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Laptop Technology and Pedagogy in the English Language Arts Classroom

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Abstract

The English Language Arts teachers in this qualitative study reported somewhat negative outcomes in social and material spaces in the context of laptop technology in their classrooms. These outcomes included: social isolation, limited communication with a teacher or peers, and off-task behavior. In an attempt to uncover the reasons for these rather negative results, the researcher analyzed these teachers' classroom environments and instructional engagements with laptop technology, since these practices are believed to be reflective of these teachers' current beliefs about instruction and technology's role in it. Some of the reasons the researcher uncovered were: limited physical space, cumbersome furniture, poor technology infrastructure, and the largely instrumental use of technology in numerous learning engagements. The study suggests that school administrators and policy makers develop a strategic plan to address physical constraints in each laptop classroom and adopt "a different mindset" about teacher professional development, which would compel them to put more emphasis than they currently do on pedagogy before technology, rather than technology before pedagogy, to help these teachers constructively re-envision both material and social spaces around laptop technology in their classrooms.

Laptop Technology and Pedagogy in the English Language Arts Classroom

Meeks (2004) refers to pedagogy as, “the ways in which an instructor designs the material and social spaces that she, her students, and their tools inhabit as they accomplish a curriculum” (p.1).

Although many literacy educators and researchers have argued that literacy pedagogy is inextricably linked with modern technology (i.e., computer technology, telecommunications, and the Internet), and urged teachers to use it in their instruction (Bruce & Levin, 2003), research has consistently shown that many English language arts (ELA) teachers have not yet integrated technology in a meaningful way to support their curricular goals.

A recent qualitative study in several high schools in the San Francisco Bay Area by Peck, Cuban, and Kirkpatrick (2002) found that many ELA teachers were still using a great many traditional technologies in instruction, such as overhead projectors and VCRs, to “support, rather than alter, their existing teacher-centered practices such as teacher-led lectures” (p.10) and textbook-based discussions.

Although this situation is complex and thus, certainly, reveals no single explanation of its origin, initial exploration into this complex problem in relevant literature has led the author of this report to identify two possible causes. One is grounded in administrative decisions, both on national and local levels, and the other is situated in conceptual thinking within the English discipline itself. Both reasons need, however, to be seen as interrelated.

On an administrative level, English teachers have not been provided with sufficient and meaningful preparation about pedagogy for technology integration into their specific content area (Cuban, 2001). As McKenzie (2004) convincingly argues, state administrators and government officials have pushed computers and peripheral equipment into teachers’ classrooms without engaging them first in sustained conversations about the worthy uses of technology for their specific subject matter. To use his words, politicians and administrators have “put carts before horses,” technology before “sound pedagogy and

learning” (p.2). In practice, this has meant that teachers frequently were provided with professional development that focused more on technology training, that is, the mechanics of a particular hardware or software, rather than on pedagogy-based technology preparation (Diaz & Bontenbal, 2000). The latter technology preparation would focus on how to teach language arts *with* technology.

On a conceptual level, English teachers have had a hard time implementing technology into their practice because of a narrow conception of technology use in the English discipline that has prevailed among the ELA community for many years (Bruce & Levin, 2003). In this narrow conception, computer technology has often been seen as a device for drill practice on basic skills or merely as a means for word processing, rather than as a literacy of its own. The ELA community has not always seen technology as “a literacy learning tool” (Pope & Golub, 2000) and, thus, they have resisted acknowledging it as an integral part of the English curriculum. If they had, it would have allowed them to engage students in conversations about modern technologies’ impact upon what is at the heart of their subject matter—language, text, communication, literacy, and literacy practices (Leu, Kinzer, Coiro, & Cammack, 2004). As a result of this narrowness of vision, many English teachers have more typically resorted to merely instrumental technology uses in their classroom practices (Peck et al., 2002).

Research has also revealed a strong connection between the instrumental use of technology and traditional conceptions of pedagogy and theories of learning that still prevail within the teacher community. Becker (2001), in a Teaching, Learning, and Computing Survey of over 4,000 teachers, grades 4-12, found that teachers with constructivist backgrounds across all content areas, including English teachers, tended to use computer technology more for higher-order thinking and learning than did teachers with traditional transmission-oriented pedagogies. The latter teachers frequently resorted to instrumental technology uses, for low-order ways of learning in their instructional engagements with technology.

Complementary to the notions of a narrow construction of technology and the instrumental use of technology in some teachers’ practice has been the idea of “division of labor” (Hass & Neuwirth, 1994)

among many ELA teachers, who often argue that “the study of English is our job; the study of computers is the work of others” (p.325). Contrary to this belief, Bowman (2004) contends that work of English teachers’ is not actually to “teach technology”(p.2), but rather to teach English content and use technology in meaningful ways to help them accomplish this job.

Without an expanded conception of technology, however, English teachers are likely to continue to use technology for instrumental purposes, as a tool to “learn from” (Jonassen, Howland, Moore, & Marra, 2003), or even worse in some cases, as a tool for “behavior modification” (Bowman, 2004). For example, technology might be used to rewarding students who complete the “real work,” supposedly English language arts work (p.2), rather than as a tool to “learn with,” where technologies and learning environments “function as intellectual partners with the learner in order to engage and facilitate critical thinking and higher-order learning” (Jonassen et al., 2003, p.9). Understandably, instrumental and behavior modification technology uses disservice both the student, who cannot take advantage of the technology’s potential to enrich his/her learning experiences, and the English teacher, since he/she is unable to utilize technology’s potential to help him/her accomplish higher English language arts curriculum goals.

Theoretical Frameworks for Technology Integration in the English Classroom

Educational scholars have already begun to develop theoretical frameworks for technology integration to assist ELA teachers in developing their own sound pedagogies for technology infusion in their individual practices. For example, Pope and Golub (2000, p.2) offered seven principles for infusing technology into English language arts teacher preparation programs, based on the National Council of Teachers of English (NCTE) Guidelines for the Preparation of Teachers of English Language Arts, and the International Society for Technology in Education (ISTE) National Educational Technology Standards for Students: Connecting Curriculum and Technology. They also used examples from their own methods to illustrate these seven principles:

introduce and infuse technology in context; focus on the importance of technology as a literacy tool; model English language arts learning and teaching while infusing technology; evaluate critically when and how to use technology in the English language arts classroom; provide a wide range of opportunities to use technology; examine and determine ways of analyzing, evaluating, and grading English language arts technology projects; and emphasize issues of equity and diversity (p.2).

These principles are also of great importance to practicing teachers who, as research has shown, frequently have lacked this type of preparation when taking English pedagogy courses in graduate schools (Peterson, 1999).

As illustrated in this model, the new pedagogy for technology integration underscores adapting uses for language arts that are broader than simple word processing or presentation applications. These uses run the gamut from grammar tutorials through e-communication and hypertext construction, and implement technology in a more encompassing way, wherein word processing is but a first stage, and challenging multimedia design tools are a latter stage. Most importantly, this proposed new pedagogy emphasizes these technologies' impact on learning and teaching. As such, this model reflects a broader conception of technology and literacy, characteristic of the New Literacies Perspective (Leu et al., 2004), where technology and literacy connections are examined through multiple lenses (social, economic, curricular, and pedagogical).

The model developed by Young and Bush (2004) provides a more detailed framework for technology infusion in English language arts than does Pope and Golub's model. Within Young and Bush's framework, English teachers are asked to think critically about technology's role in learning and teaching in context with: 1) their beliefs about literacy, 2) their conception of learning and teaching, 3) their curriculum goals, 4) their knowledge about the student, 5) the available technology tools and resources, 6) the school environment, and 7) the teacher's technology expertise. Young and Bush argue that only an analysis of such complex contextual issues allows teachers to understand the purpose of technology use in their instruction and its impact on students, classroom culture, and curricular goals.

In yet another pedagogical framework, Wallace (2004) provided teachers with the criteria for decision-making about Internet use in the classroom. Similarly to Young and Bush (2004), Wallace asks teachers to consider a bigger picture of contextual issues, to aid them in understanding teaching with the Internet. More specifically, Wallace draws teachers' attention to five "affordances of resources" (p.447), that may help them develop activities that will take advantage of the Internet's potential in support of learning and teaching in their classrooms. The author of this report describes these affordances using Wallace's questions to illustrate an analytical focus for each affordance presented in the following framework: 1) Boundaries - how does the Internet affect the teacher's control of locations for student work (physical, where they are on the page, for example, or intellectual, what content do they explore)? 2) Authority - how reliable are the resources they access and whose perspectives do they represent? 3) Stability - what will happen when students visit a particular link and what will they find when the site has been revised continuously or has disappeared? 4) Pedagogical context - will the teacher be able to tell at a glance what students are doing when the Internet offers a multitude of paths to follow, represents the same content differently in different browsers, or makes images or pictures frequently change their locations? and 5) Disciplinary context - how does the site and its content fit into the curriculum?

The issues raised in this literature review with regard to teacher pedagogy and technology and the teacher's influence upon his/her learning environment in enactment of this pedagogy are of essential importance in helping teachers, teacher educators, and administrators understand what constitutes effective instruction. What is elucidated here is applicable to all forms of classroom technology, particularly laptop technology. It addresses the question of which learning environments support such fully integrated pedagogy and which do not. The purpose of this study is to contribute some additional insight to the existing body of research exploring these and similar issues.

More specifically, this study explored how laptop technology influenced ELA high school teachers' beliefs about English instruction and their practice of it in the laptop program. It also examined how these

teachers orchestrated their learning environments to support their instructional goals. As part of a larger dissertation project, the study additionally explored ELA teachers' beliefs about literacy, their discipline, and professional identity and laptop technology's influence on these beliefs and enactments of these beliefs in practice as well as their perspectives on laptop program implementation. The latter questions will be explored in future manuscripts. This report, however, focuses primarily on teachers' pedagogy with laptop technology.

Theoretical Framework of the Study

To answer the research questions in this study, a qualitative approach (Creswell, 1998) was applied because it allowed the researcher to examine both ELA teachers' practices and the meanings that they discovered technology brought to these practices. These meanings, however, need to be seen as "social products that are formed in and through the defining activities of people as they interact" (Blumer, 1969, p.3). They are also influenced by the institutional context and the beliefs held within this establishment (Windschitl & Sahl, 2002). In this study, the laptop program initiative and the system of beliefs and practices associated with its implementation served as the social and institutional context shaping the teachers' perspectives shared in this report.

Methodology

The Setting and the Participants

The teachers who participated in this study were part of the Voluntary Laptop Initiative (VLI), which reflected a long-term commitment to cutting-edge technology initiatives into their school system (all names of informants, geographical locations, and educational institutions are fictitious names).

The VLI program offered IBM ThinkPad laptop machines with a wireless Internet connection to teachers free of charge and to students on a lease basis. The lease contract required a commitment to a \$25 per month payment for three years from laptop students' parents. The area educational services

covered the rest of the cost (60%) for the individual laptop machines. Students from low socio-economic backgrounds were provided financial assistance by a school district financial foundation.

As part of the VLI program, teachers and students had access to varied types of technology such as carts with access to power units, display screens and projectors, scanners, digital picture and video cameras, as well as central monitoring systems (Censor and Blackboard) that allowed teachers to monitor individual students' screens and to post syllabi and announcements to all student users.

Professional development staff trained the teachers and students in the use of software, such as *Microsoft Word, Excel, PowerPoint, Apple Works, and Inspiration* for the purposes of teaching and learning. The VLI technical support was responsible for repair and maintenance of the wireless network systems and the laptop technology with its ancillaries. Additional technology specialists were responsible for assisting teachers who were pursuing video and multimedia projects. The sponsors for the VLI also provided technical and/or academic assistance to laptop students and their parents.

The English language arts teachers who participated in this study varied in teaching experience and technology expertise, from two to thirty-three years, and from beginner to advanced, respectively. There was also a substantial differentiation in age, social class, and gender, from 35 to 54 years old, working class through upper-middle class, and male and female, respectively. Table 1 provides a summary of teacher profiles in this study.

Insert Table 1 here

Data Collection

Primary: Interview. An in-depth interview with an open-ended protocol was selected as the major source of data collection for this study. The protocol started with broad questions about the areas relevant to the study. For this report, these areas are ELA teachers' pedagogies with laptop technology and their learning environments to support these pedagogies. About four months into this inquiry, the initial protocol was expanded with questions emerging from individual interviews. These added either new direction or

multiple layers of representation to the meanings shared by the teachers in this study. In final member-check interviews (Creswell, 1998), the teachers were asked to comment upon their earlier statements, clarify their positions or add extra comments.

Secondary: Class visitation and teacher artifacts. In addition to interviews, the researcher visited teacher classrooms and collected teacher materials. Class visitation and teacher artifacts were intended to provide more grounded interpretation of teachers' perspectives and to record the specific instructional engagements with technology these teachers practiced in their classrooms. They also yielded descriptions of the social setting and teachers' behaviors within these settings, as they created learning and social spaces in support of their instructional engagements with technology. Appendix A and B provide initial and expanded interview and classroom observation protocols, as relevant to the issues explored in this report. The author anticipates addressing the remaining areas of research for this large study in future publications.

Data Analysis

Interview transcripts, field notes, and supplemental material were analyzed recursively and inductively to extract "open coding" and "axial coding" (Strauss & Corbin, 1998), the data categories that occurred regularly for individuals as well as across all teachers in this study, as relevant to the themes that guided this study. Thus, for the question focusing on pedagogy and technology, the following categories emerged: "pedagogical orientation," "instructional engagements," and "communication and interaction patterns." For the question exploring technology's impact on learning environment, the categories that surfaced included: "classroom layout," "space," "technology equipment and facilities," and "other supplies." For a complete description of subcategories within each main category, see Table 2, Teacher Pedagogy and Technology Uses, and Table 3, Learning Environment and Its Related Categories.

Insert Table 2 and Table 3 here

Findings

Learning Environment and Laptop Technology

Even though the classrooms in which the teachers in this study taught appeared to be adequate in terms of space, (an average room for a class size ranging from 20-30 students was about 20x30 square feet), they had to deal with huge and cumbersome desks in these classrooms, which automatically decreased the size of the overall working space. One teacher explained the nature of this problem: “Well, you just can’t move [desks] around, they are so heavy. And they’re so big, there’s not much you can do to move them anyway. There’s no room to go to.” The limited space problem was compounded further by bringing laptop carts into these classrooms.

The carts were supposed to provide students with space to store their laptops and to allow them to get their machines charged when they went to lunch. The teachers admitted, however, that “Nobody does that,” and that, to save space, they instead opted to have extension cords with multi-outlets, so they could “get rid of that big thing [laptop cart] that’s taking up room.” But, as they commented, there were not enough outlets to go around. Students had to take turns recharging their computers, and this became problematic at the end of the school day when many computers tended to run out of “juice,” because of their extended use in earlier learning blocks. And, as another teacher commented, having so many cords did not always guarantee the safest and most accessible space to navigate through in these environments. He explained: “They have to look where they’re going and be careful not to trip over cords and step on other people’s stuff and so on.”

There is no doubt that the functionality of furniture, access to power outlets, and limited space for equipment are important factors when planning material spaces for learning with laptop technology in the classroom. These factors might have well contributed to a certain degree of students’ physical discomfort and, at times, even undesired behaviors, such as talking over someone else, social isolation, or off-task behavior—the troublesome outcomes discussed further in this paper.

Seating Arrangements: Rows, Clusters of Desks, and Circles

The teachers in this study arranged their somewhat limited material spaces in different ways. In Mark's classroom, and also in Jewel's classroom, students sat in rows, facing the whiteboard at the front of the room. Where they differed, however, was in the way they utilized this standard seating arrangement during the instructional process, and consequently, the type of messages that they sent to their students about power dynamics and interaction patterns in their classrooms. Mark tended to occupy the center of the classroom position frequently, signaling to his students his leadership role and directing teacher question-answer interaction, as he led discussions of a literary text, explained homework, or assigned a sit-in exam. Jewel, on the other hand, decentralized her power, as she encouraged a great deal of group work in her row seating arrangement. This traditional room arrangement did not seem to support that type of teaching, however. In Jewel's classes, the author of this report often observed students talking to the back of their classmates' heads in response to Jewels' questions, as their desks were facing Jewel, not their peers. Additionally, there was not much space left for Jewel to walk comfortably between students' desks either. In fact, on many occasions, the author of this report noticed Jewel bump into students' desks, apologizing, as she moved back and forth between her central laptop station and the long rows of students' desks in her classroom.

In Joan's classroom, students sat at clusters of 4 desks, about 6-8 students per cluster. Even though this setup was conducive to interaction, it was not taken advantage of very often, since Joan tended to favor teacher-centered instruction, with occasional opportunities for collaboration in small groups. Typically, Joan would deliver whole-class instruction, standing behind the teacher's desk in the center of the classroom. Within this environment, the dominant interaction pattern was student response to teacher questions. Occasionally, she would patrol the room when she engaged students in group work.

Colin's cluster of desks supported interaction, as 4-6 students per cluster were facing each other at desks of four. Colin's desk was not in the central position in the front, but by the window, alongside the

students' desks. This side position gave Colin a good view of class. It also allowed him to act as a teacher facilitator, where he would typically break class into groups and facilitate, as they worked in groups. To pull group work to a close, he would debrief in an open class forum.

As ideal as this environment appeared to be for student participation and collaboration at a first glance, the researcher of this study came to realize that it did not prevent Collin from experiencing the same problems other teachers in this study confronted, such as isolated learning, limited interaction, and off-task behavior. The reasons for these problems in his classroom were not so much constrained by the material space and Colin's acting upon this space, but rather by the nature of the tasks that Colin assigned to his students and the manner in which he facilitated these tasks. These assignments are discussed further in this paper.

In Claire's classroom, students sat in a small circle of 4 or 5 at two tables pulled together, so that they could face each other, whereas in Pam's classroom, students sat in a semicircle in an arrangement that looked like a little discussion pit. To facilitate communication in her classroom, Claire mingled between groups of students, conferencing either with individual students or groups of students, as they engaged in collaborative learning. For the same purpose, Pam joined the student circle to participate in multi-channeled communication between the teacher and students in her classroom. These seating arrangements and teachers' positions within these arrangements revealed these teachers' willingness to share their authority with their students. They also showed their desire to encourage student participation and ownership over the learning process.

Roskelly (2003), who argued that seating arrangements *do* send students "messages about classroom dynamics—where authority is located, and how much talk is permitted, and what kind of interaction and how interaction occurs" (p.62, author's italics), made the author of the current study realize, however, that more important to this analysis is the question of how these teachers utilized these unarguably limited material spaces in their attempts to create certain learning spaces, and how the spaces

they created did actually encourage and facilitate interaction and collaboration in the learning process. As discussed further in this paper, the teachers in this study provided differing answers to these questions, revealing a range of social spaces and patterns of interaction in their instructional engagements with laptop technology, as reflective of their pedagogical beliefs.

Instructional Engagements With Laptop Technology

Teacher-Centered Pedagogy and Laptop Technology: Mark and Joan

In his own engagements, Mark favored traditional teacher-centered pedagogy, where the teacher acts as an authority and source of knowledge, and students are on the receiving end of the instructional process (Lunenburg & Schmidt, 1989). In his approach to literature, which the author of the current study also perceived as didactic and text-centered and, in some sense, a one way-channeled communication (teacher to students), Mark would reread fragments of the text and ask students for explanations before he gave his interpretations. In this rather traditional approach to instruction, there did not appear to be much room for student-initiated questions, even though Mark frequently entertained students' contributions and comments about the knowledge he expertly imparted to them. These contributions tended to be students' responses to Mark's questions though, with occasional student-initiated inquiries.

Similarly, in teaching writing, Mark would give students very detailed directions as to the content and format of their essays. The following assignment description reflects best Mark's prescriptive pedagogy of writing, where he provides his students both with an essay outline and the claims to be made in it:

As a final evaluation of our Persuasion Unit, we're going to complete the writing project described below. Compose an essay whose thesis is "Marge Piercy and Roger Rosenblatt express a different view of human nature than Mark Twain."

Your essay will have two sections.

- Section One: show the difference between Piercy's and Rosenblatt's views and Twain's view by writing about specific parts of their essay and poem.* Piercy and Rosenblatt claim human nature is "good"; how do they "prove" that claim in their written pieces?* Twain claims that human nature is "faulty"; how does he "prove" that claim in his essay?
- Section Two: State whose view comes closest to your view, and explain why.

When students engaged in composing such essays in Mark's classroom, there were not many opportunities for student-student exchange of ideas at either the planning or revision stages. They composed for Mark, under his guidance, and dialogued about their ideas with him as they went along. Quizzes, worksheets, and study guides, which helped Mark to assess students' knowledge attainment, did not support genuine communication and collaboration in his classroom either. Additionally, the author of the current study observed that as students worked on these highly structured assignments, they often engaged in off-task behavior, such as playing *Solitaire* or instant messaging on their computers.

Like Mark, Joan favored teacher-centered instruction in her classroom. Similarly to Mark, Joan relied heavily on teacher-led discussion and question-answer procedures. For example, when working on Shakespeare's *Macbeth* (1623/1997), she asked students to turn to their play sheets, "listen to the play" and "highlight important lines in the text," using "the magic marker". Then, she checked their understanding of the play and of the lines they had selected, asking focused questions, such as "Who says something about Macbeth as a man?" "What went wrong with the murder scene in the play?" "How did he mess up?" To end this discussion, Joan reminded her students of the key points in this scene and of the relevant quotes to support these points in preparation for a test, which they were going to take after having completed their work on the play.

Joan encouraged more student-centered instruction when she engaged her students in creative projects, allowing them to choose the medium and the format for portfolio presentations about, for example, the Elizabethan epoch or the Depression Era, when they discussed *Macbeth* and Steinbeck's *Grapes of Wrath* (1967) respectively. The assignments themselves tended to be highly structured though, where Joan provided detailed descriptions of each task for each project. The abbreviated excerpt from the portfolio requirements for the *Grapes of Wrath* project illustrates well the prescriptive nature of Joan's instructional method:

Task: The Nobel Prize-What is it? Why is it called the Nobel Prize? When did Steinbeck win it for what, did he have a speech? Organization: a news report, an interview; Task: Trivia- several topics about Mice and Men- where is the book on banned lists? Why? Where did the author get the idea for the book? Format: a three-pronged? attack; Task: The G-files-cf-X-files; The government files on Steinbeck when the FBI suspected him of being a communist. Investigate America's panic? Who was McCarthy? What was the Red Scare? Format: timeline with pictures?

Within such a highly structured instructional engagement, there really was not much room left for students' ownership of the project, and consequently, a need for collaborative goals setup and negotiation around these goals, even though Joan asked students to form small groups for the purposes of this assignment. For the most part, to complete these projects, the students did what the teacher told them to do. To allow her students to take ownership and authorship for these assignments, Joan would have had to ask them to make collaborative choices both as to the project content and format, and, eventually, as to the selection of the technology tool, as appropriate for this content. This is because choice, voice, and shared authority are essential elements in most definitions of ownership (Rainer & Matthews, 2002).

With the exception of some aspects of creative projects in Joan's practice, both Mark and Joan used technology predominantly as a productivity tool for word processing, online research, and note taking, rather than as a medium for communication and interaction about class assignments with students and among students themselves. They also found technology useful for helping students stay organized. Joan, in particular, reflected how computer technology enabled her students to follow *her* structure in a rather traditional teacher-centered instructional process:

I had a lot of things on word documents: There were outline guides for every act which they take notes; [There were databases with] a collection of factual material and vocabulary, lists, also cut and paste information from the Internet and story webs with the character analysis.

Again, these instructional engagements and technology uses reinforced an already established culture of individual effort under strong teacher leadership and an instrumental conception of technology's role in the learning process (Bruce & Levin, 2003). This view of technology presents technology, on one hand, as a delivery tool for teacher-controlled instruction, since he/she is the primary purveyor of

knowledge. On the other hand, it positions students as passive receptacles of this knowledge, as they use technology merely to take notes of the teacher's messages rather than to generate their own knowledge (Jonassen et al., 2003).

Lack of ownership and rather uninspiring instrumental technology uses in Mark's and Joan's classrooms might have as well accounted for their students' off-task behavior, such as instant messaging, gaming, and even doodling, as the students found themselves drawn to modern technologies such as chat room, instant messenger, gaming software, *Paint*, and other drawing programs. This is because the latter technology uses may have afforded them active participation, opportunities for self-sponsored interaction and authority over content. The latter technology uses have been commonly associated with constructivist pedagogy (Fosnot, 1996).

Constructivist Pedagogy and Laptop Technology: Jewel and Colin

Jewel and Colin practiced constructivist pedagogies in their classrooms. In its most common form, constructivist pedagogy assumes that knowledge does not come from the teacher, but rather, it is co-constructed by students as they engage in collaborative inquiry and problem-based learning (Fosnot, 1996). In her enactment of this pedagogy, Jewel often engaged her students in small group projects to let them learn by doing, exploring, applying and sharing information with the entire class. Her role within this pedagogy was, to use her own words, to "let the students do things" as she continued to "facilitate," helping them with the skills necessary to complete the project. An example of such a learning experience in her classroom was a *Grammar Rock* project, where she asked groups of students to design multimedia presentations on rules of mechanics, such as punctuation marks and conjunction words in different types of sentences. Similarly to Jewel, Colin frequently engaged students in creative projects and group learning. Examples of collaborative learning opportunities from Colin's classroom are: *Macbeth* stations or the imaginary in the *Night* (Wiesel, 1961) project. To accomplish these creative projects, both Jewel and Colin encouraged students to use a range of technological tools with software, such as *PowerPoint*, *Inspiration*,

databases and spreadsheets, *Publisher*, and Paint. Jewel's and Colin's more frequent use of technology and a wider range of its applications in this study corroborates such uses among constructivist teachers, as opposed to more instrumental technology uses among more traditional teachers (Becker, 2001).

Even though Jewel's and Colin's projects were conducive to interaction, collaboration, and problem solving, the author of the current study realized that in practice, each of them utilized this potential to different degrees. For example, in the case of *Macbeth* stations in Colin's classroom, students were told in both oral and written instructions to work independently, and yet they were seated in small groups at the tables with individual stations. Colin explained: "You will be working independently (instructor's emphasis) on these projects. Do not work together. The work must be your own. No more than 5 students should be at a station at any time."

In another of Colin's projects, the *Night* project, and in Jewel's earlier mentioned, *Grammar Rock* project, there was not much interaction going on within individual groups either. In Jewel's class, students briefly brainstormed their ideas as a group: "We could do a skit," "I would like to work on a song," "I'll hammer the rules," and then almost immediately they moved to independent work on their assigned roles, which involved predominantly searching for more ideas for their projects on the Internet and reviewing Jewel's handout on grammar rules, asking her additional questions about these rules. Even though they were in groups, students did not spend much time talking things over, negotiating and renegotiating group ideas and revising their action plans. Jewel's detailed worksheets provided answers to potential areas for a group's negotiation and collective inquiry. When new questions emerged, they addressed them to Jewel, rather than to their peers.

In case of the *Night* project in Colin's classroom, students engaged in some aspects of peer teaching about technology skills, such as scanning pictures, recording sound effects, and creating vocabulary databases. However, in progress and at the final production stages of their projects, there was not much student-student interaction and negotiation about the project's content. The author of the current

study noticed that they tended to work a lot individually at their computers, drawing pictures or pulling out images from the Internet for their projects. In her field notes, she described this phenomenon, as “computer-dependence,” as she was intrigued about how little human support they actually drew from their peers or from the teacher in working on these projects. At the final stage of the project design, students, as Colin observed and Jewel concurred with Colin on this issue, “threw things together” with a sort of “good riddance” attitude.

Needless to say, the quality of these presentations was low, as Jewel complained that they were “shallow in interpretation and critical analysis of the presented data.” After having seen many of these presentations, the author of the present study agreed. Colin raised similar concerns in a follow-up session to project presentations in his class, drawing his students’ attention to the connection between the intended meanings in their work and the technological tools they selected to represent these meanings in their presentations: He asked: “How are words contributing to what is on the slide? How does the slide help to contribute to what you’re saying?” He also asked questions forcing those students to think critically not only about the meaning and the medium, but also about the information and material accessed on the Internet: “What is this person’s or group’s motivation for writing this? How do you document a web page? How do you determine the reliability of a source?”

These are wonderful questions, and they illustrate the core principles of sound pedagogy with technology, as discussed earlier in Pope and Golub’s (2000) or Young and Bush’s (2004) theoretical frameworks for technology infusion in English instruction. It is good that Jewel and Colin began to raise these important questions with their students. The author of the current study recommends that they ask their students more of such questions as they engaged them in composing their projects at the beginning, rather than at the end of this process, that is, at the actual presentation stage, where such questions served more as evaluation criteria for these projects than thought provoking guidelines to scaffold their project design discussions. Having to figure out answers to these and similar questions on their own, in a collective

rather than an individual effort, would also help Jewel's and Colin's students to come alive as a group and to truly benefit from "the social and informal nature of the work of the group"—the experience that would allow them "to assimilate new ideas, to accommodate others' opinions and experiences, and to develop deeper, fuller perspectives from which to examine what they read and write" (Roskelly's, 2003, p.54).

Without addressing these two areas of group work in their enactment of constructivist pedagogy, Jewel's and Colin's students are likely to continue to work, as Jewel commented, as "individuals sitting in a group, working on their own," rather than as a group of students who are actually utilizing the group's collective potential to learn with and from one another.

Learner-Growth Pedagogy and Laptop Technology: Claire and Pam

In Claire's and Pam's classrooms, instructional activities support open communication, exchange of ideas, negotiation and problem solving, with an ultimate goal *a la* the Deweyian tradition (1916/1963) of nurturing the student's intellectual growth and natural curiosity, and per Freire's educational ideology (1993) of cultivating critical thought and democratic values of shared control over the learning process. Claire's preferred way to support this type of learning was a small group arrangement, whereas Pam's was a whole-class setting. For example, for their literary analysis of the poem *Raven* by Poe (1991), Claire put students in small groups. She gave each group a specific number of stanzas to work on, and asked them to be ready to share their interpretation of the poem with other groups. She stressed that each group had to "talk over together the stanzas you have been assigned" and to "think critically" about the selected section of the poem. This emphasis on working together and critical analysis came up frequently in Claire's instructions to class assignments, whether it was a group assignment, such as a *PowerPoint* presentation to review vocabulary, or an individual task, such as the *Crucible* (Miller, 1955) essay assignment. In instructions for the former assignment, Claire told her students:

You will create (with a partner) a PowerPoint presentation, which reviews vocabulary from the last three lessons. The class will be split up so that not everyone reviews the same words. From the words you have been assigned, create a presentation, which will be evaluated on the following

criteria: Content- How accurate is it? How informative? Is the presentation a good teaching/reviewing tool for the student? Design—Is it organized in a coherent and logical manner? Does the method of presentation enhance the understanding of the material? Graphic/animation—are they appropriate? Do they enhance the understanding of the material?—Appeal: Does the presentation keep the interest of its intended audience? Is it creative or original in any way?

What is important to note in the above instructions is that Claire expected students to work collaboratively (“with a partner”) on a project that would be meaningful not so much to the teacher but to the learner, as she reminded her students to make the presentation “a good teaching tool for the student.” She also insisted that her students made wise choices as to the technology tool, to serve well their intended meanings. As such, she encouraged her students to look at technology from the content rather than purely technical perspective. According to Pope and Golub (2000), such a view of technology recognizes it as an “integral” part of English language arts instruction. It also forces the English teacher to use technology as a “literacy tool” (p.4), by engaging students in conversations about how technology has begun to impact our language, text, and the literacy practices of composing and reading technology-mediated texts (Leu et al., 2004).

Finally, Claire informed students that they would be expected to “evaluate others’ presentations along with me,” which allowed her students to act not only as students but also as teachers to each other, a constructivist notion (Fosnot, 1996). In her instructions for an essay assignment, which students had to turn in for an individual grade, she still expected students to provide group support to one another at the drafting and revision stages. Claire elaborated on that part of the assignment:

You will brainstorm in groups to help *one another (the researcher’s italics)* with this task. Be creative! Push yourself intellectually to come to some sort of closure about the issues that are presented in the play. You will hand in a rough draft, which will be checked first by a peer editor. Next, I will return it with my comments, and then you will hand in a completed final copy.

As illustrated in this citation, Claire tried to nurture students’ intellectual growth, analytical thought, and caring for each other through assignments such as this in her classroom. Similarly to Claire, Pam insisted that her English classroom was always a place “where you were having conversations.” Therefore,

during her instructional engagements, she encouraged a great deal of conversation and learning through exploration and questioning about a complex literary text in whole-class settings. For example, for a class discussion about the main character in Herman Melville's novel, *Billy Budd* (1961), she set up a role-play. She asked group A to defend Billy's case and group B to take notes on their laptops on what the speakers were saying, paying particular attention to the rhetoric devices that the speakers were using when presenting their arguments. The note takers were also asked to prepare two follow-up questions or comments to what was discussed in class. Then, Pam flipped student roles, and asked students who were taking notes to attack Billy, as if they were in court, and the students who were the speakers in the previous round of discussion to take notes. Pam's role in this class was not only to orchestrate the discussion, calling on students to voice their opinions on both the novel's content and the moral dilemmas of its main character. She also joined the student circle and solicited students' help in making sense about this text and its character for herself, when she invited students to consider whether they think "the rights of the individual are more important than protecting the community." By becoming part of the discussion, she was able to open up to students a democratic forum, whereby both the students and the teacher could contribute equally to ideas, and could learn collectively from one another. This forum also enabled her students to take ownership of this learning (Rainer & Matthews, 2002).

Characteristic of a "division of labor" (Hass & Neuwirth, 1994) among many English teachers, Claire and Pam did not use much technology to facilitate in-class conversation, as they argued technology should be secondary to the development of critical thinking and ideas. Pam explained: "Once they have adapted the more profound, thoughtful re-seeing of their work, they can then use technology to make that process easier." Contrary to this position, both of them speculated about the use of technology for communication about text. Pam, for example, envisioned online communication with the book author in the development of the students' own critical thinking outside the classroom. Claire wished her students to use

technology for “having literate conversations with each other when they’re at home online,” or “with kids from other classes across the country.”

In retrospect, as the author of the current study tried to understand Claire’s and Pam’s paradoxical thinking about technology in support of critical thought development, she realized that their apparently conflicting messages about technology’s potential in this area revealed their actual lack of “the pedagogical content knowledge” about technology infusion to serve these curricular goals. As Pope and Golub (2000) explained, the teachers who possess such expertise, are the teachers “who not only know technology” but also know how to use it appropriately to teach their content (English language arts) “to the students’ benefit” (p. 2). Obviously, Claire’s and Pam’s uses of technology for productivity, such as note-taking or vocabulary quizzes in PowerPoint, on one hand, and their lack of technology expertise, since both of them were technology novices themselves, on the other hand, could have well been the reasons that the way they used technology did not support, and even at times interfered with, sustaining active learning communities in their current teaching contexts. These are the areas where they needed the most assistance in their professional development.

Discussion and Implications

As illustrated in the results section of this paper, Jewel and Colin struggled to create space for meaningful interaction and collaboration in their classrooms, with or without technology. Claire and Pam, on the other hand, struggled to maintain such spaces when technology was added to their already successful learning communities. Mark’s and Joan’s efforts to solicit students’ collaboration and interaction failed by default due to the nature of teacher-centered pedagogy they practiced in their classrooms. Such pedagogy does not leave much room for students’ contributions to knowledge construction and multi-channeled interaction, because of the teacher’s strong knowledge authority and leadership role in orchestrating the learning process (Becker, 2001). It is not surprising, then, that students within this pedagogical paradigm in this study could not resist the temptations of more interactive and engaging technology - uses that the

laptop technology afforded them, such as instant messaging, gaming, and other types of off-task behavior (i.e., doodling). There are also issues of limited physical space and inadequate classroom infrastructure for the laptop technology demands in this study, reflected in a shortage of electrical outlets and space for equipment.

Of course, the limited physical space, large class size, cumbersome furniture and poor technology infrastructure cannot be ignored as factors mitigating the teachers' efforts to create communities of interactors. However, it is actually their pedagogies and the ways they attempted to support these communities through instructional engagements that played a key role in shaping these teachers' and students' experiences with technology in this study, often contributing to somewhat negative social behaviors and interaction patterns.

To support the teachers in this study in regard to problems such as limited physical space and furniture constraints, administrators need to develop a strategic plan about how to create a supportive physical environment in each laptop classroom, with amenities such as: appropriate furniture, adequate space for equipment, and a supportive technical infrastructure (i.e., electrical outlets).

In view of these physical constraints and the ubiquitous laptop technology's presence in the classroom, the teachers in this study would also need to plan the "topography" of the classroom through a new lens (Bhave, 2002). This new lens would accommodate the new technology, without sacrificing the learning spaces that they had already created or would wish still to create. Such re-envisioning would also allow these teachers to critically examine not only the classroom layouts and student seating arrangements within these classrooms, but also the power dynamics and social spaces they wish to cultivate through these arrangements in their classrooms.

To deal with the problems around the social space in their classrooms, such as limited interaction, social isolation and off-task behavior, the teachers in this study need to review their current pedagogical beliefs and practices. In this way, they can perceive whether their instructional frameworks and technology

uses indeed support interaction and collaborative learning, whether they provide students with enough scaffolding and modeling of such learning, and whether the roles they assume for themselves and for technology indeed encourage student participation, ownership, and multi-channeled communication.

This process of “sketching social and material spaces,” would require from these teachers a “different way of thinking” about pedagogy and instructional engagements with technology in their classrooms (Meeks, 2004, p.1). In greater detail, Claire and Pam need to learn from professional development the concrete ways to utilize certain technologies to support what they described as “literate conversations” in their learning communities. There are certain technologies, such as bulletin boards, video conferencing, and online chat, and certain instructional practices using such technologies, such as online interviews with book authors, ask-expert consultation, and panel discussions, that can be successfully employed at any stage of in-class conversation. These technologies support the development of critical thinking and an exchange of ideas, as evidenced by the practice of Claire and Pam in analogous non-technology mediated instructional engagements in their classrooms. There has already been research demonstrating how such tools, along with meaningful instructional activities, can actually foster critical thought development among students through exposure to multiple perspectives from multiple sources. These lead to opportunities for multi-channeled communication and negotiation about these perspectives within and outside classroom communities (Choi & Ho, 2002). Because of their limited technology expertise, teachers also need to receive sustained technical support from the administration to enable them to put these ideas into practice.

Jewel and Colin would ideally need to expand their content pedagogical knowledge about technology integration, especially in the area of instructional design, to be able to incorporate genuine opportunities for communication and collaboration in their classrooms, using authentic and problem-based tasks. They would also need to provide their students with specific guidelines in their assignment descriptions for interaction, negotiation, and decision-making procedures. But above all, they would need to

model these ways of learning to their students, so they do not wait for teachers to provide them with the right answer, but rather find their own answers and opinions in the English classroom. Socializing them into these new modes of thinking about learning, knowledge construction, and developing questions for sustained learning, is the only way Jewel and Colin can make the “do it yourself, teach it yourself” principles of constructivist pedagogy both realistic and effective in their practices. Additionally, they would have to model to their students how to learn *around* technology, without being distracted or overwhelmed by it, and how to utilize it to support their learning goals, collaboration, and peer communication. Needless to say, the key to this success is their deep understanding of the constructivist teacher’s role, i.e. perceiving that to act as facilitators involves not only providing the tools, but also socializing students into the concepts of negotiation and collective decision-making in a group effort and inquiry-based learning.

Mark and Joan, the more traditional teachers in this study, would need to assume more constructivist roles of coaches and facilitators in their classrooms, releasing some of their knowledge authority and allowing their students to become more active knowledge constructors and problem-solvers during the instructional process. In securing such roles, they could borrow strategies from the colleagues who have been successful in creating dynamic and student-centered learner communities.

Finally, like teachers in this study, school administrators and policy makers would need to adapt “a different mindset” about teacher professional development, which would compel them to put more emphasis than they currently do on pedagogy before technology, rather than technology before pedagogy, to help these teachers constructively re-envision both material and social spaces around laptop technology in their classrooms.

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Table 1. Summary of Teacher Profiles

Teacher	Age	Education	Years of Teaching	Course Taught	Years in Laptop Program	Technology Training Received Prior Joining the Laptop Program
Colin*	35	MA in English	5	Advanced & Regular English	2	Substantial*
Mark	54	MA in English	33	Advanced, Honor, & Regular English	1	None
Jewel	40	MA in English	2	Regular English	1	Substantial
Pam	52	MA in English	16	Advanced & Honor English	1	None
Claire	54	MA in English	31	Honor & Regular English	1	None
Joan	47	MA in English	25	Advanced & Regular English	2	Some

*All names are pseudonyms. Substantial: implies formal technology training (i.e., coursework); Some: implies participation in some kind of teacher professional development (i.e., workshop or institute).

Table 2. Learning Environment and Its Related Categories

Main Category	Related Categories
Classroom layout	shape seating arrangement furniture & its location teacher station learning centers computer workstations
Space	room size vs. class size room between students' desks room for the teacher to move around space for technology
Technology Equipment/Facilities	types of hardware/equipment plug- ins projection devices wi-fi connectivity
Other supplies/displays	bulletin boards posters clock

Table 3. Teacher Pedagogy and Technology Uses

Main Category	Related Categories
Pedagogical orientation	teacher-centered/student-centered orientation teachers' and students' roles in knowledge construction teachers' beliefs about learning and teaching English in general teachers' beliefs about learning and teaching English with technology
Instructional engagements	beginning/ending of period procedures (especially with regard to technology set up) instructional activities with technology technology uses for English instruction (what applications for what purposes) student participation group work
Communication/Interaction	teacher/student face-to-face interaction teacher/student interaction via network student-student face-to-face interaction/communication student-student interaction/communication via network
Social Issues	off-task behavior isolation limited collaboration

Appendix A

Initial Interview and Classroom Observation Protocol for the Question of Pedagogy with Technology

Pedagogy and Laptop Technology

What are your beliefs about teaching English?

What are your beliefs about your own and your student roles in this process?

How does technology influence the way you teach?

Learning Environment and Laptop Technology

What type of learning environment do you wish to create in your classroom? Why?

How does technology influence the learning process in your classroom?

How does technology influence social and communicative life in your classroom?

Appendix B

Expanded Interview and Classroom Observation Protocol for the Question of Pedagogy with Technology

Pedagogy and Laptop Technology

What are your beliefs about teaching English?

What is your role in the classroom? What roles do you envision for your students?

How do you teach?

How does technology influence the way you teach?

How does technology support the roles you wish to assume for yourself and your students in your English classroom?

What are some benefits of technology for the teaching of English?

What are some challenges of technology for the teaching of English?

What technologies (hardware) and technology applications (software) do you use for instruction in the English classroom?

Learning Environment and Laptop Technology

What type of atmosphere do you wish to create in your classroom? Why? How?

What types of material resources are available to you in the laptop program to help you create and nourish such a learning environment? Facilities? Equipment? Furniture?

What happens when you encounter technical problems with technology? Who can help you? How?

What type of instructional activities and procedures do you use in your English classroom?

How do you plan for and structure technology-supported learning in your classroom?

How does technology influence your interaction with students?

How does technology influence student interaction and social life in the classroom?