COMPUTERS IN COMPOSITION:
INSCRIBING NEW FACTS,
CONFIGURING NEW KNOWLEDGE

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1. INTRODUCTION

The instructional computer is an innovation in the teaching of writing. As a rule, we introduce innovations into our pedagogies because we believe they will help our students write better. When we report these innovations in professional publications, we conventionally identify the *problem* we are trying to solve, and we offer some type of *evidence* that our innovation solves the problem. With this conventional problem/solution structure in mind, then, we might reasonably ask of research articles on computers in composition *why* writing teachers introduce computers into their pedagogies. What good are computers?

To answer this question, I examined research publications appearing from 1983 to 1988, and refer to them here in a variety of packages. I resort to this variety because the answer to the question--what good are computers in composition instruction?--turns out to be not simple. The research discourse which represents computer-oriented innovation in composition instruction does not deliver products we might anticipate from conventions in reporting pedagogical innovation.

First, research articles provide only a slight profile of the "problem" element of the conventional problem/solution structure: many articles don't identify any problem at all. Those that do identify a problem are liable to refer to teacher workload as a difficulty, but these workload problems are only mentioned, not defined or analyzed: their conditions and meaning are not examined. Other articles mention student motivation as a problem which computers can address--but, again, without examining or defining the problem and its conditions. Finally, a handful of articles do make a clearer statement of problem. These claim an intention to enhance or to more vigorously activate a phase of the writing process--invention or editing, for example. Although I did find greater precision here, in most cases it did not approach the exactitude we generally expect in research discourse. And, as

1

we might guess, any phase of the writing process can function as "problem" if someone wants it to.

In the research discourse, then, the problems computers are meant to address are generally ill-defined, or not defined at all. But we can't claim that computer-aided instruction is not effective, or that computers don't belong in writing instruction, just because pedagogical problems are ill-defined. This paper therefore explores other means of finding out why teachers use computers in their writing courses. First, I summarize research results, that is, the "solution" element of the problem/solution structure, where we would anticipate that evidence for the effectiveness of the innovation will be presented. In that summary, I show that the evidence is inconclusive as to whether computers do any good or what good they do. Undeterred, knowing that teachers and institutions are inviting computers into the classroom and figuring this must mean that some good comes of their introduction, I then summarize reports of the *uses* of computers in composition studies. Once we picture the computer in the classroom or adjacent to it, we may recognize, simply by inspection, its appropriateness. Finally, I suggest broader means of evaluating this innovation in teaching. Referring to Foucault's (1972; 1979) analysis of the emergence of disciplinary knowledge and power, I will suggest that particular characteristics of the computer's behaviour make it a valuable instrument to compositionists. With the computer, compositionists can configure new knowledge which consolidates disciplinary authority.

2. EVIDENCE FOR THE EFFECTIVENESS OF COMPUTERS IN COMPOSITION INSTRUCTION

I began my review by looking for regularities in the research discourse which would sketch the efficiencies of computer-aided writing instruction. I hoped to correlate applications and results: I wanted to find out which uses yielded positive results. What I discovered were not so much regularities as contradictions and discontinuities. So I gave up my plan to match applications with results and began to look for other principles governing the body of evidence. I switched my focus from application to measurement, and tried to plot relationships between the types of *measures* that were used and the *results* those measures delivered. The tables which follow loosely compile similar types of measurement, pairing each measure with the results derived from it. After presenting these tables, I will make some inferences from their data.

Measure	Result
Standardized institutional tests of writing skills	Basic writers at CUNY who were instructed with the help of computers experienced more success in the CUNY Writing Assessment test than students without computer-aided instruction normally do (75% vs. 51%). (Moberg 1987)
Comparisons with other students' work in the same course	In a Business and Technical Writing course divided into "computer" and "non-computer" sections, "the computer group raised its mean score on each assignment, [while] there was relatively no change in the mean scores of the non-computer group on the three assignments." (Weiss 1988)
	Student writers using computer-aided invention techniques produced work no better than the work of students using traditional invention techniques. (Strickland 1987)
Tests of editing skills	Students using WORKBENCH "consistently improve 40 to 50 percent more on tests of editing skills than do counterparts in control groups..." (Kiefer and Smith 1984)
Analysis of targeted feature: comparison with past performance	Children using CATCH said they found the long-sentence detector helpful; analysis of their writing showed 7 out of 8 "wrote shorter sentences at the end of the experimental period." (Daiute 1984)
Grades: comparison with past performance	Basic writers using COMP-LAB writing modules which exercised grammar skills enjoyed using the computers, but their writing showed no evidence of improvement. (Southwell 1984)
Readerly measures	Using computers, students are liable to produce "rambling" papers revised only for surface features rather than "idea" features. (Blum and Cohen 1984)
	The kinds of revision encouraged by computer modes of composing emphasize "clean-up" and "rewording" rather than serious conceptual revision. (Hult 1988)

Measure	Result
Discourse analysis	Writers using computers made more revisions and wrote slightly longer papers, but their revisions were "small-scale, superficial changes." Writers using pen and paper were more likely to revise substantially above sentence level, in higher conceptual domains. (Collier 1983)
Empirical analysis of cognitive processes	Readers/writers took longer to locate information in a text read on a computer screen than in hard copy; they also took far longer to reorganize disordered texts on the screen than in hard copy. (Haas and Hayes 1986)
Surveys (questionnaires)	Students who, at the beginning of a writing course, profess to "dislike writing" are more likely to describe themselves as able to tolerate writing (if not actually like it) at the end of a course if the course has incorporated computer use; students in non-computer sections "dislike writing" almost as much at the end of a writing course as they do at the beginning." (Moberg 1987)

When students are asked if the computer has improved their writing, they say "yes." (Maik and Maik 1987)

Students prefer using a computer to not using a computer. (Weiss 1988)

Of 48 students in a CA writing course, only one thought the computer was "not useful"; 98 percent saw it as "very" or "'somewhat useful.'" (Bridwell and Ross 1984)

"[N]early one fourth" of students in three writing classes thought their writing was "'significantly better' because of the computer, and over half gave it credit for making their writing 'somewhat better.'" (Bridwell, Sirc, and Brooke 1985)

Measure	Result
	75% of students in a composition course at CSU "found the course more enjoyable because of the computer." (Frase, Kiefer, Smith, and Fox 1985)
Participant observation	The computer-student relation is "playful." (Schwartz 1984)
	Students have "fun." (e.g., Bean 1983; Wresch 1984) Students experience "joy" in the computer lab. (Marcus 1984)

These results are too diverse to be analyzed into an answer to the simple question we had in the first place: how does this new writing technology help student writers? So I will attempt to discover patterns which relate results to the measures employed by those reporting on the effectiveness of computers.

Some measures of text *product*--standardized testing, course grading--are derived from institutional practices: these measures are independent of the technology but interior to the institution which adopted the technology. Such measures can produce positive results (but not always). When the measure is independent of such schemes of institutional assessment, however, the results are much less likely to be positive: both discourse-analytic measures and readerly measures deliver negative results. Collier found mainly small-scale changes; readers found papers rambling.

When the measure of text *product* is derived from the technology itself--as it was in the reports of the short-sentence program and the editing-skills program--we can anticipate positive results. But these results may be very fragile, and not hardy, possibly incapable of surviving in a natural environment. The writing of the students who liked doing computer grammar exercises didn't change. Students who used invention programs produced writing no better than did students not using invention programs. Students may get good at using programs without getting good at writing.

When we turn from measures of *product* to measures of *process*, we find what at first seem to be more stable results. Participant-observer reports are uniformly positive: the process of generating texts for classroom contexts is a happy one. Survey measures yield results nearly as positive, supporting the findings of participant observation. Students like using this writing technology; teachers like this writing technology and they like students

liking it. This sounds good--maybe good enough to allow us to overlook unstable findings in measurements of writing product.

But there are obstacles between us and the results we might like to embrace. First, Hass and Hayes' work--which measures process analytically rather than impressionistically--reports negative not positive, encouraging results: revision may actually be impeded by the computer. Second, measures of process in the research are based on unexamined assumptions. Although I have called reporters "participant observers," I have seen little sign of the reflective, reflexive, theoretically grounded methodologies that characterize participant observation in the social sciences. Measures and their authority are derived unquestioningly from a main conviction of process pedagogy: namely, that to expose the writing process is to contribute to communicative competence; to bring process out of the shadows and into the light will help writers. For a variety of reasons, computers do shed light on process, do enable writing teachers to more readily witness the procedures that generate students' texts, do make process more legible. (I can say what some of these reasons are: writers use instructional computers in public places; invention and revision programs powerfully control the individual's use of heuristics; writing is displayed on a screen, publicly visible; computers leave electronic traces of writing behaviour.) In these reports of happiness in the classroom, the process paradigm dominates, served by the characteristics of computer-aided instruction. In fact, in one publication, a monograph from the NCTE called *Computers and Composing* (Halpern and Liggett 1984), the authors congratulate themselves on what they perceive as the need to question no further the process model while they explore the application of new writing technologies to teaching: "we, as teachers of composition, have a sturdy ark [to ride out inundating technical change] in the cognitive process model of composing, a model that can accommodate the changes brought about by new technological systems" (78).

These research findings report the *effects* of computer technology on student writing. The second type of research that I review reports on the *uses*.

3. REPORTS OF THE USES OF COMPUTERS IN COMPOSITION INSTRUCTION

The articles which report the instructional uses of computers are the ones from which we might hope to recover a picture of the computer at work in the composition classroom. How does the computer fit into educational settings designed to trigger language behaviour and capture and

assess written products? From these articles we can recover a social portrait of the instructional computer. It appears as an amiable creature, patient in its interactions with students, even dogged and willing. But the most striking feature of the articles in this category is their focus on what the *computer* does rather than what the *writer* does.[1]

Textbook versions of the writing process tell us that composing begins with invention and ends with revision for style and clarity. Instructional computers are at work at both ends of the process. Enthusiasts for the computer's activity as an aid to invention report a variety of heuristic programs and their operation.

INVENTION

• computerized versions of Aristotle's topics, Burke's pentad, Pike, Becker and Young's tagmemic heuristic are better than written lists of questions because the programs are "interactive if not personal." (Burns 1984)

• a "visual synectic" program stimulates creative problem-solving in the student; "provide[s] the framework for prewriting exercises..., can guide the student towards an organized set of ideas for writing, and can provide the student with a hard copy of the ideas generated." (Rodrigues and Rodrigues 1984a, 1984b)

• WRITER'S HELPER can generate a five-paragraph essay out of even minimal input from the user (Wresch 1984)

• Heuristic devices need to be fully integrated into a course of composition instruction: students using a computer lab stocked with, among other software, invention programs, "never" used these programs. (Stracke 1988)

Reports on all of these programs focus on the capabilities of the software, its behaviours and characteristic intelligence. But the WRITER'S HELPER program will especially alert us to the computer program operating as a maker of text--the student writer functioning almost as an instrument of the technology. We might also wonder how willing students are to assume this role: one researcher reports that students "never" used the invention programs. This contribution to the research suggests that students may perceive the usefulness of the invention software only when they are led to its place in the pedagogical routines of the institution.

Once the student has a draft in hand, her work is eligible for screening through a text-analysis program. Text-analysis programs can review a draft for syntactic and lexical features, tabulating incidence of these surface features and recommending changes.

REVISION

• WRITER'S WORKBENCH (Kiefer and Smith 1984) and HOMER (Cohen and Lanham 1984) provide displays and/or printouts recording the incidence of certain surface features of text, calling attention to these features, and strongly suggesting revision.

• text-analysis programs will only work when incorporated into class discussion of the appropriateness of the advice given by the computer (Hult 1988; Autry 1987; Little 1987; Mortensen 1987; Frase, Kiefer, Smith, and Fox 1985; Daiute 1985; Kiefer and Smith 1984; Cohen and Lanham 1984)

Almost every writer who reports on the use of text-analysis programs insists that they will work properly only when incorporated into class discussion of the appropriateness of the advice given by the computer. Without such discussion, students are inclined to do everything the computer tells them to do--even when following its advice makes matters worse or even produces nonsense. Examples of text-analysis output confirm the need for mediating the computer's response to student writing: some of these programs are so limited they can't even tell the difference between *be* as a main verb and *be* as an auxiliary. Students trying to follow computer advice on over-use of *be* forms will find themselves in a ridiculous predicament.

So here is a new task for the writing teacher. Accustomed to developing students' judgement regarding constraints of audience, genre, reader's needs, we might now find ourselves teaching students how to exercise judgement in coping with this new constraint--the computer's reaction to prose, the computer as reader.[2]

The research reports other uses of computers as well, besides their work in invention and revision. In these uses, the computer reveals itself as a new channel of communication:

• teachers can give instructions electronically rather than verbally;
• teachers can respond to student work electronically;

• several writers report "networking" schemes which enable students to interact with one another via the computer (e.g., Garrett-Petts 1988). In this application, the domain for exchange expands beyond the scheduled classroom time. We can speculate that this would permit a greater variety of types of communication among students as they comment on one another's work in progress, as they collaborate on study questions, and so on.

Finally, among the reported uses of the computer, we see it emerging as a "research tool" (Flinn 1987a, 1987b)--or, as one writer calls it, a "source of cheap data" (Schwartz 1984). Even when the computer is not precisely programmed to do so, it leaves behind traces of students' composing activities--revisions, corrections, peer commentary, the timing of these behaviours. Now that we have this mechanism for producing data, we can construct new knowledge of the phenomenon of student writing. And some researchers are developing programs to accelerate the accumulation of this type of knowledge. With these developments, the computer is becoming what Latour and Woolgar (1986) call an "inscription device."

The computer as inscription device

• the instructor who developed SEEN argues that it not only helps students with their writing but also produces "cheap data." (Schwartz 1984)

• a team at the University of Missouri-St. Louis has developed COMPTRACE specifically as a "research tool." (Flinn 1987)

• instructor/researchers at the University of Minnesota have developed two programs which record keystrokes in order to (1) produce "a printed record of the composing process" and (2) "recreate the composing session on the computer's screen." (Bridwell, Sirc, and Brooke 1985)

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4. INSCRIBING NEW FACTS, CONFIGURING NEW KNOWLEDGE

In their ethnography of the community in the neuroendocrinological lab at the Salk Institute, Latour and Woolgar situate the inscription device at the heart of the processes which construct scientific fact:

> While participants in the office space struggle with the writing of new drafts, the laboratory around them is itself a hive of writing activity. Sections of muscle, light beams, even shreds of blotting paper activate various recording equipment. And the scientists themselves

base their own writing on the written output of the recording
equipment. (51)

This "recording equipment" is what Latour and Woolgar call an inscription
device. It is the means by which the scientists construct factual objects. The
publication of these objects earns credit for the scientists and fuels the cycle
of scientific activity. In the lab, the device transforms "pieces of matter into
written documents" (51). In the classroom, it seems, the computer has the
capacity to turn students' writing behaviour into factual objects eligible for
publication.

On such facticity the prestige of the hard sciences relies. The
instructional computer, as inscription device, may promise to confer some of
that prestige on compositionists, who work in softer domains. But before we
rejoice in access to new knowledge, we might reflect on the genealogy of
such knowledge. Foucault claims that knowledge implies power, and power
knowledge: "there is no power relation without the correlative constitution
of a field of knowledge, nor any knowledge that does not presuppose and
constitute at the same time power relations" (1979:27). According to
Foucault, modern techniques for getting knowledge subjugate individuals by
turning them into objects of knowledge. These techniques are marked by
certain conspicuous features which Foucault identifies and which we can
locate in the practices of computer-aided instruction. One feature is
surveillance: the individuals' behaviour, being, aptitudes, attributes come
under relentless scrutiny. In the applications described in the research, the
instructional computer nourishes surveillance--which the process model has
already privileged as good in itself. Another feature of disciplinary
knowledge is *supervision*: the individual's actions are partitioned into
controllable and observable segments; the partitioning permits supervision of
process rather than result. The instructional computer is an effective
supervisor: it rigorously controls the student's writing episodes, supporting
a process pedagogy which is already prone to partitioning and managing
composing.[3] A third feature of modern techniques for getting knowledge is
normalization: individuals' behaviours and attributes are precisely
differentiated from one another, exactly compared, and aggregated to
describe a norm. Once the norm is established, departures from it can be
measured and recorded. The instructional computer, with its text-analysis
programs and its tracing devices, contributes to normalization by tracking,
recording and measuring writing behaviours.

Surveillance, supervision, and normalization all join in the enveloping
condition of "compulsory visibility" (185). As students are recruited as
objects of knowledge, they are open to the teacher/investigator's view. The

instructional computer exposes the writing process in remarkable, inscribable, publishable ways. This exposure may help to perfect the construction of the writer as an object of knowledge and, at the same time, promote the teacher/investigator to positions of greater disciplinary power.

5. CONCLUSION

I return to the original questions: what good are computers in writing instruction? Why are teachers inviting them into the classroom? I can't find powerful answers in either the problem or the solution elements of the research discourse: there are few representations of acclaimed and deeply examined problems whose urgency calls for computer-aided instruction; and there is no stable evidence for the effectiveness of the computer in teaching writing. But in descriptions of the uses of computers I do find an answer: computers are good for configuring new disciplinary knowledge. And the technical personality of the computer is highly compatible with the existing themes and predispositions of the discipline. Process pedagogy--with its techniques of think-aloud protocols, writing logs, peer editing, segmentalization of procedures--values points of intervention in an individual behaviour which formerly lurked in shady, private places. The instructional computer offers new points of intervention.

NOTES

1. Although a significant number of articles begin with celebrations of computer capacities as word-processors, articles in both categories--effects and uses of computers--presuppose as common knowledge word-processing functions. Many articles remind the reader of these functions, acclaiming them as revolutionary, but only one (Daiute 1983) in my sample focusses on word-processing.

2. At first this skill--coping with the computer as reader--may seem non-transferrable to settings beyond the classroom. But teachers of practical and technical writing should keep in mind that text-analysis programs are appearing in the workplace: WRITER'S WORKBENCH was originally developed for writers of technical and scientific reports; EPISTLE is "designed to offer office workers a computer package to help them improve their business letters" (Daiute 1985).

3. In an essay on the role of prompts in computer-aided writing instruction, Colette Daiute expresses clearly the process ethos which values both the perception of the *parts* of composing and the management of these parts: "Beginning writers have to learn to choreograph the many processes and contents involved in writing. Because this is a cognitively demanding task, some writers need explicit instruction in managing their own writing processes (1985:138).

13

WORKS CITED

Autrey, K. 1987 Printout: three books on writing and word processing. *Computers and Composing.* 4, 2, 128-32.

Bean, J.C. 1983 Computerized word-processing as an aid to revision. *College Composition and Communication.* 34, 2, 146-48.

Von Blum, R., and Cohen, M.E. 1984 WANDAH: Writing-aid AND author's helper. In *The Computer in Composition Instruction*, ed. W. Wresch. Urbana, Ill.: NCTE.

Bridwell, L., and Ross, D. 1984 Integrating computers into a writing curriculum; or, buying, begging, and building. *The Computer in Composition Instruction*, ed. W. Wresch. Urbana, Ill.: NCTE.

Bridwell, L., Sirc, G., and Brooke, R. 1985 Revising and computing: case studies of student writers. In *The Acquisition of Written Language*, ed. S. W. Freedman. Norwood, N.J.: Ablex.

Burns, H. 1984 Recollections of first-generation computer-assisted pre-writing. In *The Computer in Composition Instruction*, ed. W. Wresch. Urbana, Ill.: NCTE.

Cohen, M.E., and Lanham, R.A. 1984 HOMER: teaching style with a microcomputer. In *The Computer in Composition Instruction*, ed. W. Wresch. Urbana, Ill.: NCTE.

Collier, R.M. 1983 The word processor and revision strategies. *College Composition and Communication.* 34, 2, 149-55.

Daiute, C. 1983 The computer as stylus and audience. *College Composition and Communication.* 34, 2, 134-45.

------. 1984 Can the computer stimulate writers' inner dialogues? In *The Computer in Composition*, ed. W. Wresch. Urbana, Ill.: NCTE.

------. 1985 Do writers talk to themselves? In *The Acquisition of Written Language*, ed. S.W. Freedman. Norwood, N.J.: Ablex.

Flinn, J.Z. 1987a Case studies of revision aided by keystroke recording and replaying software. *Computers and Composing.* 5, 1, 31-46.

Flinn, J.Z. 1987b Programming software to trace the composing process. *Computers and Composing.* 5, 1, 47-50.

Frase, L.T., Kiefer, K., Smith, C.R., and Fox, M.L. 1985 Theory and practice in computer-aided composition. In *The Acquisition of Written Language*, ed. S.W. Freedman. Norwood, N.J.: Ablex.

Foucault, M. 1972 *The Archaeology of Knowledge.* London: Tavistock.

------. 1979 *Discipline and Punish: The Birth of the Prison.* New York: Vintage.

Garrett-Petts, W.F. 1988 Developing a community of readers: computer networking in the freshman literature classroom. *English Quarterly.* 21, 1, 29-40.

Haas, C., and Hayes, J.R. 1986 What did I just say? Problems in writing with the machine. *Research in the Teaching of English.* 20, 1, 22-35.

Halpern, J.W., and Liggett, S. 1984 *Computers and Composing.* Carbondale, Ill.: Southern Illinois UP.

Hult, C.A. 1988 The computer and the inexperienced writer. *Computers and Composing.* 5, 2, 29-37.

Kiefer, K., and Smith, C.R. 1984 The COMP-LAB writing modules: computer-assisted grammar instruction. In *The Computer in Composition Instruction*, ed. W. Wresch. Urbana, Ill.: NCTE.

Latour, B., and Woolgar, S. 1986 *Laboratory Life: The Construction of Scientific Fact*, rev. ed. (originally published 1979). Princeton, N.J.: Princeton UP.

Little, S.B. 1987 The computer as audience: using HOMER, a text analysis program. *Computers and Composing.* 4, 2, 106-20.

Maik, L., and Maik, T.A. 1987 Perceptions of word processing in composition classes: first-year and upper-level students compared. *Computers and Composing.* 4, 3, 7-16.

Marcus, S. 1984 Real-time gadgets with feedback: special effects in computer-assisted writing. In *The Computer in Composition Instruction*, ed. W. Wresch. Urbana, Ill.: NCTE.

Moberg, G. 1987 Remedial college writing on computers: evaluation by students and faculty of a pilot project. *Computers and Composing*. 4, 3, 35-52.

Mortensen, T. 1987 Writing style/readability checkers to add to your word-processing. *Computers and Composing*. 5, 1, 67-78.

Rodrigues, R.J., and Rodrigues, D.W. 1984a Computer-based invention: its place and potential. *College Composition and Communication*. 35, 1, 78-87.

Rodrigues, D., and Rodrigues, R.J. 1984b Computer-based creative problem-solving. In *The Computer in Composition Instruction*, ed. W. Wresch. Urbana, Ill.: NCTE.

Schwartz, H.J. 1984 SEEN: a tutorial and user network for hypothesis testing. In *The Computer in Composition Instruction*, ed. W. Wresch. Urbana, Ill.: NCTE.

Southwell, M.G. 1984 The COMP-LAB writing modules: computer-assisted grammar instruction. In *The Computer in Composition Instruction*, ed. W. Wresch. Urbana, Ill.: NCTE.

Stracke, R. 1988 The effects of a full-service computer room on student writing. *Computers and Composing*. 5, 2, 51-56.

Strickland, J. 1987 Computers, invention, and the power to change student writing. *Computers and Composing*. 4, 2, 7-26.

Weiss, T. 1988 Word processing in the business and technical writing classroom. *Computers and Composing*. 5, 2, 57-70.

Wresch, W. 1984 Questions, answers, and automated writing. In *The Computer in Composition Instruction*, ed. W. Wresch. Urbana, Ill.: NCTE.

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