

Learning in the Wild: Exploring the Practice of Learning in Open, Online Forums

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Abstract

The Internet provides many opportunities for learning from static resources to conversational spaces for questions, answers, commentary and exploration of topics of interest to participants, whether organized as Q&A sites such as Reddit, hashtag communities on Twitter, or knowledge-sharing sites such as Stack Overflow. Yet, there is limited research on how learning is happening in these spaces. This paper reviews literature and studies about learning in open, online forums to begin to synthesize what is known so far, and to set a research agenda addressing the question: How do people learn in open, online forums? The review builds on work by the author and colleagues, exploring what we refer to as ‘learning in the wild’ (in recognition of Hutchins’ “Cognition in the Wild”, and to reflect the ‘wilds’ of online forums such as Reddit). The increasing use and reach of these sites raises questions not only about what is being learned and what motivates participation in such sites, but also what kind of organization and learning practices are emerging. While it may be thought that such learning, taking place outside the bounds of institutional settings, is informal learning, the research suggests a more complicated picture, dependent on conversation, networks, membership in communities, and community practices, needing to be addressed by drawing on multiple disciplinary perspectives.

Keywords

informal learning; online learning; Q&A sites; open, online forums; networked learning

Learning in Open, Online Forums

The Internet provides many opportunities for learning, from the resources on Wikipedia pages, YouTube videos, online news, books and journals, to the interactive learning opportunities of online courses and knowledge communities. Within this resource network and ecosystem, areas of discussion and learning are growing, happening in open, online forums such as the Q&A sites Reddit or Quora, hashtag communities on Twitter, and knowledge-sharing sites such as Stack Overflow and Facebook groups. These social media sites offer an arena for discussion that is contributed to, led, and moderated by members of the site, where topics are crowdsourced, questions asked and answered by moderators and participants who comment and present information in informed, accessible ways. Such sites are thriving: Reddit attracted almost 1.7 billion visits in July 2019 (Statistica, 2019a); Facebook has 2.41 billion monthly active users as of the second quarter of 2019 (Statistica, 2019b); and Stack Overflow had 2 million questions, 2.5 million answers, and over 1.6 million new users joining the community in 2018 (Stack Overflow, 2019). Yet, there is limited research on how learning is happening in these spaces.

The author and colleagues have been working for a number of years studying the practices of learning online, observing and researching the trends toward more learner-centred participation. Most recently we have turned our attention to how learning happens in open, online forums, asking the overall question: *How do people learn in open, online forums?* Our research includes in-depth evaluation of learning and motivations to participate in crowdsourced and social media based communities, including OpenStreetMap, Twitter, Reddit, and Stack Overflow (e.g., Budhathoki & Haythornthwaite, 2013; Gruzd & Haythornthwaite, 2013; Gilbert & Paulin 2015; Gilbert, 2016, 2017, 2018; Haythornthwaite, Kumar, Gruzd, Gilbert, Esteve del Valle & Paulin, 2018; Sengupta & Haythornthwaite,

2020). Different studies have included surveying and interviewing contributors, moderators, and lurkers about their motivations to participate and their experiences in these forums; identifying relational exchanges that support learning and community; and evaluating discourse patterns in open, learning online sites. We have chosen to refer to our research as examining ‘learning in the wild’ in recognition of the ideas of Edwin Hutchins in his work on “Cognition in the Wild”, and to reflect the ‘wilds’ of some of these open online forums (e.g., Reddit) with their absence of traditional etiquette, and educational and organizational structures (Haythornthwaite, et al, 2018).

In researching the new, open arenas for learning, we found that much of the research focused on understanding online interaction in formal educational settings (e.g., Massively Open Online Courses), with limited examination of learning in open, online forums. Moreover, research that does exist can be found across a number of disciplinary domains. In response, we have found it productive to draw on a number of areas of inquiry that are synergistic with learning and online interaction, including areas that address individual, group, and community goals and practices, societal transformations in who learns what from whom and via which media, and theories, research and new practices in knowledge dissemination, construction and sharing.

This review is based in part on the literature reviewed for our studies, but expanded and with the purpose of setting an agenda for wider review and further research on learning in the wild. The following outlines the areas of consideration we have found productive so far and/or see as grounds for further research. This is presented as a starting place for engagement with other researchers and for a more systematic search and review of the literature. The expectation is that understanding the organization and practice of open, online learning will show how such sites can be designed and harnessed as independent sites for learning, as adjuncts to learning for work, career and formal education, and/or as support for individual, community, and societal goals for knowledge exchange and development.

These areas include:

- Learning Framework, examining assumptions about how open, online learning is or should be organized, e.g., whether open, online learning follows the principles of formal or informal learning, or some new form of practice
- Social Learning, and in particular conversational and community approaches to learning
- Community of Practice, adding to social learning the need to learn about the social, i.e., the norms and practices of the learning environment
- Social Networks, addressing the networks of relations and connectivity that structure and support learning
- Motivations to Participate, addressing what motives individuals, and how to motivate contributions and knowledge sharing in a way that meets the needs and practices of the community
- Synergistic Literature, discovering literature that adds further insight into practices of open, online learning.

Learning Framework

Perhaps the first question to ask is: *Is the kind of learning happening in open, online forums formal, informal or some hybrid?* The answer is relevant for designing and participating in such forums. Yet, as new learning venues, we do not know whether open, online learning sites form along the lines of formal or informal learning sites (Greenhow & Lewin, 2016).

A difficulty in pinning this down is that there are varied definitions and delineations of the scope of informal learning, including anything outside a formal, educational setting to the teaching that occurs in the family as adults show children how to accomplish tasks at home.

Perhaps the most useful distinction in the context of our focus is that made by Smith (2008, online): “[I]t can be argued that informal education is largely driven by conversation (and has formal interludes), while formal education is curriculum-driven (and has informal interludes).” Open, online learning aptly fits this description: not only is the process of learning driven by conversation (online posts and responses), but also the topic, scope, and domain of learning is driven by community-agreed practice. The genre of conversation drives both the formation of the discourse community (Miller, 1994) and the epistemic community (Knorr-Cetina, 1999).

A definition by the Center for Advancement of Informal Science Education (CAISE) highlights the role of experts even in informal education: “When we talk about the field of informal science, or STEM, education, we are referring to experiences and settings that are being designed, implemented and assessed by a community of dedicated, trained practitioners” (<https://www.informalscience.org/what-informal-science>). However, it is not necessarily ‘trained practitioners’ who provide information and explanation in open, online sites; nor are the open, online settings or experiences designed by such practitioners. Community experts teach community novices (gurus and newbies), credentials are evaluated and assigned internally (e.g., Reddit ‘flairs’, Stack Overflow ‘points’), privileges are granted proportional to demonstrated practice (e.g., user access levels on Wikipedia; <https://en.wikipedia.org/wiki/Wikipedia:Administration>), and management of norms and rules of behaviour arise from participant use (e.g., Chandrasekharan et al, 2018).

Perhaps this type of learning represents a new class of self-organizing learning, leading to new ideas about how learning happens (e.g., as ‘over-the-shoulder’ learning describes a new way of learning computer applications; Twidale, 2005). While outside the classroom, there do seem to be formal role designations present in open forums, reproducing by internal consent the role of authorities, some for knowledge (internally determined expert designations), and some for administrative oversight (moderators).

In general, we find formal vs informal distinctions less productive as a way to understand open, online learning than considering how learning happens among adults, in communities, between peers, and in pursuit of knowledge. However, one reason to continue with these distinctions is to see what transfers from research on formal and informal learning into the open environment. Thus, we leave this open as an area to be explored further in an overall research agenda relating to open online learning.

Social Learning

A number of theories support the conversational and community approach to learning, most notably social learning (Bandura, 1977) and the community of practice (Wenger, 1998). Social learning holds that learning occurs through observation; the learner (e.g., a child), chooses to imitate (or not) the behaviour according to the reactions observed. For adults, apprenticeships provide a framework for this kind of learning by observing and doing, with master craftsman modelling appropriate practice (legitimate peripheral participation, Lave & Wenger, 1991). In open, online environments similar learning processes have been described as individuals lurk before posting, and observe inappropriate behaviour being sanctioned (Haythornthwaite & Andrews, 2011; Preece, Nonnecke & Andrews, 2004; McLaughlin, Osborne & Smith, 1995).

A slightly different take on social learning by Buckingham Shum and Ferguson (2012) emphasizes the ‘social’ aspect of the interaction. In analysing online social learning they write that, “the focus ... is on processes in which learners are not solitary, and are not necessarily doing work to be marked, but are engaged in social activity, either interacting directly with others (for example, messaging, friending or following), or using platforms in which their activity traces will be experienced by others (for example, publishing, searching, tagging or rating)” (Buckingham Shum and Ferguson, 2012, p. 5). This definition, while emphasizing the informal nature of the learning process online, expands notions of social learning beyond observation to what we might call *socializing as learning*. As found in support of online communities, the combination of social interaction with learning can be an important component of online learning, creating the ‘safe’ space for collaborative learning (Bruffee, 1993).

Buckingham Shum and Ferguson's definition also directs attention to social learning among peers. Where the learning is between peers, theories of relevance include collaborative learning and computer-supported collaborative learning (CSCL) (Bruffee, 1993; Koschmann, 1996; Stahl, Koschmann & Suthers, 2006). Learners help each other to gain knowledge and solve problems, while also creating the environment where it is possible

to ask questions. Expert learning and knowledge construction comes into play as emphasized in development of new knowledge and the way experts work together (Scardamalia & Bereiter, 2006). Further, this definition also echoes the work on persistent conversation (a concept defined by Tom Erickson and Susan Herring), i.e., the activity traces left in the forum record. While many use the term ‘traces’ to refer to the record of human interaction that creates data suitable for analytics and learning analytics, recent work also shows the equally important actual record of questions and answers. This record forms a knowledge base of an FAQ library within the site. Research is beginning to document how the persistent record is being used as a reference source in open forums (e.g., Gilbert, 2018), and how users gain recognition for working with that record: Reddit recently added a flair for the “FAQ finder”, who finds already published answers to newly posed questions; Stack Overflow gives ‘points’ that add to status of users who carry out this function. Thus, sites are not only locations of interaction, but also repositories of knowledge.

A rapidly growing area of analytics makes use of activity traces to examine learning, both formal and informal, with a number of studies analysing argumentation in learning and online settings. This includes work in learning analytics (Siemens & Gašević, 2012; Teasley, 2019), interaction analysis (Gunawardena, Lowe & Anderson, 1997), persuasion (Khazaei, Xiao & Mercer, 2017), and exploratory dialogue (Mercer, 2004; Ferguson, Wei, He & Buckingham Shum, 2013; Ziegler, Paulus & Woodside, 2014; Haythornthwaite, et al, 2018;). Learning and following effective argumentation practices plays a large role in open, online learning, determining how to present to the forum audience, and identifying what is considered a good or useful presentation of opinion or facts (Wise, Hausknecht & Zhao, 2014; Gilbert, 2018; Sengupta & Haythornthwaite, 2020). Of interest here is also the way authentic dialogue happens online, and the norms that support trust in the knowledge exchanged in the online space (e.g., by norms associated with backing up claims with a reference, such as citing sources as a standard in AskHistorians on Reddit; Gilbert, 2018). As noted by Allen (n.d., online): “Authentic dialogue is the last necessary feature of a collaboratively rational process: it requires that all participants in the conversation must be fully informed, with mutual assurance of the legitimacy, comprehensibility, accuracy, and sincerity of what is brought forward by all.”

We leave this section considering the need for *further research on the ways in which social learning defines and supports open, online learning*, and how this relates to the production of a record of knowledge, and to trust in site information.

Community of Practice

It is not just learning of subject matter that happens in online settings. Conversations contribute to individual learning and to group practice. Thus, we add to social learning *the need to learn about the social*, i.e., the rules and practices of the local environment – the local mix of resources, opportunities for learning, and expectations (Smith, 2008). This is not just an instrumental learning of procedures, but also a *communal group meaning-making process*, which has been argued is an add-on to informal learning (Ziegler, Paulus & Woodside, 2014).

Learners entering online conversations join or create new communities of practice (CoP), where rules, norms and communal identity are defined and reinforced (Wenger, 1998; McLaughlin, Osborne & Smith, 1995; Chandrasekharan et al, 2018). Research on both virtual communities and group behaviour show that the task of learning how to be a member of such a community or group can be a major hurdle to participation. The need for such learning is evident in the terms used for new online users (newbies, apprentices, lurkers) and more advanced users (experts, wizards, gurus). Sanctioning those who do not follow the rules is common in online forums, often the job of moderators who keep participants in line about appropriate language, expertise, and genre of posting.

Previous work addressing online forums has often comes back to the need to organize collective action and expression in a way that allows work to get done – whether the project is career, education, or socially related, and whether the work to be done is launching a product, creating or delivering knowledge, or building a community (e.g., Nardi, Whittaker, & Schwarz, 2002; Orlikowski, 2002; Renninger & Shumar, 2002; Hine, 2006). Research on collaborative learning has been particularly focused on the way interaction facilitates peer observation, evaluation, and learning (Koschmann, 1996; Stahl, Koschmann & Suthers, 2006; Buckingham Shum & Ferguson, 2012; Paulin & Haythornthwaite, 2016). Research in group behaviour provides background on small group processes that may transfer to forums such as Twitter hashtag groups. Further, the group literature provides substantial work on the initiation, development and maintenance of groups, which has further

informed understanding of both virtual communities and online learning forums (McGrath & Hollingshead, 1994; Poole & Hollingshead, 2005; Haythornthwaite, Kazmer, Robins & Shoemaker, 2000; Haythornthwaite, 2006; Nardi, Whittaker, Schwarz, 2002; DMTL, 2019). The sum of this research finds that online communities do operate as communities of practice (Wenger, 1989), sustained through continued collaborative practice. Moreover, internal practice balances with external focus, with motivations for contribution including both coorientation to the goals of the forum and to a commitment to the inner workings of the forum (Haythornthwaite, 2009; Budhathoki & Haythornthwaite, 2013), a dual orientation also well documented in the group behaviour literature (e.g., McGrath, 1984).

While many of these efforts carried with them the organizational structures of workplaces (contracts, roles and duties associated with a project or education), open, online forums have generally lacked the traditional frames of reference that come with established institutions, such as rules of behaviour, defined ways of moving up the ranks, and organizational and legal sanctioning procedures. Online forum members by contrast have worked to establish their own rules for success, defining and supporting the roles and rules that afford collaboration: bringing in the lurkers (Preece, Nonnecke & Andrews, 2004), rewarding active participants (e.g., Reddit's flair notations); establishing roles to manage content and behaviours, such as moderators who keep out the trolls, curtail off-topic discussion, manage inappropriate postings (McDonald, 2017; Roberts, 2019); articulating appropriate behaviours and sanctioning transgressors; and learning to work with the technologies and their limitations.

As norms are learned as part of any educational experience, questions arise about *what norms are being learned? And, how will these serve the individual learning them?* Formal education has been tied to building and promoting accepted practice, building cultural capital associated with current societal norms, including the norms of formal education (e.g., Lankshear, Peters & Knobel, 2002; Crook, 2002). What kind of capital is being acquired and valued when learning happens through open, online forums? What norms are learned and practiced from engagement in open, online learning forums? This is another area for further consideration, examining how the norms of open, online learning blend into other educational and workplace learning practices.

Social Networks

A number of approaches to online learning, and open, online learning emphasize network aspects – i.e., who talks to whom about what – whether relating to the way technology enables connectivity or addressing the kinds of social network relations and ties built through interaction. Working, learning and socializing are increasingly oriented around social networks rather than geographical connections (Rainie & Wellman, 2012), and woven into everyday practice as ubiquitous learning (Cope & Kalantzis, 2009). Networked learning directs attention to explicit use of the interconnectivity possible through information technology (Jones, 2015). Learning networks emphasize the social network structures that emerge from learning interaction, concerned with who talks to whom about what, how ties build in networks and what constitutes a learning tie, and how interaction identifies social network roles (Haythornthwaite, 2015, 2019). Networks form the structures that define online, learning communities. Social network perspectives describe the way knowledge held within a network forms the social capital supporting all members of the network (Lin, 2001). Such knowledge includes the resources left in the persistent record as described above, and the knowledge available from the people in the network – their expertise, and also their willingness to share it. Thus, the social capital of a learning network may heavily depend on who is part of the network, and their willingness to participate by sharing knowledge.

A network focus may be on the whole network connectivity among people and/or resources, or on the way individuals manage their personal learning environments and individual learning ecologies (Luckin, 2010; Nardi & O'Day, 1999). Connectivism, described as a learning theory for the information age (Siemens, 2005), highlights using a combined set of online places and spaces to create personal learning platforms supporting individual knowledge needs and management. Open, online forums may act as an element in those ecosystems, and reviewing the research may provide studies of supplementary or complementary use of sources and resources. Connected learning (Ito et al, 2012) emphasizes individual direction in establishing the direction of their learning, and as such connects to ideas of self-directed learning (Hase & Kenyon, 2000).

The benefit of a social network analytic approach is that it can reveal structures not identified in formal organizational roles. Just as the FAQ finder role was present before being named, other roles may be emerging in support of open, online learning. Thus, this points to a methodological approach to support the research agenda on open, online learning that can help identify interaction patterns of significance to the community of learners.

Motivations to Participate

Success of online learning communities depends on individuals being motivated to share knowledge in a way that meets the needs and practices of the community. In part, participation in these forums follows more general societal transformations in acceptance of peer production, online participation, online learning, and open repositories as viable and trustworthy practices (Benkler, 2006; Ito et al, 2012; Jenkins, Clinton, Purushotma, Robinson, & Weigel, 2006; Haythornthwaite & Andrews, 2011). The practices that started with collaborative programming efforts and open source software (Raymond, 1991), can now be seen in open learning for computer programming, e.g., through Stack Overflow. A number of studies address motivations to contribute to open source and open access projects, including Wikipedia (Bryant, Forte, Bruckman, 2005; Farič & Potts, 2014), geographic information systems (Budhathoki, Nedović-Budić, & Bruce, 2010), and citizen science projects (Crowston & Fagnot, 2018). Motivations have been found to include personal and career interests, orientation to the topic and to open knowledge, and to the aesthetics of the products (Budhathoki & Haythornthwaite, 2013).

Not discussed in this literature is the way Q&A sites have the particular challenge of not just adding content, but of responding to questioners in a way that meets their needs. The kind and format of a question may signal to an answerer whether the asker is a novice or expert, and thus provide information about how to form an answer the question. Technical features may provide for a community level 'smoothing' to answers, e.g., as in the way comments on Stack Overflow may clarify questions or answers (Sengupta & Haythornthwaite, 2020). Overall this suggests that a newer research agenda may pursue *how people learn to teach others* in these open, online forums.

Synergistic Literature

The background discussed so far concentrates on the social in various forms, with learning supported through the conversations and enlargement of experience enabled through the actions of reading, asking questions, reading responses, and engaging with a learning community. Beyond the specific work that addresses learning, a number of synergistic areas relate to the overall aim of understanding what kind of learning is happening in open, online forums. As collective and crowdsourced initiatives, research on virtual community, online groups and teams, crowdsourcing, and citizen science is relevant; as voluntary endeavours with voluntary participants, research on motivations, volunteerism, peer production and participatory culture are relevant; and as technology platforms, research on socio-technical systems are relevant. In brief, promising areas for synergistic literature include new synergies being explored at the intersection of the *information and learning sciences* (Ahn & Erickson, 2016; Reynolds et al., 2019), including 'search as learning' (Vakkari, 2016), and transformations in scholarly communication practices (Haythornthwaite, Andrews, Fransman & Meyers, 2016). A large body of work on *distributed knowledge* including distributed cognition (Resnick, Levine & Teasley, 1991), e-science (Hine, 2006), knowledge co-construction (Scardamalia & Bereiter, 2006) and more. *Citizen science* studies sites echo work on open, online learning, with research on newcomers, peripheral participation, contribution patterns, and the role of 'talk' (e.g., Jackson, Østerlund, Maidel, Crowston, & Mugar, 2016; Jackson, Østerlund, Mugar, Crowston, & Hassman, 2015; He, Parrish, Rowe & Jones, 2019).

Summary

This paper drew on research literature and results from our studies of online learning and learners. As a major transformation in learning practice, a key consideration is developing a research agenda to explore how learning is happening in open, online forums. This includes examining how practices are providing new knowledge bases and learning opportunities for individuals; how community dynamics play into successful learning; and how this activity supports knowledge, learning and cultural capital for individuals and communities. The questions and areas discussed here are not comprehensive of all approaches to be taken to

open, online learning, nor of the questions to be asked. They are presented as a starting points for engagement with others about this new experience of 'learning in the wild'.

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