he looked at other users' photos was "to get ideas of what people are shooting, and just what's really kind of popular." As he developed as a photographer, he felt he spent much less time doing this, providing evidence of the LPP nature of this behavior for some. In addition to a possible

norming function, this quote also illustrates how the work of others can provide ideas or inspiration for users who are unsure of what subjects to shoot.

It is important to note that these solitary learning experiences, although described here as observational learning, do not necessarily exist separately from practice. Indeed, the pairing of learning with practice is fundamental to learning within a CoP (Lave & Wenger, 1991, Wenger, 1998, Wenger et al., 2002). Participants discussed the relationship between solitary learning and practice frequently. As one said, "You see something nice, you want to be able to do it yourself." While discussing an oil drop photograph he had recently encountered in a lighting-focused Group, another participant discussed his intent to attempt a similar shot:

I want to try those someday [taking oil drop photographs]. And when that day

arrives, when I'm going to set that up for my 365, I'm going to go look and see

how they do [it] and then I'm going to try to emulate that and then possibly take it

to the next level, but first you've got to get to where they are. (Flickr 07).

In this case, the participant had observed a photo that inspired him, but was not ready to try to act on that inspiration. Others discussed specifically looking for photos for inspiration. One participant commented, "I do a lot of research just looking at different photos people have taken just to get kind of an idea what I might like to do on my own." In many respects, viewing photos, while certainly an important component of on-site learning, acts as a stimulus for inspiring action. For example, one participant commented that many of the photos she viewed in her Groups were of "normal stuff you see in town that you would never think to take a picture of, but are done in a really interesting way." This inspired her and changed the way she viewed everyday things and she began to take her camera with her when she would go for walks in town. Later, that same participant spoke of the relationship between observation and practice:

What I've learned photography-wise from looking at pictures is that, "Oh, I see they got

that part blurry and this part in focus and they kind of had their light coming – let me try

something like that." (Flickr 08)

This participant, as well as many others, talked about trying to emulate photos they had seen on

Flickr. Another participant talked about how viewing photos opened his eyes and had given him

"shooting ideas" and shown him "different ways to do things." He went on to say, "and if

something wows me, it makes me want to go out and chase that." This same participant

elaborated, telling a story about being inspired to attempt taking lightning photographs by

viewing some on Flickr:

My wife and I went out in a lightning storm and I had just started to learn how to do long

exposure stuff. So I set my tripod up right in the back of our van and told her to drive and

basically we found a spot where lightning was coming in and out and I did it. I got one.

And now I don't have to shoot lightning again! (Flickr05)

In addition to types of subjects, other participants talked about being inspired to go shoot

specific places because of photographs they encountered on Flickr. One participant commented

on how the geotagging feature assisted him in this endeavor. In the context of LPP, users getting

out and actually trying to take the types of photos they see on the site is an important part of

developing as a photographer. Essentially, in taking action based on photographs encountered on

the site, users are engaging in the acquisition of tacit knowledge. Admiring the technique a

photographer used to take a photo is one thing, but application of technique is an important

aspect of learning. As one participant put it:

You can't watch someone else take a pretty picture and then expect to be able to do it

yourself. You actually have to have walked the walk and done it and seen what the results

are and made the mistakes and then corrected those mistakes and that's how you learn. Or at least that's how I learn. (Flickr 07).

The work of others also provides inspiration when users run out of shooting ideas. For example, one participant commented that when he did not have any ideas of what to shoot on a particular day, he would, "just page through [favorited photos] and see which photos spark my interest for that day."

These examples of observational learning occurring through viewing photographs and paired with attempts to take similar photographs were prevalent among participants, providing opportunities to learn about subject matter, composition and various techniques. While participants felt they learned a great deal through viewing photographs taken by others, they also reported using other learning strategies. Participants described encountering other users who provided a wealth of information in the description section under their photographs, explaining how they achieved a certain effect, or the logic behind composition choices. In one case, photo viewings lead a participant to such a user:

> I saw this just incredible photograph that this person posted and you could just tell that this person was a professional. So I looked back into his photostream and it's almost like he's on there to teach. I mean he says in some of his comments [he's] gonna give as much information as he can. In this one, it was a food shot, he actually showed his sketch – I mean he actually sketched out the photograph before he took it. So someone like that you can really learn a lot just by looking through his photographs and reading just exactly …he sort of explains how he went about composing and executing the shot. (Flickr 01)

Another participant spoke about this type of information sharing, "almost as a tutorial – like this is how I did this photo." Other times, the text information revolved around very basic skills, such as how to use a digital camera:

> There was a pro user who had taken it upon himself to post some just basic, really basic, photography lessons about what the different modes were for and some of the different buttons and that was a wonderful start for me because I wasn't getting anywhere with just the manual. (Flickr 06)

In this case, the codified information provided in the participant's instruction manual was not helpful. However, when this explicit knowledge was presented in a different way, it was more accessible.

The clarity with which information is presented on Flickr was discussed by another participant who had become frustrated with what he viewed as long, overly technical explanations in forums on the official Nikon Web site. He explained how Flickr users were able to provide information in a way that he was able to more easily understand, saying, "I don't need seven paragraphs of how to do something. I just want maybe one paragraph that's something I can read." He contended that Flickr users "get right to the point," making it easier to access the information.

Other participants discussed coming across tutorial-like posts on digital processing. For example, one participant discussed encountering a user in a Photoshop editing Group who had left a number of comments on photos in the Group pool directing people to his photostream. When the participant followed the link, she discovered that his photostream was filled with images that were "almost like a PowerPoint snapshot, with all these before and after pictures and then the text to tell what he did."

Through providing this kind of information about their photographs, and basic functions of digital cameras, photographers are informally teaching others. These tutorial-like presentations of information provide evidence of the exchange of explicit knowledge. In some Groups, this type of information exchange is highly encouraged. For example, a participant explained that sharing information about how photographs are created is a rule in a well-known lighting Group called Strobist:

> Whenever you post something to the Strobist Group, you're also supposed to discuss how you did the lighting on it, and anything you do within Strobist is supposed to deal with off-camera lighting. It's not supposed to be "here's my flash, it's on the camera, I just took the picture and here's a nice pretty picture, isn't it great." It's all supposed to be "I took this, lit left, camera left...". (Flickr07)

In this particular Group, providing specific information related to how the photo was created allows for a great deal of information to be obtained by those reading the photo descriptions. This type of explicit knowledge exchange seems ideally suited for solitary learning. Users can easily read through the posted descriptions and, provided they have the equipment and technical expertise, attempt to replicate the posted image. If the user does not have the technical expertise, one can begin with less complicated photographs and work up to progressively more difficult images. Learning within a CoP is about learning through practice, and this type of explicit knowledge provides users with the necessary information to try a new technique.

These tutorial-like instances of information sharing are far from the only type of explicit knowledge exchanged on Flickr. EXIF data provides another avenue for the acquisition of explicit knowledge. EXIF data is meta-data encoded by digital cameras when photographs are taken and provides information about the photograph such as aperture, shutter speed, mode, and

lens. Each time an image is uploaded to Flickr, the EXIF data is included by default, although users can disable this feature. Participants talked about utilizing this information to learn more about how photographs were created. For example, one participant stated, "I take a look at their EXIF data to see it they're using any different settings that I might be able to use." Similarly, another participant commented that he looked at EXIF data to "start to get an idea of how you can replicate [an] effect." These uses of EXIF data were common among participants. One participant saw utilizing EXIF data as a way to "piggy back off what other people have experienced without having to go through the trial and error thing." For users that shoot a particular style or type of photograph, this information can be particularly useful:

> It [the participant's camera] has high ISO capabilities and I like to see how people have stretched that function. I do a lot of low light photography. I do a lot of rock and roll club photograpy, and I want to see what everybody else has stretched their limit to. What lens they're using and what aperature they're using, so that I can try to make my work a little bit better. (Flickr13)

Here, the participant was using EXIF data almost as a way to compare notes with people using the same model of camera, as well as glean information that may allow her to improve her photographs. Furthermore, this same participant talked about how EXIF data can be useful for sorting out the original photograph from editing and processing techniques applied using image editing software: "I want to see what the basic starting points are, because if I'm going to try to emulate the effect, I like to see the data starting out, and what lens they've used, specifically." Related to editing, another participant commented that in addition to checking what lens someone had used to take a photograph, he had, on multiple occasions, "examined EXIF data to find out if a file had been Photoshopped...I wanted to see if the EXIF gave up any data."

In this case, the user was curious about whether or not photographs he encountered were posted without being processed or if editing had been done. Using EXIF data in this manner allowed him to determine what could be accomplished with a camera alone and what effects required additional editing and processing.

While participants frequently cited EXIF data as a helpful learning aide, there is one limitation of using EXIF data: the user needs to have enough technical knowledge to be able to interpret the information. In the case of novices, the type of information accessible through EXIF data can be incredibly difficult to understand. For example, one participant commented that she would look occasionally look at EXIF settings, "but I don't know enough about my own camera to know what I'm looking at." Another participant commented that she did not utilize EXIF data because "I'm not technical."

The final type of solitary learning described by participants was information seeking. Solitary information seeking took two main forms: seeking information from Groups to which participants already belonged and using the Flickr site search tool. It is important to note that the type of information seeking described here is considered solitary learning because the participants were not asking questions of other users, but rather mining the already existing information present in Group discussion forums. Asking questions was often not necessary because of the wealth of information already posted. As one user explained, "I've noticed that a lot of the things, especially when the discussion is longer, anything that I want to ask has already been asked and answered." Another participant reinforced this, commenting, "You'll usually find something. I mean it's a pretty big web site. Chances are that someone's written on it." This second example also highlights one of the most popular reasons for engaging in information seeking: finding information about equipment. Participants often discussed being unsure of what

kind of camera to buy or, after the purchase of a camera, not knowing what type of lens they should purchase to use with their new camera. In this respect, participants found Flickr to be a valuable resource. For example, a participant commented that she had no idea what kind of camera to buy, so she search Flickr and found information that "steered me to the type of camera I wanted to purchase." In this case, the information to which the participant was referring was found in Group discussion forums. This was the most commonly sought type of information. However, other users looking for information to guide equipment purchases took a different route, instead choosing to look at photos in Group pools dedicated to the particular piece of equipment they were considering. In one case, a participant discussed combining the Group pool approach with searching tags:

> You can search by tags and a lot of people will tag their photos with the EXIF data off the lens, so if you want to see all the pictures taken with a 50mm 1.4, that's pretty easy to find. There's actually a whole group of people who just post to the 50mm 1.4 [Group]. Because they take pictures with that lens, they post to that Group. I mean, talk about crowd-sourcing your research (Flickr07).

In this case, the participant was going beyond what people had written about a lens and was interested in actually looking at photographs taken using that lens. His reasoning behind doing this was fairly straightforward:

> I've found seeing what the different kinds of lenses could do from a visual perspective – not Canon's marketing literature 'here's a picture that a pro took, printed on high gloss paper and everything to make you want to buy the lens,' but here's what Joe and Mary Sixpack can take with those same lenses – was a really eye-opening experience (Flickr07).

In addition to researching equipment-related information, participants also discussed searching for information about techniques and particular types of photography. For example, a participant spoke about researching what kind of lens to use for portrait photography, as well as different ideas for actually taking this type of photograph:

> I took my son's high school senior pictures and so I was kind of doing a little research, searching for portrait pictures and what people had said they'd done and looking at other people's portrait stuff. Maybe not asking questions, but searching through what other people had already put up there and getting ideas (Flickr08).

Again, as with other types of solitary learning discussed here, this participant and others interviewed were learning through viewing the work of others. If different types of photography are considered separately as areas of expertise, then a photographer could engage in LPP as a novice several times. For example, the participant quoted above was not a novice. During her interview, it was quite apparent that she was very knowledgeable about photography in general, yet she was unsure about portrait photography in particular. Through the CoP lens, if we consider portrait photography as a specialty with a sub-community of experts, her LPP in regards to portrait photography makes sense in the context of her overall skill.

Interview data indicates that information-seeking behaviors may evolve over time. When discussing searching for information, one participant commented on how often she searched for information, saying:

> I mean, not recently, because now I have so many local people I can ask. But definitely when I was a new person I would just type in different things, find a Group for it and kind of look through and see what they were saying (Flickr19).

The local people the participant mentions are members of one of her location-based Groups. Her transition from searching for information to asking members of her Group is particularly interesting from a LPP perspective. When the participant was a newbie, she engaged in LPP, searching for information instead of directly asking those who were more expert. This seems to have changed after she gained some experience and began developing relationships through her location-based Group. However, more research is needed to determine whether this is a common trend for users as they become more skilled and their social networks on the site increase. For example, her comfort in asking questions of other member may have less to do with her own skill increasing than it does with finding a Group comprised of people of whom she is comfortable asking for help. In particular, the local Group she speaks of was very active offline, introducing another variable that may complicate understanding the shift in information acquisition.

Searching for information related to a topic of interest, as shown in the above examples, was primarily accomplished through utilizing Flickr's search capabilities and manually sifting through discussion forum posts in pertinent Groups. However, discussion forums were utilized through interactive learning strategies as well.

Interactive Learning Strategies

Interactive learning strategies are defined here as those behaviors that involve interacting directly with other Flickr members for the purpose of advancing one's photographic knowledge or skill. As noted above, in separating the discussion of solitary and interactive learning strategies, no claim is being made that the two are mutually exclusive. In many cases, participants discussed using the two strategies together. For example, one user spoke about how

he had recently begun freelancing for a local newspaper. He was viewing existing Flickr photos and seeking tips from users to improve his photographs:

> I thought, okay, if I'm going to [be] shooting a wrestling meet or a swim meet or a gymnastics meet, which I've never done before, I may as well see what other people are doing, or get some tips from other people that are doing that (Flickr16).

These activities were occurring in the context of sports photography Groups. He later discussed how the feedback he received on the work he posted to those Groups was beneficial, further illustrating that he was doing more than just viewing photographs.

Solo learning strategies allow users to acquire knowledge through a variety of different activities. Participants described these activities as being valuable to their development as photographers. However, participants also explained how the social nature of Flickr allowed them access to a wealth of information through interactions with other users. As such, interactive learning also emerged as an important strategy. The term *interactive learning* is used here to describe learning behaviors that involve interaction with other users. This includes learning that occurs through feedback posted about photographs as comments, asking questions, answering questions, and sharing knowledge.

The comment feature allows users to leave feedback concerning specific photos. Each photo posted to Flickr has a comments section below it, unless the user has purposively removed it. Leaving comments is a way to provide critique and show appreciation for the work of another user. As remarked by one participant, "One of the big reasons that people are on Flickr is for recognition. When they get those comments, that's a big thing for them." In this case, the participant was referring to positive feedback about photos from others, although, as indicated by participants, alternative communication channels are occasionally used. Each type of feedback

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plays a role in the learning process, from encouraging the receiver to continue taking photographs, to specifying what has been done well and what could be improved. Multiple participants also cited learning from a lack of comments on a particular photograph. As one participant explained, "You can tell if you put up a photo and it doesn't get any comments or it gets very few, particularly from people who usually comment on your photos, then you kind of know that one didn't go over really well."

Comments offering encouragement are often fairly basic and consist of remarks such as "nice shot," "beautiful," "outstanding," and "great capture." These types of comments appear quite frequently, but do little in terms of letting the photographer know what he or she did right or wrong, other than reinforcing that the photo was worth posting. For example, one participant who was looking for more specific critique remarked how little comments such as these help in terms of learning:

> Well, it's mainly positive feedback. I've really only had a couple [users] that have given negative feedback, but I wished I got more. I mean not necessarily negative, but more constructive criticism. I wish more people would give suggestions, but it's normally like, 'Wow, great image,' 'Great composition.' Things like that. (Flickr 01)

However, encouraging comments allow those who have less experience to participate and show appreciation for the work others are posting. As one novice participant explains, "I guess I feel like I'm coming at this from the hobbyist point of view and I don't know that I can really comment on somebody's super excellent photo except say, 'Wow, that looks great!'" Similarly, another participant said, "I've left comments for other people, but…I feel like I'm more of a novice photographer so I don't feel like the comments I offer are critiques or give suggestions. It's more just commenting." These uses of the encouraging comments can be viewed through the

CoP lens as form of LPP. As such, both photographers above see themselves as inexperienced, but are making efforts to interact with others who are more expert. As illustrated by Forte and Bruckman (2006) in their study of Wikipedia, as people become more skilled and more comfortable within a CoP, the contributions they make become more sophisticated. Accordingly, it may well be that as these users become more expert, the content of their comments will become more substantial. One participant's description of changes in his commenting behavior based on what he had learned on Flickr shows this type of evolution. When asked if the content of his comments had changed since he first started using Flickr, he responded:

> I've learned a lot about composing a photo, and if I recognize all the right things about composition in someone's photograph, like lines drawing you in and holding your eye in the photo, I comment and I recognize to them in words that that's what I see… And actually using the terminology the right way! (Flickr 07)

In this case, the participant's comments had become more sophisticated, moving away from leaving simply encouraging comments to comments that offered a greater degree of detail. Additionally, his confidence in the use of the language of the domain shows advances in his knowledge, an important step in becoming more expert (Wenger et al., 2002).

Encouraging comments do little to contribute to the learning process except letting the photographer know that they are taking good photographs. For example, if a novice had been posting photos on Flickr for several months without receiving comments, and then did begin to receive encouraging comments, the photographer may interpret that as an indication that their work was improving. Alternatively, it could also be in indication that they have made connections to other users who are engaging in what they view as normative site behavior. Almost all participants expressed that they leave comments so that they will get them in return,

and when they get them, they leave them, indicating a norm of reciprocity. As one participant explained, "If there is someone who comments on mine, I'm more likely to leave a comment on theirs." Another stated, "That's one of the rules of Flickr. The more that you comment, the more comments you'll get. And if you're looking for recognition, that's the way to get it." These participants highlighted a common theme related to seeking attention. In many cases, the manner in which participants spoke of leaving comments indicated that they were fishing for comments to bring attention to their work. When others left comments for them, they felt the need to respond. However, according to some participants, encouraging comments serves a social function. As one participant put it, "It's just to be chatty."

While encouraging comments may make the photographer feel good about their work, provide a way to direct attention back to their photographs, and be social, comments that highlight a specific part of the photograph or a technique used to take the photograph can be considered "detail comments." Examples of detail comments might be something such as "interesting use of composition and lighting," or "the angle of this shot is great." In some respects, these hypothetical detail comments are still quite simple, and as a participant above said, are not always that helpful. However, the same participant who spoke above of encouraging and detail comments in the same way shows in the remarks below that she differentiates between the two types when leaving comments:

> I usually try to pick out something, at least one thing about the photograph that I can say that I like about it. Something specific – great depth of field or nice lighting – so it's not so generic. I think that when people write something like "excellent image" it means it's very nice, but [its] not really constructive. So I try to put a least one or two specifics in there. (Flickr 01)

Participant comments indicated that there are differences between receiving an encouraging comment and a detail comment. As evident in the following participant remark, detail comments can make a significant impact.

> You know, someone will comment on something - like I took this one picture of snow and someone said, 'Wow! Love the composition!' And I was thinking, "really?" I mean, I tried to compose it right, but I'm an engineer. I'm not a creative, visual person and I'm trying to get my creative, visual side working a little better, so I thought, if someone else said nice composition, maybe I am starting to make baby steps in that direction. (Flickr 07)

Critique comments are those that give a greater level of detail and may also include positive or negative critique, sometimes even suggesting a way that the photographer could improve the image, such as "great subject and lighting, but it would be a better image if you cropped out the road" or "between your use of light and the way your filter brings out the red in the barn, this image has an amazing sense of realism." Participants acknowledged the importance of critique comments, yet they appear to be more rare than the encouraging and detail comments. More expert participants spoke about the importance of leaving critique comments and how to best write them:

> I'm big on positive comments, [but] you can learn a lot by critical comments. I've found the best thing to do is when you're talking to people about their photography [is] to sort of give them helpful tips. Like instead of saying, "Wow! Your picture [has] cool composition, but it's ridiculously over processed and looks awful [laughs]," but [instead] to say, "I really love the composition on this, have you thought about using more of the natural quality of the scene?" (Flickr 04)

Similarly, another participant explained:

> I might try to say, "I really like the way you've used, the bright at the upper right corner and the dark at the lower left to lead us through the photo. That's really nice. On the other hand, it's too bad that it goes all the way black at the left corner. Can you tweak that? Can you recover some of the detail? I think it would be better if you had some detail there." (Flickr 10)

In both of these cases, the participants first mentioned something positive about the image, then offered tips on how it could be improved. The latter participant discussed his approach to making his critiques more palatable: "First of all, I try to say something positive. People are sensitive. These are their little babies. I always try to remember that behind every Flickr account there's an actual person." However, some participants expressed that these types of comments were not appropriate unless the photographer had requested a critique. As one participant explained:

> Though people do it, it's sort of considered rude, especially when somebody's new in the Group and their picture's not good, to say, 'I wouldn't have done this or this or that." If somebody does it regularly [makes the same mistake] – a couple times I've sent them private email saying, "Hey, I'd try this." But I think as a community, it's sort of frowned upon to give advice, unless it's asked for. (Flickr 12)

In this case, the participant perceived a norm of politeness, which was violated when people left unrequested critical comments. Interestingly, it appears to be the publicness of the critique the participant above took issue with, as he had sent private messages suggesting a user try something different. However, these more detailed, critique oriented comments are sought after by some users. One very experienced participant lamented over the quality of comments he receives:

I mean the whole purpose of me joining Flickr and [Group name omitted] and some of these other active Groups was to get some critiques. I mean what's the point of posting this stuff unless you are told the fine points? Saying something like "cool" or "that's awesome" – that's not a critique. (Flickr 09)

Another participant talked about getting critique comments "very rarely," even when she had asked for them, describing the aversion people have of posting critical comments as being an unspoken rule summed up as "we really don't want to post anything bad on here!" This is further reinforcement of the existence of a politeness norm that may conflict with learning. However, additional research would be needed to determine if this is the case universally, or if Group membership and social network influence the appropriateness of critique comments. Certainly membership in critique focused Groups would influence these types of comments, but this type of Group was used to a very limited extent by participants.

Questions and Answers

In addition to using the comment feature for feedback, participants also discussed its utility for asking questions of other users. Participant discussed both receiving and posting questions in the comments field, with topics ranging from where a photograph was taken to technical questions about how it was created. One participant noted that she regularly checked her Flickr homepage after signing in to keep up with any questions asked: "Sometimes people will ask you a question in the comments, so I want to make sure that I answer their question." Other times, participants would post photos and ask for help in the description with the hope that people would comment. Another participant explained his approach: "Hey, here's a photo that I took. Something didn't work right. What am I doing wrong?"

However, participants did not use the comments feature for all of their question asking. Flickr mail was also a popular method for asking direct questions of other users. For example, one participant, when asked about asking questions on Flickr, shared an experience about using Flick mail:

> This guy had a very beautiful landscape… and the water looked foggy. Everything else was nice, bright, sunny, and just a really nice look. So I emailed the guy and said, "How'd you do this?" and he said, "Well I used a 10-stop filter and it was such a long exposure that the waves just all sort of fade together…but everything else is nice and bright and sunny." (Flickr 12)

Some data indicates that Flickr mail was utilized for question asking because of technical difficulties experienced with the comments feature:

> A lot times it's hard to ask a question on a particular picture. There's no way to find out if you've got feedback, if they've responded, other than going back to that picture. So it's kind of a pain to follow up and remember to follow up, so you'll ask through Flickr mail directly so you get a response back and you don't have to worry about waiting for it or finding it. (Flick14)

In this case, the participant was working around a perceived technical issue. While a "recent activity" section of users' Flickr homepages provide alerts when others post comments on an image on which they have already commented, there is no easy way to know if someone has responded to their specific comment without revisiting the image. Additionally, if a user is commenting on numerous images, the alert that another user has also commented may never be seen due to the recent alerts section only have space for information about five of the last most

recent activities. A couple of participants also spoke about a similar issue with the discussion board posts.

Group discussion boards were cited as another public avenue for seeking and sharing information. Some participants discussed posting questions to discussion boards only after unsuccessfully searching for it in existing threads. As discussed earlier in the Groups section, participants frequently discussed joining Groups related to the kind of equipment they owned. Often the information they sought had already been discussed, but in some cases participants had posed questions to these Groups. For example, one participant would post questions when he encountered problems with his camera, such as, "Is anyone else having this issue with the camera? Has anyone ever experienced this?"

Participants viewed Group discussion boards as a viable means to get answers. As one participant said, "You can start a topic, and people will chime in." Question topics discussed by participants varied in content, but were often related to equipment and gear. According to participants, some Groups differ somewhat in terms of how useful the discussion boards are. Generally, more active Groups have more active discussion boards. However, even among those Groups, some participants differentiated between Groups in which they felt it was appropriate to ask photography-related questions and those that were more social. Other participants' stories indicated that some Groups are more open to questions than others, even if the question has been asked and answered before. As one participant explained:

> One of the things that's interesting to me is that people persistently come into the Strobist group and they'll say, "What do I need to get started? How do I get started?" And in many groups they'd get slammed, but in that group, typically, someone will calmly respond. Usually several people will calmly respond and say… "go here, buy this, then

go out to David's independent blog [the Strobist Group founder] and there's a thing on there called Strobist lighting 101 and it's a series of graduated lessons on learning to use lights. So go do that." And if somebody does that and comes back and says, "Oh my god this is so great. My kit's coming. I can't wait, and I've already read the first three things and I've made this snoot[6]. Here's a picture of my snoot." Somebody will say, "That's really great, man. I remember when I was just learning, [when] I got my first kit. Good luck and come back and post your pictures." And some of these people who are posting this stuff are pros. They don't have to be doing this, but they're sort of giving back. I think there is that sense of we all need to give back (Flickr10).

In addition to providing an excellent example of dealing with often asked questions, this quote also provides additional evidence of a sense of community felt by some participants. Earlier it was discussed that when users leave comments, comments are left for them in return. These examples of giving back out of a commitment to the Group help to shed light on how passionately users care about Flickr and, more specifically, their Groups. In this particular case, the Group had been in existence for quite some time and had developed a way to bring novices in, first directing them to tutorials, but letting them know that when they had questions, the more expert members were there to help. In a way, the Group had created a means of facilitating LPP. Wenger and colleagues (2002) argue that developing systems to deal with new members helps to keep existing members from getting bogged down with recurring questions. The Strobist approach provides an excellent example of a way that Flickr CoPs can accomplish this. The approach in and of itself is a further reflection of a commitment to the community. In order to ensure that members do not become frustrated with questions from newbies, or the discussion

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[6] A snoot is a special type of tube that fits over a camera-mounted flash or studio light to allow photographers to control the radius and direction of the light.

boards cluttered with already asked and answered questions, the leadership of the Group took the time and effort to design an unobtrusive entry point.

Participants' descriptions of answering questions show a consideration for their own skill level. Interviews revealed that users did not need to be an expert to provide an answer. For example, as one participant explained, if he can answer a question in his equipment group, he does:

> If somebody asks a question and I happen to know the answer to it, I'll answer it. But there's people who've been using this stuff way longer than me that are way smarter than me on the products and they're there all the time. (Flickr 07)

In this case, the participant acknowledged that he was not an expert, but helped others when he could. Other participants expressed similar sentiments. However, depending on the Group and topics, expertise can be somewhat fluid. For example, one participant discussed how his role as a knowledge sharer changes dependent on the Group:

> In some groups I'm the newbie. Some groups I'm the moderate. And that's one of the things I like, is being able to jump around and be[ing] able to give advice in some of the Groups where I'm more experienced in and where I'm not so experienced, go in and get some help.

These two examples show that the relationship between expertise and question answering is largly dependant on whether or not the user feels they can adequately answer the question, not whether or not they are a photography expert. The second example above also provides more evidence that user behavior in Groups differs depending on the domain.

The diversity of skill level within Groups was discussed by most particpants as being beneficial to the overall Group dynamic and learning of members. This was illustrated well by one particpant, who explained:

There's always people you can learn with, people who are at your level, and you don't mind asking them questions, or getting together – knowing you're on the same level without feeling insecure or whatever. Then there's also the more advanced people that you can approach and say, "Hey, now how did you do that?" or "How do you use your flash?" And then you can look at some of these snapshot type [of] pictures and say, "Oh my gosh, I can't believe I was there five years ago, thinking that was the greatest thing ever." And I always think, "Kudos for putting it out there!" (Flickr 20)

This participant mentioned learning with other users she felt were peers, and while this offered a level of security, it was still easy to access more expert members when questions outside the purview of her peer group arose.

One theme related to question asking that multiple participants discussed was the openness of users and their willingness to share knowledge. As one participant put it, "As long as you're not trying to steal somebody's effect, everybody's really open and honest about, 'here's how I did it.'" However, participants also discussed experiences in which other users have withheld information when they had inquired about how something was done. Participants expressed that some of the professional photographers they had encountered on Flickr were guarded in sharing information. As explained by one participant:

Some people are kind of hesitant [and] hold back their information because they don't want to be sharing secrets. A very popular thing, I would have to say, in the photography

world is a lot of people don't like sharing their trade or secrets because they don't want

people duplicating them. (Flickr17).

This same participant later elaborated, explaining how he had sent a message through Flickr mail

to a wedding photographer whose work he had commented on in the past:

I liked his wedding pictures and I just said, "Could I please assist you with a wedding

shoot? I don't want to be paid, I just want to see how you do it to kind of get a concept."

And the only information he'd give me back was, "Make sure you do an engagement

shoot. Get to know the couple." [He] didn't say no, but just do that. Okay. That didn't

really help me for beans…Did I ask something else and I just don't know it? [laughs]

(Flickr17)

In this case, the participant was trying to learn how to shoot wedding photography in an effort to

launch a photography business. This participant, as well as others, attributed the lack of sharing

on the part of some professionals as a response to the popularity of digital photography and

increasing numbers of amateurs encroaching on territory previously held by photographers with

professional training.

Others cited blocking EXIF data as another method of being secretive. One participant

estimated that between 30%-40% of the images he viewed on Flickr did not have EXIF data.

However, even those participants who expressed frustrations over the lack of information sharing

on the part of some users they had encountered felt that most users were very open with

information. Those instances in which they had not had a question answered, or felt that another

user was intentionally holding back information, may have stuck out in their memories because

they were such rare occurrences.

In summary, findings suggest that all participants were actively engaged in learning in multiple Flickr CoPs. Group membership was integral to CoP-based learning. Through multiple solitary and interactive learning strategies, participants advanced their photographic knowledge and skill. These strategies allowed participants to acquire both explicit and implicit knowledge. By applying these strategies and practicing their craft, participants attributed their success and improvement as photographers to their experiences on Flickr.

Discussion

Learning was central to the Flickr experiences of participants in this study. Through their use of Flickr, participants felt that they had improved and were continuing to improve as photographers. Participants leveraged Flickr as a constellation of CoPs to tailor their learning experiences to their individual needs. Groups with high levels of activity were described as being desirable by participants, as they would likely result in more people seeing and, hopefully, providing feedback on their work. High levels of activity were largely attributed to strong Group leadership. In these Groups, participants found learning partners and built their social networks. The learning processes described by participants were strongly rooted in the affordances of Flickr, relying most frequently on Groups, contact networks, comments, discussion boards and EXIF data. These features were utilized for solitary learning by accessing information that already existed on the site, as well as interactive learning that occurred through engaging with other users. Using these strategies, participants met their needs for knowledge acquisition through accessing explicit information about a wide array of topics, such as camera features, composition techniques, and lighting, which they converted to tacit knowledge through practice. In viewing photographs, participants witnessed the *know how* of other users, which inspired them to attempt similar captures, resulting in the development of more tacit knowledge. The results of

their efforts were posted to share with other Flickr users, added to Group pools and appeared via

their photostream to those who listed them as a contact. These examples of the participants' tacit

knowledge was then commented upon by other CoP members, providing encouragement,

reinforcement, and critique, further contributing to their learning process by alerting them to

what they did well, as well as what could have been done better. Data also indicate that

participants attribute their improvement as photographers to Flickr. As one participant who

described himself as a "baseline amateur" when he started using the site said of his development

to date, "I'm light-years better."

Limitations

The interviews conducted for this study were done to gain insight into CoP-based

learning practices of photography enthusiasts who use the photosharing social media platform

Flickr. While the results reported illustrate a number of different ways participants utilized Flickr

CoPs in their efforts to further their knowledge and skills related to photography, there are a

number of limitations regarding sampling and method that should be discussed. To begin,

participants were recruited from geographic Groups tied to the Great Lakes region. Flickr is a

global social media platform and, as such, the results reported here cannot speak directly to

national and international learning practices in Flickr CoPs. Additionally, as participants

volunteered to take part in the study, self-selection bias is also a limitation. A screener survey

was used to ensure that potential participants used the site for learning. As a result of these

sampling methods, participants selected for interviews may have been positively biased in

regards to their opinions not only of Flickr, but learning through Flickr as well.

As in all research relying on self-reported data, the interview data may reflect a social

desirability bias. For example, participants may have been less likely to discuss their

shortcomings as photographers and the ways in which they have struggled to learn on Flickr as they were to discuss how much their photography had improved through the learning that occurred on Flickr. Lastly, the findings reported here specific to the CoP structure of Flickr do not necessarily apply to other online CoPs, or even other photography-themed online CoPs outside of Flickr. The unique structure of Flickr and its combination of available features, including EXIF data, contacts, comments, Group discussion boards and photo pools, as well as other site features that aide in learning are different from other content-creation online CoPs. For example, Wikipedia uses a very different model for users participating in the creation of encyclopedia content. As such, findings are limited in their application to other online CoPs.

Conclusion

Learning and information sharing are frequently the focus of research employing the CoP lens. As discussed earlier, these studies often focus on how organizations can best leverage CoPs for strategic advantage. Other studies have addressed how CoPs can be structured for more formal learning, a use outside of the initial conceptualization of CoPs outlined by Wenger (1998). The study of voluntary, open CoPs has been rare, with a few notable exceptions discussed earlier. In regards to the study of Flickr, the vast majority of studies addressing this unique social media site have relied on data mining techniques using the Flickr API. This study illustrates the utility of the CoP lens for studying learning in naturally occurring CoPs. Through interviews, this study has provided insight into the learning behaviors and related social practices of a sample of Flickr users in an effort to provide a glimpse into the ability of social media to facilitate CoP-based learning for people honing their skills as photographers, and to illustrate that voluntary, naturally occurring online CoPs can serve an integral role in the learning process.

However, a number of issues related to activity in Flickr CoPs remain unresolved. More specifically, participants described activity levels of a given Group in the various features of Flickr to be important in determining the perceived utility of said Group. As activity within a CoP is an important determinant of success, a second study was conducted to explore how user characteristics are related to specific types of Flickr activities.

Chapter 5

Study Two Introduction

The ability of social media platforms to maintain connections to previously existing ties has been well documented (Ellison et al., 2007; Ellison, Steinfield, & Lampe, 2011; Steinfield, Ellison, & Lampe, 2008). However, another category of social media sites, often categorized synonymously as passion-centric, interest-specific, and content sharing, provide a different type of user experience. Typically rooted in a shared interest, such as a hobby, these SNSs allow previously unknown users to connect, using their shared interest as a means of facilitating interaction. The photo-centric social media platform Flickr is such a site.

As discussed in Study One, the features of Flickr allow for the natural development of communities of practice (CoPs), social structures comprised of individuals with a shared interest, who, through ongoing engagement, learn from each other and advance their knowledge and skills related to the interest. Results of Study One indicate that there are two main learning strategies employed by Flickr users: solitary learning and interactive learning. Both of these learning strategies are made possible by the structure of Flickr and the contributions of site members. Analysis of interview data revealed several themes. First, participant descriptions of their membership in Groups highlighted the utility of Flickr as a constellation of related CoPs. Groups function much like other online CoPs, providing a way for members to interact and share content, whether it be information or photographs. Additionally, users form social networks, adding other users, often met through their Groups, as contacts.

Study One participants viewed activity levels within Flickr Groups to be an important factor in selecting Groups to join, as well as their continued participation. According to co-founding CoP theorist Wenger (1998), continued interaction among members is necessary for

CoPs to be successful. Accordingly, active participation is a fundamental characteristic of successful CoPs. This was well illustrated by Study One participants who explained that Groups with little activity die, or simply become collections of related photos, which in turn severely limits the ability of the CoP to provide a robust learning environment. Study One participants considered posting photographs to Group pools, photograph commenting, and discussion board posts as metrics of activity and Group usefulness when deciding to join or, if already a member, if it was time to leave.

Social media tools, such as Flickr, have provided new options for communication and interaction, as well as changed how content is created and shared online. However, regardless of the format and the tools available to the users, maintaining an active membership remains a prevailing challenge for online community leaders and, in the case of CoPs, is vital to the learning experiences of members. The second study presented here seeks to quantitatively explore member participation by determining what user characteristics and perceptions predict the types of activities discussed by Study One participants as being vital to the sustained success of Flickr Groups.

Focusing on individual learner characteristics is an approach not typically used in the study of CoPs. This approach shifts the focus from specific CoPs, an approach common in CoP research, to individuals who are active CoP members. As such, findings from Study Two will provide researchers with new means for understanding CoP success: the characteristics of users who actively contribute, which can be seen as a determinate of CoP success. Additionally, this study contributes to the larger understanding of CoP success by providing quantitative means of identifying user characteristics associated with maintaining an active CoP.

Chapter 6

Study Two Supplemental Literature

While prior research pertaining to the specific variables of interest will be briefly

discussed here, the reader is referred to Chapter Two for a more in-depth discussion of work

addressing Flickr and communities of practice.

Expertise and Knowledge Sharing

The process of advancing from a novice to an expert within a CoP necessitates that the

membership be comprised of individuals with diverse knowledge and skill levels (Wenger, 1998;

Wenger et al., 2002). Participants in Study One felt that the different skill levels benefited

learning experiences within their Groups as the variance in skill meant that there were expert

members that could answer questions, as well as novice members that those with more

experience could help. A variety of different factors contribute to CoP member participation

levels, including interest in the community, perceived outcomes of membership, and expertise

(Wenger el al., 2002).

Expertise within CoPs exists along a continuum, from novices engaging in legitimate

peripheral participation to experts. Similarly, participation in CoPs is something that occurs at

different levels: core; active; and peripheral. Members of the core group are typically leaders

within the community. These members may have a formalized role, such as coordinator, or may

emerge through high levels of activity. Members of core groups perform a variety of tasks that

provide direction for the CoP, including coordinating events, facilitating communication between

members, and contributing to discussions (Wenger et al., 2002). The importance of Group

leadership, as discussed by participants in Study One, reinforces the importance of this core

group. Participants saw Group moderators and administrators as being instrumental to

encouraging activity, and thus the success of the Group. Members of the active category

frequently attend meetings and occasionally participate in discussions, but not to the extent of

core members (Wenger et al., 2002). However, fluctuation even within a CoP should be expected

as engagement may vary as domain interest and other factors change (Wenger et al., 2002).

Wenger posits that *core* and *active* members comprise between 10 to 15 percent and 15 to 20

percent, respectively, of the entire community. This leaves the rest of the membership in the

peripheral category. Similar activity patterns have been found in research addressing Wikipedia

and Twitter use. On Twitter, 0.05% of the users are responsible for around half of the posted

content (Wu, Hofman, Mason, & Watts, 2011). Analyses of Wikipedia contributions indicate

that a fairly small group of editors are responsible for producing the bulk of the content

(Panciera, Halfaker, & Terveen, 2009; Priedhorsky, Chen, Lam, Panciera, Terveen, & Riedl,

2007).

Access to both knowledge and experts has been found to be a motivating factor for

participating in online CoPs (Coreeeia, Paulos, & Mesquita, 2009). Consequently, the success of

a CoP is largely dependent on the ability of members to communicate and share information

(Wenger, 1998; Wenger, et al., 2002). In the case of online CoPs, having technological systems

capable of supporting interaction is essential (Moule, 2006; Wenger et al., 2002; 2009). CoPs

should provide space for group discussion, one-on-one communication, as well as content to be

accessed (Wenger et al., 2002). Wenger uses the term *aliveness* to capture the excitement and

levels of participation in an active CoP. He argues that good CoP design can help to facilitate

this. Members' subject knowledge influences how they choose to participate in CoPs. However,

having the infrastructure for the exchange of knowledge does not guarantee it will take place.

Ardichvili, Page, and Wenting (2003) found CoP members were reluctant to share knowledge

due to a fear of being criticized, as well as doubts about the accurateness or relevance of the information. While the researchers concluded that trust played a role in this reluctance to share, it seems evident that doubts about the knowledge itself also played a factor, indicating a possible lack of expertise.

The role that expertise plays in knowledge sharing has been explored in other online contexts. Ackerman (1998) found that experts answering questions in the Answer Garden system were concerned that they answer questions completely and accurately as failure to do so might negatively impact their status with people unfamiliar with them. Other work addressing question and answer web sites has found that *synthesists* (question answerers who research their answers) rather than *specialists* (experts in an area) provide better answers (Gazan, 2006; Harper, Raban, Rafaeli, & Konstan, 2008). Similarly, in research on the use of crowdsourcing for the creation of an accurate map of the world, scholars found that expertise was not associated with quality or contributions (Mashhadi, Quattrone, Capra, & Mooney, 2012).

Studying an online community of Java programmers, Zhang, Ackerman, Adamic, and Nam (2007) found that a select few advanced users answered most questions. However, users with less expertise answered questions posed by others with little expertise. Zhang and colleagues also found what they referred to as "the expertise gap." This describes confusion caused by an expert answering a novice's question at too high of a level. Data indicated that when less expert users answered these questions, they did so at a level that was easier for novices to understand. To address this issue, the researchers developed a system to better match question askers to question answerers. In other question and answer research, scholars found that questions are very shallow, meaning a great deal of expertise is not needed to provide an answer

(Adamic, Zhang, Bakshy, & Ackerman, 2008). This research also illustrates that experts are not the only members capable of providing good answers.

Social media platforms have also received attention from scholars addressing knowledge sharing. Addressing Wikipedia, researchers discovered that substantive experts, those who work on improving content quality, are more involved in discussions about articles and with other users (Welser et al., 2011). Morris, Teevan, and Panovich (2010) found that Facebook and Twitter users were motivated to answer questions posed by members of their social network because they had the expertise to provide an answer.

These results of these studies indicate that experts often share their expertise, but in some contexts less expert people are perfectly capable of providing good information. As a whole, these studies indicate that the relationship between expertise and knowledge sharing are somewhat complex, providing conflicted results. However, when measured, these studies show that experts do provide more answers, regardless of quality. As such, the following hypothesis is proposed:

H1:   Expertise will positively predict knowledge sharing.

The features of Flickr allow users to share knowledge in multiple ways, such as through comments and discussion boards. Comments are used to provide feedback to users about their photographs. Study One found that there were three categories of comments: encouraging, detail, and critique. Study One participants expressed that encouraging and detail comments were more frequently given. Participants also expressed frustration that critique comments occurred so rarely, even when requested. Some Study One participant accounts indicate that a norm of politeness may guide commenting, however other participant comments suggest that the

expertise of the commenter may play a role. More specifically, that the more expert users may be more likely to offer detail and critique comments than less expert users.

H2: Flickr users who are more expert will be more likely to leave detail and critique comments than less expert users.

As Study One participants expressed mixed opinions concerning commenting, the following research question is also asked to explore other commenting behaviors:

RQ1a: Does commenter skill level/expertise influence commenting behaviors of Flickr users? If so, how?

Study One identified multiple solitary and interactive learning strategies. As discussed in the initial literature review and Study Two results, LPP describes how novices advance their knowledge in CoPs, first beginning by performing tasks peripheral to the central activities of the community, then gradually completing increasingly advanced tasks. One such learning behavior that emerged during study one was learning through viewing the photos of others. However, as with other learning behaviors discussed by study one participants, expertise often did not seem to play a role in who engaged in this activity. To determine the extent to which this is true, the following research question is posed:

RQ1b: Does skill level/expertise predict the learning strategies of Flickr users? If so, how?

A central activity in Flickr CoPs is posting photographs. Users come to the site because of an interest in photography. According to scholarship on legitimate peripheral participation (LPP), novices would not engage in an activity central to the practice of the community. However, given the relative ease of uploading photographs to the site, this may not hold true for Flickr CoPs. As such, the following research question is asked:

RQ1c: Does skill level/expertise predict the photo posting behavior of Flickr users? If so, how?

Personality Traits

The Big-Five framework is a five-factor model of personality traits, which are believed to classify most individual personality differences (Gosling, Rentfrow, & Swann, 2003). The five factors (extraversion/introversion, agreeableness/disagreeable, conscientiousness/impulsive, emotional stability/neurotic, and openness to experience/resistance to change) are bipolar and summarize specific traits. Research on knowledge management has found relationships between personality characteristics and knowledge sharing (Matzler, Renzl, Muller, Herting, & Mooradian, 2008; Mooradian, Renzl, & Matzler, 2006). Specifically, agreeableness, conscientious, and openness positively influence knowledge sharing behaviors.

Researchers addressing various forms of Internet use have found relationships between use and personality traits, but in some cases have come to conflicting conclusions. Results from a study conducted by Amichai-Hamburger, Wainapel and Fox (2002) indicate that introverted people express themselves better in computer mediated communication. Studying Internet support groups, Swickert, Hittner, Harris, and Herring (2002) found the opposite. Landers and Lounsbury (2006) found that three of the Big Five traits – agreeableness, conscientiousness, and extraversion – were negatively related to overall Internet use, while Engelberg and Sjöberg (2004) found no relationship between any of the Big Five traits and Internet use.

More recently, personality traits have been the focus of research addressing social media use. Facebook, in particular, has been the subject of some of these studies. Ross, Orr, Sisic, Arseneault, Simmering, and Orr (2009) found that Facebook users who were extroverts belonged to more groups, although extroversion was not related to the number of Facebook Friends, time

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spent on the site, or any communicative features. Furthermore, those high in neuroticism were more likely to use the Wall, while those low in this trait were more likely to use the photos feature. Online sociability was related to openness to new experiences. Correa, Hinsley, and Zuniga (2010) found these same three traits were associated with more frequent use of social media. Ryan and Xenos (2011) found that Facebook users are more extraverted and narcissistic than nonusers, but less conscientious. Extraverted users also were more likely to use communicative features, while neurotic users were associated with Wall posts.

Although more recent findings regarding social media use and personality show some consistency, overall findings regarding Internet use are mixed. However, if expertise is not able to explain the Flickr activities discussed above, perhaps personality traits can provide some insight. Given the somewhat conflicting research, the following are structured as research questions instead of hypotheses:

RQ2a: Do personality characteristics predict the photo posting behavior of Flickr users? If so, which ones?

RQ2b: Do personality characteristics predict commenting behaviors of Flickr users? If so, which ones?

RQ2c: Do personality characteristics predict the learning strategies of Flickr users? If so, which ones?

RQ2d: Do personality characteristics predict the knowledge sharing of Flickr users? If so, how?

Sense of Online Community

Wenger and colleagues (2002) stress the importance of the community element, saying that a community is more than a Web site or a collaboratively created database, "it is a group of

people who interact, learn together, build relationships, and in the process develop a sense of belonging and mutual commitment" (pg. 34). This sense of belonging is commonly referred to as a sense of community. Cothrel and Williams (1999) argue that one of the keys to high levels of participation in online communities is the development of a sense of community. Sense of community, reciprocity, and prosocial behavior have all been found to be motivators for participation in online CoPs (Wasko & Faraj, 2000). Community members that lurk, or in CoP terms, engage in peripheral participation, feel less of a sense of community than posting members (Nonnecke et al., 2006; Preece et al., 2004).

The importance of community emerged in Study One as participants described their attachment to their Groups. As sense of online community has been found in previous research to be a motivator for participation, it is used as a control variable to more accurately determine predictors of user behavior. Additionally, some Study One participants discussed their attachment to their Groups and participation in a way that seemed to speak directly to a strong sense of online community, further indicating that this is a characteristic that may be influential in the behavior of Flickr users and should be considered when trying to determine the role of expertise and personality traits.

Chapter 7

Study Two Methods

Data Collection and Participants

Participants were recruited through eight different active Flickr Groups. This method was used to recruit users who were members of active CoPs. No attempts were made to ensure any particular levels of activity among the sample. Through posts made on the discussion boards in each group, users were invited to participate in an online survey about their Flickr use. Each participant who completed the survey was given a $5 Amazon.com gift card. Additionally, twelve $20 Amazon.com gift cards were raffled off to participants once the survey was completed. Initial data collection lasted two weeks.

While verifying eligibility for the $5 Amazon.com gift cards, the researcher discovered 145 fraudulent surveys. Fraudulent surveys were identified initially by having come from the same IP address (information collected by the online survey host). Additional fraudulent surveys were identified by a combination of suspicious email address, a Flickr account that had been created after the launch of the survey, and a Flickr account that did not match other data collected in the survey. For example, some surveys flagged as being suspicious listed Flickr accounts in which the profile information did not match the demographic information (e.g., gender, location) collected during the survey. In instances where there were still doubts about the veracity of the survey, the researcher contacted the user associated with the Flickr account through Flickr mail. In all such cases, the surveys turned out to be fraudulent. Cleaning of the data for fraudulent surveys revealed that the issue was localized to one Flickr Group. The researched tracked the issue back to a member of this Group having posted the link to the survey on an online photography discussion board outside of Flickr. As a result of this fraud, the survey

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was reopened for an additional three weeks, but not in the Group where the fraud had occurred. Between the initial two-week period and the additional three weeks, the survey was open for a total of five weeks.

Users with no contacts and no Group memberships were removed from the sample as Study One indicated that these two structures play an important role in Flickr CoPs. This resulted in the loss of 8 participants. The majority of the final sample (N=200) reported being U.S. residents (76%) with the remainder being international. The average age of participants was 41 and 53% of the sample was female.

Measures

The survey instrument measured specific types of Flickr behaviors as well as user characteristics. All of these measures are discussed in greater detail below. Additionally, demographic information and other descriptive data were collected, including gender, age, ethnicity, Flickr account type, and time as a Flickr member were included. A complete copy of the survey instrument may be seen in Appendix C.

Skill.

Varying levels of expertise in CoPs help to facilitate learning (Lave & Wenger, 1991; Wenger, 1998, Wenger et al., 2002). It is by engaging with more expert members that those who are less experienced increase their knowledge. Study One data clearly illustrated that there are multiple levels of expertise within Flickr CoPs. Participants felt that a diversely skilled Group was beneficial for learning and sharing knowledge. In some instances, participants' descriptions of site behavior reflected differences in activity based on skill level. For example, participants who were less experienced did not access EXIF data, while more expert participants discussed a variety of ways in which they utilized it. As such, photographic expertise within Flickr CoPs was

measured in Study Two to gain a better understanding of how expertise may influence CoP participation. Expertise, or skill, was measured in two different ways. The first was a single self-reported item asking participants to rate their level of expertise an a 5-point scale ranging from beginner to expert (*M=3.31, SD=1.01*). The second was an original digital photography inventory scale (*a* = 0.961, *M* = 4.07, *SD* = 0.95) inspired by Hargittai's (2005; 2009) measure of Web-oriented digital literacy. This scale was created in order to obtain a measure of expertise more closely tied to specific knowledge. Participants ranked how familiar they were with twelve digital photography terms using 5-point Likert-type scale (see Table 2).

Table 2
Summary of digital photography inventory scale and individual items

	Alpha	Mean	SD
Digital Photography Inventory	*0.96*	*4.07*	*0.95*
Megapixel		4.23	0.95
ISO speed		4.14	1.09
Aperture		4.20	1.07
Shutter speed		4.30	0.96
Rule of thirds		4.14	1.26
Histogram		3.52	1.34
Depth of field		4.19	1.16
EXIF		3.82	1.34
RAW		3.73	1.38
Saturation		4.19	0.97
Bracketing		3.59	1.41
JPEG		4.36	0.82

Note: All items shared a common prompt: "Please indicate how familiar you are with the following digital photography items:" and were measured on a 5-point scale (*no understanding, little understanding, some understanding, good understanding, full understanding*)

Commenting Behavior.

Commenting behavior was measured using seven single items. Study One found that leaving and receiving comments provide an important means of interaction among users. In particular Study One participants discussed how leaving a comment in order to elicit a comment is a common practice. Additionally, Study One participants identified three comment types that

seem to reflect varying levels of expertise on the part of the commenter. The commenting

behavior items were created to address these uses of the comments feature. See Table 3 for item

wording and descriptive statistics for the remaining seven commenting items.

Table 3
Summary of the single items measuring commenting behavior

	Mean	SD
I often leave comments for others.	5.49	1.39
If someone leaves a comment for me, I will leave a comment for them.	4.90	1.34
I often leave comments similar to "nice shot" or "great capture."	4.09	1.70
I often leave comments that highlight a specific aspect of the photograph, such as "good use of light" or "excellent use of composition"	5.37	1.36
I often leave comments that offer constructive criticism, such as "great subject and lighting, but it would be a better image if you cropped out the road" or "next time you might want to consider a longer exposure."	3.49	1.62
My comments are intended to be social.	5.24	1.19
If I leave a comment for someone, I hope they will leave one for me.	4.46	1.47

Note: All items shared a common prompt: "Think about the types of comments you leave for other Flickr users about their photographs. Please indicate the extent to which you agree with each of the following statements:" and were measured with a 7-point Likert-type scale ranging from "Strongly Disagree" to "Strongly Agree."

Personality Traits.

Personality traits were measured using Gosling, Rentfrow, Swann's (2003) Ten Item

Personality Inventory (TIPI), which measures each of the Big Five personality traits. Items in

this inventory consist of two item scales for each personality trait based on pairs of words

describing the trait. Respondents rate each item based on how they feel the words describe them.

One word pair for each personality trait is reverse scored, allowing antonyms to be used to assess

the personality traits. According to Gosling and colleagues (2003) internal consistency scores as

measured by Chonbach's alpha for TIPI scales are typically quite low, and instead place

emphasis on the content validity of the scales. As such, all five scales have been used, even

though some alpha scores are far below what is normally considered acceptable. The scales and

items (reflecting reverse scoring) are described in Table 4.

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Table 4

Summary of TIPI scales and individual items

	Alpha	Mean	SD
Extraversion	*0.81*	*4.09*	*1.57*
Extraverted, enthusiastic		4.62	1.67
Reserved, quiet (R)		3.54	1.74
Agreeableness	*0.50*	*5.50*	*1.17*
Sympathetic, warm		5.68	1.14
Critical, quarrelsome (R)		5.32	1.67
Conscientiousness	*0.56*	*5.46*	*1.09*
Dependable, self-disciplined		5.69	1.05
Disorganized, careless (R)		5.21	1.55
Emotional Stability	*0.72*	*5.19*	*1.31*
Calm, emotionally stable		5.38	1.27
Anxious, easily upset (R)		4.99	1.65
Openness to New Experiences	*0.40*	*5.57*	*1.02*
Open to new experiences, complex		5.68	0.98
Conventional, uncreative (R)		5.46	1.53

Note: All items shared a common prompt: "Here are a number of personality traits that may or may not apply to you. Please indicate the extent to which you agree with each statement. You should rate the extent to which the pair of traits applies to you, even if one of the characteristics applies more strongly than the other" and were measured with a 7-point Likert-type scale ranging from "Disagree Strongly" to "Agree Strongly."

Sense of Online Community.

Numerous Study One participants discussed Flickr as an online community. The literature discussed above indicates that sense of community can have an impact on CoP activity. As the one of the goals of research has been to understand CoP participation, a scale measuring sense of online community, adapted for Flickr from Chen, Boase, and Wellman (2002), was included as a control variable. The sense of online community scale and items are described in Table 5.

Table 5
Summary of Flickr sense of community scale and individual items

	Alpha	Mean	SD
Sense of Community	*0.86*	*5.63*	*1.03*
I feel a sense of community with the people I've met on Flickr.		5.56	1.32
I have made new friends by meeting people on Flickr.		5.57	1.47
Using Flickr to communicate with people is as safe as communicating with people in other ways.		5.48	1.09
Flickr has allowed me to communicate with all kinds of interesting people I otherwise would never have interacted with.		5.90	1.20
I feel I belong to an online community on Flickr.		5.53	1.36
I can find people who share my exact interests more easily on Flickr than I can in my daily life.		5.16	1.39

Note: All items shared a common prompt: "Thinking about your experiences with Flickr, please indicate the extent to which you agree with each of the following statements:" and were measured on a 7-point Likert-type scale ranging from "Strongly Disagree" to "Strongly Agree."

Knowledge Sharing.

Two single item measures of knowledge sharing were created to measure the use of discussion forums *(M=4.05, SD= 1.57)* and the comment feature *(M=4.39, SD=1.50) (I share knowledge in group discussion forums often; I use the comments feature to share knowledge often).* Additionally, a knowledge sharing scale (inspired by Faraj & Sproull, 2000) was created to measure the propensity of users to share knowledge. This scale and items are described in Table 6.

Table 6

Summary of Flickr knowledge sharing scale and individual items

	Alpha	Mean	SD
Knowledge Sharing	*0.81*	*5.21*	*1.16*
I share my knowledge and expertise with other Flickr users.		4.92	1.42
If I have some special knowledge about how to perform a photographic task, I am NOT likely to tell other Flickr users about it. (reverse coded)		5.46	1.44
I exchange virtually no information, knowledge or share skills with other Flickr users. (reverse coded)		5.27	1.66
When I am more knowledgeable on a topic than other Flickr users, I freely share hard-to-find knowledge or specialized skills.		5.25	1.27

Note: All items shared a common prompt: "Think about your experiences sharing information on Flickr. Please indicate the extent to which you agree with each of the following statements:" and were measured on a 7-point Likert-type scale ranging from "Strongly Disagree" to "Strongly Agree."

Flickr Self-efficacy.

Gunawardena and collegues (2009) suggest that users' technological self-efficacy should be considered when building online CoPs. Their recommendation stems from concerns that users unfamiliar with a system may have less successful interactions than proficient users. According to Bandura (2006), "Scales of perceived self-efficacy must be tailored to the particular domain of functioning that is the object of interest." As such, a Flickr self-efficacy scale was created to use as a control variable in the analyses. The scale and items are described in Table 7.

Table 7
Summary of Flickr self-efficacy scale and individual items

	Alpha	Mean	SD
Flickr self-efficacy	*0.92*	*6.14*	*0.69*
Upload a photo to Flickr		6.76	0.60
Join a group on Flickr		6.73	0.68
Post a comment on Flickr		6.68	0.77
Tag a photo on Flickr		6.52	1.00
Add contacts on Flickr		6.67	0.77
Start a discussion topic on a group on Flickr		6.24	1.21
Make a post to a discussion topic in a group on Flickr		6.53	0.91
Create sets on Flickr		6.64	0.87
Troubleshoot Flickr problems		5.87	1.32
Add a note on a photo on Flickr		6.45	0.96
Use Flickr to find information		6.27	1.08

Note: All items began with "I feel confident that I can" and shared a common prompt: "Please indicate the extent to which you agree with each of the following statements:" and were measured on a 7-point Likert-type scale ranging from "Strongly Disagree" to "Strongly Agree."

Flickr Usage.

Finally, a Flickr Intensity scale, based on Ellison, Steinfield, & Lampe's (2007) Facebook Intensity Scale, was created and used as a more sophisticated measure of usage than a simple frequency item. This scale measures a number of attitudinal variables related to Flickr use as well as the amount of time spent on Flickr, the number of Groups to which a user belongs, and their number of contacts. This scale was used to control for use when determining if expertise and personality traits were significant predictors of site activity. The scale and items are described in Table 8.

Table 8
Summary of Flickr intensity scale and individual items

	Alpha	Mean	SD
Flickr Intensity	*0.78*	*4.77*	*0.93*
Flickr is part of my everyday activity.		5.85	1.35
I am proud to tell people I'm on Flickr.		5.87	1.22
Flickr has become part of my daily routine.		5.82	1.33
I feel out of touch when I haven't logged onto Flickr for a while.		5.11	1.62
I feel I am part of the Flickr community.		5.55	1.23
I would be sorry if Flickr shut down.		6.38	1.03
During the past week approximately how many minutes per day on average have you spent on Flickr? 1 = 0-14, 2 = 15-29, 3 = 30-44, 4 = 45-59, 5 = 60-74, 6 = 75-89, 7 = 90-104, 8 = 105-119, 9 = 120-134, 10=135-149, 11=150-164, 12=165-180, 13 = more than 3 hours		4.47	3.26
About how many total Flickr groups do you belong to? (open-ended)		1.69	0.64
About how many total Flickr contacts do you have? (open-ended)		1.96	0.68

Note: Total Flickr contacts and Groups were transformed by taking the log before averaging across items to create the scale due to differing item scale ranges. Unless otherwise noted, response categories were based on a 7-point Likert-type scale ranging from "Strongly Disagree" to "Strongly Agree."

Chapter 8

Study Two Results

As stated by Wenger and colleagues (2002), studying CoP success quantitatively is a difficult task. By looking to related literature, the approach used here measures success by looking at activities vital to Flickr CoPs, predicting user behavior based on user characteristics related to skill, and personality traits. The researcher ran multiple OLS regressions to test the hypotheses and answer the research questions. Each had a different user behavior as the dependent variable (photograph posting, comments, learning strategies, and knowledge sharing). Independent variables consisted of two different measures of photography skill/expertise, photographer classification, propensity for knowledge sharing, and personality traits. Internet usage, Flickr account type, time as a Flickr member, Flickr intensity, Flickr self-efficacy, sense of online community and the demographic items mentioned above were used as control variables.

Knowledge Sharing

Hypothesis 1 and RQ2b were addressed with three regressions looking at propensity to share knowledge ($R^2 = 0.380$), sharing knowledge through comments ($R^2 = 0.271$), and sharing knowledge through discussion boards ($R^2 = 0.157$). Results found support for Hypothesis 1. Skill/expertise, as measured by the digital photograph inventory, was associated with propensity to share knowledge ($\beta^7 = 0.379$, $p < 0.01$), sharing using comments ($\beta = 0.276$, $p < 0.05$), and sharing using discussion boards ($\beta = 0.295$, $p < 0.05$). Additionally, sense of online community ($\beta = 0.305$, $p < 0.05$) was associated with propensity to share knowledge and conscientiousness

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[7] Betas presented for scales are standardized. All others are unstandardized.

($\beta = 0.218$, $p < 0.05$) was associated with sharing using comments. Results of these regressions

may be seen in Table 9. Correlations of the dependent variables pertaining to knowledge sharing

may be seen in Table 10.

Table 9
Predictors of knowledge sharing

	Propensity to share knowledge	Sharing using comments	Sharing using discussion
(Intercept)	-1.705	-.921	-.218
Gender (female)	-.095	-.500	-.229
Age	-.007	-.020	-.008
Internet use per day	-.003	.008	-.080
Ethnicity (white/non-white)	.083	-.253	-.332
Residence (US/non-US)	.242	.372	.337
Flickr account type	.296	-.288	-.221
Time as member	-.000	-.000	-.000
Self assessment of skill	-.176	-.300	-.173
Classification as a photographer	.074	.038	.080
Digital photography inventory	.379**	.276*	.295*
Sense of online community	.305*	.279*	-.081
Flickr intensity	.148	.161	.180
Flickr self efficacy	.085	.073	.139
Extraversion	.096	.044	.052
Agreeableness	.119	-.023	-.113
Conscientiousness	.025	.218*	.093
Emotional stability	-.001	-.163	.070
Openness to experiences	.025	.044	.037
R^2	.380	.271	.157

*$p < .05$
** $p < .01$
*** $p < .001$

Table 10

Correlation analysis of dependent variables from knowledge sharing regressions

	Propensity to share knowledge	Sharing using comments	Sharing using discussions
Propensity to share knowledge	1.000	.550**	.393**
Sharing using comments		1.000	.371**
Sharing using discussions			1.000

* *p < .01 (2-tailed)

Photograph Posting

Regarding RQ1c, which focused on skill/expertise as a predictor of photograph posting

behavior ($R^2 = 0.158$), self-assessment of skill ($\beta = -2.059$, $p < 0.05$) was the only significant

variable in the model. It was negatively associated with photograph posting frequency, meaning

those who are more skilled are less likely to post photographs as often. Results of this regression

can be seen in Table 11.

Table 11
Regression model of photograph posting behavior based on average
number of posts per week

	Average photos per week
(Intercept)	-7.650
Gender (female)	-2.438
Age	.131
Internet use per day	-.071
Ethnicity (white/non-white)	2.985
Residence (US/non-US)	-5.363
Flickr account type	2.852
Time as member	.000
Self assessment of skill	-2.059*
Classification as a photographer	4.256
Digital photography inventory	-.140
Sense of online community	.051
Flickr intensity	.098
Flickr self efficacy	-.010
Extraversion	-.073
Agreeableness	-.610
Conscientiousness	.187
Emotional stability	-.016
Openness to experiences	.007
R^2	.158

*p < .05
** p < .01
*** p < .001

Commenting Behaviors

Using regression analyses, support for Hypothesis 2 was found. Three regressions were

run to address commenting behavior based on the types of comments discovered in Study One.

The model run for encouraging comments resulted in no significant predictors. However, the

regressions for detail comments ($R^2 = 0.238$) and critique comments ($R^2 = 0.265$) both found

significant relationships with skill/expertise as measured by the digital photography inventory

($\beta = 0.384$, $p < 0.01$) ($\beta = 0.359$, $p < 0.01$). Critique comments were also associated with the

agreeableness trait, although negatively, providing additional information regarding RQ2b.

Results of these three regressions can be seen in Table 12.

Table 12
Predictors of comment types

	Encouraging	Detail	Critique
(Intercept)	4.924	3.363	4.103
Gender (female)	-.442	.102	-.386
Age	.009	.008	.004
Internet use per day	-.116	.030	-.024
Ethnicity (white/non-white)	.494	.143	-.516
Residence (US/non-US)	-.015	-.166	.094
Flickr account type	.229	-.187	.027
Time as member	-.000	-.000	-.000
Self assessment of skill	-.262	-.219	-.411
Classification as a photographer	.184	.334	.185*
Digital photography inventory	-.157	.384**	.359**
Sense of online community	.007	.035	.084
Flickr intensity	.052	.020	-.110
Flickr self efficacy	.065	-.123	.041
Extraversion	-.031	-.048	.049
Agreeableness	-.032	.001	-.284**
Conscientiousness	.205	.060	-.007
Emotional stability	-.069	.174	.071
Openness to experiences	-.179	-.114	-.033
R^2	.145	.238	.265

*p < .05
** p < .01
*** p < .001

Regression analysis was used to answer RQ1a and RQ2b, addressing predictors of

additional commenting behaviors. In the first model ($R^2 = 0.617$), sense of online community

($\beta = 0.212$, $p < 0.05$) and Flickr intensity ($\beta = 0.606$, $p < 0.001$) were found to be associated with

the frequency of commenting. The regression model for comment reciprocation ($R^2 = 0.351$) had

only one significant predictor: Flickr intensity ($\beta = 0.497$, $p < 0.001$). The regression looking at

reciprocity expectations by leaving a comment ($R^2 = 0.120$) found a negative association with

self-assessment of skill (β = -0.487, p < 0.05), such that those who are more skilled are less

likely to leave a comment to in an effort to have a comment left for them on one of their

photographs. The model addressing leaving comments to be social (R^2 = 0.289) was predicted by

sense of online community (β = 0.381, p < 0.01). The results of these first four regressions used

to answer RQ1a and RQ2b can be seen in Table 13. Correlations of the dependent variables with

significant findings from the regressions for commenting behaviors may be seen in Table 14

analysis.

Table 13
Predictors of commenting behaviors

	Frequency	Reciprocation	Eliciting comments	To be social
(Intercept)	.218	2.855	3.738	1.797
Gender (female)	-.176	-.412	-.297	-.202
Age	.005	-.002	.009	.004
Internet use per day	.004	.012	.054	.014
Ethnicity (white/non-white)	-.257	-.278	.355	.090
Residence (US/non-US)	-.228	.393	.105	.397
Flickr account type	-.124	-.463	-.389	.148
Time as member	-.000	-.000	-.000	-.000
Self assessment of skill	-.174	-.234	-.487*	-.023
Classification as a photographer	.175	-.132	.119	-.128
Digital photography inventory	-.030	-.036	.184	.063
Sense of online community	.212*	-.025	.173	.381**
Flickr intensity	.606***	.497***	.048	.061
Flickr self efficacy	-.058	-.001	-.068	-.165
Extraversion	-.099	-.013	-.059	.058
Agreeableness	.019	-.049	.013	.170
Conscientiousness	.118	.036	.048	.057
Emotional stability	.141	.012	-.145	-.114
Openness to experiences	-.041	.123	.016	.130
R^2	.617	.351	.120	.289

*p < .05
** p < .01
*** p < .001

Table 14
Correlation analysis of dependent variables from commenting regressions

	Comment frequency	Reciprocation	Eliciting comments	To be social	Detail	Critique
Comment frequency	1.000	.376**	.089	.297**	.205**	-.038
Reciprocation		1.000	.489**	.159*	-.050	.048
Eliciting comments			1.000	.181*	.160*	.165*
To be social				1.000	-.035	-.214**
Detail					1.000	.337**
Critique						1.000

*p < .05 (2-tailed)

* *p < .01 (2-tailed)

Learning Behaviors

RQ1b and RQ2c were addressed by running six regressions focused on learning behaviors related to solitary and interactive learning strategies. The first four regressions reported below are for behaviors related to solitary learning and the last two are related to interactive learning.

The results of the learning through viewing photographs analysis ($R^2 = 0.219$) revealed two significant negative associations: extraversion ($\beta = -0.227$, $p < 0.05$) and age ($\beta = -0.015$, $p < 0.05$). The model focusing on predictors of learning through reading discussion board posts ($R^2 = 0.204$) was associated with emotional stability ($\beta = 0.264$, $p < 0.05$). Addressing learning through searching Flickr ($R^2 = 0.250$), skill/expertise as measured by the digital photography inventory ($\beta = 0.341$, $p < 0.05$) was related to this learning technique. The final regression for solitary learning strategies looked at learning from EXIF data ($R^2 = 0.307$) and found three significant relationships: skill as measured by the digital photography inventory ($\beta = 0.417$, $p < 0.01$); agreeableness ($\beta = -0.296$, $p < 0.01$), although negative; and country ($\beta = 0.923$, $p < 0.05$),

such that users from the US were more likely to learn through viewing EXIF data than non-US

users. The results of the regression analyses for solitary learning behaviors can be seen in Table

15.

Table 15
Predictors of solitary learning

	Viewing photos	Discussion posts	Searching Flickr	Viewing EXIF data
(Intercept)	5.514	2.328	2.861	-.768
Gender (female)	-.160	.147	.200	.363
Age	-.015*	.005	.006	.015
Internet use per day	-.015	-.105	-.072	.072
Ethnicity (white/non-white)	-.214	-.312	-.737	.081
Residence (US/non-US)	-.229	-.184	.243	.923*
Flickr account type	-.005	-.637	-.522	-.417
Time as member	-.000	-.000	-.000	-.000
Self assessment of skill	-.040	-.217	-.290	-.400
Classification as a photographer	-.014	-.219	.316	.384
Digital photography inventory	.138	.249	.341*	.417**
Sense of online community	.172	.124	.206	.128
Flickr intensity	.101	.050	.018	.025
Flickr self efficacy	-.039	.124	.078	.063
Extraversion	-.227*	-.097	-.020	-.031
Agreeableness	.121	-.062	-.137	-.271*
Conscientiousness	.052	-.029	-.089	.108
Emotional stability	-.091	.264*	.142	.102
Openness to experiences	.148	-.120	-.218	-.171
R^2	.219	.204	.250	.307

*p < .05
** p < .01
*** p < .001

The first regression used to look at an interactive learning variable found an association

between learning though asking questions using the comments feature ($R^2 = 0.217$) and sense of

online community ($\beta = 0.399$, $p < 0.05$), as well as country ($\beta = 0.736$, $p < 0.05$). The model for

learning through asking questions in discussion forums ($R^2 = 0.248$) had one negative predictor:

agreeableness ($\beta = -0.244$, $p < 0.05$). Results of these two regressions can be seen in Table 16.

Correlations of the dependent variables from all of the regressions for learning behaviors may be

seen in Table 17.

Table 16
Predictors of interactive learning

	Questions in comments	Questions in discussions
(Intercept)	2.481	1.537
Gender (female)	.201	.331
Age	.009	.013
Internet use per day	.032	-.116
Ethnicity (white/non-white)	-.048	-.757
Residence (US/non-US)	.736*	.179
Flickr account type	-.508	-.798
Time as member	.000	-.000
Self assessment of skill	-.271	-.148
Classification as a photographer	.085	.155
Digital photography inventory	.189	.212
Sense of online community	.399*	.254
Flickr intensity	-.068	.041
Flickr self efficacy	-.061	.132
Extraversion	.091	-.034
Agreeableness	-.063	-.244*
Conscientiousness	-.055	-.096
Emotional stability	-.038	.175
Openness to experiences	-.081	-.164
R^2	.217	.248

*p < .05
** p < .01
*** p < .001

Table 17

Correlation analysis of learning behavior dependent variables

	Viewing photos	Discussion posts	Searching Flickr	EXIF data	Questions in comments	Questions in discussions
Viewing photos	1.000	.226**	.232**	.107	.319**	.143
Discussion posts		1.000	.495**	.321**	.354**	.680**
Searching Flickr			1.000	.312**	.405**	.502**
EXIF data				1.000	.199*	.360**
Questions in comments					1.000	.492**
Questions in discussions						1.000

*p < .05 (2-tailed)
* *p < .01 (2-tailed)

Discussion

This study extends the findings of Study One by predicting Flickr CoP behavior based on user characteristics. Participation has previously been highlighted as a key component of online community success and has prompted a great deal of research on how to maintain an active membership. CoP research has typically struggled with quantitative interpretations of success, instead relying heavily on qualitative approaches. Findings here suggest that addressing CoP success by studying active members may provide new insights on participation and, consequently, success related to online CoPs. While methodological refinement and adjustments will certainly be needed in future studies applying this approach, this study offers a base from which to build and provides evidence of the usefulness of quantitative data in supporting qualitative studies of CoPs.

Explaining expertise and activity.

Results show that expertise predicts a number of specific forms of participation integral to Flickr CoP success. However, the two measures of expertise do not predict the same behaviors. Photograph posting behavior, measured with an open-ended question addressing the average number of photographs posted in a week, was predicted, although negatively, by self-assessment of skill level. This suggests that users who view themselves as being more expert are posting fewer photographs. Through the CoP lens, posting fewer photographs could be an indicator that a certain level of expertise has been reached. For example, when a person is less expert, they may be engaging in more practice in an effort to hone their skills. Practicing new techniques can result in a large number of photographs that the user can then share on Flickr. These photographs exhibit the tacit knowledge of the photographer, and express to those who view them what the photographer is capable of producing. Perhaps as Flickr users become more expert, they feel less of a need to exhibit what they are capable of creating or, in the case of developing and practicing new techniques, have arrived at a level of competence that has led to a reduced need to practice, or at least publicly share as many artifacts of practice. Related to this, it may also be that photographers who are more expert are in need of less feedback, resulting in the posting of fewer photographs. Alternatively, the posting of fewer photographs by more expert users could be a function of self-presentation. Perhaps those who are more expert have higher standards for what is considered acceptable to post; thus, they may be highly selective in choosing photographs to share, resulting in fewer posts.

Attempting to elicit reciprocation, a behavior in which a user leaves a comment with the hope that the receiver will reciprocate with a comment of their own, was also found to be

negatively associated with self-assessment of skill level. As such, those who see themselves as more skilled are less likely to be engaging in this behavior.

While more expert members may not be seeking comments, expertise as measured by the digital photography inventory was a significant predictor of leaving detail and critique comments. More precisely, there is a greater likelihood that more expert users will leave these types of comments. It should be noted that classification as a photographer also predicted leaving critique comments. This means that those who are closer to being a professional photographer, as opposed to a casual occasional weekend hobbyist, are more likely to leave critique comments. While not a pure measure of skill or expertise, as a hobbyist could be an expert photographer, this finding indicates that the role photography plays in the life of the user may influence their commenting behavior.

Results show that expertise, as measured by the digital photography inventory, significantly predicts learning through searching Flickr and viewing EXIF data. Searching for information in this context may be interpreted as a sign that the user's level of expertise has reached a level where the expert members of his or her Flickr Groups are no longer able to either provide new information, or perhaps not provide it quickly enough. The lack of findings concerning learning through viewing photographs and discussion posts indicates that these behaviors occur independently of skill/expertise. However, it may be that less skilled users find these resources adequate for their learning needs, but as more expertise is accumulated, users seek additional sources. This would also partially explain the use of EXIF data by more skilled users. Additionally, it may be that less expert users are unsure of how to interpret EXIF data because they have not yet learned the meaning of all of the terms that are contained in the data or, as Wenger (1998) would say, the language specific to the domain. Since more expert users

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have learned the language, they are able to tap into this source of information as they continue to learn about settings and technical issues involved in photography.

Lastly, expertise was positively related to propensity to share knowledge, sharing knowledge using the comments feature, and sharing knowledge through discussion boards. Quite simply, the more expert Flickr users are, the greater their propensity to share knowledge, and to do so through comments and discussion boards. It should also be noted here that sense of online community also predicted propensity to share knowledge and sharing knowledge through comments, supporting previous scholarship indicating that sense of community motivates people to participate (Cothrel & Williams, 1999; Wasko & Faraj, 2000; Wenger et al., 2002). The combination of these predictors reinforces a theme that emerged in Study One: when people can help, they do.

Explaining personality traits.

Results show that personality traits have a very limited ability to predict user behavior on Flickr. However, some relationships do exist. Those who are agreeable are less likely to leave critique comments. As the agreeableness trait represents a tendency toward being good-natured and cooperative, this finding is not surprising. As found in Study One, many Flickr users appear reluctant to leave critique comments out of a concern of upsetting the photographer. Agreeableness was also negatively related to learning through viewing EXIF data and learning through asking questions in discussion forums. These findings are somewhat contradictory. This means that a user who is more agreeable is less likely to view EXIF data and less likely to ask questions in discussion forums. However, this could be a function of the medium itself. Discussion boards are a very public form of communication. While those that are agreeable are generally open to helping others and expect help when they need it, it may be that they prefer the

exchange of information to be less public. Further research should explore other possibilities, such as asking a question of a fellow CoP member or contact directly instead of posing a question to the entire Group.

A more seemingly logical finding is that of extraversion being negatively related to learning by viewing photographs. Extraverts are typically very social, and although no relationship was found to exist with interactive learning strategies, they do not seem as well suited for learning through viewing photographs as an introvert might be.

Those high in conscientiousness were found to be more likely to share knowledge through the comments feature. Cullen and Morse (2011) argue that when conscientious individuals see online activities as beneficial they will participate. In this case, it may be that conscientious users simply see sharing knowledge through comments as an effective way to help others. Conscientious individuals are also generally seen as being reliable and self-disciplined. While the measure used for sharing knowledge through comments does not specifically involve doing so in response to a question, this would fit with the personality trait. Study One participants spoke about checking to see if anyone had asked any questions about any of their recent posts and being sure to respond. Conscientiousness could explain this behavior. In an effort to be reliable, the user is responding and sharing what knowledge they can.

Finally, emotional stability positively predicted learning from viewing discussion board posts. People high in emotional stability are generally patient and less easily upset. It may be that patience is a useful trait when engaging in solitary learning strategies. This is consistent with other findings that have linked emotional stability to self-directed learning (Kirwan, Lounsbury, & Gison, 2010).

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Other predictors.

A number of other predictors that were included as demographic and control items emerged during analysis. First, those with a greater sense of online community were associated with leaving comments more frequently and for social purposes. Leaving comments is an easy way to be active, and commenting to be social allows users to maintain relationships with other users. This supports previous research linking activity to sense of online community (Cothrel & Williams, 1999; Wasko & Faraj, 2000). Additionally, a greater sense of online community was also associated with learning by asking questions through comments. This type of learning appears to be a reflection of the users. As they have a greater sense of online community, they appear more interested in learning through interacting with other users as opposed to engaging in solitary learning strategies.

Flickr Intensity positively predicted comment frequency and comment reciprocation. This first finding is likely due to the fact that the item probed the frequency of use of a particular Flickr feature and the Flickr Intensity scale includes general measures of Flickr use, including time spent on the site. Thus, if you use Flickr frequently, you would be more likely to use a particular feature of Flickr. This same logic regarding general usage can be applied to comment reciprocation. Study One found that comment reciprocation is a common norm on the site. The more time a person is using the site, the more likely they are to engage in normative site behaviors.

Country of residence, coded as US and non-US due to low numbers of users from common countries, predicted learning from asking questions in comments and learning through viewing EXIF data, such that users from the US were more likely to engage in both behaviors.

Additionally, age was also a significant predictor of leaning through viewing photographs, such that older users were less likely to engage in this behavior.

Limitations

This study was limited by a variety of factors. First, due to the use of a non-random sample, results cannot be generalized to all Flickr users. Many of the R2 values are relatively low, suggesting that there are a number of other factors influencing user behavior. Future work should consider additional predictors of use, such as motives for use. Additionally, as this research is cross-sectional, results are not able to speak to causality. Future studies should consider the use of experiments so that causal claims about learning through Flickr CoPs can be made.

Conclusions

The results of this study identify a number of factors that contribute to activity in online CoPs. These findings help to shed light on Study One findings regarding behaviors related to photograph posting, commenting, knowledge sharing, and expertise. As activity within the community is seen as instrumental to CoP success, the findings here may be useful to CoP leaders in understanding activity levels within their CoPs. Additionally, this research has presented a new approach for scholars seeking to quantitatively understand user activity and, consequently, CoP success.

Chapter 9

Discussion

These studies have explored activity and learning practices of users of the photography-themed social media site Flickr using the communities of practice lens. To gain an understanding of how Flickr users utilize Groups for learning more about photography and to determine how CoPs function on Flickr, the researcher conducted interviews with 21 Flickr users. Drawing from the results of the first study, a second study was conducted to determine predictors of activities found in Study One to be important to Flickr CoP success. This chapter will discuss findings of these studies and present a discussion that synthesizes across the results of both studies, focusing on the affordances of the medium, learning strategies, and knowledge and expertise. Additionally, implications concerning research on Flickr and for the design of systems supporting online CoP will be discussed, as well as suggestions for future research.

Affordances of Flickr: Building Social Networks Through Multiple CoP Memberships

Communities of practice provide a social structure in which people with varying levels of expertise related to a common interest can come together and learn from one another (Lave & Wenger, 1991; Wenger, 1998; Wenger et al., 2002). While initially conceptualized as naturally occurring, voluntary groups (1998), much attention has been dedicated to the development of CoPs within organizations for the purpose of managing knowledge for competitive advantage in the marketplace (Wenger, et al., 2002), with membership ranging from voluntary to required (Schwen & Hara, 2003). Related CoPs are referred to as *constellations* (Wenger, 1998, Wenger, et al., 2002). Data from Study One suggests that participants view Flickr as a constellation of photography-related CoPs structured around both Groups and social networks as articulated

through their contacts lists. While numerous studies have addressed online CoPs (see Dubé et al. for a review), very few have studied voluntary membership in open CoPs.

The results of Study One indicate that CoPs form on Flickr using Groups as an organizational tool through which members can share photographs and knowledge related to a common theme. Through various forms of activity, mutual engagement is maintained by the membership and learning occurs through a variety of different site features, consistent with successful CoPs (Wenger, 1998; Wenger et al, 2002; Wenger et al., 2009). Data from Study One indicate that not all Flickr Groups are CoPs. Participant accounts point to activity levels related to posting photographs, comments, and to discussion board threads as characteristics of Groups that can be defined as CoPs. The Group's topic provides a shared interest, or domain, that brings members together to socialize and learn from each other, forming a community where they can engage in the practice of photography. In active Groups, the three essential elements of CoPs, the domain, community, and practice (Wenger et al., 2002), are all evident.

As discussed earlier, Flickr's ability to support multiple CoPs makes it a constellation, a group of related CoPs (Wenger, 1998; Wenger et al., 2002). Discussion of constellations in the CoP literature is brief, defining what they are, but not explaining how an individual's membership in multiple CoPs within the constellation may impact his or her learning experiences. Due to the structure of Flickr, Study One results are able to shed light on how multiple voluntary memberships in naturally occurring CoPs can impact user experiences.

Study One participants described belonging to multiple Groups. Wenger and colleagues (2002) describe participation within a single CoP as being comprised of a core group, an active group, and a peripheral group of members. They argue that a CoP member might move from one of these groups to another over the period of a few months as their interests change or the focus

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of the group changes to something in which they are either more or less expert. The multi-CoP structure of Flickr allows users to maintain these positions simultaneously in different CoPs across the site. As described by Study One participants, activity within these Groups is related to expertise. Depending on the theme of the Group, the participant may be either more or less expert. This illustrates a more nuanced understanding of member roles within a constellation of CoPs than previously considered in the CoP literature.

An additional finding related to the use of multiple CoPs, and perhaps a more significant finding in terms of the CoP lens, is that participants were creating social networks through building relationships with other members of their Groups. These social networks are enabled by Flickr's contacts feature. On their homepage, users can see their contacts most recent photographs, as well as link directly to contacts' photostreams. Participants described their social networks as another avenue for learning. Indeed, some participants cited a greater reliance on their social network than their Groups. This focus on contacts is in line with what Lerman and Jones (2006) call social browsing, a process by which the photographs taken by contacts become central to the experience of the user.

In many of the examples of research on organizational CoPs, the focus is on sharing knowledge for the benefit of the organization. Knowledge sharing and learning in these contexts benefits employees, allowing them to become better at their jobs, but in the end benefits the company. Essentially, while individual improvement and professional development are part of the equation, the greater goal is an organizational one. On Flickr, the focus is on the acquisition of knowledge for personal benefit. This does not mean that users are taking without giving back. If that were the case, Groups would fail. Both Study One and Study Two found that users not only learn, but contribute back to their Groups. They care about their Groups, as reflected by

participant comments in Study One, and reinforced by Study Two findings that those who have a greater sense of online community are more likely to share knowledge, comment more frequently, and comment just to be social. These results indicate that people care about their Groups as communities. However, the use of social networks within the Flickr constellation provides new evidence that when similar CoPs are grouped together, in this case as part of the same platform, that users can leverage their CoP memberships to build social networks to further assist with their learning goals.

Learning Strategies

Results of Study One indicated that the affordances of Flickr allow users to leverage the site for learning through two main strategies: solitary and interactive. Participants in Study One provided a multitude of examples and stories about their learning experiences that illustrate the utility of Flickr CoPs and these strategies. The CoP structure provided by Groups encompasses multiple features that participants in Study One felt were beneficial. The Group pools provided users with a means of engaging in legitimate peripheral participation, learning about how others composed their photographs, inspiring them to try new things, and exposing them to new ways to consider subject matter.

Users of all levels reported learning through viewing the photographs of others. Some more experienced participants commented that it was something they now did less frequently than they did when they were new to Flickr, but they still engaged in this behavior. This type of learning is indicative of the CoP concept of LPP, whereby novices engage in activities that are peripheral to the central activities of the community, but are still learning important lessons about the practice of the community. Participant remarks indicate that, for many users, this is how the introduction to Flickr in general, and Groups more specifically, occurs. This echoes the

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findings of Bryant, Forte and Bruckman (2005), who found that new Wikipedia users engage in LPP, beginning by cleaning up articles on topics with which they are familiar and later moving on to more substantial contributions.

However, Study Two failed to find any predictors of learning through viewing photos related to skill or other variables of interest. Descriptive statistics for the variable *I learn more about photography by viewing the photos posted by others* show that 96% percent of participants indicated some level of agreement with the statement. Considered with Study One findings, it appears that this is a behavior in which almost all users engage, regardless of expertise, although it has characteristics indicative of an LPP activity. Future work should consider the frequency of this activity as it relates to expertise. It may be that in responding to the survey question, Study Two participants were thinking more about the importance of the activity to their development than they were the frequency of the activity. For example, a more expert member who learned a great deal through viewing photographs when he was a novice may have been thinking about his past experiences rather than his current behavior when answering the question.

Learning within a CoP depends on the open exchange of explicit and tacit knowledge (Duguid, 2005). Due to the creative focus of Flickr, data from Study One are able to provide a clear illustration of how participants transferred explicit knowledge into tacit. Through accessing EXIF data and reading tutorial-like posts and discussion board threads, participants were gathering explicit information. The photographs they took and subsequently shared on Flickr exhibited their ability to apply this knowledge and, in Ryles' terms, displayed *know how*. The data in this study pertaining to explicit and tacit knowledge offer a unique contribution to the understanding of knowledge sharing and acquisition within CoPs. Directly addressing explicit and tacit knowledge and the conversion of one to the other is somewhat unique in research

addressing knowledge sharing in CoPs. More typically, the focus of CoP studies addressing knowledge sharing is on ways to effectively promote the sharing of knowledge, including barriers and motivations to sharing, as well as technological solutions to make shared knowledge more accessible.

Additionally, the studies presented here provide insight into the exchange and use of a type of explicit knowledge unique to digital photography: EXIF data. The design of Flickr makes this information publically available by default when users upload their photographs. EXIF data includes a wealth of codified information about how a photograph was created, including aperture, shutter speed, use of flashes, and preset modes.

Data suggest that EXIF data is used for solitary learning. Study One participants of different skill levels spoke of EXIF data in different ways. Some, but not all, novice users were aware of EXIF data, but simply chose not to use it. One novice participant explained that she did not understand it. Another said she did not use it because she was not technical. These comments suggest an expertise barrier that prevents novice users from utilizing this information. EXIF data can be very complex and knowledge about the technical aspects of photography, as well as the related language, is essential in order to decode it. This supports the CoP position that learning the language of a practice is part of becoming more expert (Wenger 1998; Wenger et al., 2002).

According to the results of Study Two, those users who are more expert are more likely to access EXIF data for learning purposes, consistent with the fact that novice Study One participants did not report using this feature. One explanation of this finding could be that more expert users are more interested in technical settings than novice users who are still exploring more basic composition techniques, although the terminology barrier is a more likely primary deterrent to use. This finding provides insight into the learning behaviors of more expert users

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and suggests a way in which their solitary learning practices differ from less skilled members. Furthermore, Study One participants explained that there are multiple ways in which EXIF data can be utilized.

More expert Study One participants described very specific learning goals associated with accessing EXIF data, such as learning about settings or learning how to duplicate an effect. One participant described his use as a way of learning from other people's experiences and as a shortcut to avoid some of the trial and error associated with learning new techniques purely through practice. Another participant described using EXIF data to compare her settings to other users who were shooting a similar type of photograph. EXIF data was also accessed by participants as a way to determine if images had been digitally edited. Taken together, findings of both Study One and Study Two show that expertise plays a role in the use of EXIF data, and that it can be utilized for learning about a number of different aspects of photography.

Knowledge Sharing and Expertise

Experts are an essential component of CoPs. Without experts to impart knowledge to novice members, novices would struggle to become experts themselves. The role of expertise in CoPs is an important one to consider. Lave and Wenger (1991) clearly highlight the importance of expertise in their account of LPP, focusing on the interactions between novices and experts through an apprenticeship model. In later work (Wenger & Snyder, 2000, Wenger et al., 2002; Wenger, 2010), overt statements about individual expertise have been replaced with somewhat vague statements about maintaining and developing CoP expertise. This appears to be a response to the use of CoPs in organizational settings, where, in some cases, having a certain degree of expertise is a prerequisite for membership (Wenger & Snyder, 2000), a clear contrast to the

original conceptualization. However, the importance of sharing expertise remains evident, even in organizational settings where new members are not truly novices.

The mixed method approach used here allows for a more complete understanding of knowledge sharing in Flickr CoPs. Study One participants provided numerous examples of experts providing knowledge, from answering questions to providing tutorials on various techniques. Experts were valued by less expert participants. Indeed, participants felt that the varied skill level of Group members was a benefit for the overall Group. Varied expertise, as described by participants, allows for learning with peers while still having easy access to experts. It also allows for less expert members to help those with even less experience. As one participant put it, "If somebody asks a question and I happen to know the answer to it, I'll answer it." Morris, Teevan, and Panovich (2010) found that Facebook and Twitter users were motivated to answer questions posed by members of their social network because they had the expertise to provide an answer. Similarly, Wasko and Faraj (2000) found that CoP members did not answer questions because of doubts about accuracy of their knowledge.

These findings raise serious questions about the make up of CoPs. Wenger and Snyder (2000) have argued a certain level of expertise is required for joining some organizational CoPs. The findings here would indicate that this exclusionary approach to membership based on expertise may limit the success of the Group. Results indicate that varying levels of expertise within a Group allow for people to choose to learn with others of the same skill level, to learn from those who are more expert, and to share knowledge with those less experienced. This would seem to facilitate a greater number of interactions and opportunities for learning. While the data here do not allow claims to be made about a direct relationship between the range of

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expertise within a CoP and the overall activity and health of the CoP, there is evidence that makes this possibility worth exploring in future research.

Study Two results provide additional insights into the value placed on having access to experts in Flickr CoPs. Study Two found that those with greater levels of expertise had a greater propensity to share knowledge with others. Additionally, regression analysis found that more expert members were more likely to share their knowledge through comments and discussion board posts than less expert members. These results indicate that more expert users are likely responsible for contributing the majority of answers posed through comments and discussion forums. These findings support the recent work of scholars studying the contributions of experts in online communities (Zhang et al., 2007) and social media environments, such as Wikipedia (Panciera, Halfaker, & Terveen, 2009; Priedhorsky, Chen, Lam, Panciera, Terveen, & Riedl, 2007; Welser et al., 2011), who have found that experts answer most questions and contribute the majority of knowledge based content. However, Zhang and colleagues, studying a Java programming community, also found that while experts might answer more questions, their answers might be problematic for novice users. Essentially, experts had a tendency to use language with which the novices were unfamiliar, as well as assuming that they had knowledge when they did not. Consequently, novices ended up confused. However, Zhang and colleagues found that less expert members were able to provide answers that were at a more satisfactory level. More expert Flickr users might have a greater propensity for sharing knowledge, but, as Study One shows, that does not mean that others remain silent.

As a constellation of naturally occurring CoPs, Flickr users belong to multiple CoPs, causing expertise to be somewhat fluid depending on the Group. As one participant explained, depending on the Group, he could be considered a novice, in which case he asked questions, or

moderately skilled, in which case he answered questions. This finding complicates framings of expertise in the CoP literature. If one can be an expert in portrait photograph and a novice in macro photography, how should expertise be assessed? Results here indicate that this area is worthy of future research focusing on the individual levels of expertise in constellations of CoPs.

Comments

The comment feature allows Flickr users to have interactions around their photographs and provides a way to leave feedback about the photograph. Data from Study One indicates that there are three primary types of comments: encouraging, detail and critique. Participants in Study One described leaving encouraging comments most frequently, although Study Two found that participants perceived that they left detail comments most frequently. Study One participants highlighted the reciprocal nature of comments, explaining that one way to get attention for your photographs was to comment on those of others. A regression analysis predicting commenting for the purposes of eliciting a comment was negatively related to expertise, indicating that trying to elicit comments by leaving comments is a behavior associated with less expert members. It may be that once a certain level of expertise is attained, users no longer feel they need as much feedback from others, resulting in less frequent commenting as a means of encouraging others to comment on their work. Alternatively, it could also be that as skill level increases, users are getting higher levels of feedback naturally as more people are drawn to their work. Taken in combination with the findings from Study Two that many comments do not provide substantive and actionable critique, it may also be that more expert users no longer need as much encouragement, having become more confident in their own abilities. This could also be a function of the photographer's social network. Perhaps more expert members have larger, more expert networks and the members of their networks provide enough comments without having to

leave comments with the hope of having the favor returned. Lerman and Jones (2006) found that contacts accounted for a significant number of photograph comments, but their analysis does not consider reciprocation, hope of reciprocation, or expertise of the network. Future research should explore the effect of users' social networks on commenting behaviors to determine if and how these factors result in different commenting behavior.

Study Two found that user expertise is also related to commenting behaviors. Regression analyses revealed that those who scored highly on the digital photography inventory were more likely to leave detail and critique comments. These findings support the CoP precept that experts take a central role in learning activities. However, they also point to a possible issue in the user make-up of Flickr CoPs. Study One participants expressed frustration about how infrequently they received critique comments, even when they were requested. Many perceived that this was the result of a politeness norm. The finding here provides an alternative explanation: there are too few experts in some Flickr CoPs. As such, this finding has implications for CoP leaders focused on maintaining an active membership.

The findings concerning commenting have the potential to extend CoP theory by providing a way to understand user feedback behaviors. Specifically, establishing the range of expertise in a CoP could allow CoP leaders to determine whether or not there are enough expert members to provide feedback to less expert members about their work. The author could not find any references to the informal evaluation of work within CoPs in the literature. However, research on new groups has found that when established members provide a response to the post of a new member, the new member is more likely to make future posts (Joyce & Kraut, 2006). As such, ensuring that there are an adequate number of experts in relation to less expert members

may help to ensure new members not only have feedback, but are encouraged to continue participating.

Implications for Flickr

In addition to contributions related to the CoP lens, this research also contributes to the body of literature studying interest-specific social network sites and, more specifically, research on Flickr. First, in regards to interest-specific social network site research, this study exemplifies how a social media site within this genre can be leveraged for learning. While no argument is being made here that Flickr is only about learning, or that other types of SNS are not capable of supporting CoPs, interview data make it quite clear that learning is integral to the experiences of participants and great advances in skill are possible through engaging in CoPs on the site. This work also supports other studies conducted on interest-specific social network sites that show that users are often connecting with others who were previously unknown (Baym & Ledbetter, 2009), unlike on Facebook where users typically have some kind of preexisting offline connection to those they list as Friends (Ellison et al., 2007).

Regarding Flickr research specifically, this study contributes new knowledge to the understanding of user practices. As discussed earlier, much of the prior research on Flickr has often involved data mining, relying heavily on Flickr's open API. This study, by providing first-hand accounts of use, is able to shed light on user behavior in a way that these previous studies have not. Accordingly, this study complements and extends previous research by providing rich accounts of user behaviors related to features previously the focus data mining studies.

In addition to these contributions, this study also has implications for the design of online CoPs supporting creative work. Regarding Flickr specifically, there are technical limitations regarding comment and discussion board post notifications that may be limiting or slowing

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learning. As explained by participants in Study One, the comment notification system makes it difficult to track if someone has responded to a specific comment, only indicating that another comment has been left on the photograph. Discussion board posts also have a similar notification issue. Once a user posts to a board, they must return to see if there has been a response. Participants discussed workarounds they had employed to overcome these issues, but the addition of a more refined notification system could solve this issue.

Additionally, there was evidence that participants believed that a norm of politeness was limiting the amount of critiques they were receiving, even when this type of feedback was specifically requested. While there are Groups that exist solely for the purpose of critique and rating, participant comments indicate that users do not want to have to join additional Groups just for critique. As a solution, Flickr could add an option for users to select "critique requested" when uploading a photo. Initial text could fill the comment box, disappearing when the box is clicked on, that reads, "I'd like you to critique this photo." Additional options could also be added, allowing for specific elements to be critiqued, customized critique requests written by the posting photographer, or even the ability to anonymously critique. If no initial text were present in the box, then that would indicate that no critique is desired. Perhaps the emphasis that this type of signaling would place on the desire for critique would help users to overcome the described politeness limits voluntarily being imposed by users, thereby increasing the utility of Flickr CoPs for learning.

Beyond Flickr: Implications for Learning and the Design of Systems to Support Active CoPs

The studies presented here show how the naturally occurring CoPs supported by Flickr provide a wealth of opportunities for users to learn more about photography. However, the

findings also have implications stretching beyond Flickr. Perhaps most broadly, these findings have implications for people wanting to advance their knowledge and skills related to an interest. More specifically, the findings of these studies show that formalized classes, workshops, and seminars are far from the only options for those seeking to advance their expertise in a topic of interest. By joining an online CoP focused on the interest and engaging with others of varied levels of expertise, people can learn a great deal without the expenses generally associated with more formalized methods of instruction. While the idea of social learning is far from new, the findings of these studies show how social media is reshaping the manner in which these processes occur and making these opportunities more accessible to the Internet-using public.

In addition to implications for those who may want to learn more about an interest, the findings of these studies can also be used for guiding the design of systems capable of supporting online CoPs. Indeed, many of the features of Flickr that facilitate CoP-based learning experiences could be incorporated into the design of new CoP systems. The following paragraphs will briefly outline best practices for designing a system to support online CoPs based on the findings of these studies.

Principle 1: Design a system to support a constellation. Findings of Study One show that one of the reasons Flickr users are able to learn about a wide variety of photography-related skills is that Flickr is a system that supports a constellation of related photography CoPs. In this respect, designers of systems to support online CoPs should create an infrastructure that supports a constellation of CoPs. Study One participants valued being able to move from Group to Group in order to meet specific learning needs. Similar to Flickr, designers should allow users to create Groups so that CoPs are able to develop naturally. Additionally, by creating a structure capable of supporting a constellation, designers may be able to more easily retain users on the site. While

interest in one CoP may wane, there are always others to explore. In the case of Flickr, some of the CoPs that have developed are for specific types of photography, such as macro photography and the use of off-camera lighting. Allowing for the development of specialty CoPs related to the common interest of the constellation will keep users engaged and provide them not only with varied CoPs in which to learn, but CoPs in which to gain knowledge and develop skills related to varied specialties imbedded in the common interest.

Principle 2: Design a system with social networking features. All Study One participants spoke of learning through their Groups. However, they also described learning through their social networks. The extent to which users' social networks are a reflection of their membership in multiple CoPs within the Flickr constellation is unknown. However, Study One participants placed great value on adding other users as contacts and felt that their social networks were influential in their learning.

Principle 3: Design a system that allows for sharing of the results of practice. As a photography-themed social media site, Flickr is designed around the sharing of photographs. Photographs are a result of the practice of Flickr CoP members. When new knowledge is acquired, users apply it to the photographs they take and then post. Those posted photographs exhibit the tacit knowledge of the photographer. Through viewing photographs, Study One participants felt they learned more about photography. Designers should create systems that allow users to share their work so that others may learn from it. For example, in a woodworking CoP, a novice woodworker may learn a great deal from seeing images or video of a cabinet as it is being built. Essentially, building a system that allows for this is ensuring that there will be a way in which novice users can take part in legitimate peripheral participation. Additionally,

when possible, including meta-data with the result of the practice should also be included. On Flickr, EXIF data performs this function and was identified as a valuable learning tool.

Principle 4: Design a system that allows for multiple types of interaction. If Principle 2 has been followed, one of the primary means of interaction should relate to the results of the practice. On Flickr, this occurs through the comments feature. Study One found that comments can be used as a means of encouragement, acknowledging what the photographer has done well, and critiquing their work. Additionally, asking and answering questions was reported to occur through the comments feature. Study One participants also reported using discussion boards to ask and answer questions. These public forms of interaction provide ways for users to engage in interactive learning. In addition, they also facilitate learning for those who are not a part of the exchange because these text-based communications can be read by all users, thus providing another form of LPP. In the case of discussion boards, these posts can be found using the site search tool, another important feature to include. In some cases, as discussed by Study One participants, private channels of communication are perceived as being more appropriate for certain types of messages. For example, one participant explained that he used Flickr mail to send critiques, apparently in an effort to avoid embarrassing the targets of the messages by posting them publicly. Access to a means of private communication allows users to exchange messages that may result in learning, but could be potentially embarrassing if they were to occur in public spaces.

Principle 5: Design a system inclusive of participants ranging from novices to experts. Participants in Study One felt Groups with wide ranges of expertise were well suited for learning. They described that this mix of expertise allows less experienced users to learn from those who are more expert and those who are more expert to teach those who are less

experienced. In the case of Flickr, the steps outlined above seem to have helped to create this type of environment, along with leaders of Groups not restricting membership based on expertise. While restricting membership is a decision for CoP leadership, the design of the system can encourage open CoP membership through the use of default settings.

Principle 6: Provide tools for CoP leaders to access member expertise. Study Two found that experts are more likely to give substantive feedback and share knowledge. Both substantive feedback and knowledge sharing were highly valued by Study One participants as important to their on-site learning. System designers should consider including tools for CoP leaders to measure the expertise of members in order to ensure that there are enough experts to meet the learning needs of the membership. This may also help in planning activities for members as leaders can design activities that are inclusive of members of all levels .

Principle 6: Design a system that allows leadership roles to be articulated. Study One participants described CoP leadership as being an important component of encouraging activity. As such, system designers should allow leadership roles to be assigned to users. By doing this, leadership of the CoP is legitimized, allowing users in leadership positions to guide the CoP with the confidence that they are recognized by the membership.

Learning strategies that emerged from Study One data are a reflection of the types of design choices discussed above. Enabling users to share the results of their practice as well as the support of public interaction provide content through which novices can engage in legitimate peripheral participation and more expert users can choose varied avenues for learning. These design recommendations do not guarantee CoP success, but, based on the findings of the studies presented here, will make success more likely.

Closing Thoughts

  Social media tools, such as Flickr, are changing the way people interact and spend their leisure time. The communities of practice lens allows digital environments that support social learning to be analyzed so that a deeper understanding of user behavior may be attained. The findings of these studies reflect the potential of social media to provide rich social learning experiences for users.

APPENDICES

Interview Protocol

Thank you for agreeing to speak with me about your Flickr use. This interview will take about 30 minutes to complete. The questions I'm going to be asking today are open ended. I'm interested in hearing about your opinions and your experiences using Flickr. At the end of the interview you'll have the opportunity to add any additional thoughts you might have about Flickr.

- What do you typically do when you use Flickr?

- What is your primary goal when you share a photo?

- How often do you share photographs?

- How often do you log in to Flickr?

- Why do you choose to upload certain photos, but not others?

- Is there a reason you use Flickr as opposed to a service such as PhotoBucket, or SnapFish?
  - Or if you do use one of those services, do you use Flickr for a different purpose?

- Do you feel that you learn through Flickr?
  - *Additional prompt* – Where does this learning occur?
    - *If needed* – Does it happen through comments? In Groups? Discussion boards?
      - For example, has anyone ever critiqued a photo of yours in such a way that you felt you learned something about composition, subject treatment, or about the use of your camera?

- Have you ever shared this kind of knowledge, or tried to teach another user how about one of these kinds of topics?

- Do you ever learn about new equipment through your interactions on Flickr?

- Do you ever learn about other photography resources through Flickr?

- Do you feel that you learn about photography by viewing other people's photos?

- Have you ever found out about a paying photography job through Flickr?

- Do you interact with other Flickr users, such as through comments and group discussion boards?

- What is your primary goal when you leave a comment?

- What kind of comments do you typically receive?

- What is your primary goal when you participate in a discussion board discussion?

- Do you have Flickr friends/contacts?
  - If so, how do you communicate with them? Do you use any forms of communication outside of Flickr, such as email, Facebook, or by phone?

- What kind of Flickr groups do you belong to?

- Are you more active in some groups than others? If so, which ones?

- Would you describe any of these groups as communities? Why or why not?

- Some people have described a type of Flickr group that they call a "dumping ground." Have you been exposed to groups like that? What do you think their purpose is?

- Pick one of the groups that you feel you are most active in. How would you define this group? What is the theme?

- What do you think the purpose of this group is?

- Are there activities that are specific to this group (or other groups you are a member of)?

- Have you participated in any offline activities with this group, such as photowalks?

- Do you think there are specific reasons some groups fail and other succeed?

- Do you think this group would be useful for people who aren't members? How would a non-member view the group?

- Some have said that Flickr is a community. Would you agree with that? How would you define your Flickr community?

- Is there a central location within Flickr that serves as a hub of communication with your contacts?

- What is the most important feature of Flickr to you?

Study One Screener Survey

Note: This survey was administered online using Surveygizmo.com.

About Me

1. What is your sex?
    Female
    Male

2. Are you (CLICK AS MANY AS APPLY)
    Black or African American
    White
    Asian (including Chinese, Korean, Japanese and Southeast Asians)
    Pacific Islander
    Native American or Alaskan native
    Something else_____
    I choose not to reply to this question

3. Are you of Spanish, Hispanic or Latino origin, including Mexican-American, Chicano, Mexican, Puerto Rican, Cuban, Central or South American, or other Hispanic?
    Yes
    No

4. What is your age _____ (open-ended)

5. What is you level of education?
    Some high school
    GED
    High school diploma
    Some college
    Associates Degree
    Bachelor's Degree
    Graduate Degree

6. What is your relationship status?
    Single
    In a dating or casual relationship
    In a serious relationship
    Married

7. Approximately how many hours do you typically spend actively using the Internet EACH

DAY during a typical "weekend" day (Saturday or Sunday)?
    0 – 30 minutes
    31-59 minutes
    1 hour
    2 hours
    3 hours
    4 hours
    5 hours
    6 hours
    7 hours
    8 hours or more

8. Approximately how many hours do you typically spend actively using the Internet EACH
DAY during a typical "week day" (Monday to Friday)?
    0 – 30 minutes
    31-59 minutes
    1 hour
    2 hours
    3 hours
    4 hours
    5 hours
    6 hours
    7 hours
    8 hours or more

9. What type of Flickr account do you have?
    Free (default)
    Pro Account ($24.95 per year)

10. When did you join Flickr (listed on profile page)?
    (*Drop down menu with months and years, beginning with 2004*)

11. How would you rate yourself as a photographer?
    I am a _____.
    Beginner
    Novice
    Intermediate
    Advanced Intermediate
    Expert
    Other (open ended)

12. How would you classify yourself as a photographer?
    Casual Hobbyist (I take pictures on trips and occasionally on weekends)
    Active Hobbyist (I go out and take pictures frequently)
    Aspiring Part-time Professional (It isn't my full-time job, but I'm actively seeking paying
    jobs/have been paid in the past)

Professional (Photography is my main source of income)
Other (open ended)

13. Which of the following best describes the camera you use to take the majority of your Flickr photos?
Point and shoot film camera
Point and shoot digital camera
Film SLR
Digital SLR
Other (open-ended)

Your Flickr Use
Think about why you use Flickr. Please indicate your agreement with the following statements *(7-point Likert-types scale – Strongly Disagree, Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, Agree, Strongly Agree)*
14. I use Flickr to share photos with strangers & friends I've made on Flickr.
15. I use Flickr to share photos with friends (not including friends you've made on Flickr) and family.
16. I use Flickr to host photos for my blog.
17. I use Flickr to backup my photo collection.
18. I use Flickr as a professional portfolio to sell my work.
19. I use Flickr to learn more about photography.
20. I use Flickr to teach others about photography.
21. I use Flickr to meet other photographers.

Thank You!
Thank you for taking the survey. Your response is very important to me.

Study Two Flickr Survey

Note: This survey was administered online using Surveygizmo.com.

A Little Bit About You
To begin, we'd like to know a little bit about you.
1. What is your sex?
   Male   Female

2. What is your age? _____

3. During the past week approximately how many minutes per day on average have you spent on Flickr?
   0-14 minutes per day
   15-29 minutes per day
   30-44 minutes per day
   45-59 minutes per day
   60-74 minutes per day
   75-89 minutes per day
   90-104 minutes per day
   105-119 minutes per day
   120-134 minutes per day
   135-149 minutes per day
   150-164 minutes per day
   165-180 minutes per day
   More than 3 hours per day

4. On average, how many times per day do you log on to Flickr?
   More than once a day
   Once a day
   A few times per week
   A few times per month

5. Approximately how many hours do you typically spend actively using the Internet EACH DAY during a typical "weekend" day (Saturday or Sunday)?
   0 – 30 minutes
   31-59 minutes
   1 hour
   2 hours
   3 hours
   4 hours
   5 hours

6 hours
7 hours
8 hours or more

6. Approximately how many hours do you typically spend actively using the Internet EACH DAY during a typical "week day" (Monday to Friday)?
0 – 30 minutes
31-59 minutes
1 hour
2 hours
3 hours
4 hours
5 hours
6 hours
7 hours
8 hours or more

Flickr & You
7. What type of Flickr account do you have?
Free (default)
Pro Account ($24.95 per year)

8. When did you join Flickr (If you don't remember, this date is listed on the right-hand side of your profile page)? *Drop down menu with months and years, beginning with 2004*

9. How would you rate yourself as a photographer?
I am a _____.
Beginner
Novice
Intermediate
Advanced Intermediate
Expert
Other (open-ended)

10. How would you classify yourself as a photographer?
Family/casual photographer (my photos are of family and special occasions)
Part-time Hobbyist (I take pictures on trips and occasionally on weekends)
Active Hobbyist (I go out and take pictures frequently)
Aspiring Part-time Professional (It isn't my full-time job, but I'm actively seeking paying jobs/have been paid in the past)
Professional (Photography is my main source of income)
Other (open-ended)
11. How many photos do you post in an average week? (open-ended)

12. How many discussion board posts do you make in an average week? (open -nded)

13. Are you a member of any Flickr Groups? *(Skip logic – go to Why You Joined Flickr if no, if yes, next question)*

      Yes   No

14. About how many TOTAL Flickr groups do you belong to? (open ended)

15. Approximately how many of those groups do you regularly (at least once a week) contribute to (posting photos, comments, or discussion board posts)? (open ended)

Why You Joined Flickr
Think about why you started using Flickr. Please indicate the extent to which you agree with each of the following statements. *(7-point Likert-types scale – Strongly Disagree, Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, Agree, Strongly Agree)*
16. I started using Flickr to share photos with people I didn't know.
17. I started using Flickr to share photos with friends and family.
18. I started using Flickr to get recognition for my photography.
19. I started using Flickr to share information with others about photography.
20. I started using Flickr to meet other photographers.
21. I started using Flickr to learn more about photography.
22. If there are any other reasons you started using Flickr, please describe them here: (open-ended)

Why I Use Flickr Now
Think about why you use Flickr now. Please indicate the extent to which you agree with each of the following statements. *(7-point Likert-types scale – Strongly Disagree, Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, Agree, Strongly Agree)*
23. I use Flickr to share photos with people I don't know.
24. I use Flickr to share photos with contacts I've made on through Flickr.
25. I use Flickr to share photos with friends and family.
26. I use Flickr to get recognition for my photography.
27. I use Flickr to share information with others about photography.
28. I use Flickr to meet other photographers.
29. I use Flickr to learn more about photography. (Skip logic – if no agreement, skip to Digital Photography Inventory)
30. If there are any other reasons you use Flickr, please describe them here: (open-ended)

Different Ways I Learn on Flickr
Think about how you use Flickr to learn. Please indicate the extent to which you agree with each of the following statements. *(7-point Likert-types scale – Strongly Disagree, Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, Agree, Strongly Agree)*
31. I learn about photography by viewing the photos posted by others.
32. I learn about photography by reading discussion forum posts.
33. I learn about photography by searching Flickr for information (e.g. about equipment, composition, etc.)
34. I learn about photography by asking questions using the comments feature.
35. I learn about photography by asking questions in the group discussion forums.

36. I learn about photography by looking at EXIF data.
37. I learn about photography through face-to-face gatherings announced on Flickr.
38. I learn about photography when other users critique my photographs.
39. If there are any other ways you learn about photography by using Flickr, please describe them here: (open-ended)

Digital Photography Inventory
How familiar are you with the following digital photography related items? *(5-point scale – No Understanding, Little Understanding, Some Understanding, Good Understanding, Full Understanding)*
40. Megapixel
41. ISO speed
42. Aperture
43. Shutter speed
44. Rule of thirds
45. Histogram
46. Depth of field
47. EXIF
48. RAW
49. Saturation
50. Bracketing
51. JPEG

Sense of Online Community
Thinking about your experiences with Flickr, please indicate the extent to which you agree with each of the following statements. *(7-point Likert-types scale – Strongly Disagree, Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, Agree, Strongly Agree)*
52. I feel a sense of community with the people I've met on Flickr.
53. I have made new friends by meeting people on Flickr.
54. Using Flickr to communicate with people is as safe as communicating with people in other ways.
55. Flickr has allowed me to communicate with all kinds of interesting people I otherwise would never have interacted with.
56. I feel I belong to an online community on Flickr.
57. I can find people who share my exact interests more easily on Flickr than I can in my daily life.

58. On average, how often do you leave comments?
    More than once a day
    Once a day
    A few times per week
    A few times per month
    Never

Photo Commenting

Think about the types of comments you leave for other Flickr users about their photographs. Please indicate the extent to which you agree with each of the following statements. *(7-point Likert-types scale – Strongly Disagree, Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, Agree, Strongly Agree)*

59. I often leave comments for others.
60. If someone leaves a comment for me, I will leave a comment for them.
61. I often leave comments similar to "nice shot" or "great capture."
62. I often leave comments that highlight a specific aspect of the photograph, such as "good use of light" or "excellent use of composition."
63. I often leave comments that offer constructive criticism, such as "great subject and lighting, but it would be a better image if you cropped out the road" or "next time you might want to consider a longer exposure."
64. My comments are intended to be social.
65. If I leave a comment for someone, I hope they will leave one for me.

66. Approximately how many comments do you post in an average week? (open ended)

67. Which of the following comments pairs is best example of the kind of comments you are most likely to
leave?
     "nice shot," "great capture."
     "good use of light," "excellent use of composition"
     "great subject and lighting, but it would be a better image if you cropped out the road,"
     "next time you might want to consider a longer exposure."

68. If you wanted to offer constructive criticism that might hurt someone's feelings, which of the following methods would you be most likely to use?
     Comment
     Flickr Mail
     I would not offer this type of constructive criticism
     Other (open-ended)

Knowledge Sharing
Think about your experiences sharing information on Flickr. Please indicate the extent to which you agree with each of the following statements. *(7-point Likert-types scale – Strongly Disagree, Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, Agree, Strongly Agree)*

69. I share my knowledge and expertise with other Flickr users.
70. If I have some special knowledge about how to perform a photographic task, I am NOT likely to tell other Flickr users about it. (R)
71. I exchange virtually no information, knowledge or share skills with other Flickr users. (R)
72. When I am more knowledgeable on a topic than other Flickr users, I freely share hard-to-find knowledge or specialized skills.
73. I share knowledge in group discussion forums often.
74. I use the comments feature to share knowledge often.
75. I share my EXIF data when I upload photos.

Yes
No
For some, but not all
I'm not sure

Your Personality Traits *(Ten Item Personality Inventory)*
Here are a number of personality traits that may or may not apply to you. Please indicate the extent
to which you agree with each statement. You should rate the extent to which the pair of traits
applies to you, even if one characteristic applies more strongly than the other. *(7-point Likert-types
scale – Disagree Strongly, Disagree Moderately, Disagree a Little, Neither Agree nor Disagree,
Agree a Little, Agree Moderately, Agree Strongly)*
I see myself as…
76. Extraverted, enthusiastic
77. Critical, quarrelsome
78. Dependable, self-disciplined
79. Anxious, easily upset
80. Open to new experiences, complex
81. Reserved, quiet
82. Sympathetic, warm
83. Disorganized, careless
84. Calm, emotionally stable
85. Conventional, uncreative

What I Can Do on Flickr *(Flickr Self-Efficacy)*
Please indicate the extent to which you agree with each of the following statements. *(7-point
Likert-types scale – Disagree Strongly, Disagree Moderately, Disagree a Little, Neither Agree nor
Disagree, Agree a Little, Agree Moderately, Agree Strongly)*
86. I feel confident that I can upload a photo to Flickr.
87. I feel confident that I can join a group on Flickr.
88. I feel confident that I can post a comment on Flickr.
89. I feel confident that I can tag a photo on Flickr.
90. I feel confident that I can add contacts on Flickr.
91. I feel confident that I can start a discussion topic in a group on Flickr.
92. I feel confident that I can make a post to a discussion topic in a group on Flickr.
93. I feel confident that I can create sets on Flickr.
94. I feel confident troubleshooting Flickr problems.
95. I feel confident adding a note on a photo on Flickr.
96. I feel confident using Flickr to find information.

My Flickr Use
Please indicate the extent to which you agree with each of the following statements. *(7-point
Likert-types scale – Disagree Strongly, Disagree Moderately, Disagree a Little, Neither Agree nor
Disagree, Agree a Little, Agree Moderately, Agree Strongly)*
97. Flickr is part of my everyday activity.
98. I am proud to tell people I'm on Flickr.
99. Flickr has become part of my daily routine.

100. I feel out of touch when I haven't logged onto Flickr for a while.
101. I feel I am part of the Flickr community.
102. I would be sorry if Flickr shut down.

103. I tag my photos because… (please check all that apply)
        I want others to find them
        To help organize my collection
        I think it will get me on Explore
        I don't tag my photos
        Other (open ended)

104. About how many TOTAL Flickr contacts do you have? (open ended)

105. Approximately how many of your TOTAL Flickr contacts do you consider actual friends? (open ended)

106. How much has your participation on Flickr improved your photography?
        None
        A little
        A moderate amount
        A great deal

A Little Bit More About You
107. Are you (CLICK AS MANY AS APPLY)
        Black or African American
        White
        Asian (including Chinese, Korean, Japanese and Southeast Asians)
        Pacific Islander
        Native American or Alaskan native
        Something else_____
        I choose not to reply to this question

108. Are you of Spanish, Hispanic or Latino origin, including Mexican-American, Chicano, Mexican,
Puerto Rican, Cuban, Central or South American, or other Hispanic?
        Yes
        No

109. Country of residence (dropdown list)
        (Skip logic – if US, go to next question, else skip next)

110. What state do you live in? (dropdown list)

Final Page
111. Is there anything else you would like to share about your Flickr use? (open ended)

112.Please enter your email address below. We will use this email address to send you $5 Amazon gift card and to contact winners of the drawing for the $20 Amazon gift cards.

Email Address (textbox)

113. Please enter your Flickr username below. This will be used to confirm your eligibility for the $5 Amazon gift card (1 per person).

Thank You!
Thank you for taking the survey. Your response is very important to me.

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