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THE EVOLUTION OF AN ONLINE COMMUNITY — A CASE STUDY

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This article reflects findings from a long term case study of an online community of practice established through a network for the professional education of teachers in Ontario, Canada. The Education Network of Ontario/Réseau éducatif de l'Ontario (ENO/REO) was created in 1992–1993 to support and connect teachers from kindergarten to grade 12 in the province of Ontario. Its mandate was to ensure that all teachers had free access to the Internet and to each other and to encourage the development of skills in the area of information and communication technology with the ultimate goal of using those skills to improve classroom practice. The study investigated whether information technology had the potential to connect teachers to each other in order to build the capacity to create networks where professional learning could take place in a cost-efficient and flexible time and/or place. It was found that participants were early adopters who enjoyed innovation, that online networks were supportive for learning but hard to maintain over time, and though they supported the integration of technology in the classroom, other barriers within schools could challenge this effect.

Keywords: Electronic network; professional development; communities of practice, ENO/REO; online learning.

1. Introduction

The difficulties, both financially and logistically, of engaging teachers in face-to-face professional development opportunities have encouraged the creation of accessible alternatives which support the use of the online environment. Researchers such as Killion (2000) and Sparks (1998) have supported the exploration of a variety of online tools for professional development because they can be suited to individual needs and online professional development opportunities. This article reports findings from a study focused on discovering how teachers involved in an online community of practice, The Education Network of Ontario/Réseau éducatif de l'Ontario (ENO/REO), translated the technological skills honed through their involvement in the online community into classroom practice. The specific focus of this paper reflects the challenges inherent in supporting online communities of practice over

extended periods of time tracing the formation and development of the community and the pressures it faced to sustain its purpose and relevance over time.

2. Research Background

Communities of practice are defined as those "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott & Snyder, 2002, p. 4). Because of their emphasis on collaboration, communities of practice offer a means of disseminating workplace practice and potentially improve the "organizational performance" of such workplaces (Wenger & Snyder, 2001, p. 16). This optimum method of supporting professional development, when considered in an educational context (Schlager & Fusco, 2004), may "empower" teachers "to improve, to be more effective, and to enjoy their work" (Speck & Knipe, 2001, p. 226).

The use of the term community of practice in relation to the online environment has sparked much discussion (Preece & Maloney-Krichmar, 2003). According to de Souza and Preece (2004), there is no consensus regarding a definition for an online community. Kling and Courtright (2004) maintain that "the casual use of the term community to characterize groups that are engaged in learning or groups that participate in e-forums, is seriously misguided" (p. 91). Nevertheless, Preece, Abras and Maloney-Krichmar (2004) define online communities as having "a purpose, are supported by technology, and are guided by policies" (p. 2) and Gray (2004) observed that successful online networks include members who see value in participation, who have created some shared history, who have developed a way to mentor newcomers and who have strong leadership. Rheingold (2000, p. 20) defines virtual communities as social "aggregations" which occur when people engage in sustained discourse and build relationships online, while Kling (2002, p. 1) distinguishes these networks primarily through the technology which supports them. Finally, Hildreth, Kimble and Wright (in Lueg, 2002) envision a networked community as supporting "a common set of interests to do something in common, is concerned with motivation, is self-generating, is self-selecting, is not necessarily co-located, and has a common set of interests motivated to a pattern of work not directed to it" (p. 6).

Research into the use of online communities of practice for professional development is ongoing and emergent (Barab, Kling & Gray, 2004; Preece & Maloney-Krichmar, 2003; Nonnecke & Preece, 2001; Maloney-Krichmar, Abras, & Preece, 2002). Zhao & Rop (2001, p. 13) reported that there was little conclusive evidence to demonstrate the effective use of reflective communities after examining twenty-eight studies which tended to focus on "descriptions of the design and implementation of networks". Nevertheless, online communities of learning are being explored in both higher education and K-12 education (Coupal, 2004; Brook & Oliver, 2003; Stacey, Smith and Barty, 2004).

Despite the benefits reported by proponents of online communities of practice, they are notably difficult to maintain. Barab, MaKinster & Scheckler (2004) wrote about the "tensions" or "dualities" which challenge the survival of online communities of practice. They adopted Wenger's suggestion (as cited in Barab, MaKinster & Scheckler, 2004) that online communities needed to address issues around participation and reification, established design versus emergent design, local versus global issues, and established community identity versus negotiating new identity. Barab, MaKinster & Scheckler added additional dualities pertinent to the online environment which included (a) the particular needs of an online community versus the needs of a face-to-face community and (b) the need to balance coherence versus diversity (p. 59).

Despite the early enthusiasm and encouragement of participants, some online communities fail to survive. In a study of an online community that had failed to thrive, Maloney-Krichmar, Abras and Preece (2002) found that the site had seen little activity due to apparent barriers around usability and sociability. They reported challenges imposed by prohibitive technical difficulties combined with an apparent lack of community "feeling". Preece (2004) emphasized trust, empathy and reciprocity for community building and also pointed to what she referred to as social capital, i.e. bonding (the shared values of online communities) and bridging (artifacts that can be shared between community members). Huysman and Wulf (2005) also pointed out the importance of "social capital," which was defined as "... networked ties of goodwill, mutual support, shared language, shared norms, social trust, and a sense of mutual obligation that people can draw value from ... gained from being part of a network." (p. 82). A community where the social capital is eroded becomes difficult to sustain, especially where there has been an "assumption that IT can positively support and improve knowledge sharing while ignoring the social conditions that trigger people or hinder people in sharing knowledge." (p. 86).

In a study of online networks in the United Kingdom, Cuthell (2004) found that many of the networks included members who struggled to include the technology in their professional lives but were hampered by a perceived lack of access and time, combined with a perceived lack of relevance and need. Other issues involved "top down" initiatives where membership had been imposed, providing negative "trolls" (unhappy participants with negative attitudes and comments) with an opportunity to hijack discussion resulting in a lack of social capital. Cuthell (2004) pointed out that there is a danger that these potentially powerful online environments may simply become an educational chore.

> Leading and managing an online community requires time; participating in an online community requires time. Given all of the demands made of educators, participation in online communities should not be seen as another imposition, another task to be completed at the end of an overstretched day... (p. 9).

Another major aspect of community survival involves participation. The benefits of both active participation and peripheral participation, often called *lurking* (Preece, Nonnecke & Andrews, 2004; Sutton, 2001) have been investigated. Nonnecke & Preece (2001) found that lurkers lurked for a variety of reasons but were largely looking for gratification. They were interested in "three types of information: factual information (e.g., job postings, and solutions to technical problems); different viewpoints arising from different levels of expertise; and access to personal experiences of others" (p. 9). Preece, Nonnecke & Andrews (2004) concluded that "most lurkers are not free riders" (p. 1) because lurking is the "norm" in many online communities where generally only a few members of the community post regularly. However, there may be a need to encourage lurkers to post, especially as the survival of the community may be at stake if too few members are actively participating.

Another factor that is relevant to the survival of online communities is whether the use of information technology may be overwhelming busy professionals (Burge, Laroque and Boak, 2000). Wellman (2005) has maintained that "those who use email report 183 discussions per month, 54% more than the 119 discussions for those who do not use email. The result is that the more email, the more overall communication" (p. 4). Also, Cavanaugh (2004) found that e-mails now averaged 54 per day indicating a 13% increase since a similar study completed in 2001–2002, in North America. Kirsh (2000) suggested that the workplace is "bombarded" with information resulting in "cognitive overload". "The upshot is a workspace of increased complexity, saturated with multi-tasking, interruption, and profound information overload ..." (p. 2).

Finally, the need for attention to "technology appropriation" as a marriage between the activities of designers as well as the activities of users is essential. When designers actively "embed support" for appropriation based on a discussion with users it means that the process "becomes more visible" thus allowing users' activities to be examined more closely thus closing the gap between what is understood from the designer's point of view to understanding the needs of the end user to ensure successful appropriation of technological tools (Pipek, 2005).

Given the studies described above, research was needed to determine why some online communities survive while others "flounder and become digital ghost towns" (Preece, 2004, p. 7). This article reports a case study of an online network established for the professional education of teachers and the impact of such issues on its survival.

The next section of the literature review examines the conceptual framework supporting the study, which focused primarily on Activity Theory.

3. Conceptual Framework

In order to analyze human activity, Engestrom (1987) argued that there were "lineages" of thought that situate a person as a "systemic and historical being" that

could be used to examine human activity and learning. In his search for a model to examine human activity and learning, Engestrom outlined four critical criteria:

- Activity must be pictured in its simplest, genetically original structural form.
- Activity must be analyzable in its dynamics and transformations, in its evolution and historical change.
- Activity must be analyzable as a contextual or ecological phenomenon. The models will have to concentrate on systemic relations between the individual and the outside world.
- Human activity must be analyzable as culturally mediated phenomenon. (p. 31).

In analyzing human activity, Engestrom (1987) proposed using the activity system as a unit of analysis. The activity system model allows an analysis of all of the interrelated components that work together to produce the desired outcome of the activity. An activity system is comprised of a subject whose point of view guides the study and a community which supports the same outcome as the subject(s). The system's activity is directed at an object, which is used as a "problem space" to produce a desired outcome and the path to that outcome is guided through the use of tools and instruments. The system's activity must also be examined through the division of labour (hierarchy, assignment of tasks) and the rules through which the activity system is governed.

Engestrom (1987) proposed dividing the analysis into three areas: "(a) the object-historical analysis, (b) the theory-historical analysis, and (c) the actual-empirical analysis" (p. 269). The first phase seeks to uncover the "developmental" phases of the system in order to uncover the "contradictions" in the move from one phase to another of development. In the second phase, the theory-historical analysis, the "cultural artifacts" of the system are examined "i.e. handbooks, working instructions, fixed procedures for classification and diagnosis, etc. . . " (Engestrom, p. 269) in order to uncover original artifacts and imposed artifacts developed over the course of the system's evolution. Once again, the analysis is undertaken to uncover "contradictions" and "tensions" created by "successive developmental periods" in order to perpetuate change.

Engestrom noted that there was a need for empirical evidence to complement the two areas described above. He suggested that their analysis needed ". . . to be complemented by actual-empirical analysis of the internalized and invented models professed and actually used or upheld by the participants of the activity" (p. 269). Ultimately, according to Engestrom, the outcome of the analysis described above must define the "object-unit" which is the ultimate purpose of the system and what the subject(s) are "handling". An analysis of the "life-span" of the object is possible by examining how all "compartments and hierarchical levels within the community" deal with it, and thus it (the object) becomes the lens through which to examine the "inner movement" of the activity system. The entire analysis is meant to provide the participant within a system with a way to see what Engestrom suggested was a "double bind". In other words, the

analysis is meant to push the participants into acknowledging the contradictions and tensions within the system and expand and change the system based on their findings.

The application of Activity Theory to the study of ENO/REO was encouraged by several studies (Gray and Tatar, 2004; Barab, Schatz and Scheckler, 2004; Schlager and Fusco, 2004; Hung and Chen, 2002; Romeo and Walker, 2002) but especially by a description of a workplace study in the health care field completed by Engestrom (2001). In this study, researchers examined a health care system through five principles. The first principle looked at the "collective, artifact-mediated and object-oriented activity system"... and used it as the "primary unit of analysis" (p. 135). This supported the use of a case study where other "actors" and objects were understood "when interpreted against the background of entire activity systems" (p. 135).

Next, multiple "voices" were used to understand the community and its history, in order to create a context where individual and community negotiation would become possible. The historicity of the activity system was considered essential for an understanding of the issues and challenges facing the system under study. The past had to be examined to enlighten the present so that "contradictions" within the system would be revealed. Uncovering these critical issues would potentially lead to the "possibility of expansive transformations". Individuals within the system would be encouraged to change the system collectively and "embrace a wider horizon of possibilities" over time (p. 137).

In this study Activity Theory supported the analysis of the way in which technological tools mediated the activity of participants as they worked through a combination of rules, technological tools and community norms to achieve the goal of skill attainment. It presented the means to focus on understanding how separate, yet interrelated components, supported ENO/REO members as they negotiated their way through both the school systems and the web supported system of ENO/REO over the course of ten years to attain the goal of acquiring technological skills. The tensions and contradictions within the system were investigated through the multiple voices of the participants, through the textual archives uncovered in the discussion forums, and through initial surveys. The socio cultural histories of the participants were examined to understand the expansive transformations that have taken place over a decade of participation.

Engestrom's process for analysis was adapted for this study to focus on:

- the **subjects/individuals** who were members of ENO/REO — who were they (identities, pedagogy and philosophy of education)? — why had they joined? how? how compatible was ENO/REO with their "values, past experiences and needs..."?
- the **community** of ENO/REO — what were the rules and protocols developed to support ENO/REO? — what was the "relative advantage" of ENO/REO to the participants? — what tensions existed there?

- the **technological tools** used by the participants — what kind of technology had been available to the members of ENO/REO? — how had the technology been used?
- the **division of labour** within the school community and within ENO/REO — what level of "complexity" did participants find in ENO/REO? — how "trialable" were the skills learned?
- the **skills** gained by the participants — how had the environment of ENO/REO supported the members and their learning? — what skills had the members acquired?
- the **integration of technology in the classroom** — had the school culture supported experimentation? how had members assessed improvement in student practice if at all? what had they observed as a result of using those skills in the classroom of the innovation if anything?

4. Research Context

A more detailed description of the virtual "site" of the research will help the reader with the context of the study. In 1992–93, the Ministry of Education of Ontario and the Ontario Teachers' Federation provided funding for the creation of The Education Network of Ontario/Le Réseau éducatif de l'Ontario to support online collaboration and connectivity (connection to the Internet) for all teachers across the province. This initiative was designed to help teachers in Ontario access emerging professional development opportunities by ensuring that all teachers had free access to the Internet as well as online access to each other in a cost-efficient and flexible time and/or place. ENO/REO's mandate was created with a dual goal: (a) to ensure that all educators had free access to the Internet and to each other, and (b) to encourage the development of skills in the area of information and communication technology with the ultimate goal of using those skills to improve classroom practice.

In 1993, ENO/REO started with eighteen members. By 2004, over 123,000 teachers, support staff, administrators, Ontario Ministry of Education staff, and Faculty of Education staff were listed as members of ENO/REO, which constituted over half of the professional elementary and secondary population of Ontario. Initially, ENO/REO was a UNIX-based, cross platform, TCP/IP (Transmission Control Protocol/Internet protocol) which provided bilingual (French and English) electronic mail, moderated conferences (facilitated newsgroups) and Internet across Ontario. Membership in ENO/REO was free and was open to anyone who worked, or who was involved, in a formal role in publicly funded elementary or secondary education in English and French language schools in Ontario. Over the years ENO/REO grew from a publicly funded government project to an independent not-for-profit corporation and it was "retooled to enable browser based moderated Intranet newsgroups, model classroom projects with interactive web creation scaled to suit the size of provincial participation and teacher development of industry-standard content" (Beam & Beam, 2000, p. 1).

For the first ten years of ENO/REO's existence, because the Ministry of Education funded free Internet dial up service for ENO/REO members, teachers were attracted to this new method of communication. This had an effect on attracting members to ENO/REO in the years when an e-mail account was still a novelty and when Internet service providers were not as ubiquitous as they are today.

ENO/REO has had two very distinct functions. On the one hand, it provided curriculum support, project initiatives, online discussion forums and professional development opportunities and on the other hand, ENO/REO provided all of the services one would associate with an Internet service provider: electronic mail access, web space and other related services.

ENO/REO also provided online discussion forums for its members. Members of ENO/REO were provided with a user name and password in order to log on to the discussion forums. The discussion forums ranged across many educational areas dealing with a variety of educational topics. Teachers with expertise moderated many of the forums and hosted online guests who shared relevant resources with ENO/REO members. Moderators were responsible for checking the forums every day and for responding to queries or adding to resources. Initially, members could create request the creation of a discussion forum based on professional interest. As the membership grew this became too cumbersome as the creation of too many discussion forums eroded active participation. Discussion forums were then restricted to choices made by the management team that was comprised of educators from both primary and secondary education.

4.1. *Concerns*

While ENO/REO attracted many participants, there were early concerns with the level of active participation in the discussion forums and the long term effect this might have on the health of the network. In a twenty-two month study conducted by the Ontario Institute for Studies in Education at the University of Toronto between 1995 and 1997, it was noted that, "During this period 18,470 visitors, or 246 visitors per day connected to the website, transferring a total of 3,868,007,415 bytes of information" (Garton, Wolfe & Wellman, 1998, p. 2). Of the 49,859 registered members in ENO/REO, only 2,071 of them had posted messages to one or more forums. This lack of participation was considered a potential challenge.

At the time of the study noted above no technological tools were in place to gauge discussion forum readership at ENO/REO. Later this ability was put in place so it was possible to approximate how many participants were reading the forums while not actively posting messages. In an eighteen month period between January 1996 and October 1997, there were 45,785 messages posted in the ENO/REO forums and an undetermined number of readers had been able to access them. By 2003, a total of 3,088 messages had been posted in a 24-month period and those messages had been read 427,960 times.

Table 1. Total messages posted and read across all forums (1996–1997 and 2001–2003).

Year	Messages Posted	Messages Read
January 1996–October 1997 (18 months)	45,785	unknown
December 2001	1104	303,984
December 2002	1017	39,731
December 2003	967	84,245
Total (2001–2003)	3,088	427,960

Table 1 demonstrates the readership and posting tendencies between January 1996 and October 1997 and compares that to postings across all forums over 3 different years in the month of December. Because Garton, Wolfe and Wellman's study indicated that posting periods followed the highs and lows of the school year, the posting levels in the participants' frequented forums are captured during the months of December 2001–2003 to demonstrate this shift in posting trends. There is a significant drop in postings by 2001 and by 2002, there is a significant drop in readership.

4.2. *Participants*

A case study was used both as a process and a product of inquiry (Stake, 2000) to examine the involvement of two groups of educators engaged in professional development through the use of ENO/REO for over a decade. The first group of eight teachers (Group 1) had an involvement of seven to ten years (1993–2003) and the larger part of the study was devoted to these members as it was pivotal to the study to understand the way in which the development of ENO/REO had influenced their work over ten years. The second group of four teachers (Group 2) had an involvement of two to four years (1999–2003) and their perceptions, which may have been affected by changes that had occurred in that decade, were compared with those of Group 1. The pivotal changes focused particularly on:

- changes in working conditions,
- rapid advancement in technological tools from the time ENO/REO was initiated in 1993, and
- labour unrest brought about by mandatory teacher testing policies.

A comparison of the two groups of teachers was based on a strong assumption that those who had joined ENO/REO in the early years would have had significantly different experiences than those joining at a later stage. The two data groups informed the study by suggesting ways in which online networks grow and change, and ways in which those changes may affect participation and/or professional development.

The outline below gives a brief overview of the participants in Group 1 followed by an examination of the findings from this group. For the purposes of this paper,

only a detailed description of the first group's findings will be used as similar results were discovered through an analysis of Group 2. The differences between Group 1 and Group 2 will be summarized in Section 5.8. All of the participants have been assigned pseudonyms and names of schools have not been used to protect their privacy.

4.3. *Group 1*

4.3.1. *Bob*

Bob has a Master of Arts in English, and had been involved in education for thirteen years. He became a high school classroom teacher in 1991, then became the Head of an English department and is now the Vice-Principal of a high school. At the time of the study, Bob had just become a moderator with ENO/REO and had been a member of ENO/REO since its inception. Before becoming a Vice-Principal he had been the Chair of information technology at his previous high school. Bob had no experience with online communities before joining ENO/REO.

4.3.2. *Heather*

Heather has a Master in Education, and had been involved in education for twenty-nine years. During her tenure as an educator, she taught French as a Second Language, Language Arts, Computers and Special Education. Over the years, Heather held a variety of resource positions at the school level, the district level and at the Board level as a curriculum consultant. She has retired from teaching and is acting as a Curriculum Consultant for a major educational science project and had been acting as a moderator/project leader with ENO/REO since 2004. When she first became involved with ENO/REO, she had no experience with information technology beyond word processing.

4.3.3. *Jane*

Jane had been a teacher since 1983. At the time of the study, Jane was the Instructional Coordinator responsible for Instructional Technology and Business Studies within the Curriculum and Instruction Support Services department within her Board and she was working on her Masters in Education. Jane had never touched a computer before entering the Faculty of Education in 1983. By the time she graduated, she was able to teach computer programming. She used a multitude of original computers and originally focused on word processing because as she pointed out "*as soon as I could type, I used a word processor because my handwriting is so bad*" (Jane Interview 1). She had also used spreadsheet and database applications but she had never used a modem nor been involved in online communication before she became involved in ENO/REO. Jane was one of the first moderators with ENO/REO and stayed in that position until the mid-nineties, but had no experience with online communities until she joined ENO/REO.

4.3.4. *Malcolm*

Malcolm has a Master in Education, and has been teaching for twenty-five years. He taught developmental students at a segregated school for eleven years. Malcolm joined ENO/REO with some experience. He used video and Commodore PETs (one of the originals from the Commodore line of computers) in his classroom and eventually invented technological devices for his special education students but had no previous experience with online networks. He eventually taught himself web page creation skills to create an online project called The Flat Stanley Project with the support of ENO/REO after observing the opportunities ENO/REO offered.

> *I had that background under my belt but I still hadn't done much online stuff and while I was taking a break from some of the hardware issues that I was working on I started developing an online project which to my surprise has taken off and eclipsed anything else that I set off to do* (Malcolm Interview 1).

4.3.5. *Mike*

Mike had been involved in education since 1982, and has a Master of Education. He had been a classroom teacher in a Special Education/Regular Classroom with primary and intermediate children (kindergarten to grade 8), a curriculum consultant for computers in education, a Vice-Principal, a Principal, an Assistant Superintendent and a Superintendent of Education. Mike had been involved with ENO/REO almost since its inception. Mike was initially interested in computer technology and subsequently information technology both personally and professionally when he first joined ENO/REO. He was an early user of online courses completing two Masters courses in 1991 by that method.

4.3.6. *Paul*

Paul has a Master of Business Administration, and was the Department Head of Technology, Business and Computers at a large Roman Catholic High School where he had taught for fourteen years. Prior to teaching, he worked as a professional engineer for five years. Paul had been a moderator with ENO/REO since its inception. Paul was very technologically literate but when he joined ENO/REO he had "*zero experience collaborating online*" and at first he found it "*extremely intimidating. . . my online persona is very different from my persona that I would have within a group of people*" (Paul Interview 1).

4.3.7. *Sarah*

Sarah taught in the school system for 13 years. She worked for a large urban Board of Education in a major city and prior to that, she had taught multiple-handicapped adults for a number of years. Sarah had been a moderator with ENO/REO since

1994. Her forum duties included Politics and Educational Concerns. She was familiar with discussion forums when she joined ENO/REO in 1994 and had had quite a bit of experience with technology because "*several family members were working in Hi-Tech telecommunications firms so I got a lot of cool stuff, and I did database management for a Premier (of Ontario) and for a bank*" (Sarah, Interview 1).

4.3.8. *Patricia*

Patricia had been an educator since 1964, and holds a Master in Library Science. She was qualified as a teacher-librarian and as a French as a Second Language teacher and is a specialist in literacy. At the time of the study she had just retired from the job of elementary school principal in a rural area. Basically, Patricia knew how to turn a computer on and use a word processor when she first joined ENO/REO but claimed that was the extent of her knowledge. She had been a moderator with ENO/REO until 2002 but had no experience with online networks when she first joined.

5. Method and Data Collection

The complexities involved in the adoption of technology through the interaction of participants in an online network suggested, as proposed by Barab, Schatz and Scheckler (2004), that interrogation of the data needed complementary perspectives. Therefore, the choice of methodology addressed what Rogers (1983) has referred to as the "weakness of diffusion research…" where much of the data collected would be "recall data" and where the participants might have only dim recollections about their initial involvement with an innovation (p. 113). He suggested "(1) field experiments, (2) longitudinal panel studies, (3) use of archival records and (4) case studies of the innovation process with data from multiple respondents (each of whom provides a validity check on the others' data)." (p. 114). By approaching the participants through an initial questionnaire, combined with two semi-structured interviews, and an analysis of their messages over time, the weakness noted above were addressed.

Data were gathered from two groups of participants. Group 1 had been involved with ENO/REO for 7–10 years, while Group 2 had been involved for 2–4 years. As a member of the community one of the authors had a firm grasp of the norms and values of the community and did not experience any difficulty building trust with the participants. Based on researchers who were involved in similar examinations, it seemed appropriate to combine several representations for cross referencing the data (Thomsen, Straubhaar and Bolyard, 1998; Rourke, Anderson, Garrison and Archer, 2001; Stacey & Gerbic, 2003). An initial online questionnaire was used to stimulate the recall of the participants. This was followed by a semi-structured interview based on the questionnaire. The transcripts from that interview were then analyzed. A second semi-structured interview was conducted where interpretations from the first interview were compared with the participants' views and several additional questions were asked. The archived text messages of the participants were analyzed

using content analysis to provide yet another way to ensure the rigour of the study (Denzin & Lincoln, 2000). In a process akin to what Jones (1997, p. 25) has termed "cyber-archaeology", the data were mined over the course of ten months.

It was important to cross reference the stimulated recall of the participants with a study of their archived messages as relying solely on recall can be problematic (Rogers, 1983). Other researchers have successfully used stimulated recall but have additionally chosen another supportive representation. While they admitted that methodologies for studying online environments were emergent, Niven, Harris and Williams (2002) chose retrospective discourse analysis and stimulated recall in their study. They believed that discourse had to be analyzed because physical interactions are impossible to monitor in an online course and discourse "provides the doorway into analyzing the life and learning situation" (p. 1). The analysis of the text messages left in the online environment were "cocreated" with the participants using stimulated recall. Their conclusion around the methodology used in the study was that discourse analysis was "essential in highlighting the alternative indications of human interactions and group dynamics that are otherwise unclear" (p. 10).

The following stages were therefore used in the research:

- Each participant completed an initial online questionnaire which provided background information for an initial semi-structured interview.
- An initial semi-structured interview was conducted face-to-face (or by phone depending on distance and weather conditions).
- Following Interview 1, the transcripts were analyzed and coded.
- Online archived messages were analyzed and coded. Messages were collected and analyzed over a continuum. Stacey and Gerbic (2003) had used this methodology in a study of the use of content analysis for analyzing online messages. They suggested analyzing messages by using a "sequence of analysis points. . . which are representational points in the development of online interaction" (p. 2). Messages in this study were interrogated at representational points in the development of ENO/REO over three periods in time from 1993–1997, from 1997–2000 and 2001–2003.
- Transcripts of Interview 1, combined with transcripts of the archived messages were then shared with participants through e-mail to prepare for the second interview.
- Interview 2 was based on questions meant to deepen participants' recall by elaborating on Interview 1 and comparing inferences from the archived messages.

6. Data Analysis

In order to avoid surface inferences and deepen the thick descriptions required by the study, an analysis of the transcripts of twenty-four interviews as well as the text messages found in the archives of online discussion forums was shared with participants. There were no discrepancies between participants' perceptions and researcher interpretation of the data.

In the examination of the text messages, a decision was made to draw upon "units of meaning" for analysis. This decision was based on studies where findings indicated that this method was preferable to using whole conversations, or individual messages (Thomsen *et al.*, 1998; Blanchette, 2001; Smith & Kollock, 2001; Bullen, 1998; Rourke *et al.*, 2001; McKenzie & Murphy, 2000). The units of meaning were then gathered from text messages archived in discussion forums using a "sequence of analysis points..." (Stacey and Gerbic, 2003, p. 2) over the length of time participants had been involved with ENO/REO.

6.1.1. *Coding framework*

The Activity Theory framework is depicted in Figure 1. The model shows the way the Activity Theory perspective was adopted for this study. An examination of the community rules and the way in which labour was shared within both ENO/REO and the school system was combined with a study of the technological and social tools used by the group to attain the skills necessary to attain the final outcome of integrating technology in the classroom. The tensions and contradictions within the system were investigated through the multiple voices of the participants, through the textual archives uncovered in the discussion forums, and through initial surveys. The socio-cultural histories of the participants were examined to understand the expansive transformations that have taken place over a decade of participation.

The AT framework consist of the following components with the following values:

- **The Subjects** — Data were gathered from members who had been active participants in ENO/REO and focused on "...actual-empirical analysis of the internalized and invented models professed and actually used or upheld by the participants of the activity" (Engestrom, 1987, p. 7).

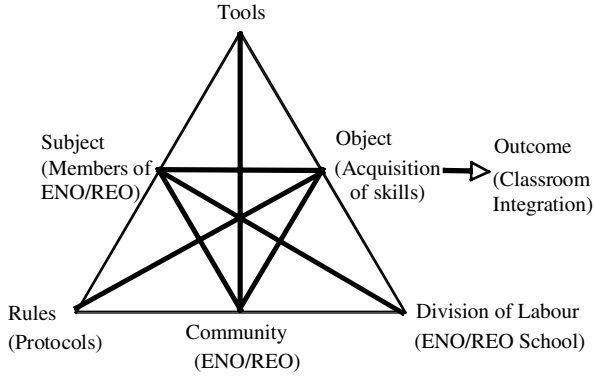

Figure 1. Graphical representation of the interrelated components under study.

- **The Community** — Analysis focused on the "object-historical" phase of the system and exposed the "developmental" layers of ENO/REO over time to uncover the "contradictions" in the move from one phase to another (Engestrom, 1987).
- **Mediating Artifacts/Tools** — The artifacts and tools mediated by the participants were examined to uncover the "theory-historical" perspective of ENO/REO. This involved an examination of the tools and artifacts initially used by the participants, as well as those developed over the course of time. The artifacts included, but were not limited to: discussion forums, e-mail, online archives, web content, online courses and modules, and/or interactive online projects. Social artifacts included the online messages and resources created and distributed by the members. The examination was undertaken to uncover the effect of "contradictions" and "tensions" created by "successive developmental periods" on the online environment of ENO/REO.
- **Rules and Protocols** — The rules and protocols under study involved those developed and used by the community of ENO/REO over time as well as rules that had evolved in more recent times. This examination brought the social tensions to the forefront of the discussion. The reaction of new and old members to the understandings of the group dynamic was important to uncover the ability of ENO/REO to support its growing membership over the years.
- **The Division of Labour** — The division of labour within ENO/REO, as well as the division of labour within the schools frequented by the participants, were analyzed to uncover the challenges within this activity area. How both environments supported technological innovation was an important determinant in the success or failure of the participants in attaining their goals in the classroom.
- **The Object** — The object of participation in ENO/REO was the attainment of technological skills by the participants in the study. This objective was examined through the complexities of the overlapping components of the system of ENO/REO and the way in which the members negotiated their way through the system to obtain technological skills.
- **The Outcome** — The final outcome of involvement in the system of ENO/REO was the ability of the participants to apply the skills attained through interaction within ENO/REO in their classrooms. This was examined through the thick descriptions of the members as well as through the accumulated data gathered through the investigation of the system of ENO/REO through the Activity Theory lens.

6.1.2. *Coding*

Coding was structured around subquestions framed through the theoretical framework. This method was supported by studies where coding had been streamlined to address the complexities of analyzing online discussions. For instance, Schlager Fusco, and Schank, (2002) chose seven categories of discourse to focus their analysis, while Rourke *et al.* (2001, p. 56) suggested the establishment of "a protocol for

identifying and categorizing the target 'variables'. . . " in an attempt to support a focused coding criteria.

Data were analyzed using the following coding criteria:

(1) Subjects–identities, philosophy of education, membership rationale, method of joining, compatibility of ENO/REO with values, past experiences and needs.
(2) Community — rules and protocols, advantage of ENO/REO to the participants, tensions.
(3) Division of labour — level of complexity in online environment, participation, barriers, support, school support.
(4) Skill development — skills learned, skills applied.
(5) Technological Tools — access to technological tools, support for classroom.
(6) Integration — school culture, application of skills in the classroom, assessment of student learning, observations.

The following section will outline the results of the study with an emphasis on the challenges involved in sustaining an online community. In order to outline the "object-historical", "theory-historical" and participant perspectives over time, this section is framed through a chronological lens to demonstrate the developmental pattern of ENO/REO as it evolved over the years. Additionally, in order to add support to the stimulated recall of the participants, data gathered and interpreted from the online messages of the participants have been woven into the discussion. In this way, not only do the online messages provide support for the stimulated recall of the participants, but they also provide a vehicle to which the historical context of ENO/REO can be traced in order to complement the Activity Theory perspective.

7. Observations and Discussion

7.1. *Group 1 subjects, community, rules and artifacts*

In order to uncover the complexities involved in the way in which ENO/REO as a system functioned, an examination of each particular interactive component was undertaken. An examination of the interrelated components of subject, community, object activity, rules, tools and artifacts revealed the "back and forth" process of skill acquisition and self-reflection mediated through online tools and governed by emerging rules and protocol. This section will focus on the ". . . actual-empirical analysis of the internalized and invented models professed and actually used or upheld by the participants of the activity" (Engestrom, 1987, p. 7) and the "object-historical" phase of the system to expose the "developmental" layers of ENO/REO.

7.1.1. *1993–1995*

As participants grew more technologically competent in the early years of ENO/REO, (1993–1995), they believed that strong personal connections were being created online. Thus, a history of engagement and relationships developed. One participant ruefully admitted that he felt cut off from people "*that I had come to know*

very well..." when the website was down and he had "*the sense that I was really missing something...and I felt a sense of anticipation 'When I dial up today, is it going to be up? Is it going to be working'?*" *(Rob Interview 1).* Participants referred to online colleagues as people they had "*... known ... for years... you have a certain connection with them...*" (Paul Interview 1). Connections to colleagues are reflected in messages that consistently reach out to the community while personal messages about family and friends left an online archive that significantly reflected societal bonds: "*... I must congratulate you, R, on doing what the combined efforts of my friends, wife, and several pitchers of draft beer couldn't do yesterday: you cheered me up*" (Bob — online message).

Participants were in agreement that bonds were also forged by face to face meetings held in the early years in order to train moderators: "*one of the things that made the original Electronic Village (ENO/REO) so powerful, was that a group of us had training together and then we got back again online... it only takes that one meeting... and it makes it more powerful for relationships*" (Jane Interview 1).

An intuitive sense of the need for welcoming new members encouraged early users to reach out to others using warm and engaging language. "*Hello, especially to new conference participants from Peel... welcome!"* (Jane — online message). This innate sense of online protocol was reflected early in ENO/REO's development by all of the participants in this study and was considered an important aspect of online etiquette; participants needed to be welcomed and respected.

Early users also noted an addictive quality to logging in to the network: "*I was on it all the time because it was addictive too — you know this need to go on. I couldn't go on for a long time because we only had certain minutes through my husband's server but, yeah, I think I was on a lot*" (Patricia Interview 1). Technical challenges were frustrating for early users, but despite the problems, participants continued to believe in the power of the network, "*It's nice to see people back online after our "hiatus". We will all benefit from sharing our students' completed work.*" (Heather — online message).

7.1.2. *1997–2000*

Messages posted in the years between 1997–2000 reflected subtle shifts which were confirmed by the simulated recall of the participants. There was less concern with the difficulties encountered with technology and more on the way in which technology could be used in the classroom but there were also signs that tensions within the ENO/REO system were escalating. The community was becoming fragmented by reactions to individuals who were more combative online and all of the participants expressed concerns with declining participation and a fractured sense of community. There were also ongoing references to labour unrest and unsettled conditions for instruction. Nevertheless, participants still posted messages reflecting an emotional attachment to the online community: "*I am grateful for the support that I received*

as I have always considered ENO and its predecessor 'The Electronic Village' an extended staff room filled with friends." (Bob — online message).

7.1.3. *2001–2003*

Data gathered from the years between 2001–2003 reflected changes in the participants' personal and professional lives as well as changes in the "tone" of ENO/REO. Participants were in the later stages of their careers and reflected various positions of leadership: one participant had become a superintendent, two participants were working as principals, two were curriculum consultants, one was a department head, one headed up an international project and one had become a leader within a teacher union. Questions and messages dealing with leadership and school management were in evidence, as well as the ongoing process of disseminating resources and information.

7.2. *Rules and protocols*

The next sections will examine the rules and protocols developed over the years in order to understand the dynamic involved in the creation and support of social norms and traditions within ENO/REO.

7.2.1. *1993–1995*

When ENO/REO was created there were no guiding principles for behaviour in an online environment as this was a new and emerging field where members had to deal with issues as they arose. Initially, because all of the participants belonged to the educational community, there were professional ethics which were used as a baseline for interaction. Discussion forums, for example, emulated the kinds of standards found in a school staff room where staff members are guided by professional etiquette and respect. Nevertheless, because the environment was so new, participants found themselves in a constant state of change and tensions arose. The lack of guidelines in the early years lead to heated debate:

> *... there was a lot of interesting dialogue that went in there and whether even that should be closed forum or should it be open. There were some things being discussed dealing with issues of certain posters who were you know, maybe flaming someone, how do you deal with that.... I am sure there were people that quit being moderators because of some of the things that they didn't believe in ... resigned their position as a moderator and said I can't be part of this.* (Paul Interview 1)

Many of the participants enjoyed the "lounge" discussion area because *"there was sort of this relaxed banter that you could sort of join in to. It was much more intimidating going into one of the main rooms"* (Jane Interview 1). Establishing

moderators in the system served as a critical focal point for settling protocol issues *"once there were moderators in place that was easier too because they tended to give some focus and at least invite participation"* (Jane Interview 1). Eventually, a Network Coordinator was employed to remind members about protocols and keep forums "on track". This, however, proved unpopular with some participants who felt "controlled" by ENO/REO management with this decision.

7.2.2. *1997–2000*

Participants continued to post messages but felt that active participation had declined between 1997–2000. This period witnessed identity issues and contradictions when newer members joined. Some viewed anyone who joined the forums later as "newbies" and believed that some of them had led to the decline of participation because they "*get into very heated — disproportionately insulting debates...*" *and* "*my sense is that nobody was joining any more*" (Bob Interview 1).

7.2.3. *2001–2003*

Between 2001 and 2003, the growing disenchantment with negative contributions from one member in particular was contributing to a sense of alienation in many forums. This increasing frustration is epitomized with these statements *"My $0.02 worth: this discussion is- again — growing increasingly acrimonious"* (Bob — online message) and *"While this is an open conference, it has a stated purpose and participants don't, contrary to what you may believe, have unbridled leave to engage in any of the above behaviours."* (Mike — online message). Some participants believed that the culture had become too ingrained to be welcoming to others: "*... no matter how you look at it they have a history and they almost have a culture of their own.*" (Jane Interview 1).

7.3. *Artifacts and tools*

Participants reported that certain aspects of ENO/REO had created barriers in the early years, and they had made decisions about staying involved with ENO/REO based on the degree to which the barriers had affected their interactions. The Activity Theory perspective suggests that when subjects encounter elements, which create "imbalances" and "contradictions", they will be forced to respond to these contradictions (Engestrom, 1987). They will react either by widening or narrowing the scope of their interaction with the objects, by manipulating or changing the "objects" in question, by switching to something completely different or by disintegrating the objects completely (Russell & Schneiderheinze, 2005).

7.3.1. *Artifacts and tools 1993–1995*

As the technology evolved there was "*... terrible, terrible growing pain... one day it would work and then another day it wouldn't work at all*" (Bob Interview 1).

Participants never knew when the website or the discussion forums would be working and "*it was incredibly frustrating . . . people would type up messages and it would turn into gibberish. I mean there were a lot of goofy frustrations like that and it was all growing kind of stuff*" (Bob Interview 2). At the time ENO/REO was compared to a "*wagon train that was trying to make progress which would have some breakdowns along the way and some disasters befalling it.*" (Malcolm Interview 1). It was noted that people had stopped participating because they

> *stopped getting in the habit of going there and there was kind of a self-fulfilling prophecy where people think it's going to be reliable and because it isn't . . . . So it took a while to restore its credibility I think.* (Malcolm Interview 1)

Because Internet connections were very slow in the early years, accessing messages involved an enormous investment of time. Additionally, because the cost of connecting to the Internet was high, ENO/REO had to impose time restrictions on usage for financial reasons. Participants remembered being able to complete household tasks while waiting for messages to download "*I used to joke that I would click on something and then go and do my dishwasher and come back and wait for it to load (laughs)*" (Jane Interview 1). Nevertheless participants continued to take part because "*. . . the purpose of it was worth the effort and also fundamentally I believe that you can fix things. . . — you figure out how to get around it. . .*" (Jane Interview 1). Despite the problems, the energy and excitement of the early years is captured by this message: *"I love it around here. It's a digital soapbox; a free Speakers' Corner. Members are not only invited but encouraged to share pet political peeves, celebrated causes, kudos and the occasional rant."* (Sarah — online message)

7.3.2. *Middle and later years 1997–2003*

In the later years, tools had stabilized and had become much simpler to access and use. Discussion forums could be accessed through the web, mail could be accessed almost immediately and content was readily available and updated regularly. Participants noted a new investment in time as there appeared to be a need to be connected almost continually as people expected immediate responses to messages and/or e-mail. Online courses had been added to ENO/REO's available options and were well attended for a brief period of time when the Ministry of Education had mandated attendance in 2001–2002. Participants found that ENO/REO was a fertile ground for understanding the demands of online learning and many used those skills to write online courses incorporating skills that reflected time management and sociability strategies.

7.4. *Division of labour — ENO/REO and school*

The division of labour within the ENO/REO system was very simple and remained so throughout the ten years investigated in this study. Teachers shared information

on a voluntary basis through moderated or un-moderated discussion forums and these discussion forums were generally asynchronous, thus allowing participants time to reflect and post comments in their own time. Other members of ENO/REO became involved in online projects and used the interactive tools available through ENO/REO to complete the projects.

Some members assumed the role of moderators and were paid a very small stipend for their efforts. The participants in this study had all been discussion forum moderators throughout their tenure at ENO/REO, which they perceived as having given them confidence and encouraged leadership. This growth in confidence is articulated in online messages where many had progressed through several leadership stages within the school system. That process has been captured in the archives where messages varied from depicting early interest in leadership roles (including a growing body of leadership advice) to attending leadership conferences, to personal reflections on the leadership process.

Some credited ENO/REO with providing "*applications into the classroom personally and professionally*" (Malcolm Interview 1) and enhanced insights which helped in leadership roles: "*I developed sensitivities to the issues that teachers face as it seemed to be mostly teachers that participated and particularly those that had a lot to say laughter...*" (Mike Interview 2).

7.4.1. *Division of labour within the school system 1993–1995*

Participants in Group 1 experienced various levels of support within the school system. The "double bind" created by the lack of support to integrate new technological skills created a great deal of tension for many of the participants. Some Boards of Education and some schools supported and encouraged their teachers to use technology while some did not. A few schools were like these ones: "*very ahead of our time with computers in a lab and we had drops in classrooms and plus I had the computer music expertise as well*" (Sarah Interview 2) and "*... the conditions were right with our administrator, my style was right, and I was also the school council liaison* so w*e came up with a plan that could free me up so that every single class in that school of 800 students was involved in an online project.*" (Heather Interview 1).

> *This was very, very new, nobody was doing this kind of student collaboration online .... There were teachers who were new to the technology themselves and then we had to learn how to bring students online who had never used it — using desktop publishing software that was ... there were schools who finally went through the whole process and got all the files and created newspapers and then couldn't get the stupid things to print. You know how it is with technology, there are so many things that can go wrong at different*

> *points — so the troubleshooting was definitely what I did.* (Heather Interview 1).

One participant used "*to take the server, it was the size of my back seat (*of his car*), with the workstation that had to go with it*" home. (Mike Interview 1). Patricia recalled connecting to the Internet for the first time in June

> *. . . and in September I was showing the teachers how they could find pictures on the Internet and this was exciting and I think that . . . I just jumped in because I thought, "What have I got to lose?" Now that I think of it (laughs) that was kind of brave of me . . . I had one computer in the classroom and it didn't work. . .* (Patricia Interview 1).

Many of the participants remembered how the artifacts and social protocols within the system of ENO/REO helped them work through labour disputes and other times of stress. They were able to use tools such as discussion forums and e-mail to deal with tensions outside the system. There were concerns with staff morale,

> *Given the current atmosphere created by our provincial government, staff morale is becoming increasingly difficult to maintain. I thought that perhaps we could begin a list of ideas/tips/good practice which we utilize to prop up staff morale during times when people are feeling low* (Mike — online message).

Participants found support through the use of ENO/REO during a province-wide educator strike:

> *A lot of people e-mailed me personally and said that they really enjoyed coming to the politics conference during times of trouble or during a strike or a walk out or during one of the many times when teaching seemed to be on the brink for some reason.* (Sarah Interview 1)

And:

> *You could go online and hear what had happened and the experiences in each school and everybody was facing the hecklers. . . there was a sense of a common bond and it certainly made me much more comfortable for the two weeks we spent on the picket line than I would have if I had only been living in my own little world or even what my union was telling me through the paper* (Jane Interview 1).

7.4.2. *Division of labour — the middle years 1997–2000*

The theme of leadership was clearly on the minds of participants as they entered different phases of their teaching careers in this middle period. Many of the participants in Group 1 discussed experiences with outside activities that enriched their professional lives and through these revelations, we see glimpses of professional growth as well. "*Just got back from OBEA, at the Holiday Inn Yorkdale. It was a wonderful two days, both as a participant and presenter!!!*" (Jane — online message) and "*I am a principal in the D. School Board. A good portion of my teaching experience includes teaching in segregated programs for moderate to severely developmentally handicapped students in my current board and in a public board further north. . . for anyone interested in administration, I would strongly suggest a subscription to Educational Leadership, the publication of the Association for Supervision and Curriculum Development (ASCD)*" (Mike — online message).

There was also a recurring theme about the general lack of professional development opportunities in the midst of rapid change in curriculum and student needs. Sarah felt that she was at a disadvantage in the classroom as a result of her lack of training and mentioned this often: "*So much is changing in Special Ed., that I used to know all of the answers, but not now. . .*" (Sarah — online message). Financial cutbacks from the Ministry of Education had depleted schools of important resources and labour unrest was also a predominant theme:

> *A little good news with which to end the week. . . . Secondary teachers will be heading back to the (bargaining) table on November 18. Three days of negotiations are planned. It's our turn again, I guess. The elementary teachers are now at impasse and a strike vote is possible soon.* (Sarah — online message).

Inadequate staffing and large class sizes were having an effect on student behaviour and this was reflected in messages posted by many of the administrators who attempted to offer advice.

7.4.3. *Division of labour 2001–2003*

The following experiences with technological challenges within the school culture exemplify the issues that were problematic in many Boards between 2001–2003. Despite Boards' promises to equip schools and teachers with technology, there was not enough technological hardware for teachers to have sufficient access in order to increase their skills. "*Their ratio was a computer for every 10 kids in the school and their model was originally 6 computers per classroom which was twice that — so we are not funded for that — so what most schools have done is congregate computers into the libraries into half labs or full labs and the teachers lose access*" (Jane Interview 2). These kinds of problems have been reported across many school districts and are not specific to Canada yet have been a barrier to teachers' skill acquisition in the area of information technology (Cuban, 2001; Burnip, 2006).

Schools made individual decisions about the kinds of technological skills students must learn with the result that "*practices vary enormously from one school to the next and we don't impose models on any particular school*" (Jane Interview 2). Asked if a "standards" curriculum document would therefore be an advantage, participants replied "*No...*" because "*... if they made actual expectations, most schools would have a terrible time delivering on them because there is just not enough equipment and the Professional Development that would be necessary — it would be huge...*" (Jane Interview 2).

Many Boards had severely restricted access to the Internet for security reasons and had provided alternate tools, which weren't working:

> *There is a student off right now for three weeks... with a broken ankle and we were sending e-mail back and forth... and if... we had a forum... whether he comes to class or not, it wouldn't matter because he would know what would be on every day. I would post what we would be doing every day and if tests were coming up we could link to resources, they could fax us what they were doing. So hopefully that would be back soon.* (Paul Interview 1)

7.5. *Object (skill acquisition)*

All participants had become more technologically literate over the years of their involvement with ENO/REO and had integrated technology into most aspects of their lives. They had all demonstrated that technology had become a critical part of their professional work throughout their teaching careers. Several themes emerged from the data which suggested that technology was valued as a supportive tool, as an enhancement for student learning, and as an adaptive tool for differentiated learning.

Participants believed that ENO/REO had supported them in crafting the following specific skills: social and communication skills, technical skills, pedagogic skills, and leadership skills. They reflected on their past experiences as challenges where they had emerged from a time of trial and error with technology, to a time where technology had become an essential tool and noted: "*... how useful it is to be able to communicate in both of those media, e-mail and the threaded discussion, and the fact that when you think about it and compose what you are going to say — how much more valuable that is than even a face to face discussion*" (Jane Interview 1).

Participants also believed that ENO/REO had benefited them professionally and that they were generally ahead of their colleagues so they became school "experts" while trying out different aspects of technology as their confidence grew: "*The school system wasn't there for us yet and we were probably two to three years ahead of that functionality in the classroom*" (Jane Interview 2) and "*I felt so empowered by the ability to quickly and efficiently connect with educators from anywhere in the province to share common problems and solutions that I started to imagine the potential for connecting students*" (Heather Interview 1). ENO/REO was considered

a perfect "*. . . testing/learning opportunity. . . on the use of technology as a means of communication and access to information. . . that's my only means of communication now, don't call me on the phone, send me an e-mail*" (Paul Interview 1).

Participants also experimented with different approaches to teaching and made changes in the way they approached the classroom. They explored collaborative projects, changed the way they approached research by honing Internet research skills, tried new tools, and as their confidence grew, so did their classroom experimentation.

7.6. *Integration of technology in the classroom*

All participants had found that participation in ENO/REO had encouraged them to integrate the skills learned through ENO/REO in their classrooms. As one participant suggested: "*Gradually, technology informed the way I was going to teach formal writing with my students. . . so the technology actually became integral in all that I was doing with my students*" (Patricia Interview 1). Another participant noted that the skills she honed through ENO/REO benefited her classroom teaching to the point where a student returned to tell her that her course had been: "*the most valuable course she had ever taken*" (Jane Interview 2). Another suggested that he was able to try out a number of experiments in his classroom as a result of his involvement with ENO/REO but he acknowledged that "*It would be a little more difficult if I was a math teacher to be able to do the implementation directly in the classroom like I can here. . . we have computers, lots of access, . . . the clientele that we deal with are very computer literate and the comfort level is astounding".* (Paul Interview 1)

He also believed

> *It provided an opportunity for me personally to go through the professional development required to participate or even spearhead some of these pilot projects. That then has given me the ability to take that back to my classroom and rather than learn it in my classroom directly I have always been able to gain some experience and exposure. . .* (Paul Interview 2).

Another participant believed that ENO/REO had empowered her to take on challenges she would not normally have tried in the classroom and that "*For many subjects like art history and science, I have no idea how to teach well WITHOUT the computer*" (Sarah Interview 1). Many credited involvement in the ENO/REO student projects as being motivational and ENO/REO had allowed them to immerse students in technology so that they were "*excited about the technology and even more excited about . . . using a different medium* (Mike Interview 1).

7.7. *Group 1 summary*

This section points out that as participants in Group 1 grew more technologically competent, a history of engagement and loyalty to ENO/REO developed. Group 1 participants believed that ENO/REO became a true online community where members supported each other while also encouraging professional growth. Significantly, members noted that early face-to-face meetings tended to create strong bonds that reinforced online relationships. Over time participants grew less concerned with the difficulties encountered with technology and more with the way in which technology could be used in the classroom. They noted a growth in confidence as a result of involvement with ENO/REO, especially when they were given status through the role of online moderators as well as continued growth with technological innovation and experimentation. Nevertheless, this section also points out that tensions within the ENO/REO community had escalated over time and active participation had declined. The next section will compare these findings to those from Group 2.

7.8. *Group 2 1999–2003*

The study also included a second group of participants who had joined ENO/REO between 1999 and 2003 and while many findings from this group mirrored those suggested by Group 1, there are significant differences. While participants in Group 1 emphasized the feeling of community they enjoyed during the early years of ENO/REO, participants in Group 2 had different experiences. Significantly, data from Group 2 indicated that the social atmosphere in ENO/REO had changed over the years and had become less friendly and inviting. When Group 2 individuals joined ENO/REO, the rules governing behaviour and participation had been developed and negotiated by the membership over many years. Newcomers to ENO/REO's discussion forums had little knowledge of these rules (as they were not generally overtly displayed) and because proponents of these rules appeared intolerant of digressions, misunderstandings arose between participants. This resulted in hesitancy and confusion on the part of participants in Group 2 and suggested a need to address issues around sociability and rigidity.

Also of note, participants in Group 2 joined ENO/REO at a difficult time in the province's educational context, compared to participants in Group 1. By 1998, the mood, atmosphere and morale of the teaching profession in Ontario had been affected by fiscal restraint, labour unrest, and massive educational reform (Fullan, 1998). Face-to-face professional development opportunities and workshops demonstrating the benefits of ENO/REO were under funded and limited to specific ENO/REO projects. Participants in Group 2 noted that time to become involved in ENO/REO was minimal as the speed with which Ontario implemented monumental changes in education during those years, despite "world-class advice on change implementation", severely reduced teachers' time and restricted their access to professional development (Hargreaves, 2003, p. 104).

The findings from Group 2 indicated that social rigidity and lack of time for adequate professional development opportunities provided significant challenges to the ENO/REO community between 1999–2003, which discouraged active participation.

8. Final Conclusions and Implications

In this study, an examination of online messages combined with the stimulated recall of participants within the framework of Activity Theory uncovered the tensions and contradictions within an online community that had been in existence for over a decade. The tensions and contradictions that arose within the interrelated complexities of ENO/REO (the community, the subjects, their tools, the rules and protocols, the division of labour) revolved around the following themes: active participation versus non-active, emergent community design/tools versus known design/tools, technological stability versus instability, community flexibility versus community entrenchment, emergent governance versus unwritten rules and standards, acceptance and support versus negativity, professional interest and commitment versus time constraints, and workplace readiness versus lack of infrastructure.

Suggestions for addressing these tensions include the need to:

(a) encourage active participation by mentoring newcomers, allowing leaders to emerge and take ownership, creating opportunities to meet face to face if possible, and making the rules and protocols of the system available to newcomers, and reviewing and changing protocol when needed,
(b) work with designers and community members to share design strategies and rationale, and
(c) embed the community's tools within the workplace so that integration is facilitated.

Online communities are constantly evolving into many forms and styles as they embrace new and evolving technologies. The simplicity with which participants can form communities may encourage another generation of community users with different needs and new tools. For example, an investigation of communities created using Ning software is worth pursuing, especially sites dedicated to teacher networking: (http://education20.ning.com/).

Finally, this study raises some issues that will consistently create challenges for community sustainability. The pivotal challenges include: lack of time to spend in discussions online, the amount of time already spent by teachers on technological innovations, and access to an overwhelming number of resources online. Nevertheless, despite the challenges noted above, the benefits of online communities to the participants involved suggest that membership in such communities is extremely valuable and that the effort to gain access to and sustain such professional networks will benefit the educational environment.

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