

Writing and Collaborative Learning with The Daedalus Integrated Writing Environment

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The two major software products from The Daedalus Group, Inc.--The Daedalus Integrated Writing Environment for Local Area Networks (DIWE) and the new Internet version, Daedalus Online--are unique not merely because they represent leading edge technology. What distinguishes these Daedalus products is that they were designed by English teachers for English teachers, and perhaps more importantly, they were designed around professionally agreed-upon discourse, composition, and pedagogical theories. In other words, instead of starting with whatever technology is available from the high tech world and asking, "How can we adapt what's available to teach language, reading, and writing?", The Daedalus Group asked "What technology needs to be built to support our profession's theories and best practices?" The Daedalus Integrated Writing Environment and Daedalus Online are designed to support the collaborative learning of the writing process.

In this paper, I offer an overview of the theoretical premises which have guided the design and implementation of DIWE and Daedalus Online, give a guided tour of DIWE/ Daedalus Online features and explain how these applications support various stages of the writing process in a collaborative learning environment, and discuss the results achieved and reported by students, writing teachers, and researchers over the last decade.

Theoretical Foundations: Composition and Pedagogy

The teaching of written composition in the United States has undergone significant transformations over the last thirty years. Leading theorists and researchers have articulated a set of premises that now guide professional writing teachers in elementary schools, high schools, and colleges alike. The current state of knowledge about teaching writing might be summarized by the following statements:

- o Writing is a Process.
- o Writing is a Social Act
- o Collaborative Learning is the most effective pedagogy to help developing writers write for real purposes and for real audiences.

Writing is a Process

While the final product is what readers see and on which writers are evaluated, we know from studies of professional writers that the writing process involves several predictable and recursive stages.

Pre-Writing or Invention

During this stage of the process, the writer gathers and explores ideas, considers audience and purpose, and writes exploratory drafts to develop content, experiment with organizing structures, and look for connections among ideas. The Pre-Writing stage is a gestation period, a rehearsal period if you will. In practice, writers might read and otherwise conduct research to learn about what has been said and thought about before about a particular topic. They might

participate in conversations and debates with others interested in the topic. During and after such conversations, they might use informal writing to reflect on what they know, what they've heard, and what they think about what they've heard or read about the topic. They might engage in formal pre-writing activities such as freewriting, a technique that encourages writers to write freely without the constraints of formal language and structure. They might engage in associative rather than linear thinking through pre-writing techniques such as branching or clustering. Another pre-writing technique might lead the writer through a structured series of critical thinking prompts, often called *heuristics*, based on the classical rhetorical notion of *heuristic* based on Aristotle's enthymemes.

All such activities help writers create a sort of database of their knowledge of and beliefs and attitudes about a proposed writing topic. When such pre-writing activities are done in writing, either with pen and paper or online, the writer is left with a record of these thoughts that she can draw upon during the drafting stage of the writing process.

Drafting/Composing

After a period of gestation and reflection, the writer drafts an exploratory version of the document. During this period, questions of audience and purpose may arise. Various forms and content are arranged into potential structures in an attempt to refine the purpose of the document with an eye towards the readers' needs. This initial exploratory draft then becomes the object of reflection and analysis during the revision stage of the process.

Revision

Revision--the act of "seeing again"--is often considered the most crucial stage of the writing process. We know from reports of the writing habits of renowned authors like Ernest Hemingway that the greatest pieces of literature and prose emerge only after numerous and sometimes torturous drafts and re-writes. The writer begins the revision stage by reading the draft critically, focusing on audience and purpose and content and structure, sharing the draft with others--both teachers and peers--to receive feedback from readers' perspectives. With reflection, critiques, and feedback in hand, the writer then re-writes the draft for content, style, organization, and structure.

Editing/Proofreading

Once the draft is stable in terms of audience needs, purpose, and content and structure, the writer engages in another round of revisions, again either in solitude or with the aide of peers (or ideally a combination of both), this time focusing on issues of style, grammar, spelling, and punctuation--the kinds of surface level features most often emphasized in a "product-centered" pedagogy. In preparation for sharing the document with the world, the writer proofreads to catch and correct spelling and punctuation errors.

Publication

Finally, and hopefully, the product is complete and ready for publication. More realistically, the project comes to a close as a result of an externally imposed deadline, as is usually the case with "school writing." Or, as American composition scholar Ann Berthoff has noted, writing is never finished--it is abandoned. Many have come to consider this final stage perhaps the most important as real writers--authors-- write to be read not by an audience of 1--the teacher-- or to be graded but rather to contribute their voice to the ongoing conversation of mankind.

As writing instructors have become more aware of the writing process, their pedagogical emphasis--which used to focus on editing, proofreading, and correctness--is redistributed to the

pre-writing, composing, and revision stages. The emphasis, therefore, has shifted from producing texts to training writers to behave like writers.

Writing Is a Social Act

During the last several decades a number of strands running through the fabric of what we call literacy education have recognized that language--its acquisition and its use--though comprised, perhaps, of discrete skills and used by individuals, is essentially a social act. For Lev Vygotsky, for example, "Development in thinking is not from the individual to the socialized, but from the social to the individual" (Gere 1987, 81). Dialogue models of language acquisition theorize that the construction of meaning through language is an interactive process between language producers and language perceivers. When discussing the pre-lingual stage of a child's language acquisition, Jerome Bruner (1981) explains that "formats," cognitive schemata that language learners must develop in order to manipulate the conventions of conversation, are developed through the interaction of the child with its environment and caretakers (44).

Contemporary literary critics also recognize the role "community" plays in the meaning-making process. Stanley Fish (1980) argues that "it is interpretive communities, rather than the text or the reader, that produce meaning and are responsible for the emergence of formal features" (14). David Bleich (1975), when discussing his conception of the interpretive community, writes,

Interpretation is always a group activity, since the individual interpreter is creating his statement in large part with an eye towards who is going to hear it. That is his community, whether it is of students, teachers, reviewers, or critics..... For this reason interpretation is a communal act (p. 94-95).

A number of contemporary rhetorical theorists have also focused on the social aspects of language and communities. Lester Faigley's (1986) "social view," Kenneth Bruffee's (1986) "social constructionism," and James Berlin's (1988) "social-epistemic," are related, as Berlin notes, "because they share a notion of rhetoric as a political act involving a dialectical interaction engaging the material, the social, and the individual writer, with language as the agency of mediation" (488). In Berlin's "social epistemic" rhetoric,

The real is located in a relationship that involves the dialectical interaction of the observer, the discourse community (social group) in which the observer is functioning, and the material conditions of existence.... Most important, this dialectic is grounded in language: the observer, the discourse community, and the material conditions of existence are all verbal constructs (488).

Professor Lester Faigley has written that social views of language, rhetoric, and literary theory all develop out of the central assumption that "human language (including writing) can be understood only from the perspective of society rather than a single individual.... The focus of a social view of writing, therefore, is not on how the social situation influences the individual, but on how the individual is a constituent of the culture" (535). Bruffee, using the term Social Constructionism to describe the theory that rejects neo-Cartesian, foundational notions of knowledge, claims,

A social constructionist position...assumes that entities we normally call reality, knowledge, thought, facts, texts, selves...are constructs generated by communities of like-minded peers. Social construction understands reality [and] knowledge...as community-generated and community maintained linguistic entities--or, more broadly speaking, symbolic entities--that define or "constitute" the communities that generate them (774).

Writing teachers who believe writing is a social act emphasize the meaning making transactions between writers and readers and emphasize the need for writers to understand their readers' and thus place issues of style, tone, and grammatical correctness in the context of the readers' needs.

Collaborative Learning

If writing is a social act, then it needs to be done--and learned-- in a social setting. In the United States, one of the terms most commonly used to label social learning is collaborative learning. Collaborative learning is based on social constructivist epistemology which says that all meaning is a social construct, that is, what any culture and sub-culture (such as an academic discipline) understands as "truths" or "common knowledge" results from a negotiated consensus among like minded peers. This meaning making process of observation, description, theory building, argument, counterargument, and negotiation happens primarily through language within discourse communities. Collaborative learning, then, is a pedagogy which attempts to capture the power of social interaction in discourse communities by structuring learning activities in such a way as to model how discourse communities arrive at consensus through negotiation. In the writing curriculum, collaborative learning places writing at the center by placing writers in rhetorical situations which engage them in meaning making dialogue and negotiation. In such settings, the writing process is then inherently social because within these model discourse communities, writers always need to construct their thoughts and texts with the audience in mind.

The Daedalus Integrated Writing Environment (DIWE)/ Daedalus Online

DIWE was developed in the mid 1980s by a group of graduate students and their professors who met at the University of Texas at Austin. After several years of attempting to integrate commercially produced computer applications into the writing curriculum, these colleagues, who eventually formed themselves into The Daedalus Group, Inc., realized that the problems associated with introducing commercial word processors and drill and practice type computer-aided instruction arose from the fact that nothing on the market started with the emerging theories about language, writing, and writing instruction. We were attempting to build social process writing curriculum and pedagogy with "productivity" tools which emphasized products. The available technology was competing rather than enhancing the pedagogy. Thus, we embarked on building our software around our theories and pedagogical needs which called for software which aided both the writing process and collaborative learning. Both DIWE and Daedalus Online include modules to support collaborative learning of each stage of the writing process.

The Modules and Their Roles in Collaborative Learning and the Writing Process

Both versions of Daedalus include modules and features to support various stages of the writing process as well as a number of instructional utilities, class management tools, and file management features to aid other elements of teaching and learning transactions. My purpose here is to describe only those features which support collaborative learning and the writing process. (For more information about the other features, please visit The Daedalus Group World Wide Web site at www.daedalus.com or the Daedalus Online site at <http://daedalus.pearsoned.com>).

Invent

This module is designed to support the pre-writing stage of the writing process. When writers launch Invent, the program delivers a series of prompts or *heuristics* with optional explanations to which the writer responds in writing. Invent prompts, which can be modified by the instructor

using an instructor utility called PromptManager, are designed to help writers think divergently about their proposed writing topic. The writer's responses to the questions are then saved as a file the writer can later open in a word processing program. Invent, therefore, not only helps writers explore their thoughts in a structured way, it also helps writers overcome the "blank screen effect" most writers encounter when they attempt to start their writing process with a word processor.

InterChange

InterChange is a "real-time" conferencing program with similarities to MUDS and MOOS, Internet Relay Chat (IRC), and Chat Rooms, but designed specifically for writing instruction. InterChange has a number of benefits for writers. The module can be used during the pre-writing stage of the writing process as it facilitates online written "conversation." Such social pre-writing activities allow writers to try out their ideas in a community of other writers, just like having a conversation or debate. The differences between online conversations and oral conversations are significant, however. First, InterChange participants are communicating in writing and thus writing for real purposes for a real audience. Second, numerous studies have shown that real-time writing allows for more participation by more and different kinds of students than is possible in traditional oral classrooms. As a result, social invention is richer as writers get to witness first hand a wider range of ideas and more points of view. Third, instructors can convert InterChange transcripts into text files that can be distributed electronically, copied to student diskettes (or accessed from an electronic class library online), and printed out so writers can have a record of the pre-writing conversation when they begin their drafts. An added benefit is that students who might have been absent on the day the pre-writing conversation took place can still have the benefit of the brainstorming session they missed.

InterChange has proven useful in other learning and writing process activities. Pre-writing need not be limited to brainstorming about writing topics; reading and discussing common readings can also serve as pre-writing activities because the words and ideas of published authors serve as inspiration and models for student writing. InterChange has been used very effectively, for example, to conduct conversations about literary selections, non-fiction prose, art, and films.

Finally, InterChange can also be used to support collaborative activities during the revision stage of the writing process. Since InterChange permits sub-conferences, a group of peer reviewers can focus on one peer's draft, and that draft becomes the topic of online conversation. With an instructor's prompting, peer review groups can be focused to discuss issues ranging from content to audience to arrangement. And, the writer goes home with a transcript of the conversation about her paper, which she can refer to while revising her draft.

Mail (DIWE) or Discussion Board (Daedalus Online)

Mail or Discussion Board is another form of computer-mediated communication (CMC) which fosters collaborative communication among learners and writers. This asynchronous form of social interaction allows writers to communicate in writing during various stages of the learning and writing processes. During pre-writing, for example, writers separated by time and space may exchange ideas about a common topic or reading. During collaborative revision, members of peer groups might post their drafts as bulletin board messages. Peer group members can then offer feedback to one another by replying to one another's drafts in the form of threaded bulletin board replies. Mail or Discussion Board can be used also to publish final versions of papers. The Mail module or the Discussion Board, then, can be a crucial tool in helping writers during various stages of the writing process to collaborate and to write for real purposes for real audiences.

Write (DIWE Only)

Write is a simplified word processor available only in the Local Area Network version of DIWE (with the Internet version, Daedalus Online, writers use whatever word processor they have available to them). Like any word processor, Write can be used during various stages of the writing process such as freewriting during the pre-writing stage, composing drafts, writing reflections upon drafts in progress, writing peer reviews during the revision stage, and revising, editing, and spell checking drafts.

Student Utilities (DIWE)/ Document Manager (Daedalus Online)

In the collaborative learning classroom, writers need to share drafts with one another. In a traditional setting, such text sharing might involve a writer printing a copy of a draft and making enough photocopies to distribute to everyone in class. On both Local Area Networks and the Internet, however, writers can share their works-in-progress using file sharing protocols. DIWE's Student Utilities and Daedalus Online's Document Manager simplify the technological aspects of copying, reading, and distributing electronic documents. Once a writer is ready to share a draft with writing partners, the instructor, or all members of the classroom writing community, she simply selects the file she wants to share, clicks a few buttons, and submits an electronic copy of her paper for her peers' or instructor's review.

Respond

Respond is designed to aid the peer review activities of the revision process. While in theory peer review is a powerful concept, we know from personal experience and research that peer review is often ineffective for a number of reasons. First, many versions of peer review focus on peer editing which places developing writers in the position of copyediting one another's papers and thus requiring them to draw on knowledge and skills they just don't have. Because peer editors lack the grammatical skills necessary to serve as an editor, they refrain from making meaningful comments. Secondly, peer reviewers, who are often working with friends or at least social acquaintances, do not want to appear critical of their peers for fear of becoming social outcasts. Third, because developing writers often don't know how to read a draft critically themselves, they are overwhelmed by the challenges of giving feedback on all the possible revision issues ranging from tone to sentence errors.

Respond, using a prompting mechanism similar to Invent, is designed to foster dialogue between writers and readers. The structure of the questions, which can be revised by the instructor, helps peer reviewers focus their feedback in non-threatening ways while still emphasizing areas of improvement.

BiblioCite

BiblioCite helps writers with the tedious process of generating properly formatted Works Cited (Modern Language Association) or References (American Psychological Association) pages for research papers. The simple to use interface allows students to enter bibliographical information into a database (mimicking the kinds of notecards American students are used to working with while conducting research), and then with a click of a button they can convert that data into properly formatted bibliographies.

Research on The Daedalus Integrated Writing Environment

The Daedalus Integrated Writing Environment has been adopted and used at over six hundred high schools, colleges, and universities in the United States, European countries including France and Greece, Middle Eastern institutions, and Asian countries including Japan, Taiwan,

and Hong Kong. Instructors have used DIWE to teach English as a First Language, English as a Second Language, and Foreign Language Education. DIWE has also been used in courses ranging from Composition, Literature, History, Philosophy, and the social and hard sciences to teach not only writing but to facilitate writing to learn and collaborative learning.

Numerous research studies and anecdotal reports have been written since DIWE's introduction in 1988 focusing on the effects of DIWE on basic college writers, English as a Second Language students, writing in the disciplines, and at-risk high school students. In general, the following statements have been made about the effects of DIWE on writing achievement, learning processes, and students attitudes toward learning.

- o Students write more often, write more varied types of texts, and produce more text than they might in traditional settings
- o There exists more student to student interaction through DIWE than in traditional classroom settings
- o InterChange helps basic writing students bridge the gap between orality and literacy
- o Students are more active learners in Daedalus classrooms
- o Students spend more time on task
- o Students have better attitudes toward learning and writing
- o Students have a better understanding of the role of audience in the writing process
- o Students make measurable achievement gains as writers.

Of the various studies conducted over the years, two are probably of most interest to high school teachers. Robin Wax, a high school American History teacher in Ann Arbor, Michigan, who used DIWE to implement a writing to learn curriculum with "at-risk, basic skills students" reports:

The technology has empowered my students, given them access to the educational process and systems in a way not possible in the traditional classroom. We are not just word processing, we are engaging in discussions, reading and responding to each other's work, and communicating with others. This non-traditional discourse draws in and includes under-represented views and voices from history and from my classroom. Students who never talk in the traditional setting or develop ideas or use higher level thinking skills do so on the computers. The use of DIWE has given legitimacy to all voices, those of my students and those of the historical figures they study. The format of computerized instruction makes access to ideas and to other learners and to means of expression easy, fun, and permanent. In other words, it works. (<http://www.daedalus.com/wings/wax.2.1.html>)

While Wax's account is anecdotal, a more controlled study was conducted over a two year period by The Learning Technology Center in the College of Education at the University of Texas at Austin. This team of researchers introduced DIWE and other technologies into an affluent suburban high school, an inner-city high school, and an inner city middle school in Austin, TX. In a report on the research project they called "Project Circle," researchers write "Teachers were positive about the extent to which use of the CIRCLE software (DIWE) facilitated achieving their classroom goals....The most commonly indicated difference was a change in role from direct teaching and the source of expertise or information to more of a

facilitator or mentor role." (58) The researchers also asked project teachers about their perceptions of DIWE on students. They report

The strongest effect reported by teachers...was an increase in motivation and engagement in learning, particularly increased excitement and enthusiasm. The most mentioned effect on learning was increased depth of learning, with teachers reporting that students went beyond what the normally did. Teachers also mentioned increased quality of discussion and improved writing. When asked if students approached assignments differently, teachers mentioned increased seriousness, more enthusiasm, and more independence and control....Teachers indicated that those who were not normally engaged in the classroom were often those who were most engaged and motivated by the CIRCLE assignments....

It can potentially be argued that the activities being done using Daedalus...are more authentic than typical classroom activities because these types of activities require real communication and interaction with real people in a way that typical patterns of student and teacher interaction do not (Shell, 124-126).

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