**The development of teacher professional identity through participation in
a knowledge building community (in progress)**

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Abstract: A virtual community of support and communication for pre-service teachers (TACT) connected to a school-based teacher community began as a design experiment in 1995, and evolved to devote some of its time to knowledge building (on teaching and learning in a networked classroom). For this study, the perspective of expansive learning (Engeström, 1987) was adopted, and ethnographic methods used. First, participants' boundary-crossing actions were identified in order to capture the transformative moves within and between activity systems, and the evolution of the community towards becoming a knowledge building community (collective identity). Second, the development of professional individual identities (four participants) was traced. Pedagogical mplications for pre- and in-service teacher education will be drawn.

Introduction

Twelve years ago, the idea of a virtual community of support and communication for pre-service teachers was born, and participatory design began. In those days, the term knowledge building/*coélaboration de connaissances* did not resonate in teacher education in Francophone traditional settings nor for pre-service teachers, cooperative teachers and teacher educators working in professional development schools (PDSs, Holmes, 1990)[1]. As the Web gained in popularity, online learning/teaching were seen as realities that could eventually blur the boundaries between onsite/online activity (teacher education and professional development).

Harasim's (1993) vision that learning communities can form and evolve guided our early use of technology in support of university-school collaborations. The idea of interconnected learning communities, that is, classroom-based networked communities (university or school classrooms) supported and extended by the use of Internet-based tools was put forward. Onsite and online social interactions were encouraged to gain a deeper understanding of the ways ICTs

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[1] Schools where pre-service teachers do their student teaching with elementary or secondary teachers engaged in their own professional development and where collaborative research is practiced (university-school partnerships).

could effectively serve teaching and learning in secondary classrooms. The knowledge building epistemology and suite of tools (Bereiter and Scardamalia, 1993; Scardamalia and Bereiter, 1994, 2003) came to be understood as best attempts to create and sustain knowledge building communities focused on the collaborative improvement of ideas. Not only did were we begin to envision networked-enabled PDSs but our social innovation ambition (Lamon, 2003) was to merge organizational design with the design of knowledge building communities (Scardamalia & Bereiter, 2004).

This paper presents the following: a) the background, b) the research methodology, c) the results pertaining to community and professional individual identities, and d) discussion of results, and implications.

Background

Participation in multiple activity systems (university courses, school field experiences and practice teaching), which do not collaborate very well in spite of pressing societal and pedagogical needs for such collaboration, is on the trajectory of pre-service teachers doing a four-year baccalaureate in secondary education at Laval University, Quebec, Canada. The design of a virtual community of support and communication for pre-service teachers aimed at reshaping the relations and practices between and within the activity systems evolved for a minority of them (less than 10%).

Engeström's expansive learning theory (1987), based on cultural-historical activity theory (CHAT) that goes back to Vygotsky (1978) and Leontev (1978) and revised in 2001 to include an horizontal view of expansive learning (across activity systems[2]), was selected to understand the evolution of the activity of the emerging community – participants' boundary-crossing actions

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[2] As pointed by Engeström (2001), "standard notions of workplace learning cherish a vertical view of competence and expertise. Characteristic to this view is a discourse of 'stages' or 'levels' of knowledge and skill (p. 1).

(across activity systems) were to be considered horizontal expansive learning actions. Expansive learning occurs through the use of new tools (ICTs) that transform the activity of the agent (teacher) in a given community (school- or university-based classroom). The object-oriented activity is also transformed as the agent begins to use the new tools at his/her disposal in object-oriented activity, and new norms and rules appear (Laferriere & Gervais, 2007).

However, a cultural-historical perspective emphasizes that teachers' beliefs and knowledge as cultural tools are well entrenched (Wideen, Mayer-Smith and Moon, 1998; Becker and Riel, 2000). Because beliefs about teaching and attitudes toward technology do not fade away when new technology becomes available, only a small minority of pre- and in-service teachers saw possibilities for the use of ICTs to enhance constructivist pedagogy and collaborative learning (onsite and online). (See also Rogers, 1995). For instance, an online forum allows for asynchronous communication, and keeps traces of participants' interactions. Online discourse is congruent with contemporary approaches to teaching and learning (Chickering and Ehrmann, 1996; Bransford, Brown, and Cocking, 1999). In 1996, Chickering and Ehrmann noticed how technologies were providing "opportunities for interaction not possible when students come to class and leave soon afterward to meet work or family responsibilities." They wrote, "The biggest success story in this realm has been that of time-delayed (asynchronous) communication" (p. 1).

Whatever the sector, however, effective uses of ICTs for teaching and learning in brick-and-mortar classrooms are still in their early stages. This study aimed at understanding the joint evolution of the collective identity of the TACT community and of key participants' individual professional identities.

The main pedagogical assumption was that reflective teaching was the key process for effective use of ICTs. Van Manen (1977) provided a sound conceptual framework when he

suggested the following three ways of thinking about one's teaching: the technical (*techne*), the judgmental (*phronesis*), and the critical/emancipatory. *Techne* and *phronesis* go all the way back to Aristotle. These two ways of understanding practice resurfaced again in Dunne's (1993) argument as being the two modes of reason that seek to regulate and guide human action. The critical/emancipatory path is one that requires the negotiation of meaning between learners, be they secondary or post-secondary students, in order for them to deeply understand an object of knowledge and transform themselves in a deliberate way. In this paper, *techne* is restricted to online resources and tools; *phronesis* refers to practical judgment in the use of ICTs, and critical/ emancipatory activity is supported by electronic forums (Virtual-U VGroups and Knowledge Forum).

The transformation of a network-enabled classroom into a networked learning/knowledge building community through *techne*, *phronesis,* and *critical/emancipatory-oriented* thinking and practice activities called for a design experiment that was to involve a number of iterations. Innovative conceptual tools included the networked classroom concept (Laferrière et al., 2001), the learning community concept (Bielaczyc and Collins, 1999), and the knowledge-building community concept (Scardamalia and Bereiter, 1996). All three concepts are understood here to complement one another in the design of powerful learning places for school learners, pre-service teachers, and teacher educators.

Research Methodologies

The learning sciences, Brown (1992) and Collins (1992, 1999), understood that an experiment's starting point and end result are intertwined and are both sources of discovery. The complexity of the participants' contributions as well as a multitude of sociocultural factors in the design under study (in this case, the network-enabled classroom becoming a networked

learning/knowledge building community) play a role in the development of the online activity of a community. The design takes contextual factors into consideration. In a design experiment, the "discovery" takes place when establishing contexts (designs), which have practical value, delve directly into the participants' knowledge in order to assure that the objectives are met at the end of a certain number of cycles or repetitions (Breuleux *et al.*, 2002).

The online activity of the virtual community was defined as the one that supported, extended and connected work that was accomplished in physical settings, namely professional development schools (creative combinations of three activity dimensions: pre-service education, in-service education, and collaborative research). The focus was on online collaborative learning in the area of ICT integration into one's teaching practice. Some participants were co-located in the same professional development school. Others were geographically distributed. Asynchronous communication extended beyond regular scheduling. Over fifty student teachers became active participants in the community by engaging in collaborative inquiries. Their cooperative teachers, all working in networked secondary classrooms (student-owned laptop classrooms), totaled 12 teachers. Three teacher educators participated. At times, secondary school learners also participated in the collaborative inquiries. A number of artifacts grew out of participants' reflective analyses.

The ethnographic methods used for this study were primarily the learning/knowledge building artifacts of the community, and focused dialogues. Participants' online artifacts were gathered over a ten-year period, and analyzed (nature, themes, patterns). They were considered as manifestations of participants' collaborative inquiries into the effective uses of ICTs, and evidence of new possibilities for teacher education, professional development and collaborative research.

Results

First, participants' boundary-crossing actions are identified in order to capture the transformative moves within and between activity systems, and the evolution of the community towards becoming a knowledge building community (collective identity). Second, and as a complement, the development of professional individual identities of four leading participants is traced through self-reports.

Participants viewed their classrooms as a network-enabled classroom and, later, as a networked learning community (collaborative learning) and, in best cases, as a knowledge building community.

Transformative moves within and between activity systems

Transformative moves identified as defining moments in the evolution of the community as a networked classroom were the following ones:

- *Participants provided technical support to one another (techne-level activity).* The first summer camps, institutes and workshops had a strong technology component. As technical issues diminished, collegial support became more pedagogical in nature. Technical support involved all individuals, regardless of the status of the individual needing or offering it, and remained among the first altruistic moves within and between activity systems (university-based classrooms and school-based classrooms).

- *Participants reached out to others (beyond techne-level thinking, and towards phronesis).* The principle of social interaction for learning purposes was in participants' minds. The networked computer was no longer perceived by pre- and in-service teachers and by teacher educators as a tool that isolated its user (pupil or student) but as one that supported classroom interaction at times beyond the limits of normal timeframes. Many-to-many online written messages emerged as a pattern of communication.

- *Participants engaged in the co-construction of meaning regarding ICTs (critical/emancipatory-level activity).* At the beginning, participants intended to make sense of the new waves of technology. Each onsite meeting, presentation, workshop, or class included some conversation about technology. They had to define, for themselves and in relation to the context of their own practices, terms such as online activity and online community. An inside-outside perspective was

adopted, that is, starting from within the classroom and moving outside through the digital network to encounters with information and people in other places. Dedicated websites including robust and user-friendly electronic forums made most sense for supporting horizontal communication within and between communities.

- *Participants' use of ICTs became routine (techne-level activity)* where school learners, school-based teachers or university-based teacher educators had frequent access to the Internet and engaged in student-centered activities. The organization and management of network-enabled classrooms also required new routines to establish good use of time and order. Project-based learning was an avenue, but one that required knowledge and skill. Online collaborative journal writing proved effective for pre-service teachers to solve classroom organization and management problems in such classrooms, and as a way to introduce peripheral participants into this practice.

Moves, and artifacts, that transformed the university-based networked classroom into a

networked learning community were as follows:

- *Online collaborative journal writing (predominantly techne-level activity).* Individual journal writing is a usual practice in pre-service teacher education. And so is the integration seminar, usually student-centered and reflective (beliefs, questions, practical problems, and interpretations). Collaborative journal writing combined and extended both: Student teachers doing early field experiences or student teaching kept descriptive statements of classroom events and provided interpretations from one to multiple theoretical perspectives. Year after year, student teachers reported being more motivated and challenged by collaborative rather than by individual journal writing. They stated that it was more work, yet more meaningful. Furthermore, online collaborative journal writing occurred in a semi-public virtual space. Cooperative teachers had access, and that gave more of an authentic tone to the ongoing dialogue. Access was also usually granted to peers and supervisors from the same university, province or country or from abroad wishing to learn more about online teacher practices in a live electronic forum. Interested cooperative teachers continued to participate during the semesters when they were not working with a pre-service teacher. This was one way the virtual community maintained cohesion and continued to grow. Another was by having incoming participants visit previous conferences. However, case studies or virtual practica were both more appealing than conferences to incomers and more effective in getting them acquainted with new practices (Allaire et al., in progress).

- *Online case studies (predominantly phronesis-level activity).* Case studies were descriptive-analytical statements about previous events in the online collaborative journal that could be read in and of themselves in order to gain an understanding of specific moments or practices. They were written by graduating teachers and graduate students who worked as research assistants. Cases combined onsite and online classroom activities and served to introduce pre- and in-service teachers to specific ways of integrating ICTs into their learning and teaching. Most cases dealt

with classroom organization and management issues and challenges in K-12 classrooms. More extensive case studies were also conducted, such as those requiring the collection of new data and financially supported by a third partner (e.g., SchoolNet Canada or the Quebec FCAR Grant Agency). Individual participants wrote case studies, and validation was sought from other participants. Collaborative reflective analysis followed. For instance, an extensive analysis has been conducted on the organization and management of the classroom as a networked learning community. For three years (1998-2001), the one-hundred page document was updated by pre- and in-service teachers working with his project in a few specific classrooms. The document was among the first presented to incoming participants. Another way the participants were introduced to the community was for them to take a virtual practicum[3] either before beginning field experiences or student teaching in a highly networked classroom or as a professional development online activity.

▪ *Virtual Tours (predominantly critical/emancipatory-level activity).* Virtual tours became a reflective activity following student teaching, and took individual and collective forms: 1) a multimedia document capturing the apprentice's understanding of some specific learning events that had occurred in a networked learning community; 2) a suite of notes on Knowledge Forum capturing a cohort's reflective activity throughout a five-week field experience or four-month long student teaching; 3) a synthesis of the database (and progressive discourse) of a particular cohort. Both types combined text, image, sound and video. Moreover, it is our understanding that, to make sense, a virtual tour required a host, a community with an online activity and an apprentice (see Lave and Wenger's concept of legitimate peripheral participation), and the goal of the facilitators of the networked learning community was to improve learning through reflective teaching on network-enabled classrooms. The use of specific technical and conceptual tools related to a focus of inquiry provides cohesion and identity to their asynchronous multimedia communication. Practice was the focus, as indicated by its Greek origin *prak-*, which, in French, means *"faire, pratiquer"* and, in English, "practical, practise, practice and praxis."* In the online activity of the community, the advancement of pedagogical practice with the support of ICTs was the focus of the collaborative inquiry in progress.

Moves, and artifacts, meant to transform the university-based networked learning

community into a knowledge building community were as follows:

▪ *Virtual practica (predominantly critical/emancipatory-level activity).* Incoming pre-service teachers had no experience in a networked learning community. They

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[3] There are four parts to a virtual practicum, following an onsite visit and an onsite presentation of the supervisor's goals and expectations regarding pre-service teachers' participation in the innovative field placement they are to join: 1) reading online materials to understand teaching in a networked classroom and learning to teach in a networked classroom; 2) the consultation of previous' participants' notes on the very process of doing a virtual tour before the onset of a field experience or practice teaching; 3) the choice of one virtual tour or more to be explored in depth, 4) the writing of an individual note of a metacognitive nature.

were instructed to prepare and plan for their early field experiences or student teaching in such a classroom by doing, besides physical visits to the school, one or more virtual practica. For in-service teachers, a virtual practicum became a professional development opportunity designed to help one master a new practice by providing bearings and maps and making sense of a network-enabled classroom combining onsite and online interaction. At the theoretical level, it was a new pedagogical reality, one capable of affording authentic learning by using the virtual mode in order to be in the concrete mode of innovative practice. Here are members' comments:

- We had to find a way of being respectful of the practical dimension of participating in the learning community…The idea of capturing on a digital support the school learners' practice came to mind.
- The action of digitalizing students' practice using ICTs was a valuable practice in and of itself for student teachers or beginning teachers wanting to relate theory and practice, and wanting to progress in their own practice.
- In a virtual practicum, participants have the possibility of knowing the direct effects of the use of a pedagogical tool on the classroom members. It is the idea of real and effective action in practice. For the first time, one can see in a concrete manner, and from different angles, the practice of many classroom members.

▪ *Use of advanced features of Knowledge Forum (Techne-level activity).* To be developed once this paper reaches a broader audience.

In short, collaborative learning ranged from publication on the Web to share knowledge with peers or colleagues, to collaborative knowledge building using the advanced features of Knowledge Forum. Participants performed local boundary crossing on a routine basis. However, on the onset, the intended design experiment consisted of a virtual community of support and communication that would be of value to pre-service teachers registered at culturally diverse universities (three universities). The way this has materialized has been the object of another study (Laferriere, Breuleux, and Erickson, in press). Here it is important to stress that local grounding at the participating sites soon became recognized as relevant for a deeper understanding of online pedagogical practice, and was also found relevant to extend reflection on practice to other interested and nearby in-service teachers, graduate students, and teacher educators. Incoming participants (pre- and in-service teachers) gained from the learning artifacts already created by more advanced participants: documentary reviews, collaboratively written

journals, case studies, and virtual practica. Some participants even remained active once they completed a given course, program, or responsibility, such as members acting as cooperative teachers for student teachers.

The development of professional individual identities of four leading participants

The final paper will present the story of four teachers, each developed as a suite of chronological events –here only the story of the fourth teacher is presented:

- *Teacher One.* This teacher was the lead teacher educator, and has been involved since day one.

- *Teacher Two.* This teacher joined the community as a graduate student, and pursued to become a teacher educator in another university while remaining an active member of the community.

- *Teacher Three.* This teacher began as a pre-service teacher (field experience, student teaching), is now pursuing her doctorate while working in the teacher education program as a lecturer (Classroom organization and management course offered to all third-year students registered to the Baccalaureate in Secondary Education)

- *Teacher Four.* This teacher joined the community the second year of its design as a pre-service teacher (field experience, student teaching) at the secondary school (laptop program), and after two years as beginning teacher in different schools joined the teacher professional community at the secondary school part of the PDS, engaged in graduate school, and worked as an entry-level university professor for one year.

  - **1998-1999: Student teacher's early experience with a collaborative online tool**. *The science teacher was on her first use of Knowledge Forum (v 2.0) with 9th graders. She had invited students to choose the theme they were to work on. Each theme they developed related to the curriculum. But, as identified by her science teacher (teacher educator), their online activity presented three limits 1) students participated a lot but in quite different ways; 2) some messages had nothing to do with science; and 3) some themes seemed to be without interest to other participating students. That led us to reflect on: 1) the norms that we had to set to gain more efficiency in the use of the tool; 2) the possibility that each student could find his/her own way to learn in the forum, thus that students will not learn on the same object at the same time; and 3) the evaluation of students' work as the reading of each written note appeared to be overwhelming.*

  - **1999-2000: Student teaching in a student-owned laptop classroom**. *At the school, student teachers did not engage much into serious talking about teaching at lunchtime and during free periods. However, we shared what we had done in class, and exchanged strategies. For instance, I collaborated with one student teacher to develop*

some online dynamic objects likely to help secondary students make sense of mathematics. After school, we often meet on the V-Group (Virtual-U) to exchange more deeply about classroom activity, difficulties, and vision of education. I think that the exchange and writing of such notes helped me enrich my understanding of socio-constructivism and made me more confident and innovative in my classroom practice.

- **2000-2001: First-year teaching with low tech and high expectations**. *I had a regular class with its share of students with learning difficulties. During the first part of the year, I taught in a traditional way, but didn't feel good about it and my students did not seem to like mathematics and science. I suggested to my students to try something new by transforming our classroom into a learning community, one characterized by respect of one another's ideas, and idea improvement (Scardamalia & Bereiter, 1996). My principal focus wasn't on scientific objects but learning to work together and students' becoming aware of impacting on one another's learning. I kept in touch with the teacher communities (the learning community, the community of practice) I had been part off, mostly through online activity, sharing my experience, giving and getting suggestions.*

- **2001-2004: Gaining teaching experience with advanced technology**. *I was back in the community of practice where I had done my student teaching. Some colleagues had engaged in identifying ways to engage students in authentic tasks, and the application of the knowledge building principles using Knowledge Forum. A colleague created scaffolds for progressive online/onsite discourse. I suggested to the 9th graders I was working with to use the principles for better understanding of the scientific inquiry process. The intent was for students to understand the research process not as a linear one but as a work with ideas. Three pedagogical problems arose: 1) some students did not understand the importance of expressing doubt; 2) the scaffolds were not clear enough for the students; 3) some teachers preferred to discontinue the use of Knowledge Forum for technological and pedagogical reasons.*

- **2004-2006: Merging research with teaching with advanced technology**. *I found Knowledge Forum helpful for students to deepen their understanding of mathematics as an activity. It supported their process of gaining objectivity regarding learning objects. My idea was that it would be a research advance to know about how students analyze their learning process, by pointing to what is important to them and comparing their point of view with that of the teacher. A systemic approach was applied, and data was gathered using Knowledge Forum, webfolios and interviews. Analysis is in progress.*

- **2006-2007 : Developing a practice in university-based teaching and research**. *Reflecting back, I become aware that onsite communities with a developed online activity have played a major role in my career. I have had the possibility to share my reflections and ideas and co-construct meaning along with the opportunity to inquire into my actions and modify teaching strategies. Next steps include the design of a math community with the pre-service students I am working with, one that will provide them with the occasion to see that they have a role to play in the advancement of school-based learning environments.*

Discussion of results and pedagogical implications

The above (and upcoming) results demonstrate the contribution of the knowledge building community (in progress) on the formation of teachers' professional identities all along the professional development continuum. Teachers that seemed to benefit the most developed their participation in the community and through the development of other networked communities (e.g., teacher two and teacher three) that shared some of the same design principles. This is a ongoing work of design … However, there are pedagogical implications for teacher educators that are becoming clearer and clearer. Of course, we understand that the relation between participation in the knowledge building community (in progress) and the development of teacher professional identity will need to be more firmly established to convince most teacher educators of the value of the networked community model for teacher education and professional development.

Pedagogical implications

- The design of networked communities, and of its online activity, is a practice teacher educators may undertake in the context of their own university-school partnerships. This practice has proven to reach beyond traditional boundaries.
- The three levels of reflective analysis can guide participation in the online activity of a networked community, and foster its development.
- Though the above networked community was designed to inquiry into effective uses of ICTs in teacher education and professional development we suggest that networked community could be designed in all kinds of different domains and sub-domains of teacher education and professional development. They may be directly linked to optional courses in any formal undergraduate or graduate program.

For those willing to push the boundaries of traditional practice the Internet and digital technologies now allow them to work in a less isolated manner, and be part of a network of teacher communities whose work can gain visibility and credibility. Such a model is also sustainable through university-school partnerships. The shared object of inquiry may be effective uses of ICTs in one's practices, but it may also be any other subject of inquiry (e.g., moral education or self-regulated learning) with enough of a focus to be visible to the larger professional community, and for them to get some sense of knowledge building within their learning community. Furthermore, the model is scalable: creative work and careful reporting on a sustained basis is likely to attract other interested participants, whether they may be pre- or in-service teachers or teacher educators.

It is our understanding that for networked teacher communities to grow, teaching and research must be combined in new, creative, and effective ways. By combining teaching and research, university-based teachers engage in new scholarship (Boyer, 1990), and such innovative work may help reduce the long-standing gap between educational research and practice. Let's envision that a knowledge society might benefit from the possibility of having some of its members engage in professional studies for which traditional classes have been replaced by learning communities connected to communities of practice, and whose members may be advanced placement school learners, undergraduate students, graduate students, practicing professionals, and university-based professors. Organizational barriers, however, would need to be removed and careful design would need to occur for such networked communities to exist and be effective.

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