CROSSING BOUNDARIES: MULTIMEDIA TECHNOLOGY AND PEDAGOGICAL INNOVATION IN A HIGH SCHOOL CLASS

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ABSTRACT

Although much has been written on computer technology and its potential for changing pedagogical practice, relatively little attention has been given as to how teachers' conceptualizations of teaching and other contextual factors relate to their actual use of these technologies. The present paper focuses on an innovative program in a Quebec high school, involving project-based teaching in networked classrooms equipped with laptop computers. One ESL language arts and two French content teachers' use of computer technology is discussed in relation to their conceptualizations of teaching and the way in which the pedagogical innovations featured in this program were supported by the broader social context. The discussion of pedagogical innovation is situated within sociocultural theory, notably in Engeström's notion of an activity system and Tharp's views on the relationship between reform and the alignment of activity settings. Implications for language learning are addressed in terms of the affordances created within the context of this particular program. More generally, the paper argues for a vision of language learning and teaching wherein language is viewed more broadly in semiotic terms and computer technology is viewed as a representational resource within a multiliteracy pedagogy.

INTRODUCTION

Much attention is currently being devoted to understanding the role of computer and multimedia technologies in pedagogical practice. To a large degree, this interest is fostered by two key factors: changes in the world socio-economic order, frequently referred to as globalization, and the ever-increasing presence of computer technologies in daily life (Hass, 1996; Hawisher & Selfe, 2000; Murray, 2000; New London Group, 1996; Warschauer & Kern, 2000). In reflecting on these changes, educators have noted the emergence of new forms of literacy and the need for educational institutions to revise their curricula and modes of functioning in order to better prepare students for life outside of school. In keeping with this perspective, The New London Group (1996) distinguishes between "mere literacy," centered on language only, and a pedagogy of "multiliteracies" that, in addition to print, would take into account the representational resources (visual, audio, hypertext, etc.) afforded by computer and multimedia technologies. Shetzer and Warschauer (2000) use the term "electronic literacy" to refer to these new modes of communication. According to these authors, whereas information technologies were initially viewed as a means to teach language, it is now equally incumbent on instructors to help students become proficient in their use.

Although studies of innovative practice are beginning to emerge (Carey, 1999; Müller-Hartmann, 2000; Sotillo, 2000; Warschauer & Kern, 2000), few have specifically addressed how contextual factors may have facilitated (or impeded) such efforts, or indeed, how teachers' conceptualizations of teaching -- their epistemological stances -- may have mediated the particular practices that ultimately emerged. Most studies have dealt with university courses and been relatively short term; longitudinal studies involving elementary or high school contexts have rarely been the object of intensive study. As one contribution to this area, we report on an innovative program for Francophone high school students in Quebec City,

Canada. The program was considered to be innovative in at least two ways: (a) students and teachers worked within networked classes with laptop computers, and (b) project-based teaching was a main pedagogical feature.

In this paper we first examine how the pedagogical innovations featured in this program were contingent on factors related to the broader social context and to teachers' conceptualizations of teaching. We will focus on the views of one ESL language arts teacher and two French content teachers in Grades 7 and 8 who were involved in this program. In the literature on computers and second language teaching, language teachers often appear to be working in a social vacuum as the focus tends to be on the analysis of discrete activities within a single classroom, while other teachers and the way particular pedagogical approaches emerge as a synergy amongst colleagues are rarely mentioned. Describing this program will focus more specifically on some of the implications of this particular milieu for language learning. As a first step, we will review relevant studies pertaining to teacher beliefs, social context and innovation in the use of computer technologies as well as to pedagogical innovation from a sociocultural perspective.

THEORETICAL CONSIDERATIONS

Teacher Beliefs, Social Context and Innovation in the Use of Computer Technologies

Although computers have at times been hailed for their potential to revolutionize teaching practice, recent research suggests that change is a complex matter and may be related to such factors as the materiality of the tool itself (its affordances)[1] as well as the way it is ultimately adopted or rejected by individuals in specific social settings (Haas, 1996; Hawisher & Selfe, 2000; Murray, 2000; Nicolopoulou & Cole, 1993). In one early study by Mehan (1989), in which computers were introduced into an elementary school classroom, far from revolutionizing existing practices, they were adapted by the teacher to fit in with the habitual ways of doing things. In a study by Warshauer (1999) involving a college ESL composition teacher, instead of promoting the critical, collaborative learning practices envisaged by the researcher, online resources were used to reinforce such traditional literacy activities as essay writing and grammar exercises. Factors evoked to explain this finding included not only the instructor's personal teaching philosophy but also the role of the English language program and the overall mission of the college as a religious institution.

Other studies (Murphy, 2000; Sandholz, Ringstaff, & Dywer, 1997; Warschauer & Meskill, 2000) suggest that more innovative uses of computer technologies may, in fact, be more reflective of teachers who espouse constructivist/socio-constructivist approaches to pedagogy. A 10-year study conducted by Sandholz, Ringstaff, and Dwyer (1997) demonstrated how the teachers' gradual shift towards constructivist teaching strategies, characterized by the use of projects and cross-curricular initiatives, evolved over time as they felt more at ease with the technology itself.

Sociocultural Theory and Pedagogical Innovation

Although innovation in pedagogical practice has been associated with various theoretical constructs, we draw on Engeström's (1991) model of an activity system (Figure 1), which expands on Vygotskian-inspired cultural-historical learning theory.

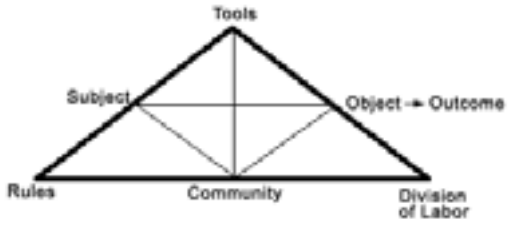

Figure 1. Engeström's (1991) model of an activity system

In developing this model, Engeström initially drew on Leontev's analysis of activity, defined in terms of three hierarchically related strata: Activity, Action, and Operation. At the uppermost level of this heirarchy, the targeted activity is viewed in terms of how the individual or *subject* (e.g., the teacher) initiating the action conceives of its underlying purpose or goal. At the second level, the targeted activity is further specified in terms of goal-specific actions and the *tools* used to carry them out. From a Vygotskian perspective, *tools* refer not only to concrete instruments but also to language/discourse, "the tool of tools" (Cole, 1995). Thus, in a teaching context, tools may refer to resources such as books, pencils, or computers, as well as modes of interaction amongst participants in a classroom (Wells, 1996). The third level pertains to the actual enactment of the activity (the *object*) in response to prevailing conditions. Whereas the first two levels are under the individual's conscious control, the operations, viewed as routinized procedures or strategies, function at the level of the unconscious. The actual *outcome* of a targeted activity is a function of how it is conceived by the individual and the tools selected to enact it.

The bottom portion of Engeström's triangle suggests how an activity, in this instance, teaching, may be further mediated by other aspects of the activity system such as community (i.e., individuals who share the purpose of the activity), the division of labor among these individuals, and the rules that govern the activity. According to Engeström, community in traditional teaching includes only teachers and students. In terms of the division of labor, the role of teachers is to instruct and control, while the role of students is to learn. The participant structure is that of a teacher-centered classroom where the flow of talk is between the teacher and the student. With respect to rules, strict codes of behavior and standards of grading are enforced.

Critics of traditional pedagogy (Freire, 1970; Heath, 1983; Moll & Greenberg, 1990; Siegel, 1995) have pointed to the discontinuity between the student's experience of life outside the school and school learning, which has tended to emphasize abstract, symbolic learning rather than more experiential modes, referred to by Engeström as encapsulated learning.

Although Engeström's notion of an activity system points to how a teacher's personal view of teaching may be mediated by factors related to the school culture, his model does not adequately cover the role of broader institutional and societal factors. In this regard, Tharp's (1993) notion of an activity setting is instructive. He describes how microlevel events (e.g., peer coaching groups or whole class discussion) within an educational establishment are embedded in hierarchically organized macrolevel structures such as a school administration, school board council, and business community. Thus, the recitation script, characterized by an uncritical acceptance of authority and, in traditional classrooms, by the memorization of facts, exists not only in schools but is also represented in the broader administrative and societal hierarchy. Hence permanent fundamental change will occur only if targeted classroom reforms are implemented within the chain of nested activity settings.

CONTEXT FOR THE STUDY AND METHODOLOGY

The school where we conducted our research is located in the province of Quebec, where French is the official language.[2] The instructional medium in schools is French, and English is taught as a second language as a compulsory subject, starting in the elementary grades. In Quebec, both private and public schools fall under the jurisdiction of the Quebec Ministry of Education, responsible for determining the curricula. School boards implement policies established by the Ministry. At the time of the study, due to declining enrolments and a shortage of funding, public schools had begun to set up special programs in order to target specific clienteles. A special program, which we will refer to as the "New Technologies" (NT) program, was designed to attract students.

The NT program was housed in a high school along with the regular curriculum. Students were primarily, white, middle-class of French origin. In an NT classroom with class sizes of approximately 30 students,

students worked in small groups on laptop computers plugged into a central network. They could submit assignments to the teacher electronically, as well as access files in the teacher's or classmates' computers. They were individually connected to the Internet and had access to a variety of physical resources in the classroom including a laser printer, scanner, LCD projector for PowerPoint presentations, a digital camera, and CD-ROMs. Although students entering the program had to indicate an interest in working with computers; in most instances, their skills were limited to basic word processing. Continuity between home and school was facilitated by the fact that students owned their computers and had access to the Internet at home.

Observations were conducted in Grades 7 and 8 in the ESL Language Arts[3] class, taught by Mark Miller.[4] Grade 7 students were also observed in their French and Ecology classes, taught by Lucie Fortin; these classes tended to merge as they were taught in a cross-curricular format. Intensive observations that included videotaping were conducted from mid-October until June. Several hours of recorded interviews were obtained from Lucie and Mark as well as a third teacher, Normand Arsenault (the Grade 7 homeroom teacher, who taught Geography, Math, and Religion). School personnel and parents were interviewed and various types of documents, including examples of the students' work, were collected. As the main focus of this paper dealt with teachers' conceptualizations of teaching and contextual aspects that supported the emergence of the NT program, analysis of classroom interaction was not dealt with. Thus, the discussion of classroom activities is limited to brief descriptions, reflecting the pedagogical views of the teachers.[5]

CROSSING BOUNDARIES: TEACHERS' CONCEPTUALIZATIONS OF TEACHING AND THEIR RELATIONSHIP TO CLASSROOM PRACTICE

As revealed by archival documents, interviews with teachers (in particular, Lucie, Normand, and Mark whose views are presented below), interviews with administrators, and our own intensive observations in Lucie's and Mark's classrooms, the NT program was broadly characterized by the following:

- integration of multimedia technology into all core subjects
- use of substantive and challenging projects as a primary participant structure
- cross-curricular projects involving two or more teachers
- emphasis on process stressing the development of efficient and productive work habits and strategies to enhance autonomy (equally featured were the writing process and critical reflection)
- portfolios to document students' progress throughout high school
- evaluation based on letter grades intended to gauge the degree to which students invested themselves in a particular project and completed the specified objectives.

During the interviews, Lucie, Mark, and Normand discussed their views on teaching and learning, which basically reflected a constructivist/socio-constructivist perspective. The pedagogical goals listed above were reflected in their words and the implementation of their projects.

Lucie

Lucie taught French (L1) and Ecology in an integrated cross-curricular format after 15 years of teaching in the elementary grades, where she had used a project-based, experiential approach. At one point, when administrators had wanted to place computers in a separate laboratory, she intervened to have them installed in teachers' classrooms. She also recounted how in the absence of adequate numbers of computers, she made her own laptop available to students. In short, project work with computers was a pedagogical strategy she had appropriated and integrated into her teaching long before joining the NT program.

Traditional schooling had little appeal to Lucie. She particularly objected to the fact that such instruction tended to promote competition rather than collaboration among students. She pointed out how during a

field trip to a woods to gather specimens for the ecology class, some teams had deliberately tried to hide what they had found from other students so the latter wouldn't get more points. Her other criticism of traditional schooling was that it provided instruction to students in a lockstep fashion, something she referred to as *le même travail mur-à-mur* (the same work wall-to-wall). She felt that traditional schooling did little to foster learner autonomy, but rather produced students she referred to in French as *les exécutants* (executors), as a result of the unreflective, mechanical manner in which they performed their assignments. By contrast, in her own teaching, Lucie emphasized the need to engage students in cognitively challenging tasks requiring analysis and synthesis, a point she made with reference to Bloom's (1956) taxonomy.

What emerged as important in Lucie's vision of teaching was the creation of a community of learners that extended not only to the students but to others outside the immediate school context (e.g., parents, technology experts, and students from the local university, who volunteered in various ways in her class).

As an example of how Lucie's pedagogical values were reflected in classroom activities, let us consider one of her projects involving the theme of Space. The topic itself was selected by the students; following an initial class brainstorming, students voted to focus on Space. After another round of brainstorming and voting, the students opted to do projects involving the creation of imaginary planets. The project took several weeks and involved a number of steps requiring individual, small group and whole class work. Groups drew slips of paper with three features of the planet they had to incorporate into its description. After working on these descriptions individually, the group team members pooled their ideas to develop a conception of the planet. As the project progressed, the text was revised and edited. Reflecting on the intense collaborative activity involved in this project, Lucie notes,

> *ils prenaient les meilleurs extraits de chacun des textes pour faire un nouveau text … puis ils ajoutaient des choses, ils enlevaient, ils critiquaient, moi je le prenais, je le regardais, je rajoutais … Finalement le texte s'est construit en coopération, il s'est travaillé beaucoup par emai l… ça a circulé…*
>
> they ended up taking the best excerpts of each text to create a new text … then they added things, they deleted, they critiqued, I took it, I looked it over, I added … Finally, the text was cooperatively constructed, it was worked on a lot by email … it really circulated…

As part of the project, student teams who took art class made a model of the planet; those in the music class created a tune and sound effects they thought appropriate for the planet. In addition, students pooled URLs related to the project for everyone to share.

Each group made a PowerPoint presentation of their project. In addition to class presentations, Lucie arranged with a local museum to have her students present their projects in connection with a Space exhibit. Thus, even though the choice of Space in the context of ecology was unexpected, Lucie accepted it and used it as the focal point for integrating objectives related to the Ecology and French programs.

For Lucie, the importance of team work and creativity is related to the skills and abilities she felt her students would need to succeed in the workplace. Referring to a letter she had received from an employment agency, she noted that employers were interested in employees who are *"capables d'être créatifs … qui sont capables d'avoir des idées, qui sont capables de travailler avec des équipes multidisciplinaires de gens"* (able to be creative … able to have ideas, able to work in multidisciplinary teams). The need to train students in these skills was, in Lucie's opinion, even more crucial since the advent of the North American free trade agreement, which increasingly brought different cultural groups into closer contact.

With respect to the role of computers in the NT program, Lucie noted that technology provided a powerful tool -- *"ça nous donne un autre canal"* (it gives us another channel). As Lucie explained in the

following excerpt, computer technology supports an educator's value system, whatever that system may be, including traditional views on pedagogy that she rejected:

> *…ça [l'ordinateur] donne de la puissance à ce que tu es d'avance, si t'es quelqu'un qui pense, qui a une philosophie que l'élève c'est un exécutant, qui fait des exercices, bien y en a des exerciseurs qui peuvent les rendre encore plus captifs qu'avant … par contre, si tu penses que l'ordinateur, ça prolonge ce qu'on est déjà, que ça nous donne plus de mémoire, plus d'oreille, on entend plus loin, on voit plus loin -- dans le monde entier finalement -- ça prolonge nos valeurs. Si ta valeur à toi c'est une question d'hiérarchie, puis c'est ça, mais si tu veux garder les gens sur l'apprentissage de connaissances, bien l'ordinateur va servir à ça.*
>
> …they [computers] enhance what you already are, if you are someone who thinks, who believes that a student merely executes, who does exercises, well, there are drills that can control them even more than before … however, if you think that computers extend what we already are, that they give us more memory, enable us to hear and see better -- throughout the whole world in fact -- they extend our values.

Mark

At the time of our study, Mark had been teaching ESL for only three years, two in the NT program. As a student in a TESL program at a local French-medium university he did his practicum in one of the schools under the jurisdiction of the board in charge of the NT program. A ground swell of favourable reports on his teaching ability brought him to the attention of school administrators, who ultimately offered him his first job. As an ESL teacher, Mark had first-hand experience with the challenges of becoming bilingual. He grew up in a monolingual English language Canadian province and had enrolled in a French immersion program in high school. Although Mark became functionally bilingual in high school, he decided to pursue his university studies in Quebec City in order to live in a French environment and to further improve his French, a goal he has since achieved.

In class, Mark sometimes presented himself as a model for his students, referring to his own experiences as a learner of French in order to encourage them to persevere in their language study and undertake challenging tasks, such as reading their first book in English. Mark also promoted cross-cultural contact and authentic language experiences in various ways, including a movie club he organized as an extracurricular activity, e-pal activities, and student exchanges.

Prior to becoming involved in the NT project, Mark had experienced cooperative learning at the university; however, he was not familiar with project-based teaching, which he described as "one step up." For him, the identification of real goals was particularly important in this type of teaching. Thus, he commented,

> …putting students in a learning situation where the goal is real, it's not learning to learn, it's not learning for school, it's not writing me a paragraph so that I can correct it and it stops there and they get a mark back, it's me getting them to write, to produce something, a Christmas story that is going to be published, we are making a book, we are doing a pamphlet, this pamphlet is going to be seen by people, you know -- let's make an Internet site, you know not because we have computers but because an Internet site is something that they can go on the Internet and people can visit and it's there, you know, it has got a purpose, ah and the positive benefits of that are that, because it's real the students are more motivated … it also fits with the whole, the final objective of the program that when those kids graduate, they graduate with the tools and the way of thinking and the methodology that's used outside in real life, I mean outside of school.

This comment shows that Mark viewed computer technology not as an end in itself, but as a means to an end. He was first and foremost concerned with an approach to literacy. Like Lucie, Mark thought that schools should prepare students for the world of work. For him, traditional schooling was characterized

by a focus on facts and memorization with students working individually. By contrast, the workplace was characterized by a focus on process, problem-solving and the ability to make use of resources. Thus, Mark commented,

> I think the problem right now is … the way classroom learning is set up, it has nothing to do with a real workplace … in a regular class , they're stuck at their desk … they have to memorize, they have to know these facts, but nobody in real life has to do that, you know you are never in a situation where you have to have information memorized, you know you will pull it up yourself (on the computer) in your office … and then you use it for whatever you happen to be doing, whether you are a plumber … whether you are a business man … that is the main problem, and the project approach is basically not to teach them facts, it is teaching them the manner to find the fact when you need it, you know -- teaching them how to use it and to use everything at their disposal in a structured way.

As reflected in the above excerpt, an underlying goal of Mark's approach to pedagogy was a focus on process, teaching students strategies needed for carrying out tasks and accessing relevant resources. Related to this goal was what he referred to as the "work process" or the "work ethic" (i.e., training students to work efficiently to meet deadlines and respond to the specific demands of a task). For Mark, developing a work ethic, especially in Secondary 1 (Grade 7) took precedence over teaching content as illustrated in the following excerpt:

> My goal in secondary one is … [to get students] to explore … and develop the whole other side of things, which is their whole work process, you know, a big part of our program is their personal habits, their shortcomings as far as learners go, as far as workers go, not to mention the subject matter, you know it's independent of math, geography, French and history, it's about them and how they work and how they interact, I'm good at this, I'm not good at this, I have to improve, in a group I tend to talk more than I work, making them conscious of that and helping them master it.

Like the other teachers in the NT program, Mark promoted the use of reflection as a means of encouraging students to become more aware of their strengths and weaknesses. With respect to the pedagogical value of portfolios and reflection, Mark commented, "I make them think of themselves as learners and what they are becoming" and "we have a learning portfolio and not just a presentation portfolio … basically you make the students conscious of their learning or how they are learning."

In addition to having real goals, Mark wanted student projects to be challenging. Although he conceded that in his attempts to find the right balance, he might have overwhelmed his students, he nevertheless preferred this to the use of tasks, which might be overly superficial. Thus, he stated,

> Some of them [students] I overwhelmed with projects sometimes, because I say, listen this is what I want you to do, go and do it, and they're like but I don't know how, well, try, you know, yeah because I don't approve of giving them everything on a silver platter, just having them fill in the blanks. I'd much rather they mess up something than have me give it to them every step of the way … it's a tough way to develop their process of making them think in an orderly fashion and decide before what they are going to need to know. I think it'll work.

Although developing cross-curricular projects was not always easy, it remained an important goal for the program. One such project in which Mark took part involved the production of a Web site at the start of Grade 8. For this project, students had to introduce themselves on the site as part of the theme *"Moi hier et moi demain"* (Me yesterday and me tomorrow). In their French classes, students worked on the texts they wanted to post on the Web; in the English class, students wrote up retrospective "blurbs" about one of their classmates, which were integrated into the French text. Such projects, in addition to fostering

students' creativity both in their writing and use of technology, also conveyed symbolically how both languages could serve meaningful communicative purposes.

Normand

Normand was the Grade 7 homeroom teacher and taught Geography, Math, and Religion. When he joined the NT program in its first year, he brought with him a wealth of experience from both the educational and workplace domains. With a degree in Theology, Normand had spent most of his 20-year career in the Quebec school system, teaching students with learning difficulties or drop-outs in adult education programs. He had also served as principal in a public school. At other points in his life, he had worked with juvenile delinquents and been employed in two government ministries.

Like his colleagues, Lucie and Mark, Normand was concerned with designing projects that would be challenging and motivating for students. During the interviews with Normand, he emphasized the importance of pushing students to excel. One aspect of this standard of excellence which he sort sought to instill in students was reflected in his use of the French word *facture* (workmanship[6]). In the following excerpt, the interviewer, Diane Huot, herself a Francophone, seeks to clarify the meaning that Normand attached to this word (D = Diane, N = Normand):

> D: *quand tu dis une facture, tu veux dire un produit final?*
>
> N: *un produit final, un emballage, quand je parle de facture je parle d'un emballage*
>
> D: *c'est quelque chose de beau là, fini?*
>
> N: *tout le temps, il faut toujours que ce soit beau, il faut que ça impressionne, c'est ça, il ne faut pas que ça impressionne les gens de la classe, si ça impressionne les gens de la classe tant mieux, mais il faut vraiment que ce soit quelque chose qui sorte de l'ordinaire, pas seulement centré sur l'extérieur, parce que les gens quand ils viennent* [those who visit this special program], *ils ne connaissent pas nécessairement les technologies, alors pour un petit peu ils sont éblouis. Et nos jeunes cherchent la facilité, petites images, petits sons,* short and sweet, *et puis les gens sont contents mais moi je ne suis pas d'accord avec ça, c'est pourquoi quand ils me présentent des produits, ils sont étonnés, je ne les évalue pas comme quelqu'un qui arrive de l'extérieur et qui va applaudir, moi je vais voir derrière la capacité de l'individu qui peut faire plus, qui peut me donner plus, et c'est là que des fois je dérange.*
>
> D: When you say *"facture,"* do you mean "finished product"?
>
> N: A finished product, the packaging, when I say *"facture"* I mean "packaging."
>
> D: It's something polished, complete?
>
> N: Always, it always has to be polished, it has to impress, moreover that's what I told them [studnets] at a certain point [re: computer technology], that if it's going to impress, it just can't impress students in the class, if it does impress students so much the better, but it must really be something that is out of the ordinary, not just aimed at the general public, because when people come [those who visit this special program] they're not necessarily familiar with computer technologies, so anything at all and they're amazed. And kids take the easy way out -- little pictures, little sounds, short and sweet, and people are happy, but me, I don't agree with that, that's why when they present their work, they are surprised I don't evaluate like someone from outside who is going to applaud, I'm going to look at the ability of the person to see if he can do more, give me more, and that's why sometimes I'm upsetting to them.

As reflected in the above excerpt, Normand was sensitive to the fact that, not only students but people from outside with little knowledge of computers, could be easily impressed by the bells and whistles, the "little pictures" and "little sounds." Normand preferred to push students toward more sophisticated uses of

technology. One such example was a project carried out toward the end of Grade 7 in Religion, where students in teams had to do a PowerPoint presentation of a problem involving ethical choice. Students were challenged by the project and rose to the occasion designing PowerPoint slide-shows with synchronized images and sounds.

The way students engaged in this project also brings to the fore a second notion inherent in Normand's use of the term *"facture."* In addition to denoting a polished product, this term was also associated with creativity. Although in his projects Normand provided students with models and guidelines, he also invited them to play with the form or genre. Thus, in reflecting on his geography project, Normand applauded those teams that succeeded in presenting information in an innovative manner such as pretending to view the Earth from the perspective of extraterrestrials. In referring to this project, he commented (referring to the team that did a geography project from the perspective of extraterrestrials),

> *…bien ça leur permet de s'amuser, moi je valorise ça beaucoup … il ne faut pas que la géographie devienne quelque chose de lourd, il faut que ce soit quelque chose de plaisant, si on veut que ça devienne plaisant il faut que ce soit un peu de nous autres, la partie qu'eux ont, c'est dans l'emballage, dans l'emballage ça veut dire qu'on peut être des personnages, on peut être des personnages farfelus, on peut être des personnages même au niveau d'une présentation qui s'expriment différemment…*
>
> …well that allows them to have fun, I consider that very important … geography shouldn't be something heavy, it should be something pleasant, if one wants it to be pleasant, we've got to put something of ourselves into it, the part they get is in the packaging, in the packaging they can play different roles, they can be crazy characters, they can even role play, using accents.

Like his colleagues, Normand felt that traditional schooling tended to produce students who were individualistic and competitive. He thought that in project-based teaching, students could be moved away from these tendencies and encouraged to share their knowledge. Although competition was not excluded, it had to be envisioned as competition with oneself -- a quest for personal excellence -- rather than with others. Like Lucie and Mark, Normand felt that a focus on process took precedence over specific subject matter content.

Normand was very conscious that the project-based teaching, as practiced by himself and his colleagues, fundamentally changed the traditional role of the teacher as an authority on a body of fixed knowledge. Nevertheless, in discussing the role of the teacher as guide, Normand conceded that not all teachers might feel at ease with this change:

> N: *Dans ce programme le prof doit accepter de ne pas avoir la vérité. Il faut accepter d'être remis en question, eh, il faut accepter de ne pas être le seul et unique maître d'œuvre … t'as plus le trône, t'as plus le pouvoir comme tel, le seul pouvoir que tu peux avoir, c'est le pouvoir de guide, t'as le pouvoir de sanction à un moment donné pour un certain rappel à l'ordre, mais je dirais que c'est un peu ce que les gestionnaires ont vécu à un moment donné quand on leur a dit -- écoutez, la gestion c'est d'apprendre à faire faire, mais d'apprendre à faire faire ça demande des habiletés très spéciales parce qu'on ne reçoit pas exactement comme on voudrait que ce soit, c'est correct que ce soit comme ça, mais ce n'est pas tout le monde qui est capable de vivre avec ça…*
>
> N: In this program, the teacher has to accept he doesn't have the truth. He has to accept he'll be challenged, he's got to accept he's not the only one who knows … you're not the king of the castle, you don't really have total authority any more, the only authority you can have is the authority of a guide, at certain points, the power to keep order, but I would say it's a bit like administrators when they were told -- listen, administration it's learning how to get people to do things, but learning how to get people to do things requires very special skills because we don't

necessarily get back what we want, it's ok for it to be like that, but it's not everybody who can live with it…

Although Normand appreciated the usefulness of computer technology, he considered it as just one tool. More fundamental to him were his beliefs about pedagogy which he would attempt to put into action whatever the particular conditions or types of students he might be dealing with:

N: *…c'est tout simplement un autre outil …moi, je fais avec ce que j'ai, si j'en ai pas je fais autre chose, je suis un gagnant, donne-moi la classe que tu veux, avec l'équipement que tu veux, je vais passer au travers…*

N: …it's just another tool, I make do with what I have, if I don't have any, I'll do something else, I'm a winner, give me the class you want, with the equipment you want, I'll come through.

CROSSING BOUNDARIES: INNOVATION IN THE NT PROGRAM FROM THE PERSPECTIVE OF SOCIOCULTURAL THEORY

The interviews showed that teachers in the NT program clearly viewed their approach to teaching as departing from traditional pedagogy. Figure 2 demonstrates the crossing of traditional boundaries with reference to Engeström's activity system.

Rules	Division of labor	Community
• epistemological stance: focus on process, strategies, work ethic. • cross-curricular teaching • portfolio evaluation	• teacher as guide; team work on projects	• teacher, student, parents, the public, students from outside the school, Web authors.

Figure 2. NT program boundaries in terms of Engeström's model of an activity system.

Thus, the first crossing of boundaries pertained to the notion of community, traditionally viewed as consisting of teacher and student and confined to the physical place of the classroom. Through the NT teachers' efforts to recruit more public audiences for the students (e.g., presentation of projects in connection with an event at a museum), as well as the use of the Internet, a more expanded notion of community emerged, which, to use Bakhtin's (1986) terminology, was multivoiced and dialogic. Specifically in regard to the Internet, collaboration involved both direct contact (e.g., e-pals or contact with a NASA official during the space project) and covert interaction with discoursal artefacts as in the search for information on Web sites.

With respect to the division of labor, here too a boundary was crossed as the NT classroom organization that encouraged team work significantly departed from the traditional class, where, as Engeström says, teachers teach and control and students study. In this reconfigured context, teachers saw themselves as guides rather than distributors of facts. Compared to a traditional classroom, the NT program also differed in terms of what Engeström identified as rules -- "the norms and standards that regulate the activity." In contrast to a focus on the amassing of facts, the epistemological stance encouraged here emphasized process (i.e., an understanding of how strategies and tools could be used as resources to achieve particular pedagogical goals), the development of a work ethic, and learner autonomy. Cross-curricular instruction, aimed at overcoming the fragmentation of subject matter, and the use of portfolios also represented important departures from traditional pedagogical approaches.

In contrast to research that suggests how individual initiatives at reform may be undermined by institutional forces that fail to provide appropriate support (Warschauer, 1998), teachers in the NT program were pursuing similar pedagogical goals. Such convergence of goals was further facilitated by three factors:

1. Teachers were hired because of their predisposition to serve the pedagogical goals of the NT program. As Mark pointed out, even though teachers at times disagreed, such "minor conflicts" did not change the "overall schema of things."
2. Since this was a special program, students were specially selected. Although in actual practice such cases were few, students who did not fit could be asked to leave or could decide to do so on their own. As Matusov (1999) has observed, such screening acts as a filter to enable innovative programs to maintain themselves.
3. Teachers were actively involved in the collective, pedagogical design of their program. This was further facilitated by teachers' personal Web sites, which provided course information including descriptions of projects and evaluation criteria. As noted in studies of genre theory (Bazerman, 1988; Paré, 1993), institutionally shared documentation serves to both regulate activity as well as enculturate newcomers.

In addition to the intersubjectivities created in the NT program through shared goals, support was also provided by the broader social context. For example, when the NT program was taking root, certain pedagogical innovations such as a greater use of computer technology, projects and portfolios were being incorporated into a major Ministry of Education reform based on socio-constructivist principles, which has since been implemented in the Quebec school system (see http://www.meq.qc.ca). At the same time, in Quebec, computers, teamwork, and use of English as the language of international communication have become increasingly more widespread in socio-political discourse. In interviews with teachers, parents, and students, these features of the NT program, were perceived favourably as being relevant to preparation for the workplace. Thus, the convergence of goals amongst teachers in the NT program and the support for these innovations within the broader institutional and societal hierarchy constituted a fundamental realignment of activity settings, a condition Tharp (1993) considers to be indispensable to the emergence of permanent and substantive reform.

CROSSING BOUNDARIES: IMPLICATIONS FOR LANGUAGE LEARNING

Although our observations of the way particular students or teams invested themselves in a given activity could vary, the vision of schooling enacted in this particular program, and in the English teacher's class more specifically, opened up certain affordances for language learning. Interpreting the notion of language learning broadly, we discuss these affordances in terms of (a) computers and multiliteracies; (b) computers -- type, place, and accessibility; and (c) collaborative processes.

Computers and Multiliteracies

The widespread use of computer technologies within the broader society has fundamentally altered the nature of the literacies students need to develop in order to enhance their chances in the workplaces of the future (New London Group, 1996; Shetzer & Warschauer, 2000). It is of note, therefore, that in this study the students' use of English is embedded in the concurrent use of multimedia and technological tools to accomplish various tasks.

The development of these multiliteracies is apparent in the two projects described above (i.e., the PowerPoint developed during the space project and the Web site entitled "*Moi hier et moi demain*" (Me yesterday and me tomorrow). For the PowerPoint space project presentation, students had recourse to the representational resources of print, visuals, and audio. Similarly, in for the Web site project, as illustrated by one student's (Charles') project, we note that, in addition to print, meaning is additionally conveyed through the use of colored fonts, images, and graphics. As a prelude to the section entitled *"Moi demain?"* (Me tomorrow?), a red flashing demon is juxtaposed to a conventional print text in which Charles announces his future plans to become a computer engineer. Images from childhood -- notably one of him sitting in front of a computer and another of his father's police cruiser -- and his own initial dreams are

contrasted with his future dreams, as evoked by flashy, high tech sports cars. By drawing on the representational resources of various media, students like Charles were thus able to convey a semiotically richer portrayal of themselves than the print texts alone would have permitted. As noted by Kress (2000), it is exactly this lack of a broader perspective on literacy and meaning-making that many TESOL professionals have tended to ignore:

> TESOL professionals continue to act as though language fully represented the meanings they wish to encode and communicate. Yes, they admit that other features are important, but if pressed, the linguist and the applied linguist (the language teacher, let us say) would maintain that their business was language, after all, and these other things were someone else's to look after. (p. 336)

Although Normand used the word *facture*, a term which may more aptly describe the nature of the literacy processes in which NT students were engaged, is *design* (New London Group, 1996; Kress, 2000). Defined by Kress (2000) as "the intentional deployment of resources in specific configurations to implement the purposes of the designers," design emphasizes the role of agency in the process of text production (p. 340)**.** In their projects, students were required to be creative and to put something of themselves into the products they created. For example, students had to describe both their past and future selves in the Web project. For this project, the texts in English were written by other students who had to imagine they were retrospectively commenting on their partner as a child. For Charles' partner, this provided the opportunity to try out the voice of a grandmother reflecting back on her grandson's youth. As recent research on literacy has shown (Kramsch, 2000; Lam, 2000; McKay & Wong, 1996; Parks, 2000a), the development of language skills (whether L1 or L2) is bound up with issues of identity and voice. Rather than merely reproducing authoritative discourses, students were, in Bakhtinean terms (Bakhtin, 1986), engaged in dialogic processes that encouraged appropriating and re-accentuating others' words. Through the various projects, students, in both French and English, assumed the role of producers of artefacts rather than that of mere consumers of textbooks or software.

Computers: Type, Place, and Accessibility

As noted in Sandholz, Ringstaff, and Dwyer (1997), the degree to which computer technology may ultimately be integrated into classroom practice depends on whether computers are located in the classroom or in the computer lab. In the present study, two tools frequently used by students for reading and writing tasks were spell-checkers and translation tools (in particular, those available on the Babylone site http://www.babylon.com). Although both bilingual and English-English paper dictionaries were available in the classroom, students had a marked preference for the electronic translation tools due to their ease of use. Since all students were connected to the Internet, authentic materials could be readily accessed, thus providing them with rich and practical language input (Warschauer, 1996). In addition to immediate access, these resources could be adapted to meet students' specific needs and interests. In the case of a Grade 8 game board project, for instance, the team that had decided to base their game on the Austin Powers movie used Internet sites to find the English names of characters they knew only in French, as well as to get ideas for developing their theme and illustrations.

Since adoption of computer technologies and the acquisition of associated literacies requires sustained periods of apprenticeship, their use across the curriculum greatly facilitated this process as teachers could build on and extend students' developing competencies. At the start of the program in Grade 7, most students had minimal knowledge of Microsoft Word, but by the second half of Grade 8, Mark was able to offer a choice of three presentation modes: Word document, PowerPoint with oral presentation, or Web page. Each of these modes involved different genres, understood here both in terms of substance and form, and the social means of production underpinning the activity (Miller, 1984), and could sometimes require tasks not normally associated with language teaching. For instance, Web page creation required an outline to map out the hierarchical organization of the links. If, as has been suggested by certain educators

(New London Group, 1996; Warschauer, 2000), workers of the future will need to master multimodal forms of communication as well as show greater agency and the capacity to adapt to changing situations, the types of interaction evidenced in the NT program would appear to provide a relevant apprenticeship.

Collaborative Processes

As reflected in the words and projects of Mark, Lucie, and Normand, collaboration and team work emerged as salient values in this particular school community. Although the nature of the collaborative processes involved in text production and their implications for language learning will be more extensively explored in future papers, four broad types were in evidence: joint, parallel, incidental, and covert.[7] Following is a brief description of each type with examples of what the activities actually entailed in this particular context. Within Engeström's model of an activity system, these four types of collaboration suggest more precisely how texts are constructed in reference to the notion of division of labor as well as how various computers and various other tools are implicated.

Joint Collaboration This refers to two or more writers working on the same text who assume equal responsibility for its production in terms of official authorship, although individual contributions to the finished product may vary. Such behaviors were observed in the context of collaborative writing assignments where teams worked jointly on the production of a common text. For example, four students worked as a group brainstorming ideas, drafting, and revising a story set in ancient Egypt. Most of the time, however, students divided up the tasks. If needed, they would then informally regroup. As students soon came to know each others' strengths and weaknesses, these groupings, as well as the distribution of certain tasks, would capitalize on the expertise of members.

Parallel Collaboration This refers to two or more writers who, although working on the same text, do not assume equal responsibility for its production in terms of official authorship, although again, individual contributions to the final product varied. One important example of this type of collaboration was the feedback provided by the teacher, either in the form of individual consultation or to the whole team. Although feedback was provided on paper drafts, it was also given electronically including color-coded highlighting of errors and hypermedia notes with explanations of the problem. Another key example of parallel collaboration pertained to peer review from other teams or individuals not involved on the same project.

Incidental Collaboration This refers to generally brief, spur-of-the moment requests for help directly related to the writing task at hand. Students were frequently observed asking their peers for help with specific tasks, collaboration which was facilitated by the fact that they could move freely around the classroom. While discussing a problem, reference could be made to an on-screen text, or the person requesting help might simply read over relevant parts of his interlocutor's on-screen text. Although widespread in the NT classes, students in traditional classes rarely have the opportunity to engage in this particular type of behavior when completing writing assignments.

Covert Collaboration One aspect of covert collaboration refers to getting information from documents or other linguistic or nonlinguistic sources during the process of producing a text. In this study, examples of covert collaboration included use of tools such as dictionaries, electronic translators, spell checkers or documents (whether hard copy, on the board, or on-line) when searching for words or ideas.

It is interesting to note that most written products were generally mediated by more than one type of collaborative activity. From a language learning perspective, we would maintain that the scaffolding provided by these behaviours not only enabled students to complete the tasks at hand but also helped them move from other-regulated to increasingly self-regulated behavior.

CONCLUSION

In this paper, we have focused on how the pedagogical innovations featured in the NT program were contingent on teachers' conceptualization of teaching as well as factors related to the broader social context. As discussed above, teachers in this program considered their pedagogical beliefs as being most important, while computer technology, although considered a powerful tool, was viewed as a means to an end.The present study supports other investigations that suggest how the actual use of technology is mediated by teachers' conceptualizations of teaching and broader contextual factors (Cuban, 1986, 1993; Mehan, 1989; Nicolopoulou & Cole, 1993; Warschauer,1998, 1999). However, in contrast to studies that showed how such factors lead to the reproduction of more traditionally oriented pedagogies (Warschauer, 1998), the present study provides an illustration of how the potential of the technology was harnessed in an effort to move toward a notion of community as a multi-voiced, dialogic space. Our observations support other studies that have suggested that constructivist/sociocontructivist approaches to learning are particularly conducive to more progressive uses of computer technologies (Murphy, 2000; Sandholz, Ringstaff, & Dywer, 1997; Shetzer & Warschauer, 2000; Warschauer, 1999, 2000). The structure of the NT program for language learning favored the development of multiliteracies and collaborative processes of text production.

From a theoretical perspective, Engeström's model of an activity system has proven useful for envisaging how the boundaries of traditional pedagogy were blurred or crossed. The success of the NT program, which was contingent on scaffolding within the broader social context, also lends support to Tharp's (1993) contention as to the relationship between reform and activity setting alignments. Although studies that showcase innovative uses of new technologies are essential, more attention should be given as to how teachers' conceptualizations of teaching and broader contextual factors underpin the particular shape such courses or programs may take. Merely focusing on the results of innovation perpetuates the myth of computers as tools capable in and of themselves of effecting change. In order to more fully appreciate the complexity of innovation in school contexts, greater attention needs to be paid to the sociopolitical dimensions of change and agency, in particular, to the way in which individuals at the local level may utilize the possibilities and constraints of their milieu to effect change.

NOTES

1. As explained by van Lier (2000), the word *affordance* was first coined by James Gibson to refer to "a reciprocal relationship between an organism and a particular feature of its environment" (p. 252). From an ecological viewpoint, a hermit crab, for example, may examine a shell on the ocean floor in terms of the possibilities (or affordances) it may offer as a potential new home. In a similar vein, Van Lier suggests that the linguistic world to which a learner has access and in which he is actively engaged offers up various enablements and constraints (or affordances). Van Lier further makes the point that an ecological perspective (with the attendant notion of affordance) is particularly apt when applied to sociocultural perspectives of language learning, which draw on Vygotskian and neo-Vygotskian frameworks. In such frameworks, the unit of analysis is the active learner or the activity itself, rather than, as in the case of psycholinguistic theory, the perceived object or linguistic *input*. In the present article, we use the word *affordance* to draw attention to the fact that the potential of computers for language learning is related to both the technological features of the tool itself -- its enablements and constraints -- and the way in which individuals choose to engage with them.

2. In the Quebec City area where this study was carried out, French is the mother tongue or main language used by 98% of the population.

3.Within the Quebec Francophone school system, enriched ESL courses, which emphasize reading (especially literature) and writing more than regular ESL courses, are referred to as language arts classes

(in reference to the corresponding L1 classes in the English school system). However, students may still have fairly limited English (especially in Grade 7), as in the class discussed in this project.

4. Real names rather than pseudonyms have been used in the case of teachers or students who wished to be identified.

5. Although students in general responded positively to the activities proposed by the teachers, more specific reporting on student perspectives and the way particular students invested themselves in classroom activities will not be considered here. Activity theory (of which Engeström's model is one version) may also be used to discuss how students invest themselves in classroom activities, that is, to explore the relationships between students' construal of the motive or underlying purpose of an activity (how they orient to a task), the tools or mediational means selected, and the learning outcomes. Studies, drawing on sociocultural theory (Gillette, 1994; Parks, 2000a; Smagorinsky & O'Donnell-Allen, 2000), reveal that the activity as appropriated by students may differ from the activity as envisioned by the teacher or researcher. To characterize this divergence, Coughlin and Duff (1994) make a distinction between the terms "activity" (to refer to the former) and “task” (in the sense of "task as blueprint") to refer to the latter. In this paper, we focus solely on the subject position as occupied by the teacher.

6. In French, the word *facture,* variously refers to how an artistic creation or a material object is constructed (in terms of quality). Thus, in one dictionary *(Le Robert & Collins Super Senior Français-Anglais,* Atkins, 1995) we find the following definition: *"facture (manière, style) [œuvre d'art]* construction; *[artiste]* technique + *poème de facture délicate/gauche* + *meubles de bonne facture* well-made furniture, furniture, furniture of good workmanship." The term *facture* resonates in English with such terms as workmanship, construction, style, design.

7. Witte (1992) defined collaboration in terms of four types: *traditional, committee, incidental,* and *covert.* Although in a study involving the appropriation of a workplace written genre (Parks, 2000b; Parks & Maguire, 1999), these terms were retained, the definitions were adapted to more aptly account for the data. In the present study, the latter definitions are retained but the terms *traditional* and *committee* have been replaced by *joint* and *parallel,* respectively, terms which seem better suited to a school context.

ACKNOWLEDGMENTS

We wish to extend our thanks to the students, teachers and administrators of the school where this study was carried out. We are particularly indebted to three teachers -- Normand Arsenault, Lucie Fortin, and Mark Miller -- who graciously shared their views on teaching and welcomed us into their classrooms. Funding for this project was provided by a joint Quebec Ministry of Education -- *Fonds pour la Formation de Chercheurs et l'Aide à la Recherche* (FCAR) grant, reference 98-NT-0035.

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