Knowledge generation and sharing in online communities: Current trends and future directions

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Abstract

Advances in technology and communication platforms have enabled the open exchange of knowledge within online communities. In these communities individuals voluntarily share information for many reasons, including to help others; due to a sense of ownership and belonging; and a belief in generalized reciprocity. The affordances of these platforms, such as openness beyond geographic and social boundaries and collaborative filtering, alter interactions on these platforms and contribute to shaping the completeness and accuracy of information shared. Yet offline social processes, such as homophily, social influence, and social identity, persist with positive and negative impacts on information quality and behavior. Because of the widespread use of online communities as a source of knowledge that affects decision making it has become imperative to understand how knowledge is generated, shared and understood in these communities.

Keywords: knowledge sharing; online communities; open innovation; problem-solving groups; computer-mediated communication

Knowledge generation and sharing in online communities: Current trends and future directions

Individuals seek and provide information in online communities. Online communities span many topics from professional (e.g. software engineering [1]) to personal (e.g. medical conditions [2]); knowledge shared can be general or specialized, facts or personal experience [3]. Researchers have called these communities "online knowledge communities" which they define as a virtual space in which individuals exchange knowledge by asking and answering questions usually voluntarily through asynchronous, text-based computer-mediated communication [4]. These communities have the potential to span geographic and social boundaries; are generally open, which means a large number of unacquainted users interact; are centered on shared interests; and are dynamic as users come and go [5].

These communities have thrived on popular (at the time) communication platforms, including newsgroups, bulletin boards, mailing lists, online forums, question and answer sites (Q&As), and common interest groups on social networking sites [6]. The use of online communities as a source of knowledge has become widespread [7, 8], creating the potential to impact individuals, organizations, and society through the decisions that individuals make based on the information they gather. In this article we describe the technical, individual and social factors that affect knowledge sharing in online communities.

Research Themes

Impact of Technology on Knowledge Sharing

The affordances of popular communication platforms have enabled the proliferation of knowledge sharing in online communities and shaped the characteristics of these discussions [5, 9]. Communication in online communities is typically open to the public, visible for everyone to see and persistent over time [10]. As a result, knowledge can be drawn from individuals that span

geographic and social boundaries; although in practice knowledge flow may be constrained by social processes like homophily [4]. Low barriers to entry make it easy for anyone to contribute, which enables knowledge exchange among very large groups, but also makes these communities vulnerable to bad behaviors, such as spreading misinformation or low-quality contributions [11].

Online discussions rely on text-based computer-mediated communication. The absence of non-verbal communication in online discussions makes it more difficult to establish common ground [12], which can hinder the exchange of complex ideas. However, the asynchronous nature of these discussions allows time for reflection and contemplation which benefits rational and critical debate [13]. In general, individuals provide more thoughtful and constructive comments when the platform design facilitates deliberation, such as by allowing longer comments and allowing edits to comments [14, 15].

Communication platforms organize discussion statements differently, which affects the quality of the discussion and the group dynamics. For example, some platforms allow community members to vote on the quality of each statement and order statements by net votes, known as collaborative filtering [16]. Collaborative filtering can serve as a reinforcement tool to encourage constructive contributions [16]; however, it can also increase bias due to bandwagoning and social influence [17]. Some platforms enable threading, in which users can reply to a statement and replies are displayed nested below the parent statement; threading promotes user retention [18].

Platforms vary in whether they are anonymous and the effects of anonymity on knowledge contribution are complex. Using real names can encourage knowledge sharing by providing a means to build a reputation and can increase the perceived credibility of shared knowledge [13]. Anonymity can encourage sharing private, sensitive information, but also has

other consequences. Researchers have found that anonymity affects individual's propensity to form a group identity with the community, sometimes increasing and sometimes decreasing group identification depending on the type of community, which is important because stronger identification with the community predicts greater knowledge contribution [19].

Discussion Content, Information Quality and Impact

In online communities individuals engage both in sharing their existing knowledge and in generating new knowledge through collaborative sensemaking by reframing problems, stating perspectives, developing arguments, refining solutions and synthesizing material as a group [8, 20, 21]. Online communities are interconnected within a broader online ecosystem [22]. Online communities can add value to other communities by providing access to external knowledge shared via links between the communities [23] and through shared membership [24].

Researchers have tried to assess the quality of knowledge shared and generated in these communities by assessing the coverage, completeness, and accuracy of the information provided. Coverage in online communities is often very good; most but not all questions get answered [25, 26]. Completeness of answers is often the largest problem: not all relevant information is shared and discussion often centers on common knowledge neglecting rare knowledge [7, 27, 28]. In addition, inaccurate information is sometimes shared, however it tends to be shared in discussions in which accurate information is shared as well [7].

The impact of knowledge sharing in online communities on understanding and decision making is mixed. Researchers have shown that these discussions are used to gain knowledge, sometimes long after the discussion has ended [29]. These communities are valued by participants because they provide opportunities to learn from others' experiences; meet experts; learn of new ideas; learn of new tools and technologies; and get help [1]. However, the use of

these discussions can have negative consequences too. First, it can increase uncertainty because individuals explore more and encounter contradictory information [30]. Second, it can mislead readers when information is incomplete and/or inaccurate [28, 31]. For example, Acar and colleagues [31] found that programmers generated worse, less secure code when using information gathered from an online community. In particular, individuals with less expertise may not reliably choose to read content with the best professional knowledge [32].

Motivations to Share Knowledge Online

In online communities shared knowledge is a public good because it can be accessed and used by anyone in the community. Yet, online communities rely on users to voluntarily contribute knowledge, thus a central challenge faced by online communities is motivating the contribution of knowledge, which takes time and effort [33]. Researchers use social exchange theory to explain why individuals share information, for example, an individual will contribute knowledge if the perceived potential benefits, such as sense of self-worth, social support, and reputation building, outweigh the perceived potential costs, such as cognitive effort and giving up a competitive advantage that the knowledge provides [6].

Researchers have found that intrinsic motivations, in which an individual is motivated by the satisfaction of the activity itself, such as altruism [34] and helping others [35], motivate some individuals to contribute knowledge. While they also have found that extrinsic motivations, in which an individual is motivated to attain a specific outcome, such as building a reputation in the community [36] or anticipated direct and/or generalized reciprocity [37, 38], motivate individuals to contribute knowledge. However, these factors (e.g. altruism, reputation, reciprocity) are better at explaining differences in contribution

among a wide cross-section of community members than among the highest contributing

members [39].

Other factors also increase individuals' likelihood to contribute knowledge,

including developing a stronger sense of identity with the community [19], developing

psychological ownership over community knowledge [40] and one's current level of

knowledge self-efficacy [20, 41]. These factors can be strengthened by effective leadership

in the community [41].

Individual Differences in Knowledge Sharing

Researchers have found large individual differences in how individuals participate in

online communities and online knowledge communities specifically. In general, in online

communities, the majority of individuals do not make any contributions, known as lurking,

which can be explained by the fact that content in online communities is a voluntary, public good

and individuals are susceptible to social loafing [33]. Even among those individuals who do

actively contribute individuals contribute an uneven amount, such that the distribution of

contributions follows a power law distribution [42].

Studies have found that personality affects the type and frequency of behavior in online

communities; for example, researchers have found that those high in neuroticism were less

represented among active contributors and those high in conscientiousness were less motivated

to contribute when they perceived the discussion to be of low quality [43]. Due to low barriers to

entry a subset of individuals engage in antisocial behavior, such as sending off-topic comments,

incendiary comments, and trolling [44]. Although online communities tend to be decentralized

some users take on leadership roles and can be reliably identified by other users [9].

Group Dynamics in Knowledge Sharing Discussions

Researchers have applied common psychological, sociological, and organizational theories to explain group dynamics in online knowledge communities. Social norms develop organically in online communities to regulate member behaviors and to reinforce the goals of the community; for example, a forum for discussing peer-reviewed scientific articles has the rule no personal anecdotes [45]. These norms are enforced by moderation and through the technological affordances of the platform, like collaborative filtering, that allow users to vote on what comments should be prominently displayed [16, 46].

Group identity develops in online communities through a sense of shared identity, such as people with the same chronic medical condition [47]. Researchers also find that increased social presence in an online community, which is the degree to which others are salient in online interactions, is associated with the development of a stronger sense of social identity with the community [48]. Individuals who identify more strongly with the online community contribute more knowledge to the community [48]. Stronger group identification leads to other positive consequences; individuals develop more empathy for others in online health communities, they report more satisfaction with life, for some but not all communities, and they report increased offline civic engagement related to the cause of the community [49, 50].

Researchers have been interested in who shares information with whom. Researchers find evidence of homophily along some but not all dimensions. They find that individuals tend to share information with those who have a similar geographic location and a similar level of expertise [4], however surprisingly others find no evidence of partisan homophily in political discussions [51]. Consistent with social networks in many other contexts, individuals tend toward reading the comments of the most popular contributors, known as preferential attachment [51]. However, when replying there is a tendency away from preferential attachment, suggesting

that individuals tend to provide knowledge to less popular, perhaps newer individuals, in the network [52].

Social capital theory has been applied to online communities and suggests that the relationships between individuals can be a source of important resources. Researchers have found some evidence that norms of reciprocity and direct reciprocity develop within these communities, such that individuals share information with others with the expectation that those specific individuals will return the favor [37, 52]. However, researchers have also argued that there is more evidence of generalized reciprocity, in which individuals share information with others with the expectation that someone else will return the favor [52]. Individuals with greater social capital in the community tend to contribute more knowledge, In addition, for inexperienced members this relationship is bidirectional and contributing knowledge helps them build social capital [53].

Conclusions & Future Directions

Technology has enabled the open exchange of knowledge among online communities not bound by geographic or social boundaries. The affordances of the communication platforms shape the quality of discussion, yet offline social processes, such as homophily, social influence, and social identity, persist with positive and negative impacts on information quality and behavior. Future research is needed to better understand how knowledge is generated collectively; how information of mixed quality is understood and used; and how broader aspects of technology is shaping knowledge exchange in online communities.

Current research shows that individuals engage in collaborative sensemaking in online communities in which they co-create knowledge [8, 21]. More research is needed to understand the processes by which a group co-construct knowledge and arguments. Unlike traditional small

groups, groups formed around a topic in online communities are ad hoc, self-organized, transient, and at least partially asynchronous. The unique dynamics of the groups are likely to moderate the social combination processes by which groups form collective judgements.

Some online discussions contain incomplete and/or inaccurate information. More research is needed to understand what information individuals selectively read in lengthy and dense discussions, whether they leverage social cues (and how) to interpret the information in these discussions, and how they process conflicting and incomplete information. Future research should also expand on the few studies that examine the potential negative impacts of reading online discussions on decision making and offline behavior [7, 31].

Future work is needed to understand the effect of more aspects of technology on knowledge sharing. Platforms increasingly rely on algorithms to filter and organize content, which may help surface important information and/or to increase bias. Research has tended to focus on how social elements of platforms (e.g. handles, profiles) affect community building, few studies have investigated how these social elements affect knowledge exchange [42]. Social elements may encourage knowledge discovery and/or increase polarization. Bots have become commonplace in online communities. Bots can be as effective as human moderators at regulating content [46]; however, they can also be used maliciously to create misinformation campaigns [11].

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**Adopts an ecosystem perspective and investigates knowledge sharing within a focal online community embedded within a larger ecosystem of interconnected online communities. Consistent with prior literature they found that sharing membership with other communities can have a negative impact on knowledge

sharing in the focal community, because individuals have less time and effort. However, they also found that sharing membership with other communities can have a positive impact because individuals that bridge communities have access to external knowledge that they can share with the focal community.

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