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BEYOND LURKING: THE INVISIBLE FOLLOWER-FEEDER IN AN ONLINE COMMUNITY ECOSYSTEM

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Abstract

Invisible members of online communities; those who access, but do not post material, have traditionally been conceived of as being inactive, peripheral, non-productive participants. The term lurker connotes a poorly understood, low-value and marginal role, characterised by a reluctance, or lack of readiness, to contribute. This paper argues that in today's complex, multimodal online communities, the lurker concept is too simplistic. Combining the concept of polycontextuality with boundary spanning theory, it proposes an alternative way of conceptualising invisible online roles. It reports on a study investigating knowledge transfer in online communities, where a subset of influential and active, yet 'invisible' online participants was discovered. These participants, follower-feeders, spanned the online-offline community boundary, acting as online followers and offline leaders. They communicated with online leaders, using low-visibility online means, and played a key brokering role in transferring knowledge from online to offline contexts. It is argued that the online community is best seen as part of a larger, polycontextual community ecosystem, comprising diverse online and offline contexts – community engagement spaces – and that the nature of value of roles in this ecosystem is best understood by focusing on understanding cross-boundary social activity and knowledge transfer, rather than by investigating online interactions only.

Keywords: Online community, lurker, boundary-spanner, knowledge broker, polycontextuality, knowledge transfer, follower.

1 INTRODUCTION

Invisible members of online communities – those who access, but do not contribute to shared online spaces – have traditionally been conceived of as being inactive, peripheral and non-productive participants. The term *lurker*, when used to describe such individuals, connotes a poorly understood, low-value and marginal role, characterised by a reluctance, or lack of readiness, to contribute to the community more fully. Although it is thought that lurkers may make up the majority of many online communities (Nonnecke and Preece, 2000; Nonnecke et al., 2004), there is a limited understanding of what value these individuals may provide, or indeed, whether they provide any value. We argue that in today's often complex and multimodal online communities, the concept of the lurker is too simplistic, and that studies of invisible online participants should consider the full range of their online activity (including, for example, use of instant messaging, email and Twitter) as well as their activity across the online-offline community boundary. Combing the concept of polycontextuality with boundary spanning theory we suggest, then illustrate, an alternative way to understand the nature and value of invisible online roles.

The paper begins with an overview of research on the lurker role, the lurker's perceived impact in online communities, and associated issues. We then outline limitations of the lurker concept, emphasising recent changes in the pervasiveness and embeddedness of technology, the rapid diffusion of Web 2.0 tools and social technologies, and the nature of what constitutes an online community. Following this, we present a case for taking an alternative, multimodal view, in which the community is conceptualised as a series of diverse online and offline engagement spaces, characterised by multiple boundaries. With reference to boundary-spanning theory, we suggest that this offers a valuable new way of conceptualising the role of the so-called lurker. We then report on the results of a research project that investigated how online communities facilitated professional change amongst communities of teachers in a professional development programme. A subset of members with an invisible online presence were found to play the active role of *follower-feeder*, following online leaders, communicating with them online using behind the scenes means, and transferring their ideas to their own followers via face-to-face communication in the workplace. The paper concludes with a discussion of the implications of this study for research and practice.

2 LITERATURE REVIEW

2.1 The Online Lurker

The *lurker* is an invisible participant; someone who may read, but does not contribute posts to shared online discussion spaces, in the online community to which they belong. While lurkers are typically seen as being inactive or silent (Leshed, 2005) participants, the means used for defining the lurker role varies. Preece et al. (2004) define a lurker as someone who has never posted, while others include those who are infrequent posters (Ridings et al., 2006), or who have not posted in recent months (Nonnecke, 2000; Nonnecke and Preece, 2000). According to Preece et al. (2004), researchers in the dot.com era took a dim view of lurkers, considering active posters as the only legitimate community members (Beaudouin and Velkovska, 1999; Parks and Floyd, 1996). Lurkers were even portrayed as presenting a problem for the community. For example, Kollock and Smith (1996) characterised non-active Usenet participants as selfish free-riders who impacted on the community by wasting valuable bandwidth and exploiting the collective goods produced by others (p.9). Turn-of-the-century demographic studies revealed that in many online communities the majority of members are lurkers (Jones and Rafaeli, 1999; Nonnecke and Preece, 2000), and it is now seen as vital for community stakeholders to better understand the lurker role. Negative views of the lurker have been supplanted, largely as a result of Nonnecke's work, (Nonnecke, 2000; Nonnecke et

al., 2006; Nonnecke and Preece, 1999, 2000; Nonnecke et al., 2004) with a marginally positive view. Studies have revealed that lurkers may sometimes identify as community members (Nonnecke and Preece, 1999) that they may be accepted as such by more active members (Preece et al., 2004), and that they may learn vicariously through engaging with the reported experiences of others (Arnold and Paulus, 2010).

Soroka and Rafaeli see lurking as arising from both situational and dispositional factors (2006), while Nonnecke and Preece argue that lurking is fundamentally a situated activity: the same participant may lurk in one community and actively post in another (1999). They stress, however, that *"lurking is not a single behaviour, but a complex set of behaviours, rationales, and activities situated in a rich space of possibilities"* (Nonnecke and Preece, 1999, p.3). In light of these understandings, Nonnecke (2000) has advocated use of the term non-public participant , while Leshed (2005) has proposed a multidimensional model (with intensity and publicity axes) to acknowledge the complexity of online participation. Nonetheless, the catchy term *lurker*, with its pejorative undertones, appears to have stuck.

Recent studies have investigated the motivations of lurkers (e.g., "Online Lurkers Tell Why" (Nonnecke et al., 2004), aiming to provide community owners with a better understanding of their invisible majority. Some of these studies are focused on how to promote so-called *delurking* or conversion of lurkers to non-lurkers. For example, Soroka and Rafaeli (2006) study the triggers to active online participation, while Ridings et al. (2006) and (Kucuk, 2010) examine the psychological barriers to posting behaviour, arguing that it is desirable for lurkers to be converted into active users in order to ensure the refreshment of core members so as to ensure the survival of community.

Despite the early recognition that members of an online community may have *"a multitude of back-channels of communication that often escape our examination"* (Kollock and Smith, 1996, p.5), there appears to be little, if any, research that consider how the online lurker interacts with others via these back-channels, such as email. In addition, few studies focus on understanding the role(s) played by the online lurker in the offline world, and how this might relate to their online lurking experience. An exception is a project evaluation by Willett (1998) and a subsequent study by Takahashi et al. (2003) which investigates the influence of lurkers outside the online community. These studies identify a new category of lurker; the *active lurker*, who transfers the knowledge gained from lurking in the outside world. Takahashi et al. subdivide the *active lurker* into two subcategories: the *active lurker as propagator* – someone who propagates information or knowledge they have gained online to others, and the *active lurker as practitioner* – someone who uses this information in their own, or their organisation's, activities (p.2). In a more recent study, Arnold and Paulus (2010) report finding that vicarious learning occurred amongst inactive users of the social networking site, Ning. They conclude that *"this calls into question out reliance on visible online behaviours as evidence for what happens in online environments"* (p.195).

2.2 Towards a Reconceptualisation of the Lurker

Studies such as those by Takahashi et al. (2003) and Arnold and Paulus (2010) suggest that focusing on lurking *per se* may not be the best way to understand the activity and value of invisible community participants. We go a step further, and suggest that the concept of the lurker has limited relevance in today's often complex and multimodal communities. Furthermore, we challenge the usefulness of the label online community. Building on the arguments of Castro (2004, 2006), ethnographic researchers (Garcia et al., 2009) and cognitive scientists (Engeström et al., 1995; Goodwin, 1990; Reder, 1993) we argue that today it is more useful to view the community as a holistic, polycontextual communication environment comprising diverse engagement spaces – differentiated online and offline communication contexts, within a larger community ecosystem. We suggest that in order to better understand the nature and value of roles, it is necessary to investigate the activity and

interactions of individuals across the boundaries of these engagement spaces, and the ways in which this influences knowledge transfer. According to this view, the individual can be seen as continually crossing between specialised communication contexts (Cranefield and Yoong, 2009). Any context-specific behaviour, such as lurking, should therefore be recognised as being only part of the picture.

Since the first wave of studies into online communities, there have been significant changes in the range and pervasiveness of online communication technologies, the ways and extent to which, online tools are used, and the very nature of what constitutes an online community. In the last two decades there has been not only a vast increase in the range of available communication technologies, but also a paradigmatic shift. The advent and rapid uptake of readily available Web 2.0 tools have given individuals an unprecedented degree of control over self-publishing, at low cost, while the massive uptake of social networking technologies has made it possible for individuals to participate in a world of extraordinary inter-connectedness, and indeed sometimes difficult to escape this world. Freely available tools such as wikis, blogs, social bookmarking tools, and Twitter, foster peer-to-peer communication and co-exist with more traditional closed community platforms such as discussion forums.

Early research into online communities was conducted in the context of bounded online spaces, such as discussion groups and facilitated forums, making it easy to distinguish a community from a network. However, studies conducted in Web 2.0 settings challenge traditional conceptions about what constitutes an online community. For example, Efimova and Hendrik (2005), Hodkinson (2004), Wei (2004) and Kaiser et al. (2007) have identified online communities in the high-density areas of reciprocal connections in blogging networks. In these blog-based communities, discussions are neither bounded nor facilitated, but distributed amongst the blogs of members who employ practices such as tagging, RSS feeding and social bookmarking, to monitor the conversation. Similarly, Murillo (2007) has identified online communities in the dense areas of Usenet discussion networks.

Castro (2004; 2006) argues that with so many open communication channels, today's online communities operate in a "universal theatre", overlapping with many other online communities that deal with the same subject (2004, p.6). He proposes a model of an open conversation space in which an individual may participate as a core member in some communities and in a peripheral way in others; the Community of Practice *Conversation Space Ecosystem* (2004, 2006). This ecosystem is made up of overlapping communities containing groups of people who have a shared practice or interest, and their conversations. According to this model, *"information gathered in one place…may have an echo and reflection in several ways across the conversation space*" (2004, p.8). Castro's model is synergistic with Nonnecke's finding that lurking is a situated, or contextual, behaviour, and has implications for how to approach the future study of individuals' roles. How does information move from space to space within the online ecosystem? What roles and behaviours are associated with such movement? However, Castro's model is limited in that it accounts only for members' online activity. We argue for an extension of the ecosystem concept to include offline communication contexts.

Garcia et al. (2009) convincingly argue that technologically mediated communication is now so strongly merged into daily life that making a distinction between online and offline worlds is of limited use. Citing ethnographic studies by Lyman and Wakeford (1999) and Ruhleder (2000), they take the stance that *"there is one social world that contains both traditional and technologically advanced modes of communication",* and that researchers should take account of this multimodal reality, rather than arbitrarily exclude either the virtual arena or the other from their studies (p.54). The potential value of integrating face-to-face settings in an ecological model of community becomes clearer when the offline world is also conceived of as a set of multimodal, or polycontextual, environments. Workplaces are polycontextual in

that they comprise different communication contexts, such as workshops, meetings, cafes, etc. Goodwin (1990) describes such contexts as professional *micro-worlds* that provide *"particular forms of access, structures that shape perceptions and talk, ways of acting etc."* (p. 46). Studies of expert cognition have demonstrated that polycontextuality can contribute to professional learning in situations of novelty (Engeström et al., 1995; Goodwin, 1990; Reder, 1993). This is because, as workers move between different activity contexts, they integrate knowledge from, and across, them.

Building on the studies outlined above, we argue that today's communities operate with a complex, polycontextual ecosystem comprising diverse online and offline settings, and that this should be recognised in the framing of research. When taking a system-level view, the poster/lurker role division takes on questionable relevance – both lurking and posting are contextual behaviours, so these role labels lack significance at system level. From a community-as-system perspective, we suggest there is potential for investigating the activities and behaviours of individuals as they cross between different community contexts. For example, as well as moving between online and offline environments, an individual may cross between public/private and formal/informal contexts. We suggest that it may be useful to examine roles using a boundary crossing lens.

Research into knowledge transfer has highlighted the importance of *boundary crossing* in the difficult task of moving knowledge from one context to another (Ancona and Caldwell, 1992; Wenger, 1998; Carlile, 2002, 2004; Harada, 2003; Pawlowski and Robey, 2004). A *boundary spanner* is a person who spans different functional groups or community settings, understands the culture and norms of each and is, theoretically, in a position to facilitate the transfer of knowledge between such settings (Awazu, 2004; Prusak and Cross, 2002; Tushman and Scanlan, 1981; Tushman, 1977). A boundary-spanner who actively facilitates the transfer of knowledge across different settings is known as a *knowledge broker*. Knowledge brokers perform valuable, typically unofficial roles, identifying context-specific knowledge needs and opportunities, promoting new ideas and facilitating their uptake across contextual boundaries by translating, recombining and/or adapting knowledge so as to increase its accessibility and fit with the recipient context (Brown and Duguid 1998; Davenport and Prusak 1998; Harragon and Sutton 1997; Wenger 1998).

The community-as-system view, outlined above, provides an opportunity to examine community roles using a boundary-crossing perspective. Of particular interest is the *active lurker* role: Although it is known that the active lurker propagates knowledge outside of the online setting in which they lurk (Takahashi et al., 2003), little is known about how and why this propagation occurs. In support of this view, and to help address this gap in the literature, we outline the results of a study in which we identified the boundary-spanning practices of a group of such individuals.

3 MOTIVATION FOR THE STUDY

Our study employed a case research strategy (Yin, 2003) in the interpretive tradition, using qualitative methods and applying an inductive approach to analysis and theory generation. Prior to outlining our research context and motivation, it is important to note that we did not develop an a-priori model or theoretical framework with which to test or analyse our data. The perspective which we have argued above emerged, as is characteristic in this style of research, through the iterative and recursive process of data gathering, analysis and theory-development, as we alternated between an inductive process of analysis and an interfolding of existing literature and theory with our emerging findings.

The study was motivated by a lack of understanding of how online communities promoted the deep transfer of professional knowledge. It aimed to understand the process through which professional knowledge is *embedded* (contextualised and integrated into interpretive

frameworks and work practices), and to identify the technologies, roles, and other factors that contribute to deep transfer, or embedding.

Various claims have been made about how online communities facilitate knowledge transfer amongst professionals and help them keep abreast of a changing knowledge (Hargreaves, 2003; Hew and Hara, 2007). Online CoPs are seen as militating against the barriers of distance, time and professional isolation, as increasing opportunities for knowledge sharing, as making interactions more visible, and as sustaining these interactions and extending their reach (Davenport, 2004; Hara and Kling, 2002). Johnson (2001) suggests that online CoPs change norms, making it easier to share ideas. It has also been argued that online CoPs can act as an equaliser, removing traditional social barriers to participation (Baker-Eveleth et al., 2005; Harasim, 1990), reducing psychological distance (Rovai, 2002) and promoting shared understanding (Baker-Eveleth et al., 2005). There is, however, little research that provides evidence to support these purported benefits. Although it is known that knowledge transfer can occur in distributed online settings (Sarker et al., 2005; Zhang and Watts, 2003), there is a poor understanding of *how* this occurs. Studies of online communities rarely go beyond identifying knowledge sharing and its antecedents to consider whether, and how, such activity achieves deeper transfer. Also, as noted above, our understanding of roles in online communities is limited and does not appear to fit the current reality. Our study aimed to address this lack of understanding. It was guided by the overarching question, *How do online communities of practice (CoPs) facilitate the transfer and embedding of professional knowledge?* and the subsidiary questions, (a) *what technologies, roles, and other factors help online CoPs to embed knowledge?* and (b) *what is the nature of the knowledge embedding process in online CoPs?*

New Zealand's school system provided a context in which the above issue was strongly topical: The government had embarked on a strategy of *embedding* knowledge about effective teaching at system level, at the same time aiming to capitalise on a significant investment on ICT infrastructure. It had placed an onus on professional communities, including online communities and networks, to help achieve this (Ministry of Education, 2005, 2006).

4 RESEARCH METHOD

As noted above, the study employed a case research strategy and qualitative methods. According to Yin (2003), case research is the most suitable approach when the researcher has little control over events, the focus is a contemporary phenomenon in a real-life context, and/or if how or why questions are asked. All three conditions were present in this study. The case was a 3-year national professional development programme, in which clusters of schools participated. The programme's aim was to integrate ICT into teaching practice in a way that increased teaching effectiveness, supporting a new, student-centred pedagogy. (Appropriating the terminology of interviewees, we came to call this *the new way*). For many participants, this new knowledge amounted to a paradigm shift, challenging their role, their relationship with students, and their understanding of what comprised effective practice.

We conducted semi-structured interviews with 41 members of four blended CoPs (cluster communities which combined online and face-to-face activities). The participants were teachers, lead teachers (change agents), school leaders (principals and deputy principals) and facilitators. We conducted two rounds of interviewing, refining questions as themes emerged. In the course of data gathering, we found that a subset of key individuals belonged to a further online CoP; an unofficial, informal online community of distributed educators which overlapped with the formal cluster communities, and made strong use of Web 2.0 technologies. In order to better understand the role of this community, four additional members were interviewed. In addition, we collected secondary data, in the form of milestone

reports, online community forum records, Skype transcripts, blog content, Del.icio.us and Twitter records, and records from an annual conference attended by some participants.

Using an inductive approach, we coded data using text analysis (Cresswell, 2003) and NViVo software, gradually reducing a large set of preliminary codes to create bridging and theoretical codes as relationships and trends relating to the research question emerged. This was a recursive, iterative process that overlapped with the later stages of data gathering. Our approach to ensuring *trustworthiness* (Lincoln and Guba, 1985) included running members checks, documenting the recursive nature of data gathering and analysis, triangulating data sources, and creating an audit trail. We confirmed the preliminary results at a series of workshops with participants, who were invited to comment further via an anonymous wiki. An ongoing aspect of theory development was the comparison of emerging results to the existing theoretical literature. This is described by Eisenhardt (1989) as the enfolding of literature. Juxtaposition of emerging theory with conflicting literature is seen as beneficial in that it forces a more creative, frame-breaking mode of thinking (p.544). This can lead to deeper insights concerning both the emergent theory and the conflicting literature.

5 FINDINGS

5.1 Overview

One of the four cluster-based online communities had entered a period of inactivity, but the other three (CoPs A,B, and C) were found to form part of a complex, tiered ecosystem of overlapping online communities. Although they were interconnected via an official resource site, listserv and forums, reported engagement with these formal community spaces was limited. Analysis of interviews and online connections revealed that knowledge transfer within and between these official CoPs occurred largely as a result of their overlap with the non-official community, CoP E. This was an open, highly active Web 2.0-based community of leaders, change agents and facilitators from ICT professional development (PD) clusters and affiliated schools, located within a global network of edubloggers – educators who interacted via blogs and other tools. Its members were united by a passion for, and belief in, the potential of ICT to transform learning when used in a student-centred way. These beliefs were aligned with those of the PD programme, so membership was an attractive proposition for those spearheading change in the clusters. CoP E provided a supply of relevant knowledge – persuasive arguments and practical solutions – about implementing the new way.

A subset of members from CoPs A,B and C also belonged to CoP E, making them boundary-spanners. Within this group we identified two types of boundary spanning roles associated with knowledge brokering activities. Firstly, core members of CoP E, who made intensive use of a range of online communication technologies including blogs, Twitter, instant messaging, social book marking (delicious), podcasts and voice-threads, to sustain their beliefs, enrich their understandings, and promote and broker knowledge. We use the term *connector-leaders* to describe those in this role. The second group of boundary-spanners were members of CoP E who followed connector-leaders but never, or rarely, left comments on blogs. In this respect they played a *lurker* role. Based on language from interviews, we called these largely invisible members *follower-feeders*. (They fed on the ideas of those whom they followed, then fed these ideas onto their own followers, *regular teachers* who did not participate in CoP E. The feeding metaphor – used by two different interviewees, is reminiscent of the ecological concept of a food chain.) Follower-feeders maintained a low online profile, lacking the confidence to espouse developing ideas in public and seeing themselves as lower in status than connector-leaders *("I'm at the bottom…they're way up there*"). However, they corresponded with selected connector-leaders via invisible, behind-the-scenes means such as IM and e-mail. Their online lurking was situated: although invisible in CoP E, they mostly had a visible presence in their respective closed, cluster-based online community forums.

Figure 1 shows the structural relationships between the five online CoPs in detail, illustrating how CoP E functioned as a hub, or bridging community, through which knowledge of the new way was brokered. (One person described it as, *"a middle layer of people, who are facilitating [knowledge transfer]".*) Overlapping membership between CoPs A, B and C and CoP E occurred in two zones: (a) a visible zone – the central shared area – within which connector-leaders interacted with a public online presence and (b) a peripheral invisible zone (the lighter area around the core) within which followers-feeders interacted invisibly via IM, email and phone, as well as face-to-face, with the connector-leaders and each other. One member of CoP A, two of CoP B and one of CoP C were connector-leaders in CoP E. One member of CoP A, six of CoP B and one of CoP C were invisible follower-feeders in CoP E. (The dotted lines show external communities to which the additional members of CoP E we interviewed belonged.) Both connector-leaders and follower-feeders were boundary-spanners by virtue of their overlapping community membership, and their active transfer of knowledge across boundaries.

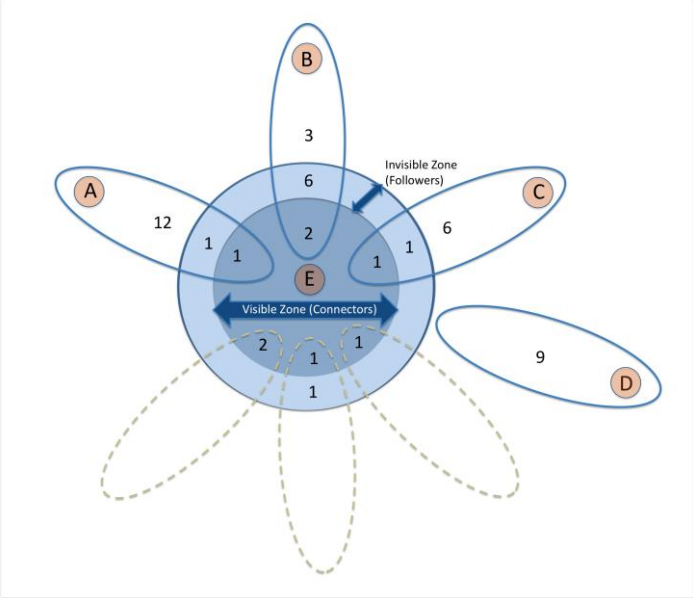

Figure 1: Participating CoPs, showing overlapping membership with CoP E

Structural analysis revealed a system of overlapping communities, reminiscent of Castro's (2004, 2006) conversation space ecosystem, but with a tiered structure (figure 2). The system comprised three levels of communities and four tiers of participants: The first level of community was the cluster CoPs. The second was the middle-layer community (CoP E), and the third was the larger global edublogging community (outside of the case boundary). The tier 1 participants were *regular teachers* who participated infrequently in the online dimension of their CoPs. The tier 2 participants – *follower-feeders* – were both change agents in cluster CoPs and invisible (non-blogging), peripheral members of CoP E. The tier 3 participants – *connector-leaders* – were change agents in cluster CoPs and also active members of CoP E and the global blogging community. The tier 4 participants were international *thought leaders* and *connector-leaders* who dominated the global community.

Figure 2: The system of communities showing role tiers

Some interviewees had an intuitive sense of this hierarchical system of roles, as shown in the interview excerpts in table 1 below.

Participant tier	**Quotes about other role tiers**
1. Regular teacher	**About tier 2**: *She's inspired me… she'll be the one that's on the internet, and finding all sorts of different things and sharing ideas, and she'll say… "What about trying this?"* **About tier 2**: *They do a lot of work and they bring a lot of stuff back to us…it takes the pressure off us.*
2. *Follower-feeder*	**About tier 1**: *We feed that [knowledge] back into our staff meeting time…* **About tier 3**: *I'm a bit like a parasite. I take up her ideas, and I'm not confident enough to give things back…But I am passing it on to people below me. There are probably people feeding off me, who will never go on-line, so I have to go out seeking more to give to them.* **About tier 3**: *I look at people who I think are similar to me, or I find myself having similar views to them... it gives a bit of weight to (my ideas)*
3. *Connector-leader*	**About tier 4**: *You've got really innovative and creative and motivational people… sitting up there at the top, and they're filtering their ideas, and they're sparking conversations out... they're like the conversation beginners.* **About tier 4**: *They're out of my league; they're big names.*
4. *Global leader*	N/A: external to case

Table 1: Quotes from interviews illustrating the perceived hierarchical structure

One connector-leader described this overall system as being like a spiral staircase, with the cluster-based change agents standing partway up. International thought leaders (described as *"conversation beginners*") were at the top. Underneath them were other overseas bloggers who created opportunities for the NZ change agents to climb on board (global connector-leaders). Regular teachers were standing just below the change agents, following them. This role differentiation reflected a stratified system of leader-follower interactions: Regular teachers followed follower-feeders, who followed connector-leaders, who in turn followed global leaders.

We now focus on how transfer and embedding of the new way of teaching was promoted by the relationship between the connector-leader and follower-feeder roles, with emphasis on the knowledge brokering practices of the follower-feeder.

5.2 Cross-boundary Brokering

Within the system of communities, the transfer of knowledge was based strongly around the interaction between visible connector-leaders and invisible follower-feeders. Follower-feeders played a key knowledge brokering role, feeding on the ideas of connector-leaders, feeding them on to regular teachers, and supporting one other, often in the face of resistance, as the new teaching approach and associated ways of thinking started to become embedded. Unlike connector-leaders, whose contribution was largely based around spanning boundaries the online realm, the role of follower-feeders was based largely around bridging the online/offline and visible/invisible community boundaries. In the following section, we outline how follower-feeders employed knowledge brokering practices to support regular teachers, then illustrate how they crossed between online and offline community settings to provide one another with out-of-hours support.

The primary concern of follower-feeders, arising from their responsibilities as lead teachers and change agents – was to transfer knowledge and provide support to regular teachers. Regular teachers were seen as being *time-poor* so reportedly did not use the internet for professional support, despite using it to promote student learning. Follower-feeders, however, spent personal time online after-hours, topping up their official 'classroom release time' provided by the programme. They scanned their emails and blogs of selected connector-leaders to identify knowledge that was relevant, inspiring and/or practically useful. Despite their reluctance to engage visibly on blogs, they felt comfortable communicating with those connector-leaders whom they followed. Using email and instant messaging (IM) tools as invisible backchannels, they regularly followed up ideas from blog posts, drew attention to broken links, pasted in screenshots, and sought opinions and advice.

> *I can talk to her via Skype, and she's very approachable, and can teach us about just (anything) ...you know, give her a call. Like interviewing with the kids... using Bubbleshare and all sorts of things. I brought [her ideas] back to our group, and said, "Have you tried this?"*
>
> *So you read her blog and then go back and Skype her? [Interviewer] Yes.*

A significant finding was that the knowledge in connector-leaders blogs was packaged up with follower's needs in minds: Connector-leaders placed great emphasis on posting novel, relevant content and commentary. In order to do this they conducted regular scanning and filtering of more influential blogs. The first step was a pull process using RSS feeds from respected tier 4 connections:

> *There's about five people… I'll subscribe to the RSS feed in my Bloglines, and so I see everything that they stick on their Del.ici.ous ...I use other people as a filter.* (Connector-leader)

Once they had identified suitable content, using what one person described as *triage*, connector-leaders adapted and repackaged it for local needs, then tagged it with thematic

labels relevant to their followers (e.g.; inquiry learning): *"I put it into my Del.icio.us, and I mark it for [Allan], or for [Susan], so they can link through to it that way".* This created significant value for follower-feeders:

> *It's like going to the library, and rather than searching for your own good books, some nice librarian (comes up)…and says, "Here are fifteen books you might well be interested in"…these guys have filtered out a whole lot of good stuff, and so I can focus on reading and thinking about it.* (Follower-feeder)

Connector-leaders kept in touch with each other via sophisticated means, such as social bookmarking, RSS feeds and Twitter, but they were also aware of their followers' identities and communication preferences, actively feeding them links to useful material via IM and e-mail:

> *"I rely on Rebecca. She spends hours and hours and hours looking at blogs on the net. She finds anything that's worthwhile and she'll alert you to it"(Follower-feeder).*

Acting as second-tier gatekeepers, follower-feeders then screened this material with the needs of the regular teacher in mind: *"I check things out prior to telling staff… I guess I make decisions about what will work, and what not to tell them"* (Follower-feeder). After matching knowledge to specific needs, they passed on the ideas, primarily in offline settings such as workshops, syndicate meetings and informal staffroom discussions, helping teachers to access, adapt and apply the new knowledge in the classroom.

5.3 Broker-to-Broker Buddying

Follower-feeders also relied on each other for collegial support, and reported engaging in online buddying relationships. With the buddies, they used instant messaging (IM) tools at home in the evenings, a safe invisible setting, to discuss the day's challenges, offer mutual support and plan ahead. The following record of a discussion between two follower-feeders illustrates buddy-to-buddy knowledge transfer across several boundaries of the community-as-system: an workshop (which they reflect on), an online reading, and the 'invisible' shared instant messaging (IM) space. Here two change agents in CoP B, "Steve" and "Jess", identify with their facilitator's efforts to bring negatives on board and express solidarity over the difficulties of being at the coalface. Jess then shares information about a change-focused reading, indicating a shared concern, and introduces two new metaphors – *sandpit time* and *cross-pollination.* This turns the conversation to a positive note, building ownership of new shared, change-focused resources. The metaphors act as persuading devices, legitimising change. As well transferring explicit knowledge, this invisible "lurker" interchange serves to embed the emerging beliefs and values associated with the new way, and nurture community:

> Steve: *[Our facilitator] was good value today, she gained an appreciation of what it's like to work with some of our more negative ICT luddites*
>
> Jess: *I have found a reading about getting the negatives on board...it's about nudge and nurture…haven't read it but it's meant to be good.*
>
> Jess: *It is hard work at times, i think the facilitators forget and they also forget the other stuff in our lives.*
>
> Steve: *oh really, flick me the details would love to read it*
>
> Jess: *Today i discovered the latest terms are sandpit time and cross-pollination!!*
>
> Steve: *sandpit time?*
>
> Jess: *I could send it via skype as a file if i'm clever enough...bear with me and I'll find it online and try!!*

Steve: *ok*

Jess: *Sandpit time...that just means time to play with the stuff...ict tools and what they can and can't do!*

Jess: *cross-pollination is when you network with others and share ideas!*

Steve: *oh cool, i like that*

5.4 Downstream and Upstream Brokering

The cross-boundary brokering practices outlined above suggest a one-way, downstream flow of knowledge from tier 4 to tier 1 members in the system of communities, but interviews suggested that the reality was more complex. For example, a follower-feeder in CoP B, "Lynn" stated that she took ideas from "Kelly" (a connector-leader) but gave nothing back, but this was not, in fact, the case. Lynn had implemented a novel and successful non-ICT-based practice which Kelly had adapted to create an online version, featuring it on her blog to share with tier 4 colleagues. By adapting a practice that worked well in practice so that it aligned with the new way, Kelly was able to enhance her *street cred*, creating opportunities for others to engage with her blog. Although it was difficult to see significant evidence of upstream knowledge transfer, it appears that the flows of knowledge operated as a two-way knowledge value chain: Tier 4 participants were the system-level leaders in terms of generating knowledge about the theory of the new way (*why* knowledge). As their ideas moved downstream they were fed on and adapted by those in tier 2 and 3, where the ideas added weight to their arguments for change. On the other hand, those who were closer to the classroom action; notably follower-feeders, who interacted daily with teachers, were at the leading edge when it came to generating practical knowledge about how to successfully apply the new way in practice (*how* knowledge). The following quote underlines why this kind of practical knowledge was of value to connector-leaders and thought leaders, and why it needed to work its way back upstream to those in tiers 3 and 4:

> *"It makes them reflect on what is actually working. Because there must be a huge amount of pressure... When you share something [on your blog] you can be really enthusiastic about it, but if it's actually not worked that well…You would have to be really careful if you were way up there on the staircase, because others will follow in your footsteps…."*

6 CONCLUSION AND IMPLICATIONS

As with most case research, the results of this study were strongly contextual: The professional development programme provided those charged with change leadership with a strong incentive to engage in active knowledge transfer and to proactively exploit opportunities (participation with a global community of edubloggers) that supported an emerging teaching paradigm. Nevertheless, the study can be seen as adding richness to the online community literature. It adds new insights to research into the lurker role by discovering how and why active lurkers (Takahashi et al., 2003); in this case follower-feeders, lurked in one context but acted as proactive knowledge brokers in other settings. Our findings demonstrate that the so-called lurker may provide significant community value through behind-the-scenes activity, while strongly challenging the continued use of the term lurker. When using a community-as-system model, any label which describes a role based on behaviour exhibited in one community setting only can be seen as providing limited value. We argue that viewing roles in relationship to their boundary spanning and knowledge brokering activities across multiple engagement spaces provides a better opportunity for understanding the nature and value of roles.

Taking a community-as-system view also makes it difficult to study any role in isolation. In this study, knowledge transfer and embedding was largely product of the reciprocal relationships and brokering practices of connector-leaders and follower-feeders. These

relationships can be seen as a form of distributed knowledge leadership that is synergistic with recent research into leader-follower relations. The theory of active followership in management literature emphasises that followers and leaders must be studied in the context of their relations (Baker, 2007, p. 58). Our findings suggest that it would be useful to extend Castro's metaphor of an ecosystem in relationship to analysis of community roles. The discovery of tiered communities and roles, and the ways in which knowledge flowed between tiers are suggestive of a natural community's food web, while the connector-leader and follower-feeders can be seen as being bound up in a symbiotic relationship.

This study's discovery of the interdependent nature of boundary-spanning roles in a complex, multi-tiered community ecosystem also shows the value of taking a broader, polycontextual view of the community, rather than focusing exclusively on the online realm: By including diverse online and offline settings in the definition of community, it becomes possible to track the embedding of knowledge across online/offline and visible/invisible boundaries in a holistic system, and to investigate the nature of behaviours in relationship to specific contexts or engagement spaces. (For example, follower feeders were uncomfortable engaging in public blog-based dialogue with connector-leaders whom they followed, yet readily initiated e-mail discussions with them about their blog posts. The relative privacy and safety provided by the context of email contributed towards this relaxed culture of use, unlike the culture of use of use associated with blogs, which required building on the ideas of others in a way that demonstrated originality and a degree of authority.)

The study has several implications for practice. Firstly, community managers and stakeholders should ensure that community members are provided with a range of online tools that are appropriate to ensure engagement by those who will not participate in publicly visible contexts and prefer the safety of invisible settings. Secondly, they should take care not to judge the value of an individual's contribution by visible behaviours alone. In this study, follower-feeders played a valuable community role, yet their reluctance to leave visible online traces online meant that their contribution and online engagement was largely invisible. Thirdly, in cases where core members have a stronger uptake of online tools than others, managers should work to foster relationships between these people and those with potential to broker knowledge across online/offline boundaries. Fourthly, they should not underestimate the importance of offline settings, but recognise them as part of the larger community space, taking into account the fact that interactions in face-to-face settings are likely to be discussed amongst those present using online, behind-the-scenes means.

For researchers, there are many future opportunities to further investigate the community-as-system model, the interdependency of roles within such systems, and the ways in which individual roles span and transfer knowledge across structural and contextual system boundaries.

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