

CONCEPTUALIZING NETWORKED KNOWLEDGE ACTIVITIES: RELATED AND CO-OCCURRING ACTIVITIES IN ONLINE SPACES

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ABSTRACT

This study examines how college students conceptualize the relationship between different types of networked knowledge activities. The purpose was to determine where there is greater or less conceptual consensus among students, which can serve as an indicator of areas where networked knowledge skills may be weak or underused. Using an interview with an embedded card sort activity, 63 college students shared how they would organize different social media actions given larger activity categories (network, collect, curate, share, broker, negotiate, and create). Findings showed greatest consensus under the network and collect categories, especially when familiar actions were represented. Less familiar actions, like different ways of tagging resources and sharing tags, were not highly associated with any particular networked knowledge activity. These findings have implications for teaching digital literacy skills at the college level.

KEYWORDS

College Students, Information Seeking, Knowledge Networks, Networking, Sharing, Social Networking, Social Media

1. INTRODUCTION

In a typical day, most people find themselves in need of information and human interaction. They also might have information of use to others or be able to meet the interaction needs of others. These needs are the driving forces behind networked knowledge activities, and the building blocks of online social networks. Most daily activities, including those supporting work, school, home, and relationships, may be enhanced or enabled by information seeing and interaction in online networks (Rainie & Wellman, 2012). These networks tend to incorporate social media platforms, which offer tools for sharing, searching, and otherwise engaging with both people and information. In a professional context, online networks offer work-related sharing and mentoring opportunities that support informal learning and professional development (Dennen & Wang, 2002). Although the motivation may be different from work contexts, the two dimensions of everyday life information seeking per Savolainen (1995) are orienting information (information about the world and world events) and practical information (information for problem solving), both of which are supported by online networks. Finally, people use social media to maintain personal relationship, including while at work. This latter option offers the ability to connect to their non-work lives in ways that are beneficial to both contexts (Kühnel et al., 2020). In short, online spaces support knowledge networking in its broadest sense for those people who know how and chose to engage in it.

Young adults, a group that includes most traditional-aged college students, occupy an interesting position in the online sphere. They are labeled digital natives because they were born at a time when technology was all around them, although the omnipresence of technology in their lives has not innately made them better than prior generations at online knowledge seeking and network building (Kirschner & De Bruyckere, 2017). They been hailed as active participants in participatory culture (Jenkins et al., 2009) and in transmedia activities (Scolari, 2018; Scolari et al., 2018), although for many their actual online activities may be far more mundane. Still, their regular use of social media is well documented from their teenage years (Anderson & Jiang, 2018; Anderson et al., 2022) and onward into their early adult years (Perrin & Anderson, 2019). Prior research on this population has found that heavy users and non-users experience the greatest satisfaction from their online

information-seeking activities (Kim et al., 2014), and that psychological and sociocultural factors may affect information behaviors as well (Kim & Sin, 2015).

This study investigates how college students conceptualize and organize different online and social media activities using the Networked Knowledge Activities (NKA) framework (Dennen, 2019). This framework was originally developed to help educators break down online activities into meaningful, related actions when designing lessons, but has also been used to analyze social network activities in naturalistic online settings (Dennen et al., 2020). While the framework provides clarity about activity intent and outcomes and helps structure content analysis for researchers interested in functional activities in online environments, less is known about how individuals conceptualize their online activities and whether they see the relationship between those activities.

2. PURPOSE AND RESEARCH QUESTIONS

This purpose of this exploratory study was to determine how college undergraduates perceive a variety of online activities, and in particular the relationship between different activities. In other words, it explores which activities participants view as being highly related, using the NKA framework as an organizational device.

1. To what extent do college students agree on the social media actions related to each networked knowledge activity category?
2. What social media actions are most associated with each networked knowledge activity?
3. Which social media actions were not closely associated with a specific networked knowledge activity?
4. Which category of social media actions are most and least familiar to college students?

These research questions put an emphasis on practices rather than tools, as recommended by Greenhow et al. (2019). Certain tools may enable specific practices, practices tend to transcend specific tools.

3. METHOD

3.1 Participants

The participants in this study were 63 undergraduate college students at a large research university. Participants were recruited from a research participation pool. All participation was voluntary, and students in the research participation pool could opt to complete an alternate assignment for their classes if they were not comfortable or interested in participating in research. Participants opted into each study they completed, including this one. The study was approved by the researchers' Institutional Review Board and all participants provided consent to participate and to be recorded.

3.2 Data Collection and Analysis

Data collection occurred via one-hour interviews on zoom. During these interviews, participants first completed a brief demographic survey. Then they were asked some general questions about their social media use. Next, they engaged in three rounds of a card sort activity hosted on the ProvenbyUsers platform. Finally, they debriefed the card sort activity with the researcher.

To complete the card sorts, participants followed a URL supplied by the researcher and shared their screen. During the card sort activities, they were asked to use a think-aloud process while sorting cards. All three card sorts used the same 41 cards, but each sort provided participants with different sorting categories. The 41 cards represented different types of social media actions (e.g., use social media to find resources; tag another person to call attention to a resource). The card list was initially developed by the researchers, and then refined with the assistance of a focus group of undergraduate students. The intent was to develop a comprehensive list of activities that might be supported on different online platforms. To maintain cross-platform applicability, general terms like connect, bookmark, and tag were used rather than platform-specific ones like friend, hashtag, and favorite.

The third card sort activity is the focus of this paper. During this card sort, participants were asked to sort their cards into six piles representing the main components of the NKA framework: share, collect, curate, broker, create, and negotiate. Each NKA category was defined for the participants at the start of the card sort and definitions appeared on screen. During the card sort, which typically took 15 minutes or less, participants had to place each card onto a pile. No card could be left out at the end, and cards could only appear in one pile. However, once placed on a pile, cards could later be moved around. At the

Data analysis focused on the calculating overall consensus levels across participants for each NKA category (research question 1) and using frequency counts to determine which actions were most commonly associated with each category (research question 2) or not distinctly associated with any category (research question 3). Qualitative data from the think-aloud portion of the study and the card sort debrief was used to address the fourth research question.

4. FINDINGS

4.1 Overview of Participants

Of the 63 college students who participated in this study, most were under the age of 25 (59; 93.7%). Of the remaining four participants, two were between 25-34, one was 45-54, and one declined to answer. Only 7 (11.1%) considered themselves very savvy social media users, whereas 3 (4.8%) reported being not very savvy. The majority of participants self-reported that they were savvy (31; 49.2%) or somewhat savvy (22; 34.9%). For these participants, the primary purpose for using social media was connecting with close ties (i.e., family and friends) and entertainment, which each were selected by 60 (95.2%) participants. Following this, 42 (66.7%) use it for school/schoolwork, 40 (63.5%) for news consumption, 39 (61.9%) for learning about hobbies, 28 (44.4 %) for meeting new people, and 20 (31.7 %) for work or seeking employment information. In addition, participants were asked about what social media platforms they often use for personal and educational purposes. Most mentioned platforms include Instagram, Snapchat, TikTok, Facebook, YouTube, Pinterest, LinkedIn, Twitter, and blogs.

4.2 Overall NKA Category Sort Consensus

To answer the first research question, participant agreement was calculated at the category level. With a maximum possible value of 1.00, it was unsurprising to see that agreement levels overall were low (see Table 1). The highest agreement was within the network category. All 63 participants sorted cards into this category, and while the participants in aggregate placed greatest number of cards in this category, the number of unique cards in this category was similar to the number of unique cards placed in other categories. The lowest agreement is in the broker category, which received the lowest aggregate number of cards, but the same number of unique cards as the network category. Additionally, 3 participants did not sort any cards into the broker category, making it the only category in the framework not used by all participants during the card sort activity.

Table 1. Students' consensus on the categorical functions of social media actions

NKA	# Participants Used	# Cards ¹	# Unique Cards ²	Agreement ³
Network	63	617	27	0.36
Collect	63	358	20	0.28
Curate	63	389	23	0.27
Negotiate	63	350	26	0.21
Create	63	294	26	0.18
Share	63	374	33	0.18
Broker	60	201	27	0.12

Notes: 1. Total number of cards placed into the group across all participants. 2. Number of unique cards placed into the group across all participants. 3. Level of participant consensus about which cards belong in a group. The maximum value of 1.00 would mean that all participants sorted cards into the category identically.

4.3 Within Category Consensus

To identify similarities in thinking about different social media actions, the most commonly sorted cards were noted for each of the NKA categories. The *network* category is the overarching category of the NKA framework, and it involves actions that help people build and maintain their connections with others. The social media actions sorted into this category by the greatest number of participants are:

- Send connection requests to people (60; 95.2%)
- Follow people who I know (60; 95.2%)
- Follow people with whom I do not yet have established relationships (60; 95.2%)
- Send a private message to someone with whom I do not have an existing relationship (58; 92.1%)
- Send a private message to someone with whom I have an existing relationship (54; 85.7%)

The 6.4% discrepancy between these last two items is interesting, with four participants differentiating the function of private messages depending on type of relationship.

The *collect* category had the second highest agreement score. This category was defined as finding and saving an online item. The actions most frequently sorted into this category are:

- Download interesting resources to my computer (55; 87.3%)
- Email things I find online to myself (55; 87.3%)
- Use search engines to find resources (47; 74.6%)
- Use social media to find resources (45; 71.4%)
- Bookmark resources (42; 66.7%)

In the collect category it is evident that participants most readily identified with downloading and emailing items to store them locally or in personal accounts. However bookmarking, while still firmly in this category, does not reach such high recognition as a collection strategy.

To *curate* is to select and organize a group of items, and curation is highly related to collecting. The top cards appearing in this category are:

- Organize online resources by topic (58; 92.1%)
- Apply tags to resources for organizational purposes (51; 81.0%)
- Apply tags to resources to help describe them for myself (44; 69.8%)

Organization as a component of curation clearly resonated with the participants, although some were unable to see that applying tags to organize items is essentially the same as applying tags to describe those items.

The *negotiate* category was defined for participants as discussing knowledge with other people. The four cards most sorted into this category are:

- Offer my opinion in response to someone else's post (57; 90.5%)
- Offer my expertise in response to someone else's post (57; 90.5%)
- Correct misconceptions or misinformation that others have posted online (53; 84.1%)
- Ask for advice online (43; 68.3%)

Interestingly, the three of these four items with the highest agreement all focus on giving information to others. The item that involves asking others for assistance had a lower frequency of being sorted into this category, suggesting that participants

The *create* category focuses on generating new knowledge objects or resources. The three most frequently appearing cards are:

- Develop media to share expertise online (55; 87.3%)
- Develop media to share opinions online (48; 76.2%)
- Make a remix or mashup of existing online items (47; 74.6%)

Based on the cards sorted into this category, participants appear to associate creation with expertise more frequently than with opinions, and with unique productions rather than derivative ones.

Share is a simple concept given the prevalence of "share" buttons in most social media tools, although it was one of the categories with lowest consensus. Sharing occurs when one person makes items available to others, The items with greatest agreement were:

- Email things I find online to other people (45; 71.4%)
- Post resources that I have created to an online group or community (35; 55.6%)
- Tag another person to call their attention to a resource (33; 52.4%)

These agreement levels are notably lower than agreement levels in other categories.

Broker was defined for participants as an intermediary behavior, where an individual draws upon knowledge or objects originating with one party or location and purposefully makes it available to another party. With the lowest overall category consensus, the three most frequently appearing cards in this category did not reach sorting frequencies comparable to those of other categories:

- Share or post resources from one social media platform to another (36; 57.1%)
- Share resources from my face-to-face network with my online network (33; 52.4%)

During the think-aloud and debrief, participants expressed that this was a largely unfamiliar concept. Still, a little more than half of the participants recognized brokering as a highly specific form of sharing.

4.4 Actions Lacking a Clear Category

Whereas many cards were sorted into a primary category, as noted above, others were sorted into multiple categories, with less than 50% categorical consensus. Table 2 presents a sample of these items along with the two highest sorting categories. All of these low sorting consensus items were sorted into at least four unique categories and, in most instances, six or seven. The varied sorting patterns indicate the breadth of ways that participants thought about the different activities, and in many cases have a logical connection. For example, Writing a description of an item before saving or sharing is an act of annotation that is associated with curation, but 14 participants felt this was an act of creation, albeit a small act. When following an account that shares interesting things a person is building their network, but the underlying intent may be to collect knowledge objects. The act of evaluating an item before sharing it online resonates with the intentionality behind curation, but 12 participants sorted it into the category related to the next action in the sequence. Finally, applying tags to resources to describe them for others made some participants consider tags as a means of curation, whereas other participants focused on the idea of an audience for those items and sorted the action under share or broker.

Table 2. Sample items with less than 50% category consensus

Action	Highest NKA	Second Highest NKA
Write a description of an item before saving or sharing	Curate (44%)	Create (22%)
Follow an account that shares interesting things	Collect (41%)	Network (37%)
Evaluate an item before sharing it online	Curate (37%)	Share (19%)
Apply tags to resources to help describe them for other people	Curate (35%) and Share (35%)	Broker (14%)

In other instances, actions co-occurred in the same categories with greater frequency than they appeared in any single category. For example, 57 (90.5%) participants placed the cards for unfriending or unfollowing a person and leaving an online group in the same category, although these cards appeared in the networking category with respective frequencies of 79.4% (50 participants) and 76.2% (48 participants).

4.5 Most and Least Familiar Categories and Actions

During the card sort process, participants were free to ask researchers questions about the actions on each card and researchers could provide clarification or examples so long as they did not suggest a specific sorting category. Participants were also asked to use a think-aloud process to indicate their rationale as they sorted cards. Prior to the NKA card sort, the NKA framework was reviewed with each participant. At that time, all participants had already sorted all the cards twice using different frameworks. Based on participant comments during this overall process, brokering was the least familiar category to participants. Curation, while a familiar term, yielded a wide range of participant familiarity; some participants indicated that they regularly curate online resources and talked about making selection and organizational decisions as well as describing or annotating their curated resources. Others appeared to understand the general concept, but struggled to fully differentiate curation from collecting. When discussing the negotiate and create categories, participants commented about their own participation in these activities, generally falling into two user types. The majority indicated discomfort with these activities, wanting to avoid both perceived conflict that might occur through negotiation and vulnerability associated with creation. Participants who engaged in these activities, however, appeared to either hold more nuanced views of the categories (e.g., negotiation as a means of navigating

conversation and creation as any act that produces something new, regardless of scope or size) or to be comfortable with public interactions.

In terms of specific actions, tagging was the most confusing to participants. Tagging actions of various types appeared on eight cards, six of which achieved less than 50% frequency in any one category. Comments during the think-aloud confirmed participants' uncertainty about tag use in various contexts. Similar questions arose when piloting the cards. During the first card sort, which focused on frequency of activity, there were four cards focused on resource tagging. For each of these four resource tagging activities, 28-41 of participants indicated it was a practice in which they never or rarely engage.

5. DISCUSSION

Overall, the findings suggest that the were best able to see the functional relationships among familiar networking, negotiation and collection activities that are part of typical information-seeking practices. However, there are many less familiar and practiced networked knowledge activities among this population. Specifically, the findings showed that tagging actions were poorly understood, as were annotation and resource evaluation activities, echoing earlier studies (Cates et al., 2019; Dennen et al., 2018). Although tags can be used in varied ways across social media contexts (La Rocca & Boccia Artieri, 2022), play a critical role in information aggregation, which means that skills related to selecting and applying meaningful tags are important. Tags enable effective information seeking behaviors (Jiang, 2013), and increased tagging literacy can help improve information storage and retrieval activities across various online social platforms and contexts (Keck & Heck, 2019; Shi et al., 2023). For individuals who know tagging primarily as a performative activity, this use of tags may challenge their knowledge and skills, and creates tensions in how people understand tag purpose and use in the broader social media landscape (McCosker, 2017).

Classifying one's everyday online activities using a framework may seem like a largely academic exercise, but it offers participants the opportunity to reflect on their practices. By discussing online practices in terms of isolated actions, it also highlights practices that may be less often invoked or less well understood. It may not be important for individuals to label their networked knowledge activities in order to perform them, but it is nonetheless important for them to understand the range of activities that might be used to support networked knowledge tasks. For example, if individuals are not taught to effectively tag and annotate online resources, or that tags and annotations may be available to help them locate resources, their networked knowledge interactions may be unsatisfactory or at the surface level. Individuals who do not understand curation and its underlying activities, for example, are unlikely to be effective online curators.

Although tagging has been highlighted in this discussion, it is not the only skill area of concern. Curation is an important skill for navigating online information across different life contexts. For example, individuals' curation activities related to online news consumption affect not only the quantity but also the veracity and perspective of the news to which they are exposed (Merten, 2020). Alternately, individuals who cannot differentiate general sharing from targeted brokering may not fully understand the purpose of either. People who engage in knowledge brokering typically exhibit greater depth of knowledge and also are successful at developing and promoting novel ideas (Resch & Kock, 2021). Their knowledge and skills are highly valued in communal knowledge settings. Essentially, all of the skills falling under the umbrella of networked knowledge activities play an important role in being an effective information user.

The findings generated by this study show variability in how people understand networked knowledge activities. Among traditional college-aged people, such as the students in this study, formal education on networked knowledge activities may be lacking. Although demonstrated time and again that the digital natives moniker has little bearing on actual digital skills (Kirschner & De Bruyckere, 2017), this erroneous belief persists. Digital skills vary widely among youth, although they generally increase as education levels increase (Correa, 2016), and meaningful generational differences about social media use may be more about cultural elements than about skill sets (Evans & Robertson, 2020). What this means for educators is that there are latent opportunities for developing these skill sets among their students and smoothing the transition from school settings. Whereas the focus of digital and related information skill development in schools may be limited to certain academic-specific activities (e.g., locating and assessing the quality of scholarly articles), perhaps it should extend to helping students develop broader abilities to navigate the information and sharing landscapes of the Internet in general and social media more specifically. To address this call, educators may need to

improve their own skills as well. Regardless, opportunities are plentiful across the academic disciplines to teach students how to effectively engage in activities like information curation and brokering, and these skill sets will serve students well as they enter the workforce.

6. CONCLUSION

The connections made by these participants, individually and in aggregate, demonstrate how they think about their online and social media actions. These findings suggest areas where transfer of skill or knowledge may be weak, specifically in the places where participants did not commonly or consistently see connections between different activities and overall activity categories. In this sense, the study has implications for how social media networking skills and related digital literacy and communication skills are taught to teenagers and young adults. Rather than just assuming frequent use of and familiarity with activities due to time spent on social media platforms, educators might identify and focus on knowledge networking skills that enhance both professional development and everyday life information seeking in their disciplines. Then they can assess the degree to which college students are able to apply skills in these contexts, noting that skill application is not just mechanical (e.g., type a tag), but also conceptual (e.g., identify meaningful tags). They can also use frameworks like NKA to help identify areas where college students may lack confidence in online environments, such as network development, and use their classes to foster skill development.

This study has several limitations as well as implications for future research. Although interviewing 63 participants is a labor-intensive process, it does not yield sufficient insights to support broad generalizability. Data collection relied on self-report and did not extend into measurements of how effectively participants can engage in the different activities. This study represents analysis of a partial dataset. Analysis of the full dataset is ongoing and will include comparison of self-reported activity frequency to effectiveness of activity classification. Additionally, future research could focus on better understanding different naturalistic approaches to engagement in networked knowledge activities as well as the formative experiences that help develop awareness, skills, and use of these activities.

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