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ABSTRACT

This is the final report of the Microcomputers and Literacy Project, which was primarily concerned with sociolinguistic analysis of written texts and classroom discourse from two urban, sixth-grade classrooms using computers with QUILL writing software. The report argues for and illustrates an approach to the study of writing that integrates ethnographic analysis of classroom interaction with linguistic analysis of written texts and teacher/student conversational exchanges. The authors use as an analytic construct the notion of a classroom writing system to explore relationships among classroom context, computer-based innovations, writing practices, and actual texts. The report of the two-year study is divided into six sections: (1) definitions and development of the construct of a classroom writing system; (2) description of writing systems in the classrooms studied; (3) use and meaning of the computer, including the function of the computer, student expertise, social interaction, amount and kind of writing produced, gender and ability differences, and teacher attitude; (4) interpretive analysis of individual texts bringing together ethnographic, conversational, and textual data and the interactions that influenced them; (5) conflicting purposes within classroom writing systems, including stated purposes, school purposes, and student purposes; and (6) implications for equity, writing instruction, evaluation of innovations, and teacher education. (Contains 40 references.) (KRN)

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Microcomputers and Literacy Project

Grant #G-83-0051

FINAL REPORT

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Acknowledgements

This is Part One of the final report of the Microcomputers and Literacy Project (NIE Grant #G-83-0051). It represents the work of the research team led by Courtney Cazden, Bertram Bruce, and Sarah Michaels, which was primarily concerned with sociolinguistic analysis of written texts and classroom discourse from urban, sixth-grade classrooms using computers with QUILL writing software. We received additional research support from the Office of Educational Research and Improvement under Cooperative Agreement No. OEG 0087-C1001 and from the Spencer Foundation. While we are grateful for their support, this publication does not necessarily represent the views of these agencies.

We were assisted in this work by researchers Cynthia Cohen, Barbara Craig, Susan Harper, Mubina Hassanali, Jean Robinson, David Rompf, Janie Simmons de Garcia, John Strucker, and Polly Ulichny. This report is complemented by the report by the ethnography team led by Karen Watson-Gegeo, assisted by researchers Cynthia Cohen, Barbara Craig, and John Strucker. We want to thank all the students in these classrooms, for letting us watch and interact with them, and learn from their experiences. And, we especially wish to express our gratitude to the two teachers with whom we worked, with the hope that their experience, dedication, struggles, and insights will make it easier for other teachers following in their footsteps--trying to improve the teaching of writing and to find powerful ways of integrating computers into an already crowded classroom environment.

Executive Summary

In this report, we argue for and illustrate an approach to the study of writing in school settings that integrates ethnographic analysis of classroom interaction with linguistic analysis of written texts and teacher/student conversational exchanges. To this end, we use as an analytic construct the notion of "a classroom writing system," the activities, norms, rights, and obligations for speaking and acting, including uses of technology, which influence and constrain student writing in the classroom. Using this construct, we explore the relationships among classroom contexts, computer-based innovations, writing practices, and actual written texts -- based on long term participant observation in two urban, sixth-grade classrooms, over two years. Our primary concern is how classroom writing systems shape the teaching and learning of composition.

In the first major section of the report, we define the construct of a classroom writing system, discuss its development, and its role in guiding our methodological and analytic procedures.

In the second section, we describe the writing systems in the two sixth-grade classrooms during Year I and Year II, discussing both outside forces that impinge on the classrooms and particular patterns of social organization that pre-dated the introduction of computer technology.

The third section focuses on the use and meaning of the computer with QUILL software within each classroom writing system. Here, we suggest that the technology did not radically reorganize the teaching and learning of writing in the classrooms. Rather, the technology was shaped to fit into already established patterns of social organization and assumptions about doing and valuing writing in school. This section looks at findings from the two sixth-grade classrooms over two years with respect to: 1) the function of the computer and at what stages in the writing process it was used; 2) how students gained access to the computer; 3) the distribution of computer expertise and uses of the computer as an editing tool; 4) social interaction at the computer; 5) the amount and kind of writing produced; 6) gender and ability differences; and 7) teacher attitude toward the computer.

In the fourth section, we alter the magnification level of our lens -- moving beyond summary statistics of writing to a more fine-grained analysis of task and texts derived from particular occasions of classroom writing. Here, through a case study of the development over time of a single compostion, from first to final draft, we discuss the importance of teacher expectations in shaping student writing. In

this section we bring together ethnographic, conversational, and textual data in an interpretive analysis of individual texts and the social interactions that influenced them. This kind of case study helps make sense of both the teacher's and student's participation in writing activities, in light of general patterns, practices, expectations, and pressures in a particular classroom. It highlights the complexity of interacting forces in classrooms that constrain or transform innovative practices and the use of new technology.

The fifth section discusses the conflicting purposes at work within a classroom writing system and the demands that conflicting purposes put on both teachers and students in carrying out sensible writing and response in classroom encounters. Through a discussion of a set of examples taken from both classrooms, we discuss the competing and often contradictory implications of stated purposes, school purposes, and student purposes.

Finally, we discuss the implications that a writing systems approach has for equity, writing instruction, evaluation of innovations, and teacher education. In each case we call for a shift from a focus on the application of methods, (materials, or technology), no matter how excellent, to a focus on critical evaluation of the learning environment and learning process. We see the writing system construct as a conceptual and methodological tool -- for both teachers and researchers -- to guide and organize critical observation and analysis of the complex social, cognitive, and textual factors influencing classroom life and literacy development.

Microcomputers and Literacy Project

Learning to write is a challenging task. Students need to develop new facilities with language at many levels, from spelling and punctuation to the use of rhetorical devices and modes of discourse organization appropriate to a range of communicative tasks, purposes, and audiences. They must develop new ways of making meaning, which allow for novelty and individual "voice" in accordance with community and societal standards. They also need to develop an understanding of different domains of knowledge in a deeper way than that required in most other tasks.

The teaching of writing is similarly complex. Over the years, many approaches have been tried. Some have viewed writing as an extension of speaking and have focused on rhetoric. Others have emphasized vocabulary and grammar development as prerequisite skills. The relative concentration on "creative" versus "functional" writing has varied for both practical and pedagogical reasons. In recent years, the attention has shifted to writing as a process, with notions of conferencing, publishing, planning, and revising becoming central. Most recently, we have seen the introduction of computer-based tools such as word processors, electronic mail, and data bases as aids for the writing process.

While debates have been heated about the relative value of these and other approaches, we still know all too little about what goes on in the teaching of writing and about what improvements are possible. On the one hand there are studies documenting problems -- pointing to the paucity of writing in schools and to the widely held view that writing is a skill divorced from other learning. On the other hand, there are reports of the ideal -- what specially trained teachers can do given the support and knowledge they need to teach writing effectively. Such studies are important, but they do not tell us much about the issue of ordinary classrooms and the effect of innovations intended to improve instruction. In particular, we need to know more about classrooms with limited resources, with non-mainstream students, whose literacy skills and orientation to literacy events may match poorly with those expected by the school, with teachers whose own education as writers and teachers of writing may conflict with that of the innovation, and with institutional constraints that limit change.

Thus, there is a need to understand in a detailed way what happens when a writing innovation is introduced into the ordinary school. We chose to look at QUILL (Bruce & Rubin, 1984; Collins, Bruce, & Rubin, 1982; Rubin & Bruce, 1984, 1985), a curriculum and software package that exemplifies ideas from writing research and ideas about how a computer could be used as a tool for learning. QUILL includes a text storage and retrieval program (LIBRARY), a note taking and planning program (PLANNER) and an electronic mail program (MAILBAG), all supported by a mode-oriented text editor (WRITER'S ASSISTANT) (see Appendix A). Carrying out investigations of QUILL's use in classrooms required us to examine computer capabilities, the demands and consequences of computer learning, the writing process, teacher and student roles, classroom organization and interaction, and cognitive processes in learning. Accordingly, we adopted an interdisciplinary approach involving classroom observations, ethnographic interviews, naturalistic experiments, and discourse analysis of texts and talk. Our specific research goals were threefold: (1) to study the impact of computers on classroom teachers, with respect to shifts in classroom organization, teacher role, and locus of control; (2) to study the impact of computers on children's social interaction and access to learning opportunities in the classroom; and (3) to study the impact of computers on cognitive change in students.

With regard to the first goal we assumed that contact with computers would change both teachers' appreciation of the potential educational uses of computers and their understanding of the issues involved in integrating a computer into an already full school schedule. We were concerned with questions such as:

(1) How do teachers organize classroom activities around the computer?

(2) How do differences in teachers' preferred style of classroom organization (e.g., highly structured vs. activity centered) relate to the ways teachers choose to use computers, assign tasks, and schedule turns at the computer?

(3) What shifts in the classroom control (such as assignment of tasks, and evaluation of student work) take place and how does this affect interaction and the teacher's role?

(4) Do certain children become computer "experts" (perhaps knowing more about computers than the teacher), and if so, what effect does this have on teachers' roles and perceived control?

(5) What creative uses does the teacher make of the computer? What does this imply about the teacher's view of the computer as educational technology?

Second, our research addressed the influence of computers on children's social interaction in the classroom. We were concerned with new patterns and channels of communication that arose -- both in dealing with the computer as a new "interactive" partner, and in dealing with other children and adults over computer-related tasks (such as peer/peer composing and conferencing in computer-assisted writing). Here, we raised questions such as:

(6) Does the computer's presence in the classroom change interactional patterns or channels of communication?

(7) If certain children become computer "experts," does this affect classroom interaction? Do "experts" gain more or less access to computer time than "novices"?

(8) How do students gain access to information about the use of the computer and does this differ from traditional channels and sources of information?

Third, we were concerned with studying the literacy skills that were taught, practiced, and learned through computer-mediated activities. We were interested in how technology affected children's writing development, the writing and revising process, and subsequent impacts on reading. This led us to ask questions such as:

(9) How does the composing process using interactive software differ from the conventional process?

(10) How do computer assisted written products differ from traditional written products?

(11) Does the ease of revision on a computer lead to more frequent revision?

(12) How does writing for peers, instead of to teachers, change the content, style, and process of writing?

Writing Systems

Our research questions required not merely an assessment of "outcomes" with respect to student writing, but an analysis of the social organization of the classroom, how the teaching and learning of writing are accomplished, and what role the computer plays in the process. We needed teacher and student involvement in the research process because we wanted to understand both the teachers' and the students' understanding and interpretation of the computer and writing activities. We also needed to integrate observations of social interaction in the classroom, school, and wider community with analysis of written texts. In short, the research required long-term ethnographic observation and data collection that allowed for fine-grained analysis of classroom discourse and written texts.

There were no simple methodological guidelines to follow. Most classroom-based studies of writing are either text-oriented, where features of written texts are coded and analyzed independent of the social interactions that shaped them, or ethnographic, looking at general patterns and practices, social functions of writing, and the social values attached to it, often quite removed from the technicalities of written texts. We needed to develop ways of studying writing in school settings that allowed us to link the interactional and institutional forces at work with the actual written products generated. Studies of computer use in classrooms were also inadequate as methodological models. These tend to be either formative or summative evaluations, in both cases attempting to focus on the technology per se. In the case of formative evaluations, the goal is to improve the technology; in the case of summative evaluation, to say something generalizable about its educational value. In neither approach is there a concern with the particular contexts in which the technology is used. For this reason, we saw as one of our major tasks the development of rigorous and replicable methods that support an integrated analysis of student writing, linking process and product. At the same time we hoped to do what might be called a "situated" evaluation of QUILL, understanding the impact of the innovation in light of the specific contexts of use (see Bruce, Rubin, & Barnhardt, in press). Both kinds of context-sensitive analysis

are critical to understanding the complexity of classroom social organization, teacher/student interaction, computer use, and student learning.

Previous work (e.g., Bruce, Michaels, & Watson-Gegeo, 1985) showed us that we needed to develop conceptual and methodological tools that would allow us to link more systematically broad scale classroom patterns, rules, and practices with students' written products. To this end, we refined the notion of a classroom "writing system" and used it as an analytic construct to mean the activities, norms, rights, and obligations for speaking and acting, including uses of technology, which influence and constrain student writing in the classroom. As we use the term, the writing system is the day-to-day practice of a "curriculum," shaped largely by the teacher, but partly by the students and partly by outside forces which impinge on the classroom. We, as analysts, derive an understanding of the writing system and the forces that shape it by observations of social activity within the classroom, interviews with key participants, and by ethnographic analysis.

The writing system itself includes elements such as:

a) the nature and frequency of assignments;

b) who has control over audience, topic, and genre;

c) the pacing of writing activities;

d) the amount of time allowed for writing, conferencing, revising;

e) opportunities for interactions over writing which lead to changes in the writing, such as feedback from teacher or peers;

f) access to computer tools for writing and computer-related knowledge;

g) whether and how finished writing is shared with and responded to by others;

h) how writing is assessed.

Figure 1 provides a graphic representation of the writing system as it relates to other social forces in and out of the classroom.[1]

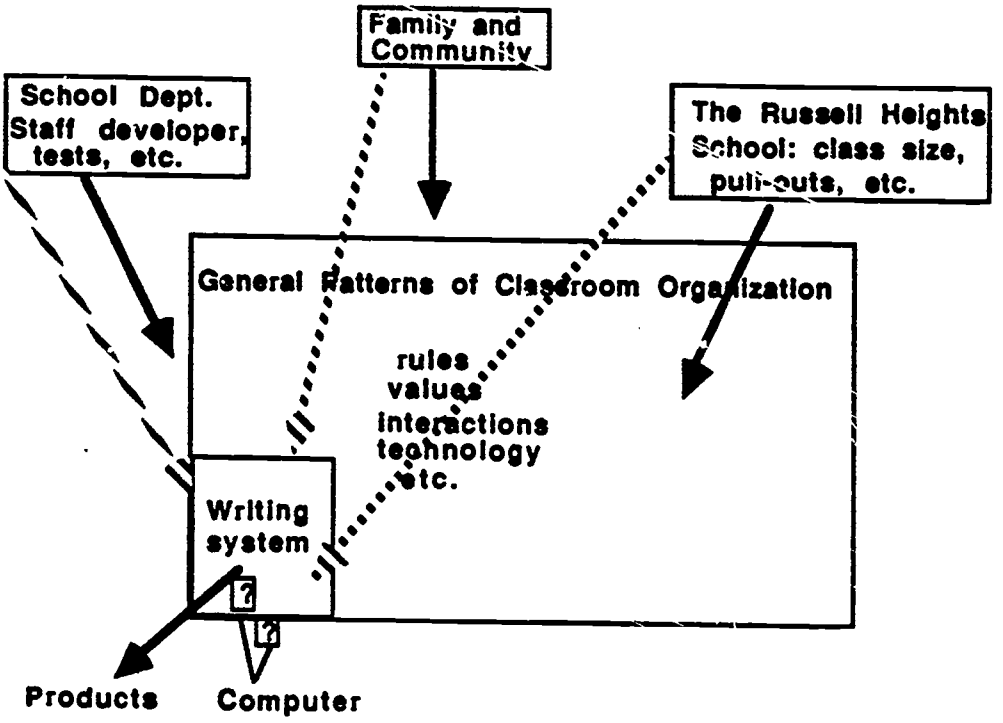

Figure 1. A classroom writing system in relation to other social forces.

As the diagram suggests, we analyze the writing system in the immediate context of the classroom at large, with its own particular patterns of social organization. We have found that the writing system is part of the classroom culture as a whole, and reflects the overall values and norms which define that particular classroom. Thus in order to understand the writing system we must have some understanding of higher level patterns of social organization in the classroom generally, which influence, for example, the organization of math lessons, free time activities, and recurring patterns of peer/peer interaction.

In addition to understanding classroom processes, we have also identified several important influences from outside of the classroom which affect the classroom as a whole and have an impact on the writing system directly. At the

[1]We are indebted to Cynthia Cohen, a primary ethnographer on the project, for her insights and ideas regarding the writing construct, in particular, emphasizing out-of-classroom forces.

level of the school district, these include mandated curricula, tests, and approaches to staff development. At the school building level, these include such things as class sizes, pull-out programs, the physical plant, and the interactions among teachers and administrators. Finally, aspects of family, community, and society all impinge upon and thereby redefine the writing system.

A Precursor: The Black History Show

In what follows, we elaborate upon our methodological approach by telling the story of its development. We began our research looking at the computer as an "independent variable," a controllable and quantifiable agent of change. Our initial research question was, "What impact will computers used for writing have on life in classrooms, teacher/student interaction, and student literacy development?" An unstated and unexamined assumption was that by introducing the same Apple IIe computer and QUILL writing software into classrooms, we were in fact introducing the same "technology," the same writing tool (a fallacy Papert, 1987 refers to as "technocentrism"). Moreover, we assumed initially that the technological capabilities of computer based writing tools such as QUILL -- the ease of revision, printed output, brainstorming and electronic mail capabilities -- would significantly reorganize the teaching of writing, by facilitating writing to real people for real purposes with attention to the writing process.

These assumptions proved to be incorrect. Early on in our observations of QUILL classrooms, we saw that the computer was used in widely varying ways. Moreover, in some cases, changes in the patterns of interactions as a result of the computer were even more significant than any simple technological effect. Thus in order to to explain changes in student writing and the role QUILL played, it was critical to understand the overall writing system in which the computer and writing instruction were embedded. We illustrate this point, and its influence on our conceptual and methodological approach to the study of writing, with an example of writing from a QUILL classroom (adapted from Bruce, Michaels, & Watson-Gegeo, 1985).

The example is taken from a sixth-grade classroom in a lower SES urban school in the northeast U.S. One afternoon during Black History Week Jim Aldridge's[2] The class attended the school-wide "Black History Show" put on by classes ranging

[2]Teachers and students in the Black History Show example are referred to by their real names. All other teachers, students, schools, and localities in this report are referred to by pseudonyms.

from kindergarten to 6th grade. The show included a variety of songs offered by different classes, one non-musical skit, and several performances by the mixed-grade Glee Club--all commemorating famous Black Americans or calling for racial harmony. Mr. Hodges, a teacher, was the emcee.

Jim had encouraged his students in advance to write reviews of the show when they returned. With this in mind, many of them went to the performance equipped with pad and pencil, and were observed by the researchers to take notes about each act, the quality of singing, scenery, lighting, etc. The next day, students who volunteered to critique the show were given a set of detailed questions/prompts from Jim, delineating the kinds of evaluative information they should include. They were to write a draft of their review at their desks, bring it to Jim for minor corrections, and then be assigned a number--first come, first served--to enter their writing onto the computer.

One of the results of this writing activity was Margaret's piece entitled "Black History Show." The following is an unedited copy of what Margaret wrote on the computer. The keywords at the bottom were selected by Margaret to identify her text (and can be used by other students to find this or other texts on a given topic stored in the computer).

"Black History Show"

Margaret Aponte

I liked the Black History show because I was surprised to see the little and big children singing so well, and clearly.

The best acts were Mrs. Martin's, and Miss Simpson's classes. The songs were nice and the people on stage weren't scared.

The worst act was "Famous Black People"- Mr. Agosto's + Mr. Andersons' class. Everybody messed up and forgot what to say, and they didn't speak clearly. They could have at least practiced more.

The scenery wasn't very much, and the light was kind of dull, and the sound wasn't very good. Mr. Hodges was speaking loud and clearly, and he was great on the stage. When the Glee-club was singing so nice, Marines got very jealous and asked Mrs. Evens to be in the Glee-Club. But when Mrs. Evens said no she wrote bad things about the Glee-Club on the computer up-stairs.

But I really liked the Black History show. I gave it 3 stars because it was very good.

Keywords: black history/Marines/glee-club/mrs.martin/miss simpson/

Briefly, Margaret's review shows several characteristics of good writing. She is sensitive to word choice. For example (a subsequent interview disclosed), she uses "and" in paragraph 2 to link two classes that gave separate performances, but "+" in paragraph 3 to indicate a single performance by two classes in concert. She refers to the "little and big children" in paragraph 1 in that unconventional order because she wants to highlight the surprisingly good performance of the younger children.

Moreover, the piece has an over-all structure--a beginning, middle, and end--marked by paragraphs, and internal patterning within paragraphs. Paragraphs 1 and 5 seem thematically and rhetorically parallel statements of positive evaluation and justification. Paragraphs 2 and 3 provide descriptive contrast sets, illustrating best and worst.

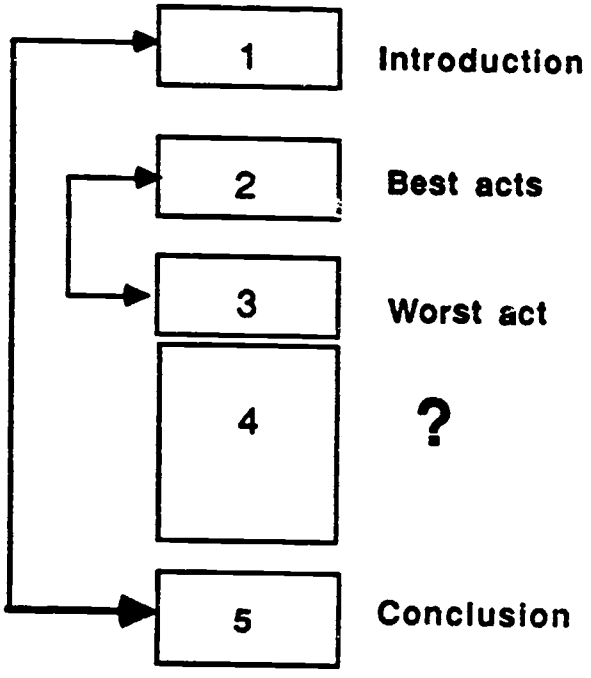

Figure 2. Structure of the "Black History Show."

As Figure 2 suggests, Paragraph 4 stands out as somewhat incongruous in length, content, and linguistic form. It moves with little overt transition from descriptive illustrations like those of Paragraphs 2 and 3 into a narrative about Marines. Linguistically, the shift into narrative is signalled by "When," the first temporal marker in the text; the clause it begins serves as orientation for the narrative (Labov, 1972). Margaret appears to assume that the reader will know Marines, who is her classmate, as she is referred to simply by proper name with no accompanying descriptive information. While the narrative account is personal, referring to someone the reader presumably knows well, the narrative voice is impersonal (3rd person, omniscient point of view). This is signalled by the perspectivizing device "up-stairs," which locates the account in the event itself, not in the writing context. This serves to distance the author from Marines, when in fact, both girls did their writing on the same computer in their classroom.

Corresponding to the shift to narrative syntax and an impersonal narrative voice is a shift in topic, as well--from "objective" criticism to personal anecdote--relating not to the quality of the show per se, but to what someone else wrote about it and why. The rhetorical force of Paragraph 4 thus shifts from criticism of the show to implied criticism of a fellow critic who had opposing views. Margaret does not overtly discredit Marines as a critic, of course. She uses the narrative voice to distance herself, taking the stance of one who merely recounts "the facts"; it is up to the reader to infer her meaning. Significant to this inference is the pivotal yet ambiguous "But" that begins Paragraph 5. Is the writer contrasting her own negative statements with her overall judgment of the show as positive, her own views with those of Marines', or merely reiterating the position she stated in Paragraph 1?

Further linguistic analysis could be done on Margaret's review. Yet without further information about the writer's goals, perceived audience, and process in composing the review, we cannot resolve the above problems of interpretation. Moreover, we are left with the question, why the stylistic and thematic incongruities in Paragraphs 4 and 5? Is Margaret merely incompetent in using cohesive devices such as "but," and in maintaining a consistent voice and perspective throughout a written piece, or does her writing reflect a young writer's attention to competing demands of style, audience, and purpose?

As researchers who observed the show and classroom interactions around writing the reviews, we know more about Margaret's review than can be inferred

from its finished form alone. This information is essential for a full appreciation of the writer's skill and complex goals. After students in this class finished their first drafts, they took them to Jim who made minor corrections and assigned the student a turn at the computer. When Margaret approached Jim with her handwritten draft, it contained only four paragraphs. Paragraph 4 of the draft read as follows:

> The scenery was pretty good, and the light was bright enough, but the sound was not that good. Mr. Hodges was speaking very loudly and was good on the stage. I think the show deserves three stars because it was very good.

Jim gave Margaret the number 5, and Marines, her classmate and friend who finished soon after, the number 7. While milling around the computer waiting for their turns, Margaret read Marines's highly negative review of the show. Marines's sharpest criticism was for the Glee Club. Some excerpts:

> The scenery was very good it was excellent but the lighting was a little dull. The sound was awful in some acts but in others it was good.
>
> I don't know what happened to the Glee Club, they were almost all weak. The audience couldn't hear them. They sounded soft then they went loud. It was a disaster!

When Margaret had her turn at the computer, she entered her text with minor changes (e.g., note the change from "the light was bright enough" to "the light was kind of dull," apparently influenced by Marines's text). However, she paused before entering the final line of her handwritten text, and composed the rest of Paragraph 4 and the first sentence of Paragraph 5 directly on the computer, revising the final sentence of the handwritten review to flow from what she had newly composed. This, in fact, demonstrates significant expertise in maintaining coherence in writing.

Rather than the Marines narrative (embedded in Paragraph 4 of the final version) being an incongruous chunk, therefore, we see the text as incorporating two separate planes. The first plane, composed in the original draft, is a straightforward critique of the show. The second, composed at the computer, is a more emotionally charged narrative-based text, whose intent is to discredit Marines as a

critic. This second plane stands outside the review proper but intersects it; it is a comment on the enterprise of criticism itself. As such, it is a meta-communicative act (Bateson, 1972) responding to the power of and motives behind negative criticism. Margaret uses this second plane to also raise her own status as a critic--presenting her "competitor" as one with ulterior motives rather than honest judgment.

The pivotal "But" beginning Paragraph 5 can now be seen as a contrastive device linking the two planes, indicating a distinction between Marines as critic (not to be trusted) and Margaret as critic (simply doing her job). A reasonable expansion, then, might be "In spite of what Marines wrote, I really liked the Black History Show." When asked what she had intended in writing this sentence, at a later point, Margaret said, "I meant, I really liked the show. It was good to *me*," providing support for our interpretation.

Several general methodological points follow from this example. To appreciate the subtlety and complexity of Margaret's review, as well as to disentangle the meaning of Paragraphs 4 and 5, we as researchers needed to have been there--during the performance and during the writing activities that followed. Moreover, we needed to understand something of the entire writing system in this classroom which led to: (1) initial (and relatively hasty) composition on paper, (2) time milling around the computer before being able to use it, (3) opportunities while milling around to read other students' writing, and (4) time to enter text and also to compose afresh while at the computer.

A second point is closely related to the first: The most important impact of microcomputers on writing may be changes in the classroom writing system rather than changes in the technology of writing (e.g., speed, printed output, ease of revision). In "milling around" the computer waiting for their turn to get on, these students read each other's writing and interacted over it. These interactions affected both the content and form of student writing. Similarly, peer interactions during writing on the computer, and programs like "MAILBAG" in which students send messages to each other, can affect students' understanding of purpose in writing, and their sense of audience. For Margaret's review, it was these interactional factors--rather than the ease of typing at a keyboard and revising electronically--that influenced her final product. A different classroom organization, incorporating one computer per student and/or constraints against reading fellow students' work, would have produced a different outcome for Margaret's review; her computer-assisted piece might have looked much like her

far more ordinary handwritten draft.

A third point emerging from this analysis has to do with the writer's sense of audience. Margaret seemed to have assumed that the reader would be a member of the class--Jim Aldridge the teacher, most likely, but possibly also Marines or other students; in any case, someone with access to both her own and Marines's reviews. She seemed to assume that both written pieces would be equally in the public domain of the classroom. She therefore added to her information-oriented, "objective" criticism a second plane that was primarily a social meta-message with indirect discrediting force, telling the reader how her piece and Marines's piece should be understood. In doing so, she assumed that her reader would have access to Marines's text and have the ability to infer her social meaning. For Margaret, both writing and reading are seen as social action--as communication between social actors.

How students like Margaret develop a sophisticated sense of audience, and the role that the computer plays in this process is an interesting question. In Jim's class, students' computer-assisted writing was striking in its attention to audience. Margaret tuned her information for an "insider" who would have read Marines's writing as well. In other students' writing, we saw a marked "media orientation"--the use of "Press Release" announcements; written commercials for up-coming stories; markers of episodes, chapters, and series; urgings to "stay tuned;" flashy titles; the use of pseudonyms (pen names), etc. Several factors were probably involved here. Writing came off the printer typed and formatted, like published print (newspapers, magazine ads). Students' writing in this classroom was public and available to be read as it was entered into the computer (looking over the user's shoulder as it appeared on the screen), by retrieving one's own or someone else's writing stored on the computer, on the wall (where its neatly typed format made it easier to read and hence more accessible to classmates and outside visitors), and through the electronic mail system whereby students wrote personal messages to one another (which were also public when being entered on the computer). However, in other classrooms where QUILL has been used, students did not develop a heightened sense of audience and did not mark their written products with the media devices common to Jim's class. These differences suggest the importance of looking at how writing "systems" vary across classrooms where computers are used.

Two Sixth-Grade Classrooms

We applied and refined the writing system construct in a two-year study of two urban, multi-ethnic, sixth-grade classrooms. The analyses to follow are based on that study. During the first year, we carried out an ethnographic study of the two classrooms, half the year without and half the year with a computer. During the second year of the study, we worked with the same two teachers, by then more experienced computer users, each with a new group of sixth graders. In the second year, the computers went into the classrooms the first month of school.

Contrastive Analysis

Central to our research design was contrastive analysis of both ethnographic and discourse data. Contrastive analysis is important for demonstrating functional relevance (Hymes, 1980a) and for achieving validity and rigor in ethnographic work. Our study was contrastive at several levels:

1) comparing classrooms that differed with respect to general organizational structure (highly structured vs. activity-centered);

2) comparing these same classrooms without computers (first half of the school year) and then with computers (second half of year);

3) comparing the production of written texts in traditional and computer-mediated writing activities;

4) comparing computer use by children who are "experts" with those who are "novices";

5) comparing children from different ethnic and socioeconomic backgrounds, and high and low achievers, with respect to their access to computer time, information, and expertise.

We made use of a variety of data collection techniques, including weekly participant observation, tape recording of recurring classroom activities, such as whole group pre-writing "brainstorming" sessions and teacher/student writing conferences, ethnographic interviews with both teachers and students, as well as

hands-on text editing tasks in which we assessed students' knowledge of QUILL commands and understanding of the text editor's mode orientation. In addition, we collected a range of writing samples from the students, including naturally occurring paper and pencil writing, all computer writing, and a set of elicited pre- and post-test writing samples.

The construct of a writing system influenced both our collection and analysis of students' written products. By this definition of the writing system, the writing produced by students is not a part of the system, but rather a material product of the system. The texts can be taken out of the classroom; the writing system exists only within the classroom, embedded in social interaction and classroom activities. Within the classroom, the texts are dynamic, evolving products, shaped by the writing system. Taken out of the classroom, as objects of analysis, they are potentially stripped of their context and the real time interactional information that helped shape them. And, as illustrated in the Black History Show example, while a great deal of linguistic analysis can be done on an isolated text, we cannot fully interpret the text and the intentions of the author without some understanding of the social forces (both general and specific to that occasion) surrounding its production. For this reason, when we collected written texts that were to become objects of linguistic analysis, we attempted to have systematic observations and tape recordings of the social context and the key interactions that influenced their form and content.

These key interactions -- in our two classrooms-- included:

1) whole-group brainstorming sessions in which the writing task is laid out by the teacher

2) teacher/student conferences

3) peer/peer interaction during writing, conferencing, and computer use

In attempting to relate the notion of a writing system to actual written texts, we selected for detailed analysis typical assignments at the beginning and end of the school year, and followed them from start to finish, collecting on audio tape and through field notes as much as we could of these key interactions.

In our analysis of writing we paid particular attention to one set of key interactions -- individual teacher/student writing conferences (Graves, 1983;

Murray, 1979; Freedman & Sperling, 1985). Conferences in these classrooms were recurring face-to-face encounters that brought together teacher, students, and written texts, and as such, were identified as a strategic research site for observing both the teaching and learning of writing. Through a dialogic (and hence recordable) exchange, teachers and students interacted over the student's text, negotiating changes ("improvements") to be incorporated into subsequent drafts. But as in other face-to-face encounters where there is an institutional power differential between participants (e.g., doctor/patient or interviewer/job applicant encounters), in writing conferences, the teacher's goals and interpretations significantly constrained the meanings, evaluations, and outcomes of the interactions (Gumperz, 1982; Mishler, 1986). A study of conferences thus reflects both macro-and micro-level forces. It provides a window on some of the institutional constraints on writing in the form of teachers' goals and ideology about what counts as good writing. At the same time, conferences provide real-time evidence of the way that teacher's goals, expectations, and interpretative judgments are communicated to students, and how they influence the construction and development of a student draft (cf. Ulichny & Watson-Gegeo, in press).

Writing System: External Forces

There were a number of similar external forces impinging on these two classrooms which influenced the way writing was done. Our examination of the classroom writing systems begins with these larger influences. In the next section we focus on the way these and other forces played themselves out within the classroom.

Staff Development. The most direct influence from the school department came through a writing staff developer who worked in the classroom with both teachers in both spring and fall. The writing staff developer, over the past three years, had helped the teachers use a new "process" approach to writing which entailed a fixed series of steps in completing a piece of writing: get an idea, brainstorm, first draft, edit and revise, final draft, publish and share. These steps were represented graphically on a laminated poster the staff developer provided each classroom she worked in (see Figure 3). The school department also provided summer and release day writing workshops which both teachers had participated in, and set forth an official language arts curriculum which all teachers were responsible for teaching their students.

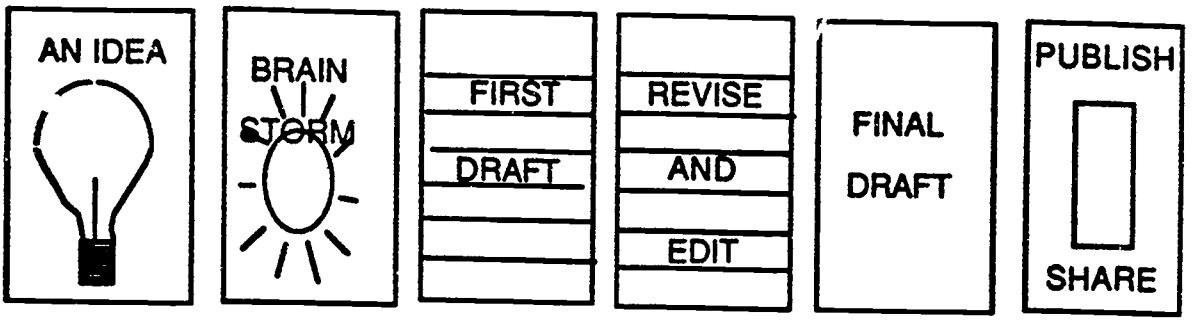

Figure 3. The six stages of writing in the Ridgeport method.

Writing assessment. In addition to writing staff development efforts, each spring the school department administered state and city-mandated writing tests for all third and sixth graders, and the teachers received their students' holistically scored results. Finally, the school department provided summer and release day writing workshops which both teachers had participated in, and set forth an official language arts curriculum which all teachers were responsible for teaching their students.

Social organization at the school building level. The Russell Heights School was located in a working class neighborhood in the center of Ridgeport's Portuguese immigrant population. It was the largest elementary school in Ridgeport, with a student population of 750 children in grades K to 8. Russell Heights offered bilingual classes in Portuguese, a follow-through program for grades K-3, and a Chapter I program, in which 28% of the students in the standard program participated. Various factors relating to policy at the building level influence classroom life, such as the relatively small class sizes (ranging from 16-18 at different times of the year in both rooms), a heavy pull-out program for Chapter I, adjustment counseling, learning disabilities tutoring, as well as music instruction. Approximately half of the students in both rooms were pulled out of the classroom at least once a week and some as many as 5 times a week. Additionally, problems with the physical plant (no heat on occasion in the winter or roof construction work during school hours) impinged on classroom activities.

Aspects of the family, community, and societal cultures of the students. The home languages of the students, family and neighborhood values and norms for speaking and socializing, as well as the wider urban American cultural norms (influenced by TV, popular sports and music, etc.) influenced what students brought to classroom writing tasks. Out-of-school knowledge, skills, and interests

influenced what students choose to write about (when permitted choices), patterns of language use, attitudes toward writing, and values about school and education in general. It is important to note that the students in these classrooms came from a wide range of language backgrounds in addition to English. Over the two years of our study, combining both classrooms, approximately half of the students were Portuguese, many speaking Portuguese or a Portuguese based Creole (from Cape Verde) as their first language. Some of these students were in fact tri-lingual, speaking Portuguese, Spanish, and English or Creole, Portuguese and English. In addition several were Spanish speaking (from Panama, Guatemala, Puerto Rico, others from the Caribbean, and one from Spain), and several from the Orient (including three Chinese, two of whom spoke both Vietnamese and Chinese, and one Korean), and one East Indian. In the minority were those students who spoke only English; typically, these were children of either Irish or Italian American descent, black Americans, or second generation Portuguese.

The Pre-computer Writing Systems

In each room, the norms, practices, and values surrounding writing -- the writing system in each classroom -- reflected the general patterns of social organization and pacing of the day. The writing system in Classroom A entailed a structured, fast paced routine where first drafts were written, edited by the teacher, whom we will refer to as Patricia Fontini, in brief one-on-one writing conferences. These drafts were then recopied as final drafts. Assignments were given on a weekly basis, and nearly always specified topic and genre. There were few opportunities for students to read and respond to other students' drafts in progress. Interestingly, more peer/peer interactions over writing occurred during the second year, when students' desks were closer together and the group was generally perceived as more cooperative. In Classroom B, assignments were given on a less regular basis and occasionally allowed for more leeway with respect to topic and genre. In this room, as a result of both the teacher, Brenda Stone's desire for a polished product and the relaxed schedule and pacing of the day, students wrote several drafts (sometimes as many as five or six) before completing a single spaced final draft. Occasionally, a student wrote more than one final draft as well. Mrs. Stone conferenced each student on each draft. A striking difference from Classroom A was thus the number of drafts students wrote and the subsequent one-on-one teacher/child conferences that took place. Overall, Mrs. Stone's students did more recopying and Mrs. Stone, herself, wrote more corrections on student writing

because she had more drafts to make corrections on. In addition there were more opportunities for informal peer/peer discussions about and sharing of writing. This was not required by Mrs. Stone but a natural outcome of the seating arrangement and her tolerance of quiet talking at the students' desks.

It is important to emphasize that in both classrooms, there was little or no collaborative writing or writing in content areas -- such as history or social studies -- before or after the computer. The majority of teacher "corrections" on students' written drafts dealt with spelling, punctuation, word choice, and sentence construction. Occasionally sentences were reordered or students were encouraged to clarify and add text. Most changes incorporated into subsequent drafts were the result of the teacher's corrections, written directly on the student's paper, rather than student-initiated revisions.

The Computer as Dependent Variable

In our two classrooms, we were particularly interested in understanding how new technology--designed specifically to create environments for meaningful, collaborative writing and revision--would alter the writing systems, and hence students' access to writing and reading opportunities. We found that rather than the new technology radically reshaping the learning environment, the computers themselves were shaped to fit the already established patterns of social organization. Because the two learning environments differed, the same computers with the same writing software ended up being used differently, and came to serve as different writing tools. It is for this reason that we have come to think of the computer as a "dependent" variable, itself affected by the classroom context, and in turn, having an influence on it. Another way to think about this is that the computer was assimilated into the already established patterns of control, instruction, and evaluation and constrained by them. But once a part of the classroom writing system, it created opportunities for reading and writing that had not existed before. The classroom learning environment accommodated the computer as a new, albeit limited, resource that allowed for text entry, change, and retrieval as hard copy. Thus the computer and the social setting are "mutually constitutive" (Mehan, 1978), or reflexive influences; the computer is simultaneously influencing and influenced by the social setting. In this section, we discuss particular ways that the computer was integrated differently into the two rooms and implications this had on the amount and kind of student writing

done.

In early February, 1984, both teachers were given three days of training with QUILL. (Neither teacher had had any previous word processing instruction or experience.) The following school year, both teachers had the computers throughout the entire year. Not surprisingly, in their second year of computer use, both teachers changed and expanded their use of the computer. To some extent this was a natural outcome of increased familiarity with the technology as well as a function of the fact that during Year II, both teachers had the computer for the whole school year instead of only half a year. In addition, changes in their use of the computer were due in part to the fact that we held bi-weekly teacher/researcher meetings in which we discussed trying out new ways of using the computer and taking better advantage of the computer as a text-editing tool. In discussing differences across the two rooms in terms of computer use and outcomes, several points of contrast or similarity emerged: 1) the function of the computer and at what stages in the writing process it was used; 2) how students gained access to the computer; 3) the distribution of computer expertise and uses of the computer as an editing tool; 4) social interaction at the computer; 5) the amount and kind of writing produced; 6) gender and ability differences; and 7) teacher attitude toward the computer. We will discuss each point, and where changes occurred over time.

The Function of the Computer in the Writing Process

QUILL could potentially serve many different functions in assisting the writing process. It allows for entering and revising text. When a text is completed, the computer can be used for copy editing and to produce a polished, final copy. It can also serve as a tool for planning and idea organization. Beyond these direct tool uses, the computer can also be used to foster environments in which reading and writing occur more easily. Electronic mail allows writers to obtain information, to exchange ideas, to comment on one another's writing, and to share texts. One would imagine that some ideal classroom might exhibit many if not all of the functions. But real classrooms constrain the way these functions get carried out.

During the first year in our two classrooms, the computer was used similarly in the two rooms for teacher-assigned and monitored composition writing. Students wrote drafts of compositions or poems on paper, had them edited by the teacher in brief one-on-one conferences, and then entered them on the computer using the QUILL LIBRARY program. Thus the computer was initially integrated into the "final draft" or "publishing" stage of the writing process. In Classroom A, the

computer replaced students' handwritten "final" draft; in Classroom B, the students continued to do a handwritten "final" draft and then typed a second final draft on the computer. In essence, in both rooms, the computer was used as a final text preparation device, a fancy typewriter, not as a text-editor as was intended by the QUILL developers. In neither case was there any regular collaborative writing done at the computer in spite of the fact that this was stressed during the QUILL training and facilitated by QUILL technology (which, for example, always allows for two authors to be listed on any piece). There was no writing across the curriculum, even though the QUILL training had included discussions about how PLANNER could be used to generate science lab reports or social studies surveys. Thus while QUILL encourages such developments, the technology in and of itself did not bring them about. One is tempted to say that these restricted uses of QUILL were misuses, in that they did not exploit its potential, but the situation is more complex.

The existence of a six stage procedure (1. get an idea, 2. brainstorm, 3. first draft, 4. revise and edit, 5. final draft, 6. publish and share) for the writing process meant that possible roles for the computer were circumscribed from the beginning. For instance, the notion of writing growing out of an environment in which reading and writing are richly interconnected is inconsistent with a strict interpretation of the six-stage model. Also, the distinctions among stages 3, 4, and 5 are blurred when one uses a text editor. In the Ridgeport writing model, stage 3 meant producing a draft in longhand on yellow paper skipping every other line. Stage 4 meant marking up that draft. Although there was no explicit intention to restrict the marking up, the practical implementation of stage 4 was what we thought of as copy editing -- correcting spelling, punctuation, capitalization, and grammatical errors. Stage 5 meant recopying the copy edited text, single spaced, onto white paper. Using a computer, these stages are intermixed. Revision, editing and entering text can be done in an interleaved fashion. The analogue to stage 5 is simply declaring that the text is finished and then printing out a copy.

When the computer was added to the classroom writing system, it became not a new model for the process, but an adjunct to the existing model. This happened for reasons having to do with established practices, but also because there was only one computer per classroom. Since the focus was on writing, it did not make sense to have students spending precious time at the computer reading each other's drafts. In fact, there was not even time for composing at the computer. In an ideal situation one could imagine a student being able to write for a few minutes at the

computer, then leave to discuss an idea with the teacher or another student, come back, but sit and gather thoughts for another few minutes, revise a line or two, add a paragraph, and so on. This type of composing would have meant that opportunities to use the computer would be infrequent, or that only a few students could get to use it. Thus, in the end, the computer became a typewriter with easy correction facilities. In Classroom B, students added stage 5.5 - typing into the computer the final draft which had been written on white paper. In Classroom A, they simply did stage 5 at the computer. In both cases, they had adapted the computer to the six stage model.

In spite of the similarity in the use of the computer for formal composition writing in the two rooms, one important difference emerged. In Classroom B, the computer was also used extensively to write informal "kid-to-kid" letters using MAILBAG. Letter writing was a voluntary, free-time activity, which both boys and girls engaged in throughout the year. Students composed their letters directly at the computer and their writing was wholly unmonitored by the teacher. Over 50% of all student files in this class were letters, primarily to classmates, written on MAILBAG. (These letters were generally shorter than compositions and for this reason they accounted for 42% of the total number of lines written.)

Here, the computer ushered into the classroom a new opportunity for "sanctioned" in-class kid-to-kid writing, but not an opportunity that was overtly linked to the teacher's instructional domain. This use of the computer did not reorganize the way Brenda Stone taught writing any more than did her use of QUILL's LIBRARY program. However, it did mesh with her general philosophy which encouraged informal communication among students and independence in the use of classroom tools (such as the science kit) for free-time activities.

One last difference with respect to where the computer fit in the overall writing system is worth mentioning. Toward the end of the school year, Patricia Fontini, in Classroom A, initiated a new use of the computer, having students read LIBRARY files of classmates during the building wide Sustained Silent Reading period each morning. Each day, a different pair of students could opt or decline this as a silent reading activity. Mrs. Fontini commented that this was one way of making use of the computer while not violating the building policy that everyone (even the teacher) must be reading during this period. Mrs. Stone heard about this idea from Mrs. Fontini but never initiated it in her classroom. Her decision not to use the computer as a means to allow students to read each other's writing may have been related to her reluctance to institute peer conferencing. She felt that weak writers might feel intimidated or get teased about their writing by more able

writers.

During the second year of computer use, the same general patterns of differential use emerged with more Kid-controlled MAILBAG writing in Classroom B. Interestingly, both teachers moved the computer further up in the writing process, still having students type in a draft from a handwritten copy, but then edit from hard copy. In both rooms, the students did more revision using the computer's text-editing capabilities. However, the students in Classroom B continued to do a series of handwritten drafts before entering a composition on the computer and editing it further. On the final composition of Year II, for both classrooms -- writing about a field trip to a nearby nature reserve -- the students in Classroom B did an average of 2 handwritten drafts (ranging from 1-3) and 3.25 computer drafts (ranging from 1-6). In Classroom A, students did on the average 1 handwritten draft and 2 computer drafts (ranging from 2-3). This reflects a pattern noted during Year I in which students in Classroom B did more drafts per assignment and had more teacher student conferencing, during the time when students were recopying drafts at their seats. The computer did not do away with handwritten draft recopying in this room, we would suggest, because rewriting (as opposed to revising on the computer) served an important function, allowing Mrs. Stone quiet time to conference with students one-on-one. These general differences and similarities are summarized in Table 1:

	Classroom A	Classroom B
QUILL use for writing	Teacher-controlled writing: e.g. entering and copy-editing final drafts of teacher-assigned compositions on LIBRARY.	Teacher and student-controlled writing: e.g., entering and (in year II) copy-editing final drafts of teacher-assigned compositions on LIBRARY and kid-to-kid letters on MAILBAG.
QUILL use for reading	Reading LIBRARY pieces Sustained Silent Reading.	Reading MAILBAG letters.

Table 1. The functions of QUILL as realized in the two classrooms.

Gaining Access to the Computer

Two different methods evolved for gaining access to the computer. In Classroom A, where nearly all computer writing was teacher assigned compositions, students were assigned a turn at the computer on the basis of the order in which they completed a handwritten draft and had it edited by the teacher. In Classroom B, students got a turn at the computer on request, except for a few occasions when Teacher B wanted to make sure everyone entered a particular composition, so she assigned turns.

Because of the way writing and computer use was organized in the two rooms, the impact of absenteeism on access to the computer (and hence on amount of computer writing done) differed strikingly in the two rooms. In both classes, the average number of days missed per student was 21. In Classroom A, students who were frequently absent were more likely to miss their turn at the computer (because they had not gotten the assignment or had not finished their draft), or else were likely to be denied their turn while making up other assignments. No student who was frequently absent was a prolific computer writer. In contrast, in Classroom B, where students gained access to the computer by request, absenteeism did not create barriers to turns at the computer. Some of the most prolific writers were among the most frequently absent. This pattern of differential access maintained itself in Year II.

The Distribution of Expertise

With respect to computer expertise, the two teachers took divergent paths. Simply put, Patricia Fontini became the classroom computer expert and Brenda Stone did not. In Year I, Mrs. Fontini often took the computer home over weekends and vacations. As her competence increased, she asked more questions of the project's QUILL consultant, and tried out more sophisticated uses of the Utility Disk, which allowed her to look up particular files on a disk, print off a list of text files, and so on. She became more facile with the more sophisticated editing commands, altering the margins and printing specifications, copying disks or making new ones, and even examining the disk controller cards in the keyboard console.

Mrs. Stone, in contrast, spent far less time "after hours" experimenting with or simply using QUILL. This was partly due to the fact that it was difficult for her to take the computer home on weekends as she lived alone in a third floor walk-up apartment, and also due in part to her ambivalence toward or discomfort with the technology. In an end-of-the-year interview Brenda Stone acknowledged that she

hadn't fully mastered QUILL's editing commands. In another interview, she spoke openly about her resistance to technology, saying,

> I never liked computers. I was one of those people who resisted. I'm one of those people who doesn't even like those [bank teller] card machines. I like to go to the bank and talk to and touch the person. I don't really like mechanical things.

Differences in the teachers' level of expertise seemed to relate to the value they placed on their students' learning QUILL's text editing commands and the way they went about teaching them. Mrs. Fontini, who became thoroughly familiar with QUILL, made an effort to teach all of the students the commands needed to insert and delete text. She made a wall chart of all the basic commands, which students referred to frequently, and she was able to fine tune her instructions so that more adept users learned more sophisticated commands. Toward the end of the year, she replaced this chart with a new one including some of the more sophisticated editing and cursor movement commands.

In contrast, Mrs. Stone, who herself did not fully master the basic commands, did not make a concerted effort to teach them to her students. Rather than making a public wall chart, she asked the researchers to xerox several pages from the teacher's guide that explained basic editing commands and distributed these pages to each student. These were put in the students' computer writing folders which were attached to a bulletin board. No student was ever observed referring to them. Instead, when students needed typing or editing help on the computer, Mrs. Stone referred them to one boy in her class (Richie) who, early on, had shown interest and aptitude in the computer and had by chance picked up basic text editing information from some of the students in Mrs. Fontini's classroom and even from Mrs. Fontini herself.

As a result, on an end-of-the-year, hands-on computer quiz, in Classroom B, only Richie had fully mastered the basic QUILL commands. Two other boys, both close friends of Richie, demonstrated some knowledge of the commands. But not a single girl knew how to insert or drop text, or move the cursor through the text. In contrast, in Classroom A, 14 out of 17 students knew the basic QUILL editing and cursor movement commands, with no obvious differences between boys and girls.

Differential levels of expertise had an impact on the ways students used the computer as an editing tool. Students in Classroom A typically typed in their text,

and then went back and edited it, correcting typos and occasionally making substantive revisions. Students (other than Richie) in Classroom B typed in their text and made typographical corrections as they went along, using the back arrow to delete text, sometimes several lines if they spotted an error earlier in the text. On five separate occasions, different students in Classroom B retyped their entire composition (making only minor spelling corrections) instead of using QUILL's electronic editing capabilities. It should be noted that in neither room were the computer's text editing capabilities fully exploited. As mentioned above, both groups of students typed in final drafts of compositions or single draft letters. Nonetheless, in both rooms, text-editing know-how was useful and used when available. These Year I findings are summarized in Table 2:

	Classrooom A	Classrooom B
Teacher expertise	Classroom computer expert	Not computer expert
Student expertise	14/17 learned basics No sex differences	1 boy learned basics 2 other boys learned some no girls learned to insert or delete text or move cursor.

Table 2. Text editing expertise.

During Year II, there were notable changes with respect to the distribution of expertise among students; at the same time, relative differences in the two teachers' level of expertise remained the same. At the end of Year II, most students in both rooms had mastered the basic text editing commands and many had even learned some of the more sophisticated editing commands. Interestingly, even though Mrs. Stone became more experienced with QUILL commands, she continued to develop and rely on student experts to teach text-editing commands. In Year II, however, she used more student experts, not just one, and involved both boys and girls as experts. She herself was more committed to having her students learn the commands, and made sure that student experts did indeed teach other students. As a result, nearly all of the students in this room learned the basic insert, drop and

cursor movement commands and several of the boys made a point of learning as many of the commands as they could. These boys referred to the teacher's manual as a source of information and even learned to use the computer's help function to teach themselves highly sophisticated commands such as block moves (which they did not actually use in editing their pieces). In this room, while the majority of students learned far more than their cohorts from Year I, text editing knowledge was still unevenly distributed and the boys as a group knew more than the girls, even the girl "experts.

In Classroom A during Year II, all the students learned the basics but none stood out clearly as classroom experts, in the way Mrs. Fontini herself did. In this room, the girls thought of themselves as the computer experts, and proudly talked about the fact that three girls, referred to as "the computer girls," set up and put away the computer each day. (As it happens, the girls' names were picked randomly from a hat at the beginning of the year.) Nonetheless, when students were asked individually "Who knows the most about the computer in your classroom?", just as in Year I, every single student answered, "Mrs. Fontini." In contrast, when the same question was asked in Classroom B, every student named the three boy experts, and a few named a girl expert and the teacher in addition.

Social Interaction at the Computer

In Classroom A, there was an official pair policy, whereby the student assigned to use the computer next (based on the order in which his or her numbered draft had been corrected) was designated "helper" to the student typing in text. The helper read the author's draft out loud and provided help with editing commands. Because turns were based on the order first drafts were completed, a certain randomness was introduced. Mixed sex and mixed computer ability pairings were common. Students often were heard talking about text editing commands, and giving instructions about how to move the cursor. This led to wide diffusion of computer vocabulary (such as "cursor") and expressions (such as "Control-C freezes the text") and editing skills, with no obvious sex differences.

In Classroom B, there was no official partner policy at the computer; students who had nothing to do were often allowed to hang out at the back of the room while a friend used the computer. These groupings at the computer divided along sex lines. Not surprisingly then, there were striking differences in both Years I and II with respect to girls' and boys' text-editing knowledge. In both years, the boys as a group gained more expertise. Moreover, no classroom-wide shared vocabulary or

editing expressions developed. (See Michaels, 1985, for a more detailed analysis of the relationship between the classroom learning environment and students' learning of text-editing commands.)

Amount and Kind of Writing Produced

With respect to the amount of computer writing produced in year I, certain similarities emerged in each class. Each room spawned one computer "star" who wrote far more than any other classmate. In Classroom A, the star was a girl who wrote 40% more than the next most prolific writer and in Classroom B, the star was a boy (Richie, the computer expert) who wrote 63% more than the next prolific writer. The rest of the students were distributed fairly evenly over comparable ranges from high to low. In both rooms, the girls overall did slightly more computer writing than the boys. Moreover, when students were ranked by amount of computer writing done, and relative ranks were compared across time, girls in both classrooms tended to move up in rank over time while boys tended to move down.

However, differences in the pacing and frequency of classroom writing activities, and the degree to which the teacher controlled computer writing led to striking differences in the overall amount and kind of writing that was produced. In Classroom A, where the teacher initiated and monitored all classroom writing and instituted a system whereby she controlled access to the computer, most classroom writing that was done was eventually entered onto the computer. In Classroom B, where computer writing was more often student-initiated and controlled, students did much paper and pencil writing -- in terms of new pieces and revised versions of the same piece -- that never found its way onto the computer.

In Classroom A, students collectively did 43% more computer writing than students in Classroom B. Students in Classroom A also did a much higher proportion of "expository prose", about 80% of all their computer writing. Moreover, nearly all other forms of writing in this room, such as poems and letters, were assigned by Mrs. Fontini, corrected by her, and entered on the computer from handwritten drafts; 95% of the writing was what we have called "teacher-controlled." In contrast, in Classroom B, only 58% of the writing done was expository prose compositions. Kid-to-kid letters (unmonitored by the teacher) accounted for 42% of the writing.

Year II figures were similar to Year I. More computer writing was teacher-controlled in Classroom A than in Classroom B (where students continued to write

many kid-to-kid letters on MAILBAG). In Classroom A, 91% of the files written were teacher-controlled (whether using LIBRARY or MAILBAG), versus 52% in Classroom B. Approximately the same amount of computer writing was done in each room during Year II (an average of 151 lines per student in Classroom B and 144 lines per student in Classroom A). This was in contrast to Year I when Classroom A had produced 43% more computer writing. Another difference was that girls tended to do slightly more computer writing overall in Classroom A, while there was no girl-boy difference in Classroom B. Finally, no single "star" writer emerged in either room in Year II. These findings are summarized in Table 3.

	Year I		Year II	
Classroom	A	B	A	B
Star Writer(s)	1 girl	1 boy	none	none
Gender & amount of writing	more by girls	more by girls	girls slightly more	no girl-boy differences
Lines of text/student	101	71	144	151
Proportion of writing that was teacher-controlled	.95	.58	.91	.52

Table 3. Amount and kind of writing.

Gender and Ability Differences

In line with findings that the computer became a different writing tool in the two classrooms, it is important to pay attention to the computer's differential impact on individual students and sub-groups within and across the two classroom communities. For example, as discussed above, MAILBAG was used differently in the two classrooms, both with respect to audience and purpose, and with respect to access. In Classroom B, students used MAILBAG "on request" to write to other

students, wholly unmonitored by the teachers. Students composed directly at the computer, about topics of their own choosing. In Classroom A, MAILBAG was used as part of the "official" writing program. Students were assigned topics (such as book report letters to the teacher) or formal letters to adults or peers, which were written first on paper, checked by the teacher, and then entered into the computer. Students generally gained access to the computer on the basis of the order in which their first draft was completed. These different realizations of MAILBAG had interesting implications for the kind of MAILBAG writing students did, the kind of MAILBAG writing they received, the kind of teacher feedback and instruction they received and how much MAILBAG writing they accomplished. Moreover, these differences interacted with both gender and school attendance in interesting ways.

In Classroom B where students wrote unofficial "kid-to-kid" letters, during Year I, it happened that girls wrote only to girls and boys wrote only to boys. Within the two gender sub-communities, there evolved significantly different letter genres, which entailed writing about different topics with different pragmatic functions and exploiting different stylistic features and markers of dialogue. In effect, boys and girls were gaining access to different writing and reading opportunities.

In Classroom A, where students gained access to MAILBAG computer use on the basis of teacher permission, students who were often absent or often pulled out of the classroom for special tutoring were far less likely to do MAILBAG writing, hence not gaining access to opportunities to write letters to real people for real communicative purposes. In Classroom B, over both years, absenteeism or special tutoring had no impact on access to the computer. Some of the most frequently absent students were among the most prolific MAILBAG writers. These findings highlight interesting tensions between a writing system that supports student control over topic, audience, and purpose and a system that attempts to maintain controlled access to equalize opportunity. We need to think hard about issues of gender and ability sub-groupings in a classroom and how the writing system reduces or increases differential access to particular kinds of writing experience or instruction. Teachers need support in becoming critical evaluators of their own goals with respect to these issues and critical evaluators of patterns and practices (both stated and unstated) in their own settings.

Teacher Attitude Toward the Computer

In Year I, differences in attitude toward the computer (summarized in the

section, "The Distribution of Expertise") seemed to relate to and underlie the teachers' differential expertise with QUILL commands. In Year II, these differences in attitude continued to manifest themselves, reflected in the teachers' level of interest in and confidence with the computer, and willingness to use and experiment with it. Patricia Fontini (the computer expert) became interested in exploring new ways to use the computer's capabilities while Brenda Stone continued to have her students use QUILL only to enter and edit LIBRARY files or send MAILBAG letters.

Throughout Year II, Mrs. Fontini tried out additional uses of the computer that allowed her students to do different kinds of writing or reading than they had done before. For example, mid-way through the year, she read an article in the local newspaper talking about a teacher who had her students write her book report letters. She decided to try out this idea using MAILBAG. During a teacher/researcher meeting when she first mentioned her experiment with book report letters, she explained that she had wanted to make more use of MAILBAG during Year II and in addition felt that it would give the students practice with the form of "friendly letters" which they get tested on at the end of the year as a part of the city-wide writing test. Typing directly at the computer, the students wrote Mrs. Fontini book report letters and she wrote back, commenting on the style and content of their report and suggesting new books to read. Later, she had students first write a draft of their letter on paper because she felt they were sloppy when they composed directly on the computer. While it is true that Mrs. Fontini could have had her students write her book report letters without a computer, it seemed that having a computer with electronic mail capabilities made this idea more appealing. It allowed for MAILBAG to be used in a way that was both academic and socially interactive, and it called on Mrs. Fontini to use MAILBAG herself in responding to the students' letters. Mrs. Fontini also continued to encourage students to read each other's LIBRARY files (as well as the files of students from Year I) at the computer during the daily Sustained Silent Reading period.

Another reflection of differences in attitude was that Mrs. Fontini was willing to do things differently to accommodate and even capitalize on the quirks of the technology; Mrs. Stone was not. Several examples will illustrate this general contrast. QUILL types the title of a piece automatically at the top of the printout, in addition to whatever gets printed out as the text body of the file. For this reason, if the student types the title of the piece in the file as well (as if at the top of the page), the title will be printed out twice. Mrs. Fontini's response to this "double

title" was to get her students to delete the title in their file and let the computer generate the sole title automatically. Mrs. Stone's response was to keep the students typing the title at the beginning of their piece and to cut off with scissors the extra title on the printout if they wanted to. She felt it was important for students to continue to type a title at the top of the their piece -- computer or no computer.

As another example, QUILL requires the author of a LIBRARY file to select from one to five words (referred to as "keywords") describing the piece. These keywords are automatically typed at the bottom of a piece and are also stored in a keyword index, akin to a subject index in a LIBRARY card catalog. (Because QUILL is character oriented, a single character, such as a "." or "," will be accepted by the program as a keyword.) Mrs. Stone felt that on some pieces, such as poems, the keywords were a nuisance and encouraged the students simply to use a "." which could be easily removed (with whiteout) from the printout. Otherwise, she ignored keywords altogether and gave her students complete independence in selecting their own. Mrs. Fontini, in contrast, capitalized on QUILL's keyword capabilities to do bookkeeping work for her. She had each student enter only three keywords (though QUILL permits up to five): the student's name, the topic of the assignment, and the month. By quickly listing a directory of all files, she could check and see who was late in finishing an assignment.

When students in both rooms worked on class newspapers, they made differential use of QUILL's formatting capabilities. Mrs. Fontini's students typed their texts normally and then used QUILL's "set environment" command to make narrow margins for newspaper columns. In Mrs. Stone's room, even though many students knew how to reset the margins, they were often encouraged to retype their entire piece by hand with narrow margins so that they could hyphenate (which QUILL cannot do) and make the columns neater. Some of the students retyped a piece up to three times in preparation for the newspaper. Mrs. Stone commented that she wanted the students to have the experience of doing newspaper layouts by hand, not just pushing a couple of buttons, as well as the benefits of looking words up in the dictionary to hyphenate them.

Discussion

While contrast often makes us inclined to evaluate one outcome as more successful than the other, both of these teachers made reasonable (albeit different) decisions about how to organize writing activities and how to implement QUILL.

Both teachers used the computer in ways which were in tune with their overall goals and interest in using the computer themselves. Moreover, while there were some changes over time, they were not necessarily the same changes in the two cases. However, changes over time for both were in a consistent direction. Mrs. Stone, for example, made sure that more students in Year II learned basic text-editing commands, but continued to rely on student experts as in Year I. Mrs. Fontini tried out new uses of the technology toward the end of Year I and continued this trend throughout year II, in each case selecting uses that sustained "teacher-control" over writing. Observing the same teachers for two consecutive years was important; it helped us understand the role of the classroom writing system in constraining the integration of the technology. It wasn't a simple matter of the teacher's lack of familiarity with the technology that led to limitations in use (such as the multiple re-copying of handwritten text in Classroom B); this was, at least in part, a function of the need for managing teacher-led one-on-one writing conferences after each draft was produced. Had there been a procedure for peer conferencing (or of course, many more computers), the technology might well have been used differently. At the same time, the kind of changes that occurred over the two-year period highlighted the importance of the teachers' attitude toward the computer, independent of the teachers' attitude toward teaching writing. Here we saw that interest in the computer as a tool (again, above and beyond familiarity per se) led to different degrees of willingness to implement new kinds of computer- mediated reading and writing.

In a similar study of teachers implementing computers into classrooms, Mehan (1985) notes differences across teachers with respect to whether they use the computer as a "new means to meet previously established curricular ends" or as a "means to meet new curricular goals." Such a contrast is perhaps too stark in this case. Both teachers used the computer to do basically what they had been doing -- teaching writing as a specific subject area. However, Patricia Fontini did use more of the computer's functions, and could not easily have done some things (such as automatic bookkeeping, or having students read the writing of students from a previous year) without a computer's capabilities. The teachers never explicitly commented on this issue. However, in a teacher/researcher meeting, Mrs. Stone did say that she "really didn't see the computer as all that important in and of itself." She saw the primary job of teaching writing as the teacher's while the computer provided, at best, some assistance. And while Mrs. Fontini no doubt also saw the teacher as the primary influence on students' writing development, she

commented, in contrast, that she could no longer imagine teaching writing without a computer.

In summarizing the status of the computer in each of these classrooms, the following statements hold generally for both years. First of all, the same computer and software were integrated differently into the writing systems of the classrooms. Because the meaning and use of the technology is mediated through social activities, the computers emerged as different writing tools in each room. In Mrs. Stone's class the computer had a complex status, with different uses and purposes, depending on whether teacher-controlled LIBRARY or student-controlled MAILBAG was used. Technical expertise was generally attributed to student experts, and primarily to boys. In Mrs. Fontini's room, the computer was a tool with a range of uses -- typing and editing compositions, reading student pieces, book report letters, and some kid-to-kid letters -- nearly all directed and monitored by Mrs. Fontini who herself was seen as the primary teacher and expert user of the computer.

In addition to describing the evolved status of the computer as a tool in each room, two general points emerge. One is that in neither case did the computer radically reorganize social organization in the classroom or the teaching of writing. The second is that the computer, in both cases, created some new opportunities and purposes for writing and reading, but not precisely the same opportunities in each case, examples being kid-to-kid letter writing in Classroom B and book report letters in Classroom A.

Two factors have emerged as critical, constraining influences on the use of the computer. The first has to do with teacher attitude -- interest and confidence level and willingness to use the computer on one's own -- which seemed to underlie the rate at which the teachers developed technical expertise and the degree to which the teachers tried out the computer's capabilities to create new reading and writing activities in the classroom. The second factor has to do with patterns of social organization and control in the classroom, patterns that pre-dated the arrival of computers. In Patricia Fontini's and Brenda Stone's case, these two factors of attitude and classroom organization/control led to differential access to and use of the computer, and different methods for teaching text editing commands. These differences, in turn, had a significant impact on the kind of writing that was done and the degree to which students gained control over the technology (both with respect to text editing commands and the selection of QUILL programs).

It is interesting to speculate to what degree these two factors are related. It is not surprising, for example, that the technical expert would be the one to integrate

the computer more fully into a teacher-controlled writing curriculum, whereas the teacher who had not mastered the technical aspects of the machine might be more inclined to turn it over to student experts and allow for a great deal of student-controlled writing.

On the other hand, the difference in management and pedagogical styles between these two teachers provides an equally plausible and competing explanation. In Classroom B, much of Mrs. Stone's control was exerted through her personal relationships with individuals. She tolerated a great deal of informal interaction, self-pacing of work, and encouraged students to take responsibility for classroom tools and tasks. The use of MAILBAG and the reliance on student experts fit naturally into this learning environment. In Mrs. Fontini's room, control strategies were group oriented and many revolved around the teacher-controlled density and pacing of school work. Students were held accountable for completing a range of academic tasks; there was little time for socializing or free-time activity. In this setting, the computer was naturally integrated into the teacher-controlled writing curriculum, whether writing compositions on LIBRARY or book report letters on MAILBAG.

In order to assess the relative importance and direction of causation of these two factors, we need to study more teachers who vary in different ways along these two dimensions of attitude/expertise and control, such as teachers who are computer experts who want to use the computer as a means to new curricular ends but who tend to encourage student choice and responsibility over classroom pacing, tasks, and tools. And importantly, we need to study teachers in very different institutional and community settings. We have argued that forces outside of the classroom will have a significant impact on the classroom writing system. By studying two teachers in the same school and school system, albeit teachers with different classroom writing systems, we inevitably limited the kind of differences we would find. Comparable work needs to be carried out in a wider range of school, community, and even home settings.

This study has implications for researchers as well as for practitioners. If we are to understand more fully the effect that computers have on classrooms, we must see the computer as both influenced by and influencing the classroom context, that is, both a dependent and independent variable. As this study shows, computers did indeed have an impact on how writing was carried out. However, we cannot accurately explain the computer's impact on these classrooms without first considering the impact of the classroom, and in particular the teacher, on the

computer.

In characterizing differences in these teachers' attitudes or styles of classroom management, we do not mean to imply that one teacher had the "right" attitude and the other a "wrong-headed" attitude or that one used QUILL in the "best" or "right" way. In looking at the computer in the framework of the larger writing system, we have tried to show how their differences in computer use made a great deal of sense in light of their overall goals, styles, and attitudes. We still have much to learn about the "best" uses of computers before it makes sense to evaluate teachers' early attempts at integrating the technology with relatively little training and influence from outside experts.

In thinking about introducing computers into other classrooms, we must learn from Patricia Fontini and Brenda Stone to expect that teachers will have different values, styles, and strengths, and that these differences will influence the ease with which and the degree to which the computer is integrated into the curriculum. In both our teacher education and our on-site support, we need to appreciate and build on teachers' strengths and not turn differences into deficits. Researchers and teachers must collaborate in documenting a variety of successful strategies and options which work with teachers who have various styles, attitudes, and goals. But most importantly, teachers need support in becoming critical evaluators of their own goals, of the potential of the technology in light of those goals, and of patterns and practices (both stated and unstated) in their own settings.

Implicit Versus Explicit Schemata

In the preceding section we discussed the ways in which the computer, i.e., the QUILL innovation, took on different forms in different settings, that it was itself transformed rather than the primary agent of transformations in the classrooms. To illustrate this, we have relied on summary statistics of writing and anecdotes of patterns of social interaction over the course of two years. But in order to understand how aspects of the writing system influence the writing of particular texts, it is necessary to look in far more detail at actual occasions of writing. This entails a focus on a particular writing assignment, a particular text, a detailed analysis of what both teacher and student bring to any given writing task, and how texts are influenced by the real-time social interactions surrounding their production. In this section, we change the magnification level of our lens -- focusing not on summary statistics over an entire school year, but on a more fine-

grained discussion of task and texts derived from particular occasions of classroom writing. This approach, integrating ethnographic and linguistic analyses, requires a shift from frequency counts of categorized texts to more interpretive analysis of individual pieces of writing and more detailed descriptions of social interactions around writing. Using this approach, we discuss the importance of teacher expectations in shaping student writing.

Through close analysis of teacher talk in whole group brainstorming discussions, one-on-one writing conferences, and written response to student drafts, it was possible to document the teachers' often unstated expectations about what counted as "good" writing. In addition to obvious expectations teachers had with respect to spelling, punctuation, and word choice, we were able to identify the teachers' implicit expectations (or "schemata") for how school writing assignments were to be structured -- and the degree to which students' initial drafts were "matches" or "mismatches" with respect to the teachers' organizational, or structural, schemata. It was then possible to trace the students' writing through a series of drafts and a series of teacher/student writing conferences, to chart the real-time influences of teachers' tasks, comments, suggested corrections, etc. on students' written texts. We could actually chart the "life history" of a particular composition and study the coallescing influences of teacher expectations, class discussion, student communicative intentions, and one-on-one conferences as students' early drafts were shaped into final drafts -- and in particular as "mismatches" were turned into "matches." This kind of genetic analysis of text production (studying how a composition came to be) highlights not only the teacher's schema for text, but her unstated values, goals, and ideology with respect to the teaching of writing. In spite of the fact that a particular teacher uses what is called a "process" approach, we find often that classroom practices suggest an implicit product orientation, with a focus on getting the student to make "corrections" and changes that the teacher identifies in accordance with her expectations. We found, for example that "conferencing" in these two classrooms looked much like teacher controlled lessons, merely enacted through a one-to-one dialogue. This point is discussed fully in Ulichny and Watson-Gegeo (in press).

As an example of this kind of analysis, we will describe the development of one student's composition -- the task, the social setting and interactions that shaped it -- so as to suggest some of the complexities at work in typical occasions of classroom writing, complexities for both student and teacher. This example was taken from Classroom B, where students were expected to produce a written composition in

response to the teacher's assignment. As was mentioned earlier, students then wrote multiple "rough" drafts (sometimes as many as five or six) and were conferenced after each draft by Mrs. Stone, who made corrections in ink, asked questions about students' ideas, and made suggestions for improvements -- both orally and in writing. Elsewhere (Michaels, 1987) we have carried out a detailed analysis of the whole group brainstorming discussions, the entire corpus of teacher/student conferences, and all student drafts completed for the circus composition assignment. In what follows, we will trace a single text through a series of drafts and teacher/student writing conferences.

Elliot's circus composition

In October, 1984, Mrs. Stone's entire class took a field trip to the Barnum and Bailey Circus. Several students had never been to the circus before. The next school day, the students were told that they would be writing about this experience. In a pre-writing "brainstorming" session with the whole class, Mrs. Stone summarized their writing task as follows: "Whatever your favorite part of the circus would be, a particular act (pause), think of some title that would be an appropriate title for your composition." Later, as the students were beginning to write, she reiterated the task: "Right now you should be putting an act at the top of the page. That's what I want you to focus on." Still later, she reminded the students to "stick to one particular act," telling them to write "about two or three paragraphs to go with that one particular act."

From multiple sources of evidence, it was clear that in addition to general expectations about good writing at the level of word choice, spelling, and punctuation, Mrs. Stone had specific expectations about how the students' circus compositions should have been structured. This schema called for a composition with three distinct segments -- each with particular linguistic and thematic characteristics. She was looking for a beginning section that was narrative-like in syntax -- specifying date, place, and the name of the circus (which might be thought of as an "introduction"). This was to be followed by a middle section which entailed a shift to specifics, describing and evaluating the particular "act" (which might be thought of as a section of "analytic detail"). Finally, there was to be a final section that returned to the general, the circus as a whole (which might be thought of as a "summary and conclusion" section). In light of this schema, students' first drafts could easily be characterized as "matches" or "mismatches." Of the 14 first drafts produced by the students, 5 were matches and 9 were mismatches.

And through a series of multiple conferences and rewritten drafts, incorporating changes suggested by the teacher, every mismatch was shaped into a match. In many cases -- as exemplified in the case of Elliott below -- the result was a piece that was simpler in both form and content that the student's original draft, with some meaning taken out or reshaped in often quite subtle ways to fit the structure the teacher was looking for. As we will see in Elliott's case, the teacher's expectations constrained her reading of a student's text and the kind of rewriting that was then encouraged.

Elliott Brown was once described by Mrs. Stone as "the classroom bully" due to personal problems he was having at home, where he lived with a foster mother while his real mother underwent rehabilitation therapy for a drug problem. He was a tall, light brown-skinned boy who looked part Hispanic or black, but who was classified by his previous teacher as "white." His English evidenced many dialect features of urban working-class speech, and showed some influence from Black English Vernacular.

Elliott's handwritten first draft of his circus composition read as follows:

> Elliott Brown Oct. 22, 1984
> The Pink Panther Act
>
> I liked the Pink Panther Act very much. Because he is my favorite character. I've seen him on T.V. cartoons and movies. Where he is not on. But there a man named Inspector Clooseau. Who is trying to catch the Pink Panther. The movies are in color as in cartoon. When he's in the circus the best act is when he is on a three wheeler and two men are chasing him on motorcycles. And they are chasing him all around the areana. I really liked the circus alot. It was amazing.

Elliott's piece begins with an evaluation of the Pink Panther act. He assumes shared knowledge on the reader's part that the act was one of many at the circus. Elliott then shifts markedly to a discussion of the Pink Panther character in another medium--specifically the Pink Panther movies, which star Peter Sellers as Inspector Clouseau. This appears to be embedded background information, explaining more about the Pink Panther character to clarify his significance in the circus or at least his significance to Elliott. Corresponding to this shift in topic, Elliott shifts from the simple past tense ("I liked the Pink Panther act very much")

to past perfect and present tense description of the Pink Panther's unusual status in these movies ("where he is not on"). There is no overt marker of this shift to background information. (Elliott might have made this shift lexically explicit by saying something like, "Not only is the Pink panther a character in the circus, I've also seen him on..." Alternatively, the information could have been signaled as background information graphically, through the use of parentheses.

Elliott then returns to the topic of the circus, this time signaled syntactically by the adverbial clause "When he's in the circus." However, this transition is not as clear to a reader as it would be if it had been indented as the beginning of a new paragraph or if the Pink Panther had been renominalized as the focus, rather than referred to as "he." In this segment, Elliott describes the best act involving the Pink Panther in the circus, and ends with a return to simple past tense verbs and two evaluative statements, now providing evaluation of the circus as a whole.

This text does not fit the teacher's 3-part schema for two reasons. First, there is no introductory section about the circus. Second, the middle section does not give specific details about one act. Instead, there is a shift from circus to TV and movies and a concomitant shift from the Pink Panther to Inspector Clouseau. However, transitions are not signaled graphically through paragraphing, parentheses, or redundant uses of format, punctuation, and syntax. Moreover, the rhetorical significance of the shift from the circus to the movies is never explicitly stated.

Once this draft was completed, Elliott approached Mrs. Stone's desk to be conferenced. Mrs. Stone began reading his composition, but stopped suddenly and said, "Elliott, this says, 'he's my favorite character. I've seen him on TV, cartoons, and movies, where he is not on.'" Elliott responded, "You know, some of the movies he's not on and it's Inspector Clouseau...." Mrs. Stone interrupted with mild impatience, saying, "Then why would he be on? I don't understand. You explain it to me. It says 'I've seen him on TV, cartoons, and movies where he is not on'" (again emphasizing with questioning intonation "where he is not on").

At this point, the classroom participant/observer (who had already talked to Elliott about his composition when he was asked to help spell "Inspector Clouseau") came over and attempted to intercede for Elliott. He said, "Elliott, do you mean in some of the movies they call it the Pink Panther, but they're really about Inspector Clouseau?" Elliott nodded and looked back at Mrs. Stone. At this point, Mrs. Stone paused, looked again at his paper, and then seemed to come to some understanding of the complex idea Elliott was grappling with. She tried to rephrase it, but she herself had a hard time of it, saying, "The ones they call the Pink Panther, they're

something else but they're really about the detective but he is not in it. Is that what you want to say?" Elliott nodded. She then instructed him to take the entire part about Inspector Clouseau out and explain it "in another sentence of its own." The researcher offered a possible way of phrasing it, saying, "They show the cartoon of the Pink Panther at the beginning of the movie and then they go into a movie and it's about Inspector Clouseau." In addition, Mrs. Stone suggested that Elliott reorganize the composition, explaining first about the circus and "then in your next paragraph explain that you've also seen the Pink Panther on TV, cartoons, and movies, and use this as your example."

In addition to correcting the mechanics on Elliott's draft in a few places (adding commas and changing a capital "b" to a small "b"), Mrs. Stone had circled the section about Inspector Clouseau and had written directly above this in red ink, "Elliott, rewrite explaining the circled section clearly. Save this paper." Mrs. Stone asked him to do the rewrite of the confusing section first and then return for another conference. The field notes describing this interaction record the fact that following Mrs. Stone's instructions, "Elliott gritted his teeth. Once back at his chair he slumped" (Field notes 10/22/84).

Back at his desk, the first thing Elliott did was to mark off with parentheses the entire section about seeing the Pink Panther on TV and in movies. He then added two sentences to his original draft in the skipped lines of this section. These sentences read: "Where they show a little of him in the beginning but not in the movie. So the movie is named after him but not about him." As he wrote this, he inserted arrows to indicate that the text did not read from line to line, but skipped down a line (with the old text interspersed with the newly composed lines). He spent approximately 15 minutes working on these lines, erasing and rewriting. He also circled the description of the pink panther's activities in the circus and separated off with parentheses the final sentences "I really liked the circus alot. It was amazing." It appears that these marks were made in preparation for rewriting and resequencing this information in his next draft.

Following this first writing and conferencing period, Mrs. Stone led another whole-group discussion based on her impressions of the students' writing that she had seen. She made a specific point of urging everyone to begin their composition by telling when they saw the circus and which circus it was. In response to this, Elliott added a line between his title and his opening sentence to say, "Our class went to see the Barnum and Baily Circus."

The next day, Elliott wrote his second draft, again as a single paragraph,

spending the bulk of his time working on the section about the Pink Panther in the movies. His completed draft read as follows:

Elliot Brown Oct. 23, 1984

The Pink Panther Act

On October 19, 1984 Our classroom went to see the Barnum and Baily Circus it was lots of fun! I liked the Pink Panther Act very much, he was my favorite character. The best part I think is when he is on a three wheeler and two men are chasing him on dirt bikes. and they are chasing him all around the areana. I've seen the Pink Panther on T.V. cartoons, and movies where it is not about him but the movie is named after him. But where they show a little of him in the beginning but not in the movie. I really liked the Circus alot. it was amazing.

Note that in this second draft, Elliott has added an introductory section and has indeed clarified his ideas about the Pink Panther's minor role in the movies. However, gone is the reference to Inspector Clouseau and, along with it, the subtle connection between the Pink Panther being chased in the circus and being chased by Inspector Clouseau in the movies. The writing conference, of course, did not focus on the connection. Rather, the issue discussed was Mrs. Stone's confusion over Elliott's sentence "I've seen him on T.V., cartoons and movies, where he is not on."

While the subtle "chase" connection between the character in the circus and in the movies was never explicitly stated in Elliott's first draft (in one case the verb "chase" appeared, in the other the verb "catch" was used), the kernel was there. It appears that neither the researcher nor the teacher noticed the implicit link when reading his first draft. In any case, neither tried to help Elliott clarify it or explain the point of such a link.

In Elliott's second draft, the information about the Pink Panther in the movies is accurate and reasonably clear to someone familiar with the Pink Panther films. However, it is not explicitly related to the circus. During Elliott's second conference with Mrs. Stone, she suggested that he take out the entire section beginning, "and movies where...," explaining that it takes him too far afield from the circus. She made a large red "X" through the entire movie section and replaced it with the

words "and in the movies," so that the only sentence remaining read, "I've seen the Pink Panther on T.V. cartoons, and in the movies."

Aside from Mrs. Stone's "X", this draft had few red marks, and no written instructions other than the word "indent" at the beginning of the first paragraph. Mrs. Stone corrected the spelling of "Bailey" and "arena" and broke one "and"-conjoined sentence into two independent clauses.

After copying this second draft (with Mrs. Stone's corrections) over as a final draft, Elliott entered his piece on the computer. He picked as his keywords (used in the QUILL program to identify pieces on a disk) the words "Three Wheeler". The computer printout was edited by Mrs. Stone, for typographical errors (there were two) and Elliott made corrections using the computer's electronic text editing ommands. The final printout read as follows:

The Pink Panther Act

On October 19, 1984, our classroom went to see the Barnum and Bailey Circus. It was lots of fun. I liked the Pink Panther Act very much, he was my favorite character. The best part I think is when the Pink Panther is on a three wheeler and two men are chasing him on dirt bikes. They are chasing him all around the arena. I've seen the Pink Panther on T.V. cartoons, and in the movies. I really liked the Circus alot. It was amazing.

Elliott Brown

Keywords: /Three Wheeler/

Compared to his first draft, Elliott's final draft contained fewer mechanical errors (though some oddities remained, such as the "classroom" going to the circus). Structurally, the piece fit the teacher's schema; it was short and concise, with temporal grounding in the beginning, detail about one act in the middle, and evaluative statements at the end. Structurally, in fact, it bore a striking resemblance to the rest of his classmates' pieces, in spite of the fact that they wrote about different circus acts. On any kind of holistic or primary trait scoring scheme, it would no doubt receive a higher score than his first draft.

However, all of Elliott's knowledge about the Pink Panther's unusual role in

the movies, Inspector Clouseau, and so forth was gone. The subtle but elegant parallel between the Pink Panther being chased in the circus and in the movies had been edited out. Moreover, the parallelism between the Pink Panther's unusual status in the movies (appearing only at the beginning, in cartoon form) and the Pink Panther's unusual status in the circus was never explicitly alluded to, though it might have been. For example, the Pink Panther character in the circus was not himself an "act" like the trapeze artists or the horses, but rather appeared at the beginning (as in the movies) and then again at infrequent intervals. He was not a real animal, in a circus of real animals doing human-like stunts, but a man dressed up as an animal (analogous to a cartoon character in a movie about real people). Finally, he served as the theme of the circus but was not really "in it" (just as the Pink Panther is the theme and namesake of the movie but not really "in it").

The kernels of all these ideas appeared in some form in Elliott's first draft (though this is not to say that Elliott himself was aware of the parallels). Only someone with firsthand knowledge of the movies, who in addition saw some of these connections in Elliott's very unclear first draft, could have helped him develop and clarify them. But most importantly, only if the system at all levels supports the valuing of complex ideas over simplicity of form would Elliott be encouraged to say *more* about his knowledge of the movies and link this knowledge to his description of the circus. Mrs. Stone did give him a second chance to clarify his ideas about the movie character, but focused his attention only on one point of confusion (the fact that the Pink Panther is "in it" but "not in it"). By the second draft, some of the potential parallels, such as the "chase" connection, had already been edited out.

In an interview about Elliott's piece, Mrs. Stone said she saw the information about the movies as "off the topic of the assignment," and therefore felt that it was better left out. She did not see it as playing an integral role in explaining Elliott's appreciation of the Pink Panther in the circus, or as leading to interesting parallels. Even once these potential connections were pointed out, she felt that it was not really sticking to the assignment she gave--to tell about one act in the circus. Only after much discussion did she reconsider her position and remark that there might have been a way for Elliott to bring in this information and still have it be about the circus.

But even a less constraining assignment or less concern with "sticking to the topic" might not have fundamentally altered Mrs. Stone's response to Elliott's first draft. On the spot, it was hard to see the connections to begin with and thus it was hard to help him build on them. An alternative would have been to encourage him

simply to talk and write more about his ideas about the Pink Panther and the movies; if that had happened, Mrs. Stone might have had more rather than less to go on in the second draft.

When a member of the research team interviewed Elliott about his composition and in particular about the section he finally removed altogether, he had several interesting points to make. First of all, Elliott indicated that the section about the Pink Panther in the movie was important to him because the Pink Panther was his "favorite character." He talked animatedly about how he used to draw him in the fourth grade and had seen all the Pink Panther movies. He added proudly that "It was probably showing that I knew more about the Pink Panther than everybody thought."

Second, Elliott indicated that he was "writing a lot about Inspector Clouseau but it was really about the Pink Panther." He explained that in order to really understand the Pink Panther, "you have to talk about Inspector Clouseau." Thus for Elliott, a description of the Pink Panther in the circus required information about the character itself, which, in turn, necessarily led to a discussion of the movie and Inspector Clouseau.

Third, when asked if he saw distinct parallels between the movie and the circus, he said he didn't. However, as soon as the researcher mentioned that the Pink Panther was often being chased, he said, "The best part I think is when the Pink Panther is on the three wheeler and two men are chasing him on dirt bikes. They're chasing him all around the arena. And it's just like Inspector Clouseau is--is like a bounty hunter trying to catch him." The researcher asked him if he had been thinking about that when he wrote his composition and he said, "Well, not really, but I know it now." Similarly, when other parallels were mentioned he immediately picked up on them and extended them. For example, when the researcher referred to the fact that the character appeared in cartoon form but wasn't featured in the movies, he added an additional parallel linking the Pink Panther cartoons (on Saturday morning TV) with the movie and circus. He said, "Like on the cartoon, Pinky and Panky [his sons in the cartoon], it's about Pinky and Panky and their friends but they hardly every show the Pink Panther, sort of like the movie too." Thus Elliott was ripe for seeing connections, once encouraged to explore them.

Finally, when asked if he liked his piece better *with or without* the section about Inspector Clouseau and the movies, he said, "The teacher knows best. Miss Stone said for me to take it out 'cause it wasn't, it was like changing the subject. She's the teacher so I have to listen to her." Then he added softly, "But I think it

would have made the story more interesting.

This one example highlights the complex interpretive demands on teachers who are called upon to read and respond quickly to student's texts while other students await their turn, and to appreciate the potential strengths in texts that are often full of mechanical, grammatical, and rhetorical obstacles to understanding. Another factor in teachers' reading and responding to student writing is their implicit of expectations for how a good composition ought to be organized and developed. These implicit, unstated expectations often make it hard for the teacher to see connections and thematic development embedded in a text using an alternative structure or rhetorical style.

In looking in detail at the way Mrs. Stone assigned the circus composition, shaped student writing, and evaluated it in light of her implicit schema, our first inclination might be to find fault with the teacher and her way of interpreting and implementing a "process" writing approach. However, once one looks at aspects of the larger writing system, it is clear that there was a great deal of reasonableness in Mrs. Stone's decisions. Recall that in this district there was a city-wide holistically-scored writing test (given at the end of the year), on which a simple text that conforms to the teacher's schema will be given a higher score than a complexly organized one. A second important constraint on Mrs. Stone was the staff developer's so-called "process writing" program which calls for a fixed routine (draft, revise, publish) in the production of every piece. This set of procedural steps may well have pressured teachers to focus on getting a polished product rather than experimenting with ideas and ways of communicating them. Finally, the students in this class brought to assigned writing tasks well established expectations that the teacher "knows the answers" and will direct student performance.

To the extent that the teacher's goals are functional, they are likely to be resistant to change. Similarly, to the extent that student's communicative intentions and perhaps competing schemata are reasonable, they, too, are likely to be resistant to change. The value of this kind of study is that it looks closely at actual occasions of writing instruction and text development but interprets these encounters in light of larger institutional and socio-cultural factors. This kind of case-study approach does not tell us what general changes in writing activities or in teacher response are called for. But it does help us make sense out of both the teacher's and student's participation on this particular occasion, in light of general patterns, practices, and expectations in this classroom. And while not providing

answers to questions about how writing instruction should be improved, it highlights the complexity of interacting, often contradictory, forces in classrooms that constrain or transform innovative practices and the use of new technology.

Conflicting Purposes

An activity may have several associated purposes depending upon one's perspective and what one establishes as a criterion for deciding what the purpose is. Consider the following example:

> Ortcutt is standing with a suitcase in front of a counter at the airport beneath a sign that says, "Check baggage here". Ralph, an observer, might well infer that Ortcutt's purpose at the time is to check his baggage, since that is the stated function. Another observer, Willard, might interpret Ortcutt's actions differently, as say, "waiting for a friend." Ortcutt himself, might, of course, have yet another purpose for his actions.

In a classroom writing system, similar differences among the purposes of the participants can result in difficulties for teaching and learning. For any classroom writing activity, there is a stated purpose, e.g., write a letter to a relative or friend thanking them for a gift or favor they gave you. At the same time the teacher may have a school purpose that bears little direct relation to the stated purpose, e.g., assess the student's ability to write complete, grammatical sentences. The student, in turn, will interpret the task in his or her own way, adopting a purpose that may or may not mesh well with either the stated or the school purpose. This can lead to the production of puzzling texts and confusions for both student and teacher. Consider the following example:

> "THE NUTCRACKER"
>
> The mother told Fritz and Clara to go an pick some fruits. Then there father came home. Than he said where's the kids? They went to pick some fruits. Why did you let them go out there? There is a mun old witch out there we got to go and find them come on. So they went to look for Clara and Fritz. So when Clara and Fritz were looking for fruits Clara said I'm frightened. Then Fritz said don't be frightened lets sing

that and you'll be much better? So they where singing it. Then the next morning they saw a candy house and they picked some. After a witch came out and said come in and I'll cook use some candy? So they went in because they were hungry. Then the witch said do you want ginger bread cookes. And they said yes? So she got Fritz and put him in a cage and Fritz told Clara to get help? So Clara tried to get out of the house. But the witch locked the door. Then the witch tried to put Clara into the oven. So Clara pushed the wtich in and got Fritz out the cage. When there mother and father came they went home.

The piece of text above was written by a sixth-grade boy named Fred. It purports to be a review of the school Christmas play The Nutcracker, but describes a story remarkably similar to "Hansel and Gretel." Although it meets some of the formal characteristics of a review, one is tempted to say that this "review" is not a review of The Nutcracker at all. Nor, in an important sense, is it a review of "Hansel and Gretel" either. Reading the text raises a number of questions: Why would Fred write such a review? What led Fred to see this as a sensible kind of writing? What is Fred learning about the uses and purposes for writing?

We believe that an analysis of the classroom writing system is the key to answering these questions. This analysis suggests that the attention now being paid in many schools to such things as writing conferences, publishing, revision, writing in varied genres, brainstorming, and planning, in some cases actually encourages dysfunctional writing. If the task itself poses inherent rhetorical conflicts (such as "write a review of a play we have all seen and have no opportunity to see again"), then the process itself will reflect those conflicts. Thus, the very attempts to move beyond grammar-oriented language teaching may have negative outcomes for student writing, and worse, for what students are learning.

In the case of this review, Fred had been absent on the day the class attended the school Christmas play, but he had attended the school play the previous year which had been a production of Hansel and Gretel. He was, however, present when Mrs. Fontini led a class discussion about writing a review of the Nutcracker. It began as follows:

T: Remember the play...?

Kids: Yeah, the Nutcracker! (all together).

T: Oh, good, you do remember. Who [remembers] what that story was about?

[Kids shout]

T: Don't start yelling...just raise your hand. Tell me something that you remember from that story about the nutcracker? Duncan.

D: It was...a girl got a Nutcracker for Christmas.
T: O.K.

D: ...and they turned into a soldier

T: The nutcracker

D: ...turned into a prince.

T: came alive. The nutcracker was really like a wooden soldier and if you opened his mouth, what could you put in?

Kids: A nut!

T: A nut. And then (...) so it was like a magic nutcracker, (and it) came alive...What else happened?

The discussion continued with Mrs. Fontini drawing out aspects of the play: fighting with swords, using magic, the elves, the mouse king, the big Christmas party, the toys coming alive, and so on. She used pictures to help the students recall these features. She concluded this idea generation phase of the discussion as follows:

T: OK. I think that's pretty much basically what happened. I don't know if there's anymore...

She then shifted to a focus on evaluation:

T: Because you were the audience, you have the opportunity to decide

whether you enjoyed the play...how many enjoyed it?

[?]: I did.

T: How many didn't like it at all?

[?]: Yeah sure, put that hand down. You liked it... you were smiling and everything...you liked it.

T: At any rate, I think we all enjoyed some parts of it, and maybe some of us enjoyed more parts than others, but surely there's something about it that you might have liked.

Presumably to establish a model for a review, Mrs. Fontini then read from a music review published in the city's newspaper:

T: This reporter who went to see Ozzie Osborne at the Town Center wrote a review of the show. And Ernie Welch, says here "Ernie Waters, special to the News; he went to see Ozzie Osborne, and this is what he said about it. Did he like the show or he didn't like the show, we'll find out. He says, "Well it wasn't the 'Police' or anything resembling the 'Police', 'Men at Work' or anything else; but for the first time in more than 13 months, rock and roll raised the rafters and got the music of Ozzie Osborne, the highest priest of heavy metal." That's his opening paragraph. So in that paragraph, all he did was let you know who he is reviewing. So who is he reviewing?

Kids: Ozzie Osborne!

T: He said it wasn't the Police, but it was Ozzie Osborne.

Following a guided reading of the published review, Mrs. Fontini linked that review to her next writing assignment:

T: When the people go to see these shows, they go to this one to see Ozzie Osborne, they might go to see an orchestra, or the Ridgeport Symphony, or

they might go to see a play like "Cats"...

Kid: Michael Jackson!...

T: Michael Jackson. Then they come back to the newspaper, they sit down at their computer, and they write these stories. Now, this is a special kind of story, it's called writing a review...on...

Kid: Ozzie Osborne...

[?]: I can't remember that story...

T: Well, this review was on Ozzie Osborne, but...you didn't see Ozzie.

Kid: I did.

T: How do you say excuse me?

[?]: [.....?.....]

T: The play that you saw...was a while back, now. We're going to see if you can give it your best shot and give us a review of what you think the play was like. Was it a good play? Did you enjoy it? What kind of things could you mention?

And a minute or so later:

T: Well, if you were reviewing the Nutcracker, the play, if you were going to write a story to the Times, that Russell Heights School had a Christmas play called...

Kids: The Nutcracker!

T: The Nutcracker. How do I spell that?

[Kid]: n...u...

T: Capital N....

Kids: N...u...t...c...r...a...c...k...e...r.

Kid: The Nutcracker!

T: You have to pretend that you're a reviewer who will be putting this into a [...] in the newspaper, so that they could read...

[?]: Russell Heights could read it...

T: Yes, (Joey?)

[Kid]: What will I have to put on [?]?

T: I want you to think of whatever you have to say about the Nutcracker. Think about whether you liked it or not, think about if there was a special part that you wanted to mention, that you liked the best. Or maybe a special costume that the audience really liked, or maybe one of the characters that really was a good part. Who were the better actors?

[Kids] --??--

She then led a brief discussion on the elements of The Nutcracker, writing key words on the blackboard. Finally, she made the writing assignment explicit:

T: Now this is a writing assignment. It has to be done, first three steps: The idea, the brainstorming, are done, we have to do our first draft. What do you do with a first draft?

[Kid]: Write a letter...

[Kid]: Skip lines...

T: Ivette?

[I]: Use yellow paper.

T: You have to use yellow paper. And you have to skip lines. Before I give you your yellow lined paper, I want you to make a list of four things that you're going to say in your review. Think about what we were talking about. Think about the part you liked the best
or the person or the actor that you liked the best, or maybe a costume that you liked. Think of four things, and those four things that you write on this list will be what you talk about on your first draft. And let me tell you something, you have to write fast, because...you only need it on yellow paper today [asking researcher]?

R: Yes.

T: After the yellow line, I'm going to have you sit next to someone and try to go over and do the revising and improving. And what we're going to try...I don't know...

One student immediately questioned the process:

[Kid]: Why don't we just write the letter? Instead of doing...

The discussion continued, though with Mrs. Fontini insisting on following the steps of the Ridgeport writing plan.

It is in this context that Fred wrote his text. Having missed the performance in question, Fred might logically have said that he couldn't write a review. But the writing assignment before him was not simply to write a review of The Nutcracker. That was the stated purpose, but Mrs. Fontini had made it clear by her insistence on the staged writing process that this was a school activity; writing a review was not the primary goal. Fred actually took a somewhat sensible course. He followed the process as outlined by Mrs. Fontini. He used the key words she had written on the board. And, he drew on the most relevant experiential knowledge he had--the school play he had seen last year.

The result, of course, is a text that makes little sense with respect to the stated purpose. It is not a review of "Hansel and Gretel" or of The Nutcracker. This is not only because there is no evaluation of the performance, but more importantly, there is no audience for a review. Mrs. Fontini is reading it as a school writing

assignment, not to determine whether she should go see the play. Students at Russell Heights did not get to read the text, and even if they had, it was about a play they had all seen and would not have a chance to see again. Readers of the Ridgeport News never even saw this pretended review.

With regard to the school purpose, the text may be marginally appropriate. But in violating fundamental conventions about audience and purpose, it is unclear just what is being taught. In evaluating written expression, one must consider issues such as genre-appropriate style. Like music, good writing requires a pleasing design, in particular, the effective use of formal devices. But, more than any other art form, writing must attend to content as well as form. What is being said is as important as how it is said. Moreover, there is a third aspect of writing that must be considered, namely its purpose. It is crucial to know why one is writing, with attention to related issues such as the social situation, the audience, and the discourse context.

In recent years there has been a renewed emphasis on writing in general, accompanied by a marked shift in both research on writing and in the teaching of writing from issues of form alone towards a focus on content. Thus, we see more attention being paid to whole texts, to writing in varied genres, and to relating writing to its purposes. To the extent that students experience new forms of language and have the opportunity to develop new skills, these developments undoubtedly have beneficial effects. But in many cases, the well-intentioned attempts to improve writing instruction may founder because writing activities were conceived with little consideration of the context in which they would be carried out. We found a number of other instances in which stated functions of activities began to diverge from the functions the activities really serve for the participants involved.

One example occurred in Classroom B. In May, the students had taken a field trip to Perry Lake. Following the trip, Mrs. Stone asked the students to write articles for a class newspaper about their trip. Two of these are shown below:

Perry Lake

On May 3, 1984 our teacher Mrs. Stone. took the whole class on a field trip to Perry Lake. Mrs. C. a Graduate Student, and a good friend of Mrs. Stone's also can along with us. Mrs. Black wasn't there that day, so Mr. Mark Schwartz was substituting for her. Mrs. Brown our regular Science teacher wasn't with us, because she was home with her newly

born baby. We learned about ant holes, earthworms, barks on trees, and things about nature.

By Billy Morris

"Perry Lake"

On May 3, Mrs. Stone took us on a field trip to Perry Lake. Our science teacher for that day was Mark Schwartz. The weather was cold. We were outdoors more than we were indoors. We discovered how to make fire with a magnifying glass. A magnifying glass is also used to see things close up. We learned the different names of trees, and how to tell their age. We saw a dinner table for the animals, and ant hills. We collected earthworms and ants. Even though it was cold it was fun!

By Maria Ricci

These articles and two others on the field trip were subsequently published in the classroom 304 Times, an eight page newspaper. Of the 16 articles in the newspaper, 4 were on the same trip to Perry Lake. As a compendium of the writing students had done, the 304 Times was a useful document. But its status as a newspaper in the conventional sense is less clear.

A newspaper invariably has only one article conveying a single message. When there are multiple articles on a single topic, each one explicitly addresses a different aspect, as for example, the news report of an earthquake, the geological analysis, the economic cost description, the human interest side, etc. In contrast, these four articles covered similar aspects of the same topic from similar perspectives. Thus readers of the 304 Times, (including the students in Classroom B) could get an odd view of the function of a newspaper. A crucial question, which we are unable to answer at this time, is what function they each saw their writing performing. Was it simply to satisfy a school assignment? In what ways did they see the newspaper as being like a commercial paper? How did they see the function of their own article in relation to the others?

It is interesting to note that three of the articles situated the report by giving a date, May 3; two included the year, 1984. One article, shown below, assumed both the date and the fact that the trip was a "field trip" to be shared knowledge:

Perry Lake

When I went to Perry Lake I had a lot of fun. We saw and learned about trees, insects, birds, and erosion. I think I liked learning about trees the most, because we learned that animals use fallen trees as dinner tables, also that insects use them as homes. If you turn the tree over you will find a lot of unusual looking insects underneath. That's why I liked learning about trees. I had a very good time, and I learned a lot at the same time. I was glad to be there and I hope Mr. Segal was glad to have me there for the day.

by Sophia Dalia

Of the four articles, the one shown above was the only one written in first person singular. (Note that the plural is more newspaper-like, unless one is writing a personally signed column. Standard newspaper style would, of course, call for third person writing)

Similar differences between classroom and standard newspaper writing can be seen in the sports articles. In one, the student, wrote from a personal perspective:

Baseball Highlights

My baseball team is Gallager's and we are 1 in 1. We won one game and lost one game. Our next game is against Lorraines. I'm pitching or playing third base. If we win that game we will have two wins and one loss but if we lose we will have one win and two losses. So I hope we win that game Wednesday.

By Charles Stilson

Note that he assumes the reader needs no setting other than the name of his team. This is in contrast to another student's article:

Commentary

Derans Baseball Team

Derans, a baseball team in Ridgeport, is not doing very well this year. They are 0 and 4 and still looking for their first win. Their first win will probably come Wednesday night against Lorraines. The other night Derans lost a game against Gallager Roofing 4 to 0, because of mental mistakes. Derans would be a awesome team if their mental

mistakes were corrected. Their batting and pitching is good, but their fielding needs some improvement.

by Richie Pence

Here, the article not only names the team, but also gives its location. It does assume, however, that the reader knows the general time and that the topic is a little league team. This second sports article is also more newspaper-like in that it maintains the third person perspective.

It is not easy to say that one of these articles is better than the other on the important dimension of meeting the purpose, because the purpose is conflicted. How one identifies the setting for a story can be vital to the success of the writing, but that determination can only be made in reference to some imagined audience and some purpose. Since the 304 Times falls into a genre somewhere between the cumulative writing-folder and a real newspaper, it invokes schemata pertinent to each, but without much credibility. The result is that the task for the student is either much more difficult, or cannot sensibly demand attention to purpose and audience.

Implications

A writing systems approach has a set of interrelated implications for teaching, evaluation, teacher education, and equity in schooling. These implications are interrelated because they call for the same basic shift in perspective for each of these domains, namely, a shift from a focus on the application of methods, no matter how excellent, to a focus on critical evaluation of the learning process.

Critical evaluation is best understood with reference to the methodology and results discussed above. A high level gloss is this: Programmatic approaches to teaching are at best limited in their effects because they do not have the power to reorganize an existing writing system. In fact, the innovation is itself reorganized to match the characteristics of the writing system. Thus, a single innovation is realized in many different ways in different contexts. (Use of the QUILL MAILBAG program becomes another way to write book reports for the teacher in Classroom A; in Classroom B it becomes an environment for personal mail among students. Boys and girls in Classroom B both write personal mail, but even they are not engaging in the same activity -- boys write to arrange after school meetings; girls write to discuss relationships.) The phenomenon of divergent realizations means that a

single, apparently straightforward innovation is in fact the seed for a complex array of changes in different writing systems.

Given this analysis, it becomes clear that no innovation, no matter how well conceived, and no application of innovations, no matter how well intended and executed, can in and of themselves be assured of achieving positive change in instruction. Instead, one must continually reexamine what is happening and ask critical questions: What is the innovation we are using? What are the different ways that students are engaged in learning? What is the effect of my actions on students' learning? What should be the goals of instruction, of each activity? And so on.

It should also be clear that the writing systems approach will not itself provide a method for critical analysis, instruction, evaluation, or teacher education. Rather, it can only suggest a path for learning, in which the learning must be an activity for teachers, researchers, curriculum developers, and administrators. In each of the sections to follow, we sketch how the adoption of critical analysis as a goal might assist the educational enterprise.

Equity

One of our primary concerns in looking at open-ended, tool-oriented software like QUILL and for studying urban, multi-ethnic classroom settings has to do with issues of educational equity. Computers can in principle be used to make educational resources more equitably distributed (e.g., through network access to data bases and LIBRARY resources), to facilitate more active student involvement in and control of learning (e.g., through the use of computer tools such as text editors and programming languages), and partially to address the needs of students who are victims of educational neglect.

Unfortunately, the progressive potential of the computer is all too often unrealized. As is so often the case with new technologies, computer use is more apt to reinforce existing patterns than to change them. In many ways the introduction of computers appears to maintain or even increase existing inequalities in education, inequalities which predated the availability of computers. While these inequalities were not caused by computers, they may well be reproduced and even accentuated by their use.

Our approach to the study of computers in classrooms (using the writing system construct) suggests that we must pay attention to both institutional factors,

such as the availability of hardware and software, and classroom-specific factors, such as how students get a turn and how the computer is actually used. Here, we focus more attention on the second area because it is more apt to be overlooked in discussions of equity in computer use, and because the process by which inequalities are produced is more subtle.

We know from studies of student-teacher interaction that students within any single classroom receive differential treatment from the teacher. Considered positively, this differential treatment is called "individual instruction." Considered negatively, it is a source of discrimination and self-fulfilling prophecies. Computers are very different from teachers in one way, and like them in another. The difference--often mentioned by advocates of computer instruction for minority children--is that computers don't see the color of children's skin or hear their non-standard speech. Teachers form expectations on the basis of unconscious reactions to cues such as these; computers to not. That is an important difference.

But the similarity is that a computer, like a teacher, is a scarce resource, and in the allocation of this resource within a single classroom, the gap between the haves and the have-nots can be widened. In this study, we saw teachers integrate the computer very differently into their writing programs. These observations have led us to raise some general questions about the relationship between computer use within a classroom and students' access to computer time and expertise.

If the computer is used in the final stage of writing to produce a neat, typewritten copy (rather than as a text-editing tool), the speed with which a student writes a first, hand-written draft often determines his or her number in line to enter text on the computer. Students who start out writing better and quicker often are rewarded by a prompt turn, which allows for a prompt (and probably more meaningful) connection between what they wrote on paper and what they entered into the computer.

If access to the computer is strictly controlled by the teacher (so that students have scheduled times or have to have their writing checked by the teacher before writing on the computer), then absenteeism is likely to influence how much time a student has on the computer. Students who are absent often (for whatever reason) are more likely to miss their turns or be denied their turns while making up other assignments. This is often the case with students who are pulled out of the classroom for special tutoring (such as students with diagnosed learning disabilities or Title I status). Thus students who have the most to gain from time on the computer are often kept off because of institutionalized absenteeism (known as

"pull-out" programs). Alternatively, some teachers have found that by making use of innovative approaches such as peer tutoring, students do not necessarily fall behind just because they miss a lesson.

Another kind of access to the computer comes through students' knowledge of text-editing commands used for inserting, deleting, and rearranging text. Different teachers have different strategies for teaching their students text-editing skills. If a teacher becomes fully versed in the commands, group and individualized instruction are possible, so that the entire class can be given basic information, and advanced instruction can be provided to those students who seem "ready" for it. If a teacher does not become proficient with the commands, access to necessary skills becomes more problematic for many students.

As mentioned earlier, in year I of our study, one of the teachers in our study did not fully master the text-editing commands. Instead, she selected one student--a boy who seemed interested in and facile with the computer--to become the classroom "expert," and then directed the other students to consult him with questions about computer commands. By the end of the school year, only this student had mastered all the basic text-editing commands and fully understood the mode orientation of the text editor. Two other students, both of whom were close friends of the student-expert, knew a few commands.

In this classroom, voluntary grouping at the computer was allowed when students had free time. As a rule, groupings at the computer divided along sex lines (as did groupings in the lunchroom and on the playground). Not surprisingly, the student-expert's knowledge of text-editing commands diffused narrowly in this classroom and did not cross sex lines. Not a single girl in the class learned how to insert or delete text. Thus, how information about the computer is made available to students (via wall charts, formal instruction by the teacher, or informal teaching by a student expert) and how information is passed from student to student (through voluntary grouping or assigned pair work) limits or enlarges students' command over the technology.

Many children are effectively denied access to new educational technologies because they live in the wrong school district. Others are able to use computers, but only in the most limited ways. Our classroom study suggests that in addition to these inequalities in educational access, the same computer with the same software may be used very differently by different teachers, even in the same school and with the same student population. For this reason, if we are concerned about equity of computer distribution and use, we must have ways to evaluate the actual usage in

real classrooms. Before asking what impact a computer with a particular kind of software will have on student learning, and whether it is good or not, we must ask what impact the classroom (and in particular, the teacher) will have on the way the computer is used. How will students get a turn? How is computer related information made available to students? These classroom specific factors, overlaid on system-wide factors such as computer and software availability, ultimately determine a student's access (or lack of access) to computer related learning opportunities. We need to think hard about issues of gender and ability sub-groupings in a classroom and how the writing system reduces or increases differential access to particular kinds of writing experience or instruction. Teachers need information and support in order to be self-conscious about and able to critique their own efforts to increase equity in their classrooms.

Writing Instruction

Studies of writing instruction could produce implications of this sort: "Conducting writing conferences with middle grades students is an effective way to help them develop better expository writing skills." Or, "a study of rhetorical devices that integrates an understanding of their use in texts students read with practice in applying them in their own writing will improve both writing and reasoning abilities." Or, "journal and dialogue writing are good ways to get young students started with writing." This study will not do so, not because such results have no value, for indeed they do. But results such as these, which lead to programmatic implications, are necessarily limited by the proviso: "If you do as we did and your context is the same, you should achieve similar effects." What we have seen, though, is that contexts are never the same and that apparently similar educational activities may have vastly different realizations and unexpectedly diverse impacts on students. Thus, we are led to a different category of implication. In addition to work on developing better teaching procedures or even a better theory about learning, we need to develop better methods for critical analysis of instruction. We observed a variety of teaching methods, including writing conferences, publishing, microcomputer use, emphasis on revision, electronic mail, and found that the method was not the total answer. What was needed in addition was a serious questioning of each method, its application, and its effect on students' learning.

To take one example, consider the role of implicit schemata in writing conferences. We found that teachers were invoking their own implicit

expectations of what an ideal piece of writing should be in their interactions with students. This resulted in texts being shaped to fit the teacher's mold as much as the student's original intentions. One is tempted to say either that the teachers were wrong -- a writing conference should be a place to help a student build on his/her own writing, not to rewrite for him/her, or to say that teaching a schema is right, that is the role of a teacher.

We would argue that either conclusion is premature. Instead, these observations highlight a host of questions that have been scantily addressed. Some pertain to the teacher's role: If one is teaching a schema, should it be made explicit? Should it be presented in different ways to students who "have" the schema to different extents? Should it be presented through reading or writing first? How should the use of the schema be motivated? Other questions pertain to the schema itself: What is a good schema for a particular piece of writing? Is a schema a structural outline, or is it a set of questions one should ask about the audience and the satisfaction of a purpose? Are there general schemata, or does each writer need to create a new schema for each individual writing task? Other questions relate to the community and students' prior experiences: Do different students come to the writing task with different schemata? Can useful writing instruction grow out of non-standard schemata? Can the critical analysis of differing schemata by students be a way to develop writing and reasoning abilities?

This list of questions is clearly incomplete. What it suggests, though is that participants in a writing system need to become more aware of their own roles, beliefs, values, and expectations within that system. They need to view the learning process not as a procedure to be instantiated with a particular learner, task, and content, but as a process of discovery.

In addition, this kind of study raises a number of more general questions. How do we distinguish the positive vs. the negative aspects of guidance in teaching writing (or anything for that matter)? How do we distinguish between guidance that develops a student's own ideas or knowledge, and guidance that merely imposes the teacher's preconceived ideas and goals on the student? Additionally, this kind of analysis raises the issue of differential treatment of students relating to the conformity or nonconformity of student texts to teachers' expectations and what impact this might have on students' developing skills, or developing senses of self as a writer.

As educational researchers, it is not responsible simply to revel in the creativity and competence of students' initial attempts. The role of teachers is precisely to develop, and hence alter, the thinking and the end products of their

students. There is thus nothing inherently wrong with the fact that a teacher has a "schema" that she is trying to impose on the students. It can be thought of as an attempt to teach students to organize their thoughts, observations, and experiences in a particular way, using an analytic structure (such as background, analytic detail, conclusion) which they will certainly be called on to invoke in their high school and college essays. Moreover, a framework can also allow for and encourage individual expression. The task for analysts is to investigate how a schema constrains or encourages creativity, and the actual process by which it is internalized over time by the student.

If this research is to have an impact on teachers' practice, we need to ask additional questions such as the following: How can a teacher impose a structure and build on a student's ideas without simply rewriting the composition and appropriating the student's voice? How to convey the characteristics of a schema (coherence, clarity, use of specifics, concern with relevance, a return to the general, etc.) without imposing overly simplistic rules of thumb, such as, "Don't start sentences with 'and' or 'but.'"

We also need to ask questions about the status of these schemata to begin with: Where do they come from, historically and with respect to the teachers' own educational and writing background? What purposes do these school schemata serve? Do they prepare students to be competent writers (in a broad sense) or to be competent students, able to pass the writing test or go on to the kind of writing required at the next grade level? What are the most appropriate schemata for all students to master? Should schemata be structural (as in "beginning, middle, and end") or more situational (focusing on audience and purpose)? Finally, how can teachers use this information about schemata to improve writing instruction?

Our analysis of writing assignments in two classrooms does not answer these important questions. The value of this work is primarily methodological. It argues for and illustrates an approach that brings together information about social organization and recurring writing practices in the classroom, teacher/student conferences, and the texts that are shaped by them. Such an approach gives us a way to talk about and document differential treatment and differential access to instructional help. Moreover, it allows us to do fine-grained micro-analysis of talk and written text but locate the analysis in the context of the classroom and larger school setting. This gives us the kind of multi-level information we need in order to raise and ultimately answer questions about the influences of teacher expectations, writing conferences, and schools as institutions on the outcome of

students' written products and literacy development.

Assessing Innovations: Situated Evaluation

"To innovate" means to introduce something new into an existing system. If the innovation is significant, it may trigger changes in the system, some of which are easily predictable and others of which may be surprising. People involved with the system naturally want to know what those changes will be and what they mean. The notion of change that is implied by an innovation thus calls for an assessment. We are led to questions such as: Did the innovation have the effects we expected or desired? What else changed? Or, was it worth the effort? In general, the answers to these questions are of more than academic interest. For some audiences, usually either the developers or the users of the innovation, the results of the evaluation suggest actions they should take. Thus, the familiar issues of purpose and audience become paramount in considering types of evaluation. In what follows, we argue that the standard approaches to evaluation respond to some important audiences and types of action decisions, but neglect a crucial category.

There are two major categories of assessment that are typically applied to educational innovations. Summative evaluation is perhaps the more widely understood type. With summative evaluation, researchers look at the impact of the innovation as a whole on learning. Through summative evaluation we provide information to a teacher, a principal, or a parent that helps them decide whether to adopt the innovation. The emphasis is on coming to a judgment about the innovation. Over time, judgments may lead to changes in the innovation or the manner of use, but the first priority is simply to assess what was accomplished. Summative evaluations frequently involve any of a wide range of quantitative methods, but they are not limited to these. Miles and Huberman (1984), for example, present a variety of qualitative methods for use in summative evaluation. These typically result in visual displays such as event-state networks, context charts, site-dynamics matrices, scatterplots, and causal networks.

Formative evaluation is a second widely used method for looking at innovations. Here, the audience is typically not the end user, but rather the parties involved in developing the innovation. Thus, the developers want to know how to improve the innovation on the basis of trial use. In formative evaluation, the emphasis is on observations, interviews, and surveys. The developers introduce the innovation into a suitable context, or a small number of such contexts. They then monitor its use to determine how different features work, with the goal being to

make appropriate modifications of the innovation. Formal statistical methods have limited usefulness in this endeavor. For example, suppose the developers observe that one student has difficulty deciphering a particular screen display. In the formative evaluation process this should be taken as a sign that the display should be scrutinized. Since the developers are still engaged in shaping the innovation, they cannot afford to ignore any indicators of how the innovation functions.

In practice, the distinction between summative and formative is not always crisp. Suppose, as is usually the case, that a summative evaluation identifies some strengths as well as some weaknesses of the innovation. While a potential user might simply weigh these strengths and weaknesses in order to decide whether to adopt the innovation, the developers could use the same results to guide a revision of the innovation. Thus, what for the user was a summative evaluation becomes simply a part of the formative evaluation cycle for the developer. In fact, formative evaluation can be viewed as a collection of micro-summative evaluations of portions of the innovation, with the aim of identifying the places where revision is most needed. In other situations, formative evaluation can yield summative type results. Data that was collected in order to guide revisions of the innovation can also be integrated for the purposes of a summative assessment.

Both summative and formative evaluation have wide ranging and important uses. However, they also each are strictly limited in the functions they serve. There is another type of evaluation that combines aspects of both formative and summative evaluation. We call this <u>situated evaluation</u> (Bruce, Rubin, & Barnhardt, in press), because of its emphasis on the unique characteristics of each context of use. With situated evaluation we look at the <u>realization</u> of the innovation in different social contexts. As for summative evaluation, the audience is ultimately the user. The action, however, is not to decide whether to adopt the innovation, but rather to see how to make it serve one's goals. A situated evaluation should enable a user to decide how certain aspects of the innovation can be matched with possible changes in the social context to make the best realization. Schematically we can view the three types of evaluation as follows:

<u>Evaluation Type</u>	<u>Audience</u>	<u>Action</u>
Formative	Developer	Improve the innovation
Summative	Us	Decide whether to adopt the innovation
Situated	User/Developer	Characterize how the innovation works

The studies reported here are examples of situated evaluation. We assume that the innovation (in this case, Quill) is not simply the software or even the set of objects and activities including the software, the teacher's guide, other materials, and workshops. Instead, the innovation exists in the application of these objects in the classroom context, in particular, in its role within the classroom writing system. The result of the study is then not a simple assessment of the innovation's effectiveness, but rather a characterization of what it becomes in particular classroom settings.

Studies such as this may ultimately provide for more useable information than standard evaluations provide because they describe what happens when the innovation is situated in representative contexts. There is a need for such analyses if we are to work towards realistic change in education.

Teacher Education

A writing systems approach has important implications for teacher education. We have argued that innovations (whether new technology or new pedagogical methods) will not in and of themselves reorganize teaching and learning. The goal of finding better methods or better software or better mechanisms for getting teachers to use them in "the right way" is for all of the reasons we have outlined above not the only or most productive course to follow. New ideas, new tools will be used differently by different teachers, depending on institutional, ideological, and classroom specific constraints -- in short the complex, interrelated forces within a writing system.

Teachers, we suggest, do not simply need more practical tips, technology, or even packaged theories of instruction and learning, though this is not to say that these are wholly unimportant. In addition, and more importantly, they need to become theory builders in their own right, able to critically evaluate their own goals, and the practices carried out in their own classrooms. They need to treat new curricula, methods, and tools as "hypotheses" to be tested out and evaluated in light of their own pedagogical goals, strengths as a teacher, and classroom constraints.

In order to become better teachers of writing, they need tools for thinking deeply about the kind of writers they want their students to become, the kinds of literacy required in different kind of social settings, to meet different kinds of communicative demands. Is their goal the development of creative writers, "school" writers (who will be prepared for the writing tests and next level of

schooling), or functional writers (prepared to enter a particular kind of work force)? Given particular goals, they need skills to analyze their own classroom writing system, to judge whether or not it supports their goals, and how it is perceived differently by different students. assessing their own writing system, teachers need to be able to assess broad scale patterns of social organization, the language patterns and interpretive strategies that their students bring with from home, and the situated cognitive outcomes of instruction. For this to happen, teachers need rigorous training to become practitioner/researchers in their own classrooms, "curriculum-proof" teachers, who can actively construct and adapt their own curricular ideas, analyze and critique curricular materials, and inform research and public policy on the basis of their own classroom teaching, observation, and research.

Such a course of study is currently the goal of a New England-based, school-university collaborative institute devoted to an interdisciplinary approach to literacy. The "Literacies Institute" integrates concerns for written language, spoken language, critical thinking, and the social, cultural, and institutional complexities of teaching and learning. Stressing the inherent plurality of literacy across social groups, social settings, and across the curriculum in schools, the Institute sees its mission as providing training in theories of literacy relevant to school practice, discourse studies, the study of home and school cultures, and social influences on cognitive development. The goal of the Institute is to increase the autonomy and professionalization of teachers as teachers of literate thinking, reading, writing, and speaking in a cross-cultural and curriculum-wide approach to literacy.

Conclusion

Over the past ten years, we have seen an increasing emphasis on process over product in writing instruction. We have seen this concern become institutionalized across the country as the "process approach" to writing (Graves, 1983; Murray, 1968; Freedman, 1985). A process approach builds into classroom writing activities various opportunities for the writer to talk, plan, write, rewrite, conference with peers and teacher, publish -- stressing the complexity of composing text as a communicative act, and the value of writing in and to a responsive community of fellow readers and writers. In the ideal, the teacher's role as primary responder

and evaluator is altered in favor of the writer having expanded control over the ideas, purpose, audience and the revision process. The product (until perhaps the publishing stage) is less important than the process by which it is shaped.

When we looked at the way a "process writing program" actually worked in our two classrooms, many of our initial assumptions about process/product distinctions were called into question. For example, what is often talked about as the "complex, non-linear" writing process, became in these classrooms a simplified, linear set of procedural steps. This was because there was a need for a recurring, familiar schedule for writing activities that would build in opportunities of various kinds of writing and response, in the midst of a school day fraught with multiple disruptions. To create continuity, a series of steps from brainstorming to sharing were devised to be carried out for every assigned piece of writing. The "steps" were marked off by the vocabulary used ("a brainstorming sun," "edits") and the color of paper used. First, there was brainstorming on unlined yellow paper. Then a first draft on lined yellow paper, skipping lines, followed by an individual writing conference with the teacher, final draft on white paper, single spaced. And so on. The procedure itself became something of a product; each step could be monitored and evaluated by the teacher. For example, after a particular writing conference, a student was told to make the changes the teacher had suggested and recopy her draft. The student asked, "On white?" [meaning, "as a final draft, on white paper"]. The teacher replied, "No, on yellow. It's still a yellow" [meaning it was still a "first draft" and there was a substantial amount of work to be done before it was completed].

At the same time, we found that the activities named by the different "steps" often reinforced a product orientation to writing. This was most striking in the case of writing conferences -- seen, by advocates of process writing instruction, as the heart of the process, whereby fine-tuned response from an interested reader orients the student to a concern with ideas and effective communication, and leads the student to internalize a strategic writer/reader dialogue. In contrast, we found that teacher/student conferences looked much like traditional teacher red penciling, oriented to correcting "mistakes" such as spelling, punctuation, or word choice -- but enacted through a face-to-face dialogue. Moreover, the familiar patterns of teacher-dominated interpretation and evaluation reappeared, with the teacher helping the student, through leading questions, clues, or straightforward text replacement, "get" the correction in the teacher's head. For example,

Teacher: (reading) THE [CIRCUS] PEOPLE, all right, instead of saying the people, what's another word that we can use?

C1: Acrobat?

Teacher: No, they-- we

C2: Actors?

Teacher (to C2): Am I talking to you? And you're giving him the wrong information. Out! Back! 'Kay? My office door's behind Mario's desk. (pause) All right, considering that we went to a performANCE, what would the people be called?

C1: Perf-- performers.

Teacher: OK, that's a much better word.

The computer, too, in spite of its potential for supporting process-oriented writing (by facilitating revision and planning, for example), in effect reinforced a concern with final products, not process, in both classrooms. Because QUILL generated neatly printed, published-looking hard copy, both teachers worked to polish their students' pieces before they were "OK'd" to be printed off the computer. Polishing often meant cleaning up the surface "mistakes," again orienting teachers and students to pay more attention to correctness than to effective communication.

Similarly, the district wide, holistically-scored writing test, given to all sixth graders at the end of the year, reinforced the teachers' concern with product over process. The test, designed to assess students' ability to construct a meaningful text, rather than to assess writing sub-skills, required students to write both a friendly letter and a short essay. Both teachers worked hard at, and succeeded in teaching their students the form of a friendly letter and to getting them to write short, well structured compositions that would prepare them to pass the test. But this kind of orientation to the test encouraged the teachers to focus on getting simple, polished products from their students.

A writing systems approach to these classrooms is critical in making sense out of these "surprises." The writing process approach (with 6 steps), teacher/student

conferences, the computer, the holistically-scored writing test, must all be understood in light of the writing system as a whole, each factor influencing and influenced by others. And as we have argued throughout, new technology, new activities, or new testing policies, in and of themselves, will not radically reorganize the learning environment. Moreover, the changes that do result will often not be in predictable or generalizable directions.

Moreover, each of these surprises calls into question the long standing "process" vs. "product" dichotomy. The counterintuitive findings here, the blurring of the lines between process and product in a writing conference, or in the push to publish a draft -- all suggest that we need to rethink the traditional distinction. In opposing the two, we fail to see that process and product are importantly and inextricably linked. There can never be one without the other. In dichotomizing, we tend to focus on one to the exclusion of the other, both in our theories and pedagogical movements. This is analogous to our tendency to oppose "form" and "content" (Inghilleri, in press) or "skills" and "content knowledge" (Hirsch, 1987). Instead we need to develop systematic ways of integrating a concern for process and product, form and content, meta-level skills and concrete information. We also need new ways of thinking about educational activity systems that promote integrated learning.

A classroom is a social system with its own rules, behavior norms, values, conflicts, and prevailing ideologies. Like other social systems, the classroom changes, but also resists change. A new element introduced into this social system may be rejected or assimilated into the classroom culture. It may also catalyze changes in the culture. These processes of change are complex and may occur over long period of time in many stages.

This study has been an effort to understand more about the change process in classrooms as social systems. We rejected early on the notion that we could derive a linear, invariant causal model of the form: "Innovation I produces Effects E." Instead we saw that the result of introducing an innovation was as much a function of the existing classroom culture as of the innovation itself. The computer, for example, became the dependent, not the independent variable.

In many instances, there was little resulting change. Writing assignments and patterns of interaction between students and teachers substantially reproduced, in new forms, the elements of the existing classroom culture. In other cases, there were changes, but not easily predictable ones. Throughout we saw that in order to understand the effects of the new technology, we needed to consider aspects of the classroom as a whole--the writing system that established the context

for all writing related activities.

The ultimate value of this study may not lie, though, in its contribution to understanding the effects of QUILL on children's writing development, nor in how interaction patterns in two sixth-grade classrooms define the types of learning that occur, but rather as a beginning effort towards establishing a methodology for addressing the complexities of classroom life and developing literacy. If, as our study suggests, one cannot successfully understand even a single piece of writing without seeing it in the light of the child's developing abilities, the purpose of the writing assignment, the teacher's explicit and implicit values, the social organization of the classroom, the district's testing program, and so on, then we need better frameworks for research. We see the writing system construct, or more broadly, the literacy system as such a conceptual tool for guiding and organizing research. The analyses presented here represent only initial and limited attempts to apply that tool to understanding schooling and learning.

References

Barnhardt, C. (1984, April). The QUILL microcomputer writing program in Alaska. In R.V. Dusseldorp (Ed.), Proceedings of the Third Annual Statewide Conference of Alaska Association for Computers in Education (pp. 1-10). Anchorage, Alaska: Alaska Association for Computers in Education.

Bateson, G. (1972). What is play? In Steps to an Ecology of Mind. San Francisco, CA:Chandler.

Bruce, B. C., Collins, A., Rubin, A. D., & Gentner, D. (1982). Three perspectives on writing. Educational Psychologist, 17, 131-145.

Bruce, B., Michaels, S., & Watson-Gegeo, K. (1985). How computers can change the writing process. Language Arts, 62, 143-149.

Bruce, B., & Rubin, A. (1984, September). The utilization of technology in the development of basic skills instruction: Written communications. (Final Report, Contract No. 300-81-00314). Washington, DC: U.S. Department of Education.

Bruce, B. C., Rubin, A. & Barnhardt, C. Electronic Quills. Hilldale, NJ: Erlbaum, in press.

Collins, A., & Gentner, D. (1980) A framework for a cognitive theory of writing. In L. W. Gregg & E. R. Steinberg (Eds.), Cognitive processes in writing. Hillsdale, NJ: Erlbaum.

Collins, A. (1983) Teaching reading and writing with personal computers. In J. Orasanu (Ed.), A decade of reading research: Implications for practice. Hillsdale, N.J.: Erlbaum.

Collins, A., Bruce, B. C., & Rubin, A. D. (1982) Microcomputer-based writing activities for the upper elementary grades. In Proceedings of the Fourth International Learning Technology Congress and Exposition. Warrenton, VA: Society for Applied Learning Technology.

Elbow, P. (1973). Writing without teachers. London: Oxford University Press.

Flower, L. (1981). (Problem-solving strategies for writing). New York: Harcourt Brace Jovanovich.

Flower, L.S. & Hayes, J.R. (1981). Problem solving and the cognitive process of writing. In C.H. Frederiksen and J.F. Dominic (Eds.), Writing: The nature, development and teaching of written communication (pp. 39-58). Hillsdale, NJ: Erlbaum.

Freedman, S. (Ed.) (1985). The Acquisition of Written Language: Response and Revision. Norwood, NJ:Ablex.

Freedman, S. & Sperling, M. (1985) Written language acquisition: The role of response and the writing conference. In S. Freedman (Ed.), The acquistion of written language: Response and revision (pp.106-130). Norwood, NJ:Ablex.

Graves, D., & Hansen, J. (1983). The author's chair. Language Arts, 60 (2), 176-183.

Graves, D. (1983). Writing: Teachers and children at work. Exeter, NH: Heinemann Educational Books.

Gumperz, J.J. (1982). Discourse Strategies. Cambridge, England:Cambridge University Press.

Hirsch, E.D. (1987). Cultural Literacy: What Every American Needs to Know. Boston:Houghton Mifflin.

Hymes, D. (1980) What is Ethnography? In D. Humes (Ed.) Language in Education: Ethnolinguistic Essays. Washington, DC: Center for Applied Linguistics.

Inghilleri, M. (in press) Learning to mean as a symbolic and social process: The story of two ESL writers. To appear in Discourse Processes.

Labov, W. (1972) The transformation of experience in narrative syntax. In W. Labov (Ed.) Language and the Inner City. Philadelphia, PA:University of Pennsylvania Press.

Levin, J.A. (1982) Microcomputers as interactive communication media: An interactive text interpreter. The Quarterly Newsletter of the Laboratory of Comparative Human Cognition, 4, 34-36.

Levin, J.A., Boruta, M.J., & Vasconcellos, M.T. (1982). Microcomputer-based environments for Writing: A Writer's Assistant. In A.C. Wilkinson (Ed.), Classroom Computers and Cognitive Science (pp. 219-232). New York: Academic Press.

Mehan, H. (1978). Structuring school structure. Harvard Educational Review. 48 (1) 32-64.

Mehan, H. (1985). Computers in classrooms: A quasi-experiment in guided change. Final Report, NIE Grant #6-83-0027. June, 1985.

Michaels, S. (1987). Text and context: A new approach to the study of classroom writing. Discourse Processes 10,321-346.

Miles, M.B. and Huberman, A.M. (1984). Qualitative Data Analysis: A Sourcebook of New Methods. Beverly Hills, CA: Sage Publications.

Mishler, E. (1986). The Discourse of Medicine: Dialectics of Medical Interviews. Norwood, NJ:Ablex.

Murray, D. M. (1968). A writer teaches writing. Boston: Houghton Mifflin.

Murray, D. (1979) The listening eye: Reflections on the writing conference. College English. 41, 13-18.

Newkirk, T., & Atwell, N. (1982) Understanding writing. Chelmsford, MA:The Northeast Regional Exchange.

Newman, D. (May 1984). Functional environments for microcomputers in education. Center for Children and Technology Technical Report No. 25. Bank Street College of Education.

Papert, S. (January-February 1987). Computer criticism vs. technocentric thinking. Educational Researcher, pp 22-30.

Piazza, C. L. (1986). Computer writing programs: Linking research with practice. The Florida State University

Rubin, A.D. (1982). The computer confronts language arts: Cans and shoulds for education. In A.C. Wilkinson (Ed.),(pp. 201-271). New York: Academic Press.

Rubin, A.D. & Bruce, B.C. (1985). QUILL: Reading and writing with a microcomputer. In B.A. Hutson (Ed.), Advances in reading and language research. Greenwich, CT: JAI Press.

Rubin, A.D., & Bruce, B.C. (1986). Learning with QUILL: Lessons for students, teachers and software designers. In T.E. Raphael (Ed.), Contexts of school based literacy.(pp. 217-230). New York: Random House.

Rubin, A. D., & Hansen, J. (1983). Reading and writing: How are the first two "R's" related? In J. Orasanu (Ed.), A decade of reading research: Implications for practice. Hillsdale, NJ:Erlbaum.

Scardamalia, M. (1981). How children cope with the cognitive demands of writing. In C.H. Frederiksen, & J.F. Dominic (Eds.). Writing: The nature, development and teaching of written communication (pp. 81-104), Hillsdale, NJ: Erlbaum.

Ulichny, P. and Watson-Gegeo, K. (in press). Interactions and authority: The dominant interpretive framework in writing conferences. To appear in Discourse Processes.

Appendix A
QUILL: Software Tools and Environments for Writing

QUILL (Bruce & Rubin, 1984; Rubin & Bruce, 1985, 1986) is a software system including tools and environments for writing. Its design is based on research in composition and encompasses the prewriting, composing, revising and publishing aspects of the writing process (Bruce, Collins, Rubin, & Gentner, 1982; Flower & Hayes, 1981; Graves, 1982; Newkirk & Atwell, 1982). To aid students in becoming more experienced writers, QUILL includes two tools for writing: PLANNER, which helps students plan and organize their pieces, and WRITER'S ASSISTANT (Levin, Boruta, & Vasconcellos, 1983), a text editor that facilitates the revision process by making the addition, deletion and rearrangement of text easier. QUILL also provides students with two contexts for writing, designed to foster communication by providing audiences for student composition: MAILBAG is an electronic mail system with which students can send messages to individuals, groups, or to an electronic bulletin board; LIBRARY is an information management system in which writing can be accessed by title, author, or keywords.

QUILL uses the computer's capabilities to help teachers teach writing, by facilitating different aspects of the writing process. There are three parts: PLANNER, LIBRARY, and MAILBAG. Students decide which program they want to use according to their purpose for writing and choose it from the following menu:

1) PLANNER: Helps you think of ideas for writing. You can take notes and get a list of your notes when you are finished.
2) LIBRARY: Stores your writing so you can change or add to it later and others can read it.
3) MAILBAG: Allows you to send messages to your teachers and your classmates or read the messages they have sent to you.

Each of these programs makes use of WRITER'S ASSISTANT, QUILL's editing system. It enables students to type their stories, poems, or reports, to rearrange the order of their text, to replace or delete words, and to correct mechanical errors. The following sections provide short descriptions of each program (adapted from the QUILL Teacher's Guide).

PLANNER

PLANNER is a tool that is especially useful for prewriting. It helps students generate ideas for writing, organize their thoughts, and select key points to cover in their written piece. At the beginning of a writing activity, a teacher can involve students in a brainstorming session to generate a list of questions or topics to consider. If they are writing movie reviews, the students might focus on how to select a movie (price, subject, intended audience, location). A teacher can put this list into the computer, so that when students begin composing their movie review, they can use PLANNER to help them start generating ideas. At the end of a writing assignment, PLANNER can help students revise work. It might ask students to include personal experiences or to change a story's introduction or ending.

PLANNER was developed to help students generate and organize ideas. It is not meant to be used as an outline or rigid structure for a writing assignment. PLANNER should elicit many ideas from students, however, all the ideas generated do not have to be used, nor do they need to be treated in any particular order. A student or teacher who has chosen to use PLANNER sees the following menu on the screen:

1)	USE	Use a PLANNER to start working on your writing.
2)	CREATE	Make a new PLANNER.
3)	MODIFY	Change the old PLANNER.

LIBRARY

LIBRARY creates an environment that enables students and teachers to share information. They can write about any topic they choose and store their writing so it is available to other computer users. Pieces of writing are organized by their author(s), title, and topic (identified by one or more keywords). LIBRARY performs three major functions: (1) It creates a communication environment in which students are encouraged to write for their peers as well as the teacher, (2) it organizes writing in multiple ways, and (3) it provides easy access to the stored pieces of writing.

LIBRARY encourages writing, facilitates sharing, and eases the teacher's record-keeping burden. For example, a student, Jeff, wants to use LIBRARY to find some information about sharks for an adventure story he is writing. He chooses SEE on the LIBRARY title page and looks through the keywords on the LIBRARY's "Animal Encyclopedia" disk. He finds a list of keywords including "arctic," "cats,"

"fish," "horses," and "whales." "Sharks" does not appear on the list, so Jeff decides to look at all entries with the keyword "fish." After he types the number of this keyword, the titles of four articles about fish are shown on the screen, one of which is called "Denizens of the Deep." He suspects the article may be about sharks, and so he types that article's number so he can read it. The article gives him some information about sharks, but it is not as focused as the article he is writing. He decides to add his article to the "Animal Encyclopedia" when it is finished. The LIBRARY has provided important information for Jeff's writing, as well as motivation for Jeff to contribute his own piece to fill in a gap in the "Animal Encyclopedia."

The following is the LIBRARY menu:

1)	SEE	Read LIBRARY entries by choosing keywords or titles.
2)	ADD	Put a new entry into the LIBRARY.
3)	CHANGE	Change an old LIBRARY entry.

MAILBAG

MAILBAG facilitates direct communication between individual students, groups of students, and teachers. It combines features of the post office, the telephone, and a bulletin board; written messages can be sent between individuals, with responses returned immediately; or a message can be posted to provide information to a group. MAILBAG is intended to enhance writing instruction by: (1) Encouraging written communication to varying, but specific, audiences (for example, friends and classmates), (2) allowing different kinds of writing to occur (for example, informing, persuading, instructing, entertaining), and (3) motivating students to write more by personalizing the experience.

Students and teachers have the following options when they use the MAILBAG:

1)	READ	Read messages to you, a group or the Bulletin Board.
2)	SEND	Write messages to other people, groups, or the Bulletin Board.