

Language and Learning Across the Disciplines

A forum for debates concerning interdisciplinarity, situated discourse communities, and writing across the curriculum programs.



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Linda Driskill

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Ronald J. Heckelman and Will-Matthis Dunn III

August 2003
Volume 6, No. 3

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Language and Learning Across the Disciplines is a forum for issues concerning interdisciplinarity, situated discourse communities, and writing across the curriculum programs. The journal will publish articles dealing with issues in learning theory, discourse analysis, participation in disciplinary discourse, and the social, intellectual and political locations of WAC programs. We welcome articles seeking to make connections among several such areas of inquiry. All manuscripts will be carefully reviewed by members of the editorial board and appropriate outside readers. You may expect to hear from us in two months. When submitting a manuscript please follow the current MLA or APA style sheet; submit three copies (3,000 to 7,000 words); print your name, address, telephone number and affiliation on a cover sheet, not on the manuscripts; and enclose sufficient return postage clipped, not pasted, to a self-addressed envelope. Send manuscripts to Sharon Quiroz, Editor, *Language and Learning Across the Disciplines*, Illinois Institute of Technology, 3301 S. Dearborn, Chicago, Illinois 60616. Email submissions to quiroz@iit.edu. Major funding for *LLAD* is provided by the Academic Resource Center of the Illinois Institute of Technology. <http://aw.colostate.edu/llad>.



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Language and Learning Across the Disciplines is a publication of the Illinois Institute of Technology, and follows the NCTE guidelines for non-sexist language. Major funding for *LLAD* is provided by the Academic Resource Center of the Illinois Institute of Technology. (ISSN 1091-7098)

Call for Proposals

Language and Learning Across the Disciplines is now soliciting manuscript proposals (500-1000 words) for a special issue titled: "The Linguistically Diverse Student: Challenges and Possibilities Across the Curriculum." Guest editor for this issue is Ann Johns, Linguistics and Writing Studies, San Diego State University.

A remarkably diverse group of students is currently enrolled in our academic classrooms, and one aspect of this diversity is linguistic variety. Linguistic variation is so complex that researchers and practitioners employ a number of categories for student identification (ESL, EFL, ELL, ESD, ELD, bilingual, Generation 1.5), none of which can do justice to classroom diversity. How are our linguistically diverse students faring? Or, more importantly, what classroom practices and assessments in the disciplines are successful in including and motivating these students?

In this special issue, authors are asked to relate theory, research and practice in discussing pedagogy and assessment in linguistically diverse disciplinary classrooms.

Proposals due: February 1, 2004
Notification of acceptance: April 1, 2004
Manuscripts due: September 1, 2004
Publication: Winter 2005

Send proposals and inquiries to Ann Johns, Department of Rhetoric & Writing Studies, San Diego State University, San Diego, CA 92182-4452. Electronic submission preferred: ajohns@cox.net.

ANNOUNCEMENT

LLAD is going on line! This will be the last hard copy publication of our journal. Beginning with Volume 7, *Language and Learning Across the Disciplines* will be available FREE at the WAC Clearinghouse Website, at <http://wac.colostate.edu>.

This new site will combine *LLAD* and *Academic Writing* (currently edited by Michael Palmquist) into a single online writing across the curriculum and academic writing journal. Sharon Quiroz will continue to edit the online version, and the distinguished editorial boards of the two journals will be combined to make sure that the new journal continues to be the product of a rigorous review process substantially unchanged.

Back issues of *LLAD* have been available at this site for the last several years. Beginning with the next volume, everyone will have free access to the material as it is published. The site will feature a printable version of documents, much like the off-prints of past hard copy versions, that can be downloaded to include in your file.

And so—we join the electronic age. Although we can't predict all the changes, we look forward to bringing manuscripts to you much faster and more cheaply than we have been able to do. We see opportunities to push against boundaries of space and time that have defined the print journal, and we look forward to sharing the fruits of all our work in writing across the disciplines in the academy freely with all who wish to join in.

P.S. Some of you have actually already sent checks to subscribe to Volume 7. Quite a few were deposited in the *LLAD* account, which means we have to go through the process of getting money back from the University. It will happen, and thank you.



Editor's Note

Sharon Quiroz
Illinois Institute of Technology

This issue of the *Journal of Language and Learning Across the Disciplines* is given over to the Proceedings of the National Writing Across the Curriculum Conference held at Rice University in Houston, in March 2002, titled: "Writing the Future: Leadership, Policies, and Classroom Practices"

The conference was chaired by Linda Driskill, the guest editor for this issue, whose goal was bringing together representatives from business, industry and government with the academy, to inspire collaboration toward future policies in writing instruction. From the outset, Professor Driskill planned that these Proceedings would be widely distributed to people outside the academy who take an interest in national educational policy.

The papers and summaries published in these Proceedings were selected by the Review Committee for the National Conference.



Guest Editor Introduction

Writing the Future to Improve Systems and Empower Ourselves, Our Colleagues, and Our Students

Linda Driskill

Cain Project in Engineering and Professional
Communication
Rice University

Learning to listen with concern for the weather in Iraq as well as for traffic reports on Houston freeways, I have discovered it is easy to feel helpless, overwhelmed with thinking about systems only a few can affect. Sitting in our schools and colleges, students must feel even more powerless. The key for leaders is not to focus inward or to block out the system. We must understand systems in new ways and find new alliances that can develop the liberating force of articulate, persuasive communication. We must improve, enhance and reform the systems as we empower ourselves, our colleagues, and our students.

In March 2002 the Sixth National Writing across the Curriculum Conference: "Writing the Future: Leadership, Policies, and Classroom Practices" challenged panelists and presenters to show policy makers and administrators WAC's potential. Summaries of panelists' comments, articles dealing with institutional, civic, and international or national leadership, and accounts of innovative practices in the disciplines are presented here to begin a dialog. The authors of these articles have dared to write the future by sharing their thoughts on leadership and discipline-specific opportunities. We invite you to take the next turn in the dialog with academic colleagues and with leaders outside of academe.

In an era of international electronic networks, a global economy, and hemispheric trading partnerships, communication skill affects the success of individuals, companies, and coun-

tries. Mathematical or scientific literacy is vital, but without communication skills workers may be relegated to lower technical tasks and be unable to influence their futures. Federal and state education policies, institutional arrangements, technologies, and funding can dramatically facilitate—or limit—outcomes. Many policy makers at all levels—in government, business, and education—are deeply concerned with these issues, but they are unaware of their own potential for enabling writing and communication across the curriculum to help accomplish these goals. Our vision requires that all people be helped to find voices in democratic processes. To prepare students across the Americas, writing and communication must be restored as a top priority.

However, the future prompts a host of questions: What goals should countries and schools set for their students to make them successful? How can students be encouraged to write not only for their first job but to imagine their future? How can students be taught to think critically and productively about problems in every field? How can writing across the curriculum, writing in the disciplines, and communication across the campus be used to help students master the knowledge they will need? How can the full potential of rhetoric and professional communication be brought into the partnership and not merely a “handmaiden” or “service” view of collaboration?

How can legislators, policy makers, educational leaders, and scholars collaborate for faster responses to the challenges ahead? What institutional arrangements will position writing across the curriculum programs and leaders for success in schools and colleges? What support and training enable writing across the curriculum faculty and teachers to reach their objectives? What oversight and assessment practices foster program improvement? What recognition will encourage participation? How can the slow pace of educational reform be accelerated to accomplish our vision for the future?

To spark thinking about how to address such questions, the conference began with a plenary session on planning processes. This session included senior WAC leaders Chris Thaiss of George Mason University, Carol Holder of the California State University System, Susan McLeod of University of California Santa Barbara, and Carl Lovitt, Associate Dean at Penn State University Berks, as well as Julie Zeleznik, a Ph.D. candidate who had been involved in facilitating community focus groups in planning an expanded WAC program at Iowa State Univer-

sity, and Linda Driskill, leader of a relatively new program at Rice University. The summary of their remarks provides a starting point, whether administrators are founding a new program or directing an established one.

The highlight panels were planned to invite contributions from policy makers and industry leaders as well as writing across the curriculum scholars. A list of the panelists is shown on pages 89-91. Summaries of two panel discussions present these distinguished speakers' insights on what leadership, goals, and policies can ensure that college students communicate well in multicultural environments, and international commerce and in their chosen fields. In the first, Moderator Deborah Andrews summarizes ideas presented by Rebecca Burnett, University Professor, Iowa State University; Mr. Daniel Chavez, President, Grupo Vidafel, Guadalajara, Jal; Mexico; Jonathan Monroe, Professor and Knight Writing Program Director, Cornell University; Neal Lane, University Professor, Rice University, formerly National Science Advisor to US President William Clinton, and Carol Geary Schneider, President, Association of American Colleges & Universities (AAC&U), Washington DC. Andrews shows how their comments endorsed, in Schneider's term, an approach to intercultural learning that supports "a vision of civic responsibility in a diverse and still deeply unequal world."

In the second panel summary, Moderator Steven Youra emphasizes the range of changes in funding, leadership, faculty participation, and communication abilities that the panelists recommended. Panelists in this group included more administrators and faculty, both from WAC and from other disciplines. Among them were Mary Burgan, General Secretary, American Association of University Professors; Brian Huot, Professor of English and Director of Composition, University of Louisville; Ken Cox, Instructor, Department of Chemical Engineering, Rice University; David Jolliffe, Professor of English, DePaul University; Sharon Quiroz, Editor of *Language and Learning across the Disciplines* and Director, Communications Across the Curriculum Program and Academic Resource Center, Illinois Institute of Technology; and Tracy Volz, Assistant Director of the Cain Project in Engineering and Professional Communication, Rice University. This panel brought together Mary Burgan's national perspective and Sharon Quiroz's view as editor of the key journal in the field as well as comments of assessment specialist Brian Huot and views of faculty in the disciplines such as chemical engineering faculty member Ken Cox.

The Leadership and Policies Articles

The current economic conditions tend to dissuade administrators from launching new programs and expanding established ones. Producing change is even more challenging under such conditions. How a writing or speaking program is positioned within a college can have strong impacts on its acceptance and effectiveness. Administrators can launch new efforts and redirect less successful ones with lessons from Chris M. Anson (chris_anson@ncsu.edu), Michael Carter, Deanna P. Dannels, and Jon Rust's model for choosing strategic partners within an organization. They use their own experiences at North Carolina State University as a test case to illustrate how the collaborations between units with common interests can achieve change.

The authors of two more articles recognize that change can be possible even when formal WAC programs and an official infrastructure do not exist. Lee Odell (odellc@mail.rpi.edu) and Bert Swersey of Rensselaer Polytechnic Institute suggest a collaborative strategy for accomplishing curriculum objectives with a covert alliance. Their approach focuses on the intersections of rhetoric and engineering in courses and assignments. Their samples of student writing offer concrete, clear examples of how such an alliance can benefit both the faculty members and students.

A different creative strategy comes from Texas A&M at Corpus Christi. Glenn Blalock, Diana Cardenas, Joyce Hawthorne, and Susan Loudermilk (Susan.Loudermilk@iris.tamucc.edu) offer a refreshing illustration of how town and gown can unite by identifying community needs that an English department's writing programs can address. They propose to strengthen writing across the curriculum by managing writing program development in cooperation with faculty from other departments. The consultative process allows the writing programs to change their courses and other disciplines to plan more writing in their courses.

New Models and Classroom Practices for WAC

An increasing number of colleges, especially in urban areas, struggle to educate students whose richly varied backgrounds include knowledge of other languages and cultures but who may know little English and be unfamiliar with student roles and US dominant culture. Linda Hirsch (LHIRSCH@hostos.cuny.edu), WAC Director at Hostos Community Col-

lege/City University of New York, and Carolina DeLuca, CUNY Writing Fellow, illustrate how colleges can rethink their courses in order to scaffold learning experiences for these students. Both faculty and mainstream students are unaware of how much cultural knowledge is presumed in traditional assignments. Hirsch and her co-author show how traditional assignments lack detailed instructions and presume knowledge students may not have. They demonstrate how courses and assignments can be redesigned to give students opportunities for actively engaging with community institutions such as museums, and reflective writing and discussion assignments that honor students' own experience and consolidate new knowledge.

Educators from both two- and four-year institutions will want to examine carefully the learning community Ronald J. Heckelman (Ron.Heckelman@nhmccd.edu), Department of English, and Will-Matthis Dunn III, Department of Mathematics, at Montgomery College created. Their first-year students flourish when both a freshman mathematics and a freshman rhetoric course focus on models. For some faculty, such a yoking might seem improbable, but the intellectual synergism and value to the students convinced the audience (and the reviewers) that this highly original approach could stimulate fresh thinking all round.

Other conference speakers offered fine presentations that could not be included in this issue. Morgan Gresham (now at Clemson, sgresha@clemson.edu), Former Director of First-Year Composition at Texas Woman's University, Sandi Reynolds, Director of First-Year Composition (SReynolds@mail.twu.edu), and Hugh Burns, Professor & Chair, Department of English, Speech, & Foreign Languages, both at Texas Woman's University (hburns@twu.edu), gave a trio of presentations demonstrating that through WAC, nursing education can improve the professional training, affect patient care, and enhance nurses' professional practice. And remember all those reports that say a huge fraction of the US population doesn't have a clue where Manila, Afghanistan, or Belgium is located? Catherine Hooey and Tim Bailey in the Department of Social Science at Kansas's Pittsburg State University (chooey@pittstate.edu, tbailey@pittstate.edu), explained how geography can be a great site for writing and becoming a more knowledgeable world citizen. Deborah Smith (dasmith@siu.edu) of Southern Illinois University combined writing with Bloom's taxonomy to design a coherent instructional service learning sequence in

a recreation curriculum. Ivan A. Shibley, Jr., a chemistry professor at Penn State Berks, described how he assigns chemistry term papers that allow students to explore a chemistry topic of their own choosing. Finally, William Carpenter (carpentw@lafayette.edu) offered a call for courses and assignments that help students analyze the language of the fields they study with a critical eye to the ways that power and authority are wielded. Without fostering this kind of critical distance as well as mastery of disciplinary conventions, students may be assimilated unthinkingly into roles and processes that leave a legacy of suppression and exploitation.

Although we could not include these fine presentations in this issue, we urge you to seek out their publication in future issues of *LLAD* and other journals or better yet, to contact the presenters directly. This issue and the additional pieces we could not include suggest spots for faculty and a host of colleagues, friends, industry leaders, and government officials to become partners in writing a better future for all students, all people, all nations. We invite you to read these summaries and articles and to contact the authors or members of the editorial panel to discuss their implications. Our names and e-mail addresses are listed below.

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Panel Summaries

Plenary Panel

Processes for Thinking about WAC's Future

Linda Driskill, Professor
Rice University - Moderator

Panelists

Chris Thaiss, Professor
George Mason University

Carl Lovitt, Associate Dean
Pennsylvania State University

Julie Zeleznik, Doctoral Candidate
Iowa State University

Carol Holder, Director
*California State University Institute for
Teaching and Learning*

Susan McLeod, Professor
University of California Santa Barbara

Faculty often tell their students that conversations contribute to the collaborative writing process. The first plenary session was planned as a generative activity: conversations, first, among the panelists, and then involving the whole audience, to begin collaboratively writing the future on a grand scale. The result of these conversations should impact policy makers, leaders in many institutions, and legislators who control state funding.

Chris Thaiss — At any phase of a program's evolution, a leader is always starting and restarting; some faculty are advanced and experienced with writing across the curriculum, while some are beginning. However, if we compare program planning twenty-five years ago and now, the big difference is the amount of support available. Now we have many places to turn:

- A huge array of schools' web sites that show what other schools are doing

- The on-line WAC Clearing House at Colorado State University
- Hundreds of professional books and articles
- Issues of *Language and Learning across the Discipline*, which are on-line at the WAC Clearing House
- A strong research tradition
- National conferences, where we work together and answer questions
- Special interest groups at national conventions, such as the Conference on College Composition and Communication
- A small army of very experienced WAC people who can be used as consultants
- People on every campus who, by their experience and reading, are familiar with the concept and who can be sources of support.

These connections create a new context for planning, whether the program is new or old, and allow us to avoid the frustrations of really “reinventing the wheel.”

Carol Holder – Changing institutional contexts present opportunities for those who are starting or maintaining a language across the curriculum program. These new initiatives are very important as partners for WAC and CAC programs. Furthermore, these new partners are more likely to succeed if they incorporate writing and other forms of communication instruction into their activities.

- *Faculty centers for professional development.* Many, many dollars go into faculty professional development programs. WAC leaders can suggest the impact that would be made on faculty development if centers would put a high level of funding into helping faculty use writing activities in their classrooms to improve teaching. After all, where does the learning happen? – through discussions, e-mail exchanges, bulletin boards, writing assignments, journals, and new forms of texts.
- *Service learning initiatives.* Service learning courses with a backbone of writing assignments enable students to make connections between service experiences, academic learning, and personal growth.
- *Assessment centers.* These centers’ staffs are concerned with how to assess a broad range of learning. WAC leaders can assist them with how to assess stu-

dents' skills, confidence, and competence as writers and speakers. In turn, such collaborations provide plenty of opportunities for working with colleagues to examine assessment outcomes and improve the curriculum through WAC.

- *Scholarship of teaching initiatives.* These initiatives foster classroom research and help faculty discover more about learning processes in their classrooms and the impact of writing on student learning.

Linda Driskill — Chris Thaiss mentioned how writing links us to people outside the institutions, while Carol Holder mentioned new connections to people within our institutions. These people are all potential stakeholders in WAC programs, but they have different types of experience with WAC and with writing and communication instruction. As a result, they have different expectations and definitions that can cause them to propose activities or policies that are not enriched with the many forms of knowledge that Chris has noted. In considering how to make connections with stakeholders of all kinds, it could help us to apply the principles of a perennial best-seller, Fisher and Ury's book, *Getting to YES*, which distills lessons learned from the Harvard Negotiation Program.

Key points from that process include

1. Ask what's driving the person's (or group's) proposed vision for the program – forestall criticism and find out motivation. Once that is known, the many resources Chris Thaiss mentioned can be put in the service of the discussion.
2. In a separate step, find options for mutual benefit. In this step one forestalls all criticism and evaluation but tries to develop possibilities that have not been considered earlier.
3. Figure out the alternative each side has to a negotiated agreement. If no agreement can be reached, what will others do? What will your program do? In considering this matter, you may find reasons that enable you to persuade others to agree to a solution or you may find additional options.
4. In a separate step, choose criteria that can be applied to evaluating options. You can insist on a principled decision and avoid intimidation. There will be fewer roadblocks, and you can make the feasible connections more quickly.

5. Finally, make the agreement and include provisions for what everyone will do if the agreement needs to be changed or renegotiated.

Carl Lovitt – In planning for new or ongoing programs, I see additional connections that programs can make, partnerships with people outside the institution. This is a different kind of partnership, but an equally integral one. Specifically, I suggest creating off-campus advisory boards and involving them in planning. These people are often very concerned with improving student writing. Accrediting agencies and businesses want to see improvement, and having an advisory board off campus as well as one on campus can get practitioners involved.

You may want to choose people who can communicate powerfully to students and faculty about what it means to communicate well in the workplace. Bring them in for a day. Have panels from different industry sectors and sessions that both students and faculty might attend. Programs can match up managers' skill sets with student courses – these professionals can do a lot to help students understand what they will need in the future. Furthermore, such industry partners can review resumes and counsel students about how to position themselves to be employable. Professional fields often have advisory councils of their own. Advisory board members can be involved in watching final presentations or reviewing video tapes of student presentations. They may help conduct workshops, too. People who say students can't communicate may want to do something about it, from coaching to teaching to providing endowments.

Sue McLeod — Having recently moved to the University of California at Santa Barbara, I'm once again involved in planning and "thinking anew" about the future. One change that people have not been taking into account in their planning is the dramatic shape of student demographics. In many universities, students who speak multiple languages now constitute a large proportion of the student population. At school, they speak English, but at home they speak another language. Although they are adept at speaking English, their written English is a kind of an interlanguage, affected by the patterns of their home language. These are not traditional English as a Second Language students, and their problems are not ones English faculty are used to dealing with. They don't belong in ESL classes. In planning for WAC programs, we need to de-

velop expertise in helping these students and helping faculty who work with them.

Julie Zeleznik — Involving graduate students in planning can have multiple benefits for universities. Having been undergraduates recently themselves but having recently taken courses in teaching writing and writing across the curriculum, graduate students can be advocates for undergraduates. At the same time, they are not as completely assimilated into the university and have some critical distance. Working with industry representatives as I did at Iowa State, graduate students can serve as research staff at the same time they are gaining a better understanding of the employers their students will communicate with in the future. Such experience helps graduate students later when they plan their own courses, as well.

Conclusion. The panel's discussions of the stakeholders, negotiation processes, issues, and personnel prepared the audience to engage in conversations throughout the conference as topics of leadership, technology, and many other aspects of WAC's future were foregrounded in presentations and panels. Tables in the Duncan Hall lobby were full throughout the conference with participants engrossed in discussions. We hope these conversations will continue as readers respond to the summaries and papers in this special issue of *LLAD*.



Panel 1

What Leadership, Goals, and Policies Can Ensure that Students Communicate Well in Multicultural Environments and International Commerce?

Deborah C. Andrews

University of Delaware, Moderator

Panelists

***Rebecca Burnett**, *University Professor, Iowa State University, Ames, Iowa*

Daniel Chavez, *President, Grupo Vidafel, Guadalajara, Jal, Mexico*

***Jonathan Monroe**, *Professor and Knight Writing Program Director, Cornell University, Ithaca, New York*

***Neal Lane**, *University Professor, Rice University, Houston, Texas. Formerly National Science Advisor to US President William Clinton.*

***Carol Geary Schneider**, *President, Association of American Colleges & Universities (AAC&U), Washington DC*

Note: * denotes panelists whose prepared statements are available in the conference website (<http://www.ruf.rice.edu/~wac2002/>). Also available is a statement from Elaine Maimon, Campus CEO, Arizona State University West, who had been invited to participate in the panel but was not able to attend.

The five panelists addressed this very large question from different points of view and different areas of expertise. In general, however, they endorsed, in Schneider's term, an approach to intercultural learning that supports "a vision of civic responsibility in a diverse and still deeply unequal world." This summary captures some of the issues raised in the discussion and suggestions for addressing these issues.

Learning That Crosses Borders

Students need to learn to cross borders—of language, culture, and disciplines. A baseline for communicating well in multicultural environments and international commerce is communicating in more than one language. English has increasingly become the international language of commerce. But those who speak only English, especially only *American* English, lack an essential ingredient for multicultural understanding. Language study should occur at all educational levels from pre-school through university.

Students also need to acquire an ability to negotiate understanding in culturally contested situations foregrounding competing perspectives, an environment characterized increasingly by conflict, tension, and resistance (Burnett). And they need to work with people from their own as well as other disciplines. Words and ideas, even in one common language like English, don't mean the same things in different professions (Neal), and professions tend to create their own special languages as well. So students need to learn not only how to communicate within their discipline but how to translate their discipline to others. "The big context is learning how to learn from and work with others, in many settings, across different cultural, socioeconomic, class, religious, and language boundaries"(Schneider).

Learning to Solve Complex Problems

Students also need to learn how to deal with muddled, complex problems, with "unsettling knowledge," knowledge that is "provisional, contingent, subject to revision...unstable" (Monroe). Their assignments should prepare them for an international workplace and an international community by helping them recognize the many dimensions of any decision beyond the mere disciplinary or technical. Good education is engaged education that encourages students and faculty alike to recognize that social policy, for example, is not something done to us but something we should shape (Burnett).

Taking Responsibility: Corporate Support for Education

From his perspective as a Mexican entrepreneur, Chavez cited the role of corporations in fostering education for civic reform. For years, Mexico has exported cheap, low-skilled labor to the US and imported management talent, especially from the US. Moreover, Mexican business can thrive only in

conditions of social stability. Social policies that counteract poverty and enhance the lives of everyone can lead to greater foreign investment as well as greater national and international security. Thus Mexican executives serve themselves as well as other citizens in fostering education and international understanding.

Implementing Change: Some Suggestions

The panelists cited many practices and programs (including, not unexpectedly, writing across the curriculum approaches) that can advance the central goal of intercultural learning, for example:

- educating the public that bi- or multilingualism is desirable
- supporting language instruction at all educational levels
- developing international student and faculty exchanges through the Internet and, where possible, through personal visits
- enhancing and perhaps requiring study abroad placements
- adapting curricula so that international thinking is pervasive, not merely decorative
- offering well conceived service learning opportunities that help students fulfill their civic responsibilities.

Some of these suggestions are included in a recent AAC&U report, "Greater Expectations: A New Vision for Learning as a Nation Goes to College." (In addition, Schneider notes, *US News* now collects data on how many campuses feature writing in the disciplines. The 2002 issue of *America's Best Colleges* ranks ten good examples of such programs.)

At the end of his presentation, Chavez outlined an international internship program that he proposed on behalf of his company, a major timeshare resort developer in Mexico. He offered to sponsor students from the US who would work in some of the 10 resorts his company runs. In return, as a way of enhancing Mexican education, sponsoring US schools would agree to arrange exchanges for Mexican students at US firms. Initially, he will work with students from Rice University. Eventually the program will expand to other institutions, and in doing so, provide one model of how educators and corporations can help make the world a better place.



Panel 2

What Must Be Done to Ensure That College Students Communicate Well in Their Fields?

Steven Youra

Director, Hixon Writing Center
California Institute of Technology
Moderator

Panelists

Mary Burgan, *General Secretary,
American Association of University
Professors*

Ken Cox, *Instructor, Department of
Chemical Engineering, Rice University*

Brian Huot, *Professor of English and
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With the turn of a new century, it seems as though everyone has gone into the forecasting business—especially stockbrokers and academics. Our own field has marked the emerging era with a wonderful essay collection, *WAC for the New Millennium* (ed. McLeod, et al., NCTE 2001). In the same spirit, this panel looked to the future by reflecting on best current theory/practice (guided by the stockbrokers' caution that past performance is no guarantee of future results.) To set the stage for the discussion, the moderator briefly considered the title assigned by the conference organizers: “*What Must Be Done to Ensure That College Students Communicate Well in Their Fields?*”

The passive construction begs the question of agency. Just *who* is supposed to ensure that students communicate well? With regard to WAC, it turns out that this ambiguity is appropriate. WAC work is shared among teachers from different fields, and increasingly, with participants from *beyond* the curriculum (as Eli Goldblatt put it in a recent *CCC* article) in projects that involve non-academic constituencies (e.g., business, engineering, community groups). Since the WAC enterprise is collaborative, the “who” is plural, often shifting, and sometimes up for grabs.

- “*Ensure*” in the title reminds us that assessment is critical if WAC/WID efforts are to improve teaching and learning, especially as we are asked to demonstrate the effectiveness and value of this work to legislators, deans, funding agencies, and accrediting boards (such as ABET, in engineering).
- “*Communicate well in their fields*” raises a different set of questions: How does effective communication (in its myriad forms—written, oral, visual, electronic) differ among various fields & genres, and how can we benchmark, measure, and improve something as intangible as our students’ ability to communicate?

Our panelists offered a range of perspectives, with resonances—points of contact and areas of difference—that we explored with the audience in discussion.

Mary Burgan addressed a key political/economic issue—the allocation of faculty resources for teaching writing across the curriculum. She stressed economic factors over pedagogical issues because of the irreducible fact that writing instruction is a labor-intensive activity. Burgan offered four “exhortations” to promote successful writing instruction across the disciplines in the current academic environment marked by increasing competition for limited funds and by rewards that go to raising an institution’s national ranking.

- We must stop exploiting part-time and adjunct faculty. The situation is unfair to the instructors, it isolates student writing from other intellectual activ-

ity, and it falsely implies that “someone else” should attend to this essential feature of every field.

Composition specialists, invested in their own expertise, must be open to having colleagues in other disciplines work with writing. “[T]he theorization of the

- field of composition must be decoupled from the notion of ‘good enough’ writing pedagogy.”

Faculty across academic fields must overcome disciplinary and participate in WID programs via graduate training, modeling from senior faculty, and informed support from disciplinary associations.

Institutions (chairs, deans, and provosts) must reward WAC work with recognition (money and status) for good teaching that includes attention to language.

Ken Cox posed two questions: “Why should teachers across disciplines include writing when they already have plenty to teach?” and “What does it mean to have students ‘communicate well in their fields?’” As a chemical engineering instructor, Ken is particularly concerned about the particular skills that his students need for professional success after graduation. He explained that professional practice has changed radically in the past twenty-five years. In the old days, a research engineer in industry could do good science and report the results to a manager who had the same level of expertise. That manager would communicate the information to a range of audiences, including those who were far less specialized. But that scenario has changed: Many engineering grads now become consultants and must communicate to broad audiences. Even if they go to industry, engineers now often work on small teams in which each person’s communication skill is critical for a project’s success. The typical audience for engineers’ communication is no longer a single expert in the field, but a range of readers and listeners—decision-makers and others who have diverse specialties or little engineering background. Therefore, our students must learn to communicate effectively with such audiences and to recognize and translate jargon.

Brian Huot extended the discussion of politics by way of genre, citing a local example as paradigm case. He began by suggesting that genre study can be a useful way for us to extend writing instruction into the disciplines, in collaboration with faculty from other fields. Brian contrasted the WID approach with a more generalized WAC effort—one that “often focuses on the generative power of writing for teaching and learning”—and he emphasized that institutional structures and rewards must support developments in either of these writing-intensive approaches. To illustrate these programmatic and structural imperatives, he then described a situation from his own school, University of Louisville, as a negative example: Brian led a WAC effort based in English department. But “[e]ven though a review of our initial plans by outside evaluators had recommended that a writing center be established and that disciplinary faculty receive some kind of compensation for their increased efforts, these measures were not enacted.” As a result, all schools and colleges at the University, except Arts & Sciences, voted not to keep the WAC requirement for graduation. “I cannot help but wonder if we would have been able to sustain our program had we employed a different institutional structure.” On another note, Brian stressed that those of us who work with language across disciplines should continue to learn research and theory in allied fields (e.g., literacy, dialect analysis, applied linguistics, composition, disciplinary discourses, etc.).

David Jolliffe argued that we must attend to genres, as students are asked to employ them in different disciplines and as genres are made and remade to enable and to structure power relationships. He stressed the need to engender uncertainty in students to complicate their decision-making and genre choices, and he bemoaned the fact that in WAC situations, “faculty members frequently assign students to write something they label an *essay*, without realizing that the definition of this genre is highly malleable and differs from one field to the next.” David stressed that situation and genre are critical and noted that WID faculty “often ask students to write in one of the discipline’s preferred genres without helping the students see the genre as a principal tool of the discipline’s epistemology and methods.” For a scholar working in a field, genre is more than format. Citing the work of David Russell and Carolyn Miller, he claimed that genre has

a critical dual function—to “help writers recognize recurrent rhetorical situations and . . . to shape and constrain knowledge work.” Genres emerge as substantive and stylistic features in recurrent rhetorical situations and are recognized as conventional by members of a disciplinary community. David explained that a genre allows a writer to report information while the conventions and constraints give structure to whatever is reported. Therefore, he concluded, genre must play a central role in WAC/WID pedagogy. Students must be taught to ask: What situation am I in? How should I respond substantively and stylistically?

Sharon Quiroz modified the panel’s charge by asking: What must be done to ensure that college students communicate well *in fields of science and technology*? She noted that her own professional move from a liberal arts institution to a technical school raised new problems for her work in WAC. She explained first, that in working with language in engineering and science education, the primary instructors must speak English. This would mean both linguistic competence and uses of language beyond mathematics. She cited research demonstrating that students who are required to write regularly about technical concepts are better able to understand specialized articles in their field. Second, Sharon noted that in technical institutions, faculty feel pressured to bring in large research grants, sometimes at the expense of attention to teaching. Third, she suggested that technical institutions must develop new incentives and rewards for teaching excellence, perhaps by establishing new kinds of appointments that stress pedagogical excellence more than research. Finally, she noted that external factors and organizations can have a positive influence, for example the stress by the Accreditation Board for Engineering and Technology (ABET) on “educational outcomes,” including effective communication.

Tracy Volz emphasized the importance of instruction in oral presentation, especially for students in professional fields. She noted that two problems in conventional curriculum design often undermine such efforts: First, oral presentations are typically assigned at the end of the term, when students are overwhelmed with other work. Second, presentation experiences are often limited to a single senior capstone course, a high-stakes situation that comes too late and with too much

pressure to be effective. Furthermore, in these limited situations, students do not usually receive enough coaching in advance or feedback afterwards. Alternatively, Volz argued, “[t]he integration of oral presentation assignments throughout a course and curriculum that focus on this purpose. . . not only will improve students’ learning but also will provide multiple opportunities for students to practice and experiment with oral presentation skills when the stakes aren’t quite as high.” In addition, communications activities that include career planning, explorations of the particular profession, and role-playing, will “generate enthusiasm, build students’ self-confidence, allow comparisons between their expectations and actuality, and prepare them to take charge of their futures.”



Mutual Support: CAC Programs and Institutional Improvement in Undergraduate Education

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Writing- and communication-across-the-curriculum programs often develop as independent initiatives focused on improving students' writing and/or speaking by incorporating these activities into coursework and helping teachers to use them more effectively in their instruction.¹ However, there is now much anecdotal evidence of the conditions that work against the cultivation of cross-curricular programs: faculty complacency; the weakening of a program's original spirit; reduction or elimination of funding; and the continued avoidance of involvement by some programs, administrators, or faculty (see White).

We believe that such failures occur, in part, when programs become either isolated grass-roots efforts, struggling to scatter the seeds of change across a vast and sometimes arid curricular landscape, or isolated control units, empowered and supported by higher administration but unable to break the bonds of their authority in order to work collaboratively with the groups they are trying to change (see Holdstein). In this essay, we will first describe ways in which CAC programs can become an integral part of a broader, in-

stitution-wide mission to improve undergraduate education through a stronger focus on collaborations and partnerships with organizations and administrative units that share commonalities of mission. We will then describe and assess the results of such a partnership at North Carolina State University, where we have teamed up with those responsible for a major, institution-wide initiative involving every undergraduate program in continuous cycles of program review and assessment. By analyzing the successes and limitations of our work, we suggest some fruitful directions for programs seeking mutual support for their efforts.

Pieces of a Puzzle

Early literature on CAC programs was generally silent about the prospects of collaboration, focusing instead—justifiably—on the nature of faculty development and questions of leadership and internal structure (see, for example, Young and Fulwiler). As CAC developed strongholds in many colleges and universities, program leaders became increasingly aware that isolation-based autonomy creates vulnerability and hampers effective curricular and instructional reform (see Gottschalk; Harris).

In the context of these concerns, many programs are now actively pursuing new partnerships and are considering greater integration with other academic and support units. Highly successful collaborations such as that between the College of Agriculture and CAC experts in the Department of English at Iowa State University are becoming more commonplace in many institutions, though still far from the norm. The advent of digital technologies has also created contexts for new electronic partnerships (see Reiss).

Most campuses have groups, committees, support units, departments, projects, or educational divisions with which a CAC program can work to effect change in the processes and practices of education. We visualize such possibilities using the conceptual metaphor of a jigsaw puzzle. In some ways, campuses are like partially finished puzzles. If we could see them in time-lapse photography, jigsaw puzzles move from a hundred disparate and disorganized pieces toward a final, complete, interlocked picture with only one “solution.” But universities are more like puzzles whose pieces are continuously moved around and can fit into more than one space. Sometimes two pieces will lock together to form a bit of the

campus picture, but later are pulled apart again and relocated. On one campus, for example, a CAC program will be adjacent to and sometimes interlocked with other units—a teaching/learning center, or a tutorial service. In contrast, the WAC program on another campus will be designed to stand at the center of an undergraduate curriculum, providing help and reform to all units. But it has not yet partnered with other units on campus, existing as a lone effort that offers lots of output (workshops, resources) but gets little input from others—a puzzle piece with blank pieces around it. In visualizing programs in such a way, we do not want to imply that an autonomous or disconnected program is less functional or successful than one that is more interlocked. One program simply tries to operate in a more autonomous way, like a writer who works alone and shares her final product with an intended audience, while the other seeks out connections and partnerships.

Extending this metaphor a bit further, we can also imagine where the unit might be located in entire puzzle; it may be situated toward the edges, as a peripheral effort without much visibility across a campus, or near the center. An isolated WAC or CAC program might be partnered with only one or two units, or with none at all (surrounded by blank pieces). Some WAC programs that have strong ties to business and industry interlock with pieces that are part of other puzzles, beyond the administrative and physical domain of the campus.

Fitting with other pieces can be a challenge for a WAC or CAC program. Competition for scarce resources can pit units with shared missions against each other, or more subtly create anxiety about who will get credit for what. Some potential partners don't share the knowledge or perspectives of the program leaders, and agendas can diverge or become the source of tension. The fierce independence of some units, or their perception that they are "maxed out," may show up as resistance to collaboration. Or a unit may be poorly organized or on the verge of dysfunction, and end up sapping the energy of the CAC program by happily allowing some of its responsibilities to be managed or fulfilled by the program's more energetic leaders and staff.

These and related perils of partnerships between CAC programs and other administrative, academic, or support units on campus can be mitigated with a sensible approach

to collaboration. Collaboration is not a unitary process in which a CAC program always fully partners with another unit. Instead, collaboration is multifaceted and in a constant state of evolution. In our own work, for example, we have felt the bonds of collaboration change naturally in the course of a single semester, as a project involved intense, close work and then, reaching fruition, saw the partners become more distanced again, leaving behind not only the results of the work but a deepened understanding of one another's missions and a feeling of shared effort. Monitoring and talking about the fit or lack of fit between partnerships can help a program to decide whether to keep pursuing a relationship or move on, without animosity or regret, to establish new connections or strengthen existing ones.

Fitting Pieces of the Puzzle: An Integrated CAC Program at NC State

Our own Campus Writing and Speaking Program (CWSP) illustrates the kinds of partnerships that CAC programs may build across the campus. Indeed, the CWSP was initiated as a highly collaborative program and, in its history, has successfully sought to extend that collaboration. In the early 1990s NC State established the Council for Undergraduate Education to oversee the creation of a general education program, comprised of a set of requirements for all students across a range of disciplines. The original General Education Requirements for Writing and Speaking consisted of three parts: six hours of first-year writing, three hours of a more advanced writing or speaking course, and a vaguely worded paragraph encouraging faculty in the majors to use writing and speaking to enhance their students' learning.

This final paragraph, the only hint at communication across the curriculum in the general education program, proved to be so vague and difficult to assess that another committee was formed to rewrite it. That latter committee at first proposed a very modest set of writing-intensive courses in the majors, but there was a strong push for something more, a plan that better integrated writing and speaking in the academic majors and also had more teeth to it. The new wording, though unapologetic in its linguistic institutionalese, set forth a new direction: "In addition [to the other writing and speaking requirements], each curriculum is designed so that upper-level courses and other programmatic experiences

help students write and speak competently in the disciplines. In each curriculum, the design and delivery of that support are guided by *various form of programmatic assessment*" (italics added).

Unpacked, this statement meant, first, that responsibility for writing and speaking in the disciplines would reside in each department. There would be no campus-wide communication requirements, no mandated writing- or speaking-intensive courses, no portfolios from across the university—none of the usual models for CAC. Second, it meant that along with this responsibility, each department would be held accountable for its students' writing and speaking. Specifically, that accountability would take the form of outcomes-based assessment: each department should evaluate the ability of its majors to write and speak competently in the discipline according to department-specific writing and speaking outcomes.

In practical terms, this form of assessment required departments to: (1) determine writing and speaking outcomes for its majors, (2) create plans for assessing those outcomes, (3) implement those assessment plans, and (4) report its assessment findings to the Council on Undergraduate Education periodically and show how those findings have led to the improvement of students' writing and speaking through changes in courses or curricula. Nearly everyone involved agreed that we could not realistically expect departments to take on both the responsibility and the accountability without appropriate guidance. It was out of this need that the CWSP was created.

As it came into being, the CWSP developed two main areas of activity: cross-campus faculty development that supports the integration of writing and speaking effectively into courses and curricula; and departmental consultation in support of the writing and speaking assessment process we have described. In 1996 the CWSP initiated a five-year plan by which it would work with two of the nine undergraduate colleges per year for five years. It developed an intensive procedure for collaborating with faculty committees in the various colleges to identify writing and speaking outcomes and generate plans for assessing those outcomes (Carter; see also sample outcomes at <http://www2.chass.ncsu.edu/cwsp>).

The CWSP was in its inception, therefore, neither an isolated grassroots effort nor an isolated control unit. Rather,

it was fully integrated into the university, working in partnership with other units in the institution. It was directly linked to the general education requirements and the Council for Undergraduate Education. It was linked also to all the undergraduate academic departments through the shared goals of improving students' writing and speaking. This integration was symbolized by the Campus Writing and Speaking Board, an advisory group to the CWSP consisting of representatives of all nine undergraduate colleges and other members of the university community associated with writing and speaking.

In the third year of our five-year plan, CWSP leaders (Anson, Carter, and Dannels) came across a bootleg draft of a memo from a faculty-based university committee we'd never heard of, a committee (chaired by Rust) that was proposing university-wide outcomes-based assessment. According to this memo, all undergraduate academic programs would be asked to submit assessment portfolios that would, among other items, contain: (1) student learning outcomes for their graduates, (2) methods the program uses to determine whether its graduates are achieving those outcomes, (3) results from the assessment, and (4) how the results have been used to improve the program.

These four items looked distinctly familiar to us. Our first response was to feel threatened. Even in the midst of our own connections with other units, we felt invaded, our territory and expertise undermined by outsiders claiming to be doing similar things. Who were these people coming into our neighborhood and throwing their weight around? Like many CAC program leaders, we were immediately suspicious, sharing a belief that assessment initiatives are often planned and overseen by some administrative office removed from the CAC program, an office whose members do not share the CAC program's student-centered, contextually sensitive, longitudinally oriented, and developmentally preoccupied ideology of assessment.

An Unlikely Fit? A Partnership with Institutional Assessment

In light of this natural move toward defensiveness, our most fortuitous response to the committee's memo was not to rush to judgment. Instead, we began to learn more about the committee that had drafted it. Assessment-based undergradu-

ate academic program review had begun years earlier at NC State University and paralleled the efforts of institutionalizing CWSP. As the five-year plan of working with the undergraduate colleges was launched, another initiative was underway: a faculty ad-hoc committee was formed to study how program review could be improved to include the concepts of continuous improvement, respecting departmental autonomy and being sensitive to outside accreditation needs to which many programs on campus were subject. The recommendations of that ad hoc committee included the above-mentioned goals, adding suggestions that the assessment process be team-based, faculty driven, focused on learning outcomes, and overseen by a task force to explore models for implementing university-wide assessment. The newly formed task force then created guidelines that have, at their foundation, commitments to respecting departmental uniqueness, both in what was to be assessed and in how it was to be assessed, and to facilitating a process that allowed departments to make the curricular implementation process meaningful.

Following the approval of the task force guidelines, the Committee on Undergraduate Program Review (with membership from all nine colleges) was formed to carry out the assessment plans and guidelines. The charge to CUPR was to implement assessment-based program review across the campus. The CUPR faculty members began the first year at various levels of awareness of assessment methods in undergraduate education. Most were novices, some had minimal experience, a few had a lot of experience. The varying levels of experience required an initial stage of group formation—where members asked questions, raised challenges, and addressed confrontations within the group. This process had several steps: identifying a common assessment vocabulary, identifying best practices to use as models campus-wide, refining program review guidelines, and setting a timetable that took into account outside accreditation requirements. The outcome of this process was clearly defined guidelines for programs across campus that include:

- 1) drafting student learning outcomes, 2) implementing a plan for measuring those outcomes, 3) collecting and analyzing data, 4) drawing conclusions from those data, 5) making programmatic changes as a result of data analysis, and 6) and ensuring that the process was continuous and ongoing.

It was at this point that the CUPR members realized the time was at hand to begin the actual implementation. And simultaneously it became painfully obvious (since most members were novices themselves—albeit committed novices) that CUPR might have difficulties leading others down a road they had not been down—a road that could have obstacles of which CUPR was not entirely aware. Under the leadership of its faculty chair (Rust), CUPR turned to CWSP for help.

Having learned this history of CUPR and its goals, those of us in the Campus Writing and Speaking Program began to think positively about a possible partnership with the committee, especially because we recognized in it a certain degree of shared understanding and similarity of assumptions about assessment. Perhaps we could form a relationship with this other committee, one that could be mutually reinforcing and beneficial to all of us and to our university. Thus began a productive collaboration between the CWSP and the Committee for Undergraduate Program Review (CUPR).

Since CUPR was devoted to the concept of implementing an assessment-based program review process, the appeal was not only to assist in this implementation through the continued outcome-driven efforts of the CWSP, but also to help guide the CUPR members to be effective facilitators of the process so that the number of assessment-based program review facilitators on campus could grow—quickly.

Mutual Support in Practice: A Collaboration between CWSP and CUPR

As illustrated, the CUPR, having gone through multiple iterations of building common definitions and working through committee members' challenges to the new Undergraduate Program Review process, represented a fairly cohesive unit. They were now faced, though, with the daunting task of spreading information about a widespread assessment initiative to faculty across campus, answering questions from faculty that they had only recently answered for themselves, and doing these tasks with an attitude that would combat the expected “just another fad” response. Therefore, to assist CUPR members with these issues, the CWSP provided a “train the trainers” program for faculty on the committee. Upon consultation with CUPR leadership, we developed a two-phased model for training CUPR members to work, as col-

lege representatives, with small groups of faculty engaged in the outcomes-development effort in their departments.

The first phase of the train-the-trainer program focused on providing a model of outcomes-based assessment consultation for CUPR members to reflect upon in guided ways. We were committed to capturing the consultation process “in action” (as opposed to simply telling trainees about it), because many of the complex issues that arise in faculty consultations are about the social, personal, and inherently political nature of curricular reform that can only be appreciated having “been there.” Therefore, we videotaped a faculty consultation that was facilitated by a member of our CWSP team working with a group of faculty through the initial stages of the outcomes development process.² The 12-minute videotape was divided into five different sections: explaining the outcomes-based assessment process; handling resistance; asking questions to facilitate discussion; encouraging participation; and moving forward after the initial outcomes consultation. To accompany the videotape, we constructed a series of training questions to help faculty, organized into smaller focus groups, to think deeply about the issues involved. For example, in the section titled “handling resistance,” training questions included the following: (1) What kinds of resistance can you discern in the video? (2) What are some other possible sources of resistance? (3) What are some strategies for handling this resistance?

Phase two of the train-the-trainers model included a workshop focused on providing CUPR members with an opportunity to role-play faculty consultations in which they practiced working with mock faculty members. We designed five role-play scenarios to address the most common situations CUPR faculty might face in their consultations, each targeting a particular challenging situation. We designed each scenario so that the trainee would know the rank and disciplinary affiliations of the mock group of faculty they would be working with. For example, in the scenario “What About Assessment,” three faculty members, one from forestry, one from plant pathology, and one from statistics, bring to the table different ideas of what assessment means, and expect clear answers about what is to be done. The faculty member in forestry is concerned about the issue of measurability, arguing that some important educational goals in forestry cannot be measured. He gives the example of the following objec-

tive and challenges the facilitator to show how it can be assessed: “Students will generate an ethical stance and reverence for the environment and the natural world.” The other faculty bring contradictory ideas about assessment. The statistician believed that the only way to assess these outcomes is through clear, valid pre- and post-tests. The plant pathologist reports on several situations in which his colleagues were able to assess their students by reviewing their field journals. The conversation that emerges forces the facilitator to explain the issue of assessment and deal with differing assessment questions and concerns.

In the role play itself, we had three trainees sit with the mock faculty group and asked each person to work with the mock faculty for a set time period. When that time was up, the next member of the faculty group picked up where the previous one had left off. This arrangement allowed trainees to try on their facilitator hat with minimal risk (they knew that if they got in trouble, time would run out and they would be saved by the bell), and to engage in peer learning (often the person who started where the previous trainee stopped was able to provide a fresh perspective on the situation).

Following this role-play session, we provided the CUPR faculty with a training guide for their consultations. This training guide included a model structure and process for them to follow, if they still felt unsure about how to run the consultation session. Additionally, we attended the larger CUPR sessions where facilitators worked with faculty and acted as “roaming facilitators”—providing support to any facilitator if asked.

Mutual Support: Larger Issues for CAC and WAC Programs

In this abbreviated example of one partnership between the Campus Writing and Speaking Program and the Committee for Undergraduate Program Review, we see several larger issues emerge for CAC programs. First, in training faculty to become trainers themselves, we had to let go of the notion that we, as CWSP administrators, were the only people who could and should work with faculty in this arena. We had to approach the faculty facilitators with a genuine desire to give up our power and control so that they could take over the task of spreading the word to faculty across campus. In fact, in the large workshops where the trainees were actually

working with faculty groups, we sat back and did not participate with their groups so that they would have more control over their own consultation group without the perception that we were running the process.

As a program, we also had to be willing to adapt some of our faculty development practices to the needs of the CUPR facilitators. For example, the CWSP typically runs workshops that help faculty to pay more attention to writing and speaking in their courses. Our partnership with CUPR required us to engage in a different type of faculty development in which writing and speaking were present, but not as the guiding force of the training. Essentially, we were training faculty facilitators to participate in important writing and speaking activities (helping other faculty write objectives and outcomes; facilitating difficult discussions with colleagues) but we had to adapt our standard faculty development practices to focus more centrally on training facilitators for outcomes-based assessment processes, not training teachers of writing and speaking.

Although the Campus Writing and Speaking Program had to be willing to accept these issues of power, control, and adaptability, we believe the rewards far outweigh the costs. In our partnership with CUPR, we moved the program to a central position in larger institutional initiative. We provided assistance and training to facilitators that allowed us to continue working toward the long-term sustainability of our program. Our position in our institutional puzzle moved as we found a place where we could fit with another important piece, a piece that itself had created alliances with various departments and colleges, with our Division of Undergraduate Affairs, and with the Provost's Office.

In their cross-curricular and cross-campus work, CAC programs are central to certain kinds of curricular and pedagogical reforms. Our story illustrates for us the principle that the mission of such programs is not to keep handing out sustenance; rather, it is to help others to learn ways to become self-sustaining in their own continuous improvement. Such an attitude does not, as some have suggested, spell the demise of the program that has worked toward change; instead, it promises that it and the units with which it has partnered can support each other mutually as we all continue to face new and ever more complex challenges in higher education.

End Notes

1. For convenience, hereafter we use the acronym “CAC” to mean both writing- and communication-across-the-curriculum programs, since the latter are broader and encompass the former.
2. CWSP received permission from one of the departments it was working with in the outcomes-development phase to videotape an already scheduled meeting as the “data” for this training video. Video production students edited the tape according to CWSP guidelines.

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Reinventing *Invention*: Writing across the Curriculum without WAC

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Work for this essay began with a problem that will sound all too familiar to most of us in higher education: It has recently dawned upon administrators and faculty in many departments across our university's curriculum that our students can't write. Or more accurately, enough of our students write poorly enough that we have cause for concern. This concern is usually expressed in the unequivocal if vague resolution that something ought to be done.

But exactly what? And by whom? Our university has no institutionalized way of trying to solve this problem. There is no single writing course that all students are required to take. Indeed, students at our university can avoid taking any writing course at all. Moreover, it is unlikely that our university will undertake any formal writing across the curriculum program. Such a program existed at our university a decade ago; when funding ran out, interest disappeared. It's unlikely that interest will somehow reappear, especially in these days of budgetary constraints.

So what's the best way to respond to the familiar but newly perceived problem of improving students' writing? There is, of course, no magic bullet, no single response that will solve the problem satisfactorily. There's every reason to think that part of the solution lies in providing good writing instruction, both through writing courses and drop-in tutorial work at our school's writing center. However a course in writing (especially if students take only one such course during their college careers) is not adequate to solve the problems we see in

writing. We will need to complement writing courses with some collaborative efforts between writing faculty and faculty in other disciplines.

There are, we hasten to note, approaches to collaboration we are not recommending. Specifically, we are not advocating projects in which colleagues in other disciplines read student work for content while writing faculty read them for style and mechanics. Nor are we advocating the sort of missionary work in which composition specialists try to persuade colleagues in other departments to change their teaching practice so as to 1) assign types of writing (for example, journals) that composition specialists value or to 2) teach certain stylistic features (using active voice, getting rid of nominalizations), even though there is good reason to believe that these features make writing more readable.

Our Proposal: Informal Collaboration to Teach Invention in All Disciplines

Instead of the preceding approaches, we propose that writing specialists collaborate with faculty in other disciplines in making explicit—and demonstrating to students—the often tacit processes of thinking that are important for a given assignment in a given discipline. In other words, we propose that writing faculty collaborate with their colleagues in understanding and teaching the processes of invention that are fundamental to understanding a given academic subject. As faculty do this, we argue, they can concentrate on the primary business at hand (teaching engineering, for example) while contributing to one aspect of effective writing—the development of well-thought-out claims and arguments.

To illustrate our proposal, we'll analyze excerpts from two design reports created by a team of students in an engineering course, *Inventors' Studio*. Our goals here are twofold: 1) to demonstrate a form of assessment and response that will help students not only with one aspect of the writing process (figuring out what they want to say) but also with the engineering process (designing a product that can help solve a problem); and 2) to illustrate a model of collaboration that we believe can work in a wide variety of disciplines. We will conclude this article by acknowledging some reservations people may have about our approach and then suggesting both the potential benefits of the procedure we're recommending and our next steps in carrying out our approach.

Understanding *Invention*

Many people equate “good writing” with observing the conventions of Standard Written English and clarity of expression. We do not mean to disparage these qualities in student (or faculty) written work. But our interest in writing comes out of the ancient rhetorical tradition that identifies five arts of the rhetor:

- Invention (for Aristotle, the discovery of persuasive arguments; for modern rhetoric, the formulation and articulation of ideas)
- Arrangement (organization)
- Style (aptness of expression)
- Memory (for the classical rhetor, mnemonic devices that would enable a speaker to speak for a couple of hours without referring to a written text)
- Delivery (the effective use of gesture, body language, and so on).

We have chosen to concentrate on invention for two reasons. First, we acknowledge pragmatic limitations on faculty members’ time and energy; confronted with, say, a stack of twenty-five design reports, faculty need to focus their attention on an area that will have the greatest pay off for students’ learning. Second, we assume that the most important goal of a writer is to have something worthwhile to say, and the most important obligation of a teacher is to help students understand what they need to do in order to develop their thoughts.

The last several decades have seen a variety of approaches to invention, ranging from the relatively unstructured—freewriting (see, for example, Elbow), mapping (see, for example, Axelrod and Cooper), or journal writing (see, for example, Fulwiler)—to highly structured, systematic approaches represented by the topoi of classical rhetoric (see, for example, Corbett and Connors) or the categories of “critical thinking” described by philosopher Richard Paul or cognitive psychologist Robert Sternberg. All of these approaches to invention assume the existence of discovery processes that can be useful in a wide variety of situations.

We agree that it can be useful to identify generalizable strategies that can guide the conscious aspects of thinking (see Odell, 1995; 1998). But we also recognize that thinking well is a highly contextualized activity (see, for example, Miller

and Selzer; Odell 1992). If there are certain basic, widely applicable activities that comprise conscious thought, not all those activities will necessarily be equally important in all situations. Moreover, a given activity may be manifested in quite different ways in different contexts. Consequently, we will approach the topic of invention somewhat inductively, beginning with the Engineering instructor's goals for the course and the assumptions underlying those goals. Then we will show how an understanding of those goals and assumptions allow us to answer two questions:

- What kinds of questions are answered in a given report?
- With respect to questions answered (or not answered), how does this report compare with other reports written for the same course?

Clearly this sort of analysis will not give us insight into the moment-to-moment process by which the two reports were created. Nor can we draw any conclusions about the thinking processes of individual team members, since individual team members often draft different sections of a given report. But we think this sort of analysis makes sense for two reasons. First, answers imply the asking of questions, which indicates an awareness of cognitive dissonance, a basic cognitive activity that can be widely applicable but that varies widely from one context to another. Second, the questions answered in a finished text reflect ways of knowing, patterns of meaning making—in effect, the footprints of significant cognitive activity.

Our analytic approach is based on several assumptions.

- Many of our colleagues have a strong, tacit sense of what it means to think well in their fields, but they often feel frustrated in making that tacit sense explicit and available to students.
- One way to get at that tacit understanding is by closely examining contrastive pairs of student work—examples of A work and examples of C work. (Work that receives Ds or Fs is usually so far off the mark as to make comparison relatively useless.) Often, if not invariably, the A work reflects patterns of thinking—in effect answers to questions—that either are missing from or appear only sporadically in the C papers.

- To discover these patterns of thinking, one must draw not only on the perspective of the writing teacher but also on the disciplinary perspective of the colleague—in the case of this article, an engineer—with whom the writing teacher is working.

Inventors' Studio: An Engineering Perspective

The goal of Inventor's Studio is for students to invent something that will:

- Be patentable
- Provide significant benefits to improve the quality of life
- Be environmentally sound and beneficial to society
- Use existing technology and components in new combinations
- Satisfy a largely unrecognized need

This goal is founded in the instructor's view that the goal of engineering is to improve existing technologies or to create technologies that respond to needs that are not currently being met. This view and the accompanying goals translate directly into the work students are to do in the course and the ways they report on that work.

Here's the advice the Engineering professor routinely gives to his students.

Handout to Students

- **Start with a problem**

If you start with a problem, that creates a need. And that, in turn, creates an opportunity to create something better.

- **Identify the state of the art (SOTA) in existing solutions**

If it's a significant problem for a significant number of people, chances are someone's tried to solve it. And even if no one has worked on your specific solutions, they may have—in trying to solve other problems—developed technology that could be used and improved upon in your solution.

There's an artificial leg I've used as an example. It allowed this person to walk down 70 flights of stairs during the World Trade Center disaster. But it cost \$50,000. For one artificial leg. Clearly that puts it out of range of [almost anyone], certainly for people in

Afghanistan who had their leg blown off by a landmine. Or one of the 40 million Americans who don't have health insurance. It's just unaffordable. So you have to ask, "What could be affordable?" Maybe you could design a leg that would allow people to do 80 or 90 percent of what that expensive artificial leg can do at maybe 10 or 20 percent of the cost.

- **Determine what's wrong and what needs to be improved**

—*Look at it from the user's point of view*

Become the user. Of course you can do surveys and ask people. That's one way to proceed, and inventors should do it. But you should watch people use the product; you should observe and diagram how people use it.

Also, think about different sub-groups of users—whether, for example, an artificial limb is for a football injury or for someone who's 80 years old who hurt their ankle. There are different needs for different audiences.

—*Create specific scenarios*

I think it was Stephen Sondheim who said, "If you ask me to write a song, I'd have a hard time. But if you asked me to write a song about a cowboy whose girlfriend had left him, and his pick-up broke, and his dog just died, I could write that song."

- **Create something that improves upon SOTA**

In part, success in creating a design depends on creativity, especially the ability to come up with multiple concepts. But let your creativity be guided by your analysis of what's wrong with existing technology and/or the assumptions on which it is based.

As you try to improve on SOTA, aim high: determine what would be ideal; think of ways to incorporate new technology to create additional functions and features that will be important to users.

Once you have a sense of the ideal and of alternatives, assess the alternatives carefully, and work out the details of a product that will let you come as close to the ideal as is feasible, given the constraints under which you must work.

Test your product, using what you learn from your tests to see how you can refine it further. And in all

this, document your work carefully, partly to protect your intellectual property and partly to enable others to replicate your work.

The Design Report: An “A” Paper

Bearing in mind the engineering perspective makes it relatively easy to see why one design report received an A. To put the matter simply, the students who wrote this report did excellent engineering work. As will be apparent in the excerpt presented below, they began by identifying a problem that affects a significant number of people: the immobility caused by injuries to the ankle or foot. They identified several technologies (for example, the “standard crutch”) and explained the limitations of each technology.

In an attempt to understand the perspective of people who have injured their ankle or foot, the students interviewed a physical therapist who works with patients who have this sort of injury, trying to identify the characteristics that will matter most to an injured person. For example, they determined that “[t]he bottom of the crutch should act like a foot so the user’s gait is not greatly affected.” And then they drew on both their knowledge of existing technology and the needs of potential users to identify goals their invention must meet (for example, it must allow users to keep their hands free).

In effect, they answered a series of questions, noted in the margins, below, that are central to the engineering design process.

Student Report	Questions Answered
<p>SOTA Research</p> <p>Ankle and foot injuries are a common mishap in today’s world, causing immobility for many people. Currently there are few options to keep the injured leg immobile, the most common being a standard crutch. However, standard crutches have many problems included with them such as:</p> <ul style="list-style-type: none"> • Change in the gait of the user • Difficult to carry items 	<p><i>What is the problem?</i></p> <p><i>For whom is it a problem?</i></p> <p><i>Why does it seem a significant problem?</i></p> <p><i>What is an existing technology that tries to solve this problem?</i></p>

<ul style="list-style-type: none"> • Difficult to use on slippery or uneven surfaces • Cumbersome to use for everyday purposes (see pages 35-36 A) <p>One alternative to this type of crutch is the “I Walk Free” crutch, a hands-free crutch that mounts to the thigh of the user and distributes the bulk of the weight over the knee and shin. Though this product is an improvement on the current SOTA, it still has several problems associated with it, such as:</p> <ul style="list-style-type: none"> • A high cost • The injured foot protrudes behind the user’s body (3 more problems listed.) <p>To investigate the process a person with an injured ankle/foot must go through, we interviewed K... R... a physical therapist from St. Peter’s Hospital in Albany. Notes from the interview can be seen on pages 37-38 A and 33-34 R, but the main points touched on in the interview include:</p> <ul style="list-style-type: none"> • The bottom of the crutch should act like a foot so the user’s gait is not greatly affected. (5 other “points” listed.) <p>While the “I Walk Free” crutch is a good start, there is much room for improvement. Ideally, the crutch would be:</p> <ul style="list-style-type: none"> • Hands-free • Lightweight • Inexpensive (10 more traits listed.) 	<p><i>What are the limitations of that technology?</i></p> <p><i>What alternative technologies exist?</i></p> <p><i>What are the limitations of these technologies?</i></p> <p><i>From the perspective of a potential user, what characteristics would a good solution to the problem need to have?</i></p> <p><i>From the perspective of a user, how might an existing technology be improved?</i></p>
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Assessing and Responding to Student Writing

Implicit in the preceding discussion is a way of assessing and responding to the design reports created for Inventors Studio. The report just presented was turned in not quite half way through the semester. It would become the basis for a longer report and oral presentation assigned as the final project for the semester. Consequently, the nature of the response and assessment must have formative value, helping students understand what they need do (continue doing/begin doing/quit doing/do differently) in order to succeed on the semester's final project. This response must not simply help students improve the content of their written work; it must also help guide their engineering processes for the remainder of the semester.

In the case of the students whose work we have just described, it would seem that the main message would be something on the order of the following: Keep doing what you are doing—noting limitations of existing technology, relying on the perspective of the user in order to set goals for one's design, etc. But what about students whose design reports seem less satisfactory? It seemed inappropriate to single out a particular group of students for what amounts to public criticism. Consequently, our second sample represents a certain amount of fabrication on our part; the specific technology described was never mentioned in any of the design reports students turned in for this assignment. But substantively and stylistically, this sample is closely modeled on one of the less successful design reports turned in for this assignment. The qualities it displays are, in our judgment, typical of the less successful reports. As was true for the first example, this sample consists of the first several paragraphs of a longer design report.

The Design Report: A “C” Paper

From one perspective, the following design report is not badly written: it makes extensive use of active voice; organization is made clear by two superordinate terms (*requirements* and *functions*) that forecast the topics to be discussed; the text discusses those topics in the sequence in which they are announced; the piece is coherent (the phrase *another technology* announces a new topic that clearly relates to the topic that precedes it); and the piece displays a good bit of lexical cohesion (for example, the first sentence of paragraph two in-

troduces a new technology and the second sentence begins by referring to this technology).

But this perspective does not help us see why an engineering colleague was not entirely pleased with this work. Nor does it help us tell students what they need to do in order to improve on their subsequent work, which will be based on this report. Granted, this sample answered two important questions (What are the existing technologies? What are their limitations?) that are important from an engineering perspective. But as the following table will show, this report either fails to address other significant questions.

Student Report	Questions Answered
<p><u>SOTA</u></p> <p>The state of the art research that we have done so far has been on our concept for a portable way to store and retrieve selections from a student's collection of CDs. From our Concept to Product outline we have split the concept into two categories: requirements and functions.</p> <p>The requirements establish exactly what this design will accomplish. The state of the art research has to do with the way the design functions.</p> <p>During the past few weeks we have concentrated on finding technology that can be used to identify individual music selections within a large collection of CDs. One way of doing this is to create a bar code for each selection on a CD, essentially using a technology that has been very successful on cash registers at supermarkets and discount stores. The problem is that the bar code would have to be visibly imprinted on each selection, a</p>	<p><i>Exactly what is the problem? What basis do you have for thinking it is a significant problem?</i></p>

process that might degrade the quality of the music at a given point in each selection. Another technology that we considered was *Radio Frequency (RF) Communication*. This technology uses radio frequencies to transmit and receive data. This technology is frequently used in stores such as music stores. At the store exits, there are machines that can recognize an electrical circuit that is imprinted on a tag attached to each item. If this circuit is not deactivated by a clerk when the product is purchased, detection devices installed at the stores exit will sound an alarm....

What do you know about users of these technologies? What functions matter to them? Given the limits of SOTA and the needs of your users, what are your goals?

The failure to address the questions we have identified above is quite typical of less successful design reports in this course. But does this failure matter? Does it constitute a significant problem for this assignment and for students' development as engineers? After all, the report talks in some detail about the technology students intended to use. And the students who wrote the report on which Sample #2 is modeled showed some ingenuity in the product they eventually designed and created. However, this report represents a characteristic mistake of inexperienced engineers: they fail to take adequate account of the larger context in which their work exists and

the social or institutional goals it must serve. Perhaps equally important, the report gives no indication that the students can do the metacognitive work needed to successfully negotiate the complex process of identifying and guiding their own efforts to solve an ill-defined problem.

From the perspective of the writing teacher, it might be tempting to focus exclusively on the qualities that make this work seem well organized and readable. After all, teachers could do worse than encourage organization and readability. But this sort of response is not enough; it won't help students with the most fundamental task of all writers—formulating and articulating their ideas on a given topic. At some point, someone needs to respond to students in ways that help them carry out the intellectual work at hand. But who should do this? How? At what point in the writing/design process? And is it in fact the case that students should be given this sort of help? Shouldn't tacit procedures be left tacit, to be assimilated as best students are able? Answers to these questions lead us to acknowledge some reservations about the approach we recommend and then to identify what we see as its benefits.

Reservations

One reservation we have in advocating this approach is that it requires faculty to venture out into territory that may be unfamiliar or uncongenial. Writing faculty will routinely find themselves dealing with subject matter about which they know little or nothing. In the design reports, for example, writing faculty are likely to have little ability to judge the appropriateness or the accuracy of some of the calculations students must provide. Moreover, many faculty—in composition/rhetoric and in other disciplines—tend not to be very reflective about the processes of knowing involved in their work. These processes may be so deeply internalized that experts in a given field may find it difficult to articulate these processes or even to recognize that they should do so. Indeed, there are those who feel that tacit knowledge should be left tacit; the more able students will somehow acquire it, and other students' failure to acquire it will enable faculty to recognize these less able students and grade them accordingly.

Even if one accepts the premise that faculty ought to make tacit processes explicit and accessible to students, the effort to do so will take time and patient collaboration between writing

faculty and colleagues in other disciplines. Writing faculty may be able to see significant differences between A and C papers. But inevitably they have to confront the question: Are these differences significant from the perspective of the colleague with whom they are working? And writing faculty will have to work with colleagues in other disciplines to negotiate a language that adequately expresses these differences.

As David Kaufer and Richard Young have pointed out, this sort of negotiation is likely to be difficult. Faculty from different disciplines often approach writing with different assumptions—about the types of writing that are appropriate for a given discipline, about the role of writing in the process of invention, and about the nature of the expertise possessed by rhetoric/composition specialists and faculty in other disciplines. Eventually, Kaufer and Young argue, it is possible to bridge these differences, especially if all parties adopt what Kaufer and Young refer to as an interactionist view of expertise, one that allows the generalizable strategies of rhetorical invention to be integrated with the knowledge and meaning-making strategies of a particular academic subject.

But even if we assume that this negotiation is possible, we still must encounter a series of questions: Who should explain the processes of invention that are necessary in a given course? How should they be introduced? Through analysis of exemplary models? Through structured classroom activities that, according to George Hillocks (1993; 1986) are the most effective way of improving students' thinking and writing? And who will monitor students' efforts to engage in the process of invention? Lurking beneath these questions is yet another: Why should I try to teach someone else's subject matter? For writing teachers, this may be an especially vexing question, since it may seem to place them in a service role, one in which they have no specific disciplinary identity. And for colleagues in other disciplines, the work we have described may appear simply to add to an already substantial teaching burden that must be balanced against demands for publication and grant writing.

To begin with the questions about *how* and *who*, our experience suggests that students perceive faculty as the authorities within their respective disciplines. In an engineering course, the word of an engineer carries far more weight than does that of a writing teacher. If colleagues in a given discipline want students to engage in a particular set of in-

vention procedures, they will have to explain those processes—and, better, model them and construct classroom activities that require students to learn them. Moreover, when colleagues in other disciplines read students' papers, they will have to comment on the extent to which students are engaging successfully in those processes. Relegating this work to a writing teacher or to a tutor in the university's writing center sends a clear message to students: "These processes may be important, but they are not important enough to warrant my time and effort." In our experience, students rarely fail to pick up on such messages, to everyone's eventual regret.

Benefits

These reservations notwithstanding, we think our approach entails several benefits. For one thing, it enlarges the definition and value of *writing*. From the perspective we have tried to establish in this article, writing well entails more than observing the conventions of Standard Written English or adopting a graceful, readable style. It entails a process of problem solving that is at the heart of successful engineering. Consequently, it enables engineering faculty to contribute to students' writing ability while at the same time engaging them in the essential business of an engineering course—devising, testing, and explaining a product (or process) that solves a significant problem. Further, it provides faculty—in engineering and in rhetoric/composition—a means of monitoring and guiding the design process. The questions that must be answered in the written report are also questions that the instructor can repeatedly pose to students as they work on their designs and as they submit interim reports. By making such questions a routine part of the work of the course, the engineering faculty member (or for that matter, a writing center tutor) can use those questions in assessing students' interim work, whether in written reports or in the designs themselves.

At least as important, from the perspective of a composition/rhetoric specialist, this approach gives provides new impetus to the study of rhetorical invention. Our experience affirms Dorothy Winsor's notion that rhetorical invention and invention in engineering are closely related processes. This affirmation, in turn, raises a series of questions: Can we find evidence that some form of rhetorical invention is equally important in, say, doing philosophy or biology? If so what

forms does that invention take? What are the questions students need to learn to ask in these various academic contexts? To what extent do these forms of invention lead scholars to revise (affirm/abandon/add to) the processes of invention identified in classical or contemporary rhetoric? In short, the sort of collaboration we propose may provide service to colleagues in other disciplines. But it also engages writing faculty in questions that are fundamental to scholarship in their area. As scholars answer such questions as these, we believe they will be, in effect, reinventing invention—and in the process making a concrete, practical response to the vague, campus-wide notion that “something ought to be done” to improve the quality of students’ writing. The approach we have described in this article is not the single magic bullet that will solve all the problems one finds in students’ writing. But it’s not a bad beginning.

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Using ‘Community’ Needs to Promote and Expand WAC

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What’s in a Name?

We know that many WAC initiatives start as grassroots efforts to meet local curricular needs, and that success depends on the extent to which these initiatives gain institutional support. However, as the missions of institutions change to account more fully for preparing students for their roles as citizens and workers, WAC initiatives need to be more aware of the needs of the larger community as well as the university community.

At Texas A&M University-Corpus Christi (TAMU-CC), we are building our writing programs—our Technical and Professional Writing Program (TPWP) and our First Year Writing Program (FYWP)—using information we are gathering from our local business community and from faculty across the campus. We do not have a formal WAC program, but we have reshaped our writing programs through surveys and interviews that connect formal writing program courses with increased writing and presenting in courses. Furthermore, we have connected the writing and presenting with the needs of employers and not-for-profits. The results say “writing across the curriculum” although the names of our programs do not.

Building Connections— Technical and Professional Writing

TAMU-CC offers a minor in Technical and Professional Writing. The program has been small for many years, with as few as ten students in the program at any one time. A common misconception that students often express is that

there are no opportunities for technical writers in the Coastal Bend area (the counties in and around TAMU-CC). The 18 credit hour program originally consisted of a service course that was required for Criminal Justice majors; a course in writing for the professions intended for students enrolled in the minor, most of whom were English majors; a course in desktop publishing; a course in computer-aided reporting that was rarely offered; a course in on-line research and editing; and a topics course.

Because of the small number of students enrolled in the minor, and the faculty's feeling that if the courses were updated more students might be attracted to the major, we reviewed the program during the 2000-2001 academic year. The goals of the review were

- to redesign and build a program that will meet university, departmental, and community needs and goals and
- to build connections between the program and the larger university community and the Coastal Bend community.

As part of this program review, we surveyed local businesses to determine what types of jobs were available, and what skills were perceived as being important for technical and professional writers. In August of 2000, we mailed 500 surveys to a representative sample from the Corpus Christi Chamber of Commerce and Corpus Christi Hispanic Chamber of Commerce membership lists. The return rate was 10%, and follow-up interviews were conducted with those respondents who indicated they would like to work collaboratively with our students. We have now identified new internship opportunities for students and formed ongoing service learning collaborations. For example, students have worked with the Boys and Girls Club of Corpus Christi to write grants, develop web sites, and coordinate technology training. (For survey results, go to http://critical.tamucc.edu/~loudermilk/twpro/tw_survey_report.htm.)

The survey also helped us to set program goals that will make our students successful. The survey results indicated that how we define technical writing matters in the Coastal Bend area. The survey identified 35 specific positions that require technical and professional writing skills; the majority are high-paying administrative jobs.

Respondents were asked to list types of writing/documents required on the job. Most documents were familiar (letters, memos, and reports), but we used the skills ranked most important in redesigning our program. We now focus on gathering information, planning, ethics, identifying document development tools, designing documents, and analyzing audience and purpose. We emphasized the local community, but part of the program review gathered information about job opportunities and required skills from national resources, such as the Society of Technical Communications and their listserve, Techwr-L.

The new TPWP, still an 18 hour minor, now reflects the findings of the program review. The service course is still offered but has been expanded and focuses on community collaboration. The course is now required of Criminal Justice and Computer Science majors. The Writing in the Professions course is being redeveloped as a linked learning course that will emphasize different areas each semester it is offered. For example, one section may concentrate on Nursing students. Flexibility in course delivery will be needed to fit the demands of Nursing program students. We developed two new courses, Writing in Networked Environments I and II. Desktop publishing is still offered, as is the topics course. All courses teach project development; students choose projects that prepare them for future careers.

Aligning the Technical Writing Class with Workplace Communities

The results of the community survey have reshaped our entry level technical writing course for students from across the curriculum. The survey outcomes emphasized that context drives the distinct tools and rules used to create documents as well as how documents are distributed and consumed: A safety and health specialist operates in a context different from that of a juvenile probation officer, and their written products are shaped to each setting. The survey helped us realize that we need to move away from a prescriptive approach (creating assignments based on format without understanding the student's academic needs and future professional needs) to a constructivist approach that shifts inquiry and the decision-making process to students. The assignments provide many opportunities for students to place themselves in their future workplace contexts, use knowl-

edge gained in the coursework for their majors, learn about genres used in that context, decide what skills they need to develop, and become involved in the community as productive communicators.

The key portfolio assignments allow students to work within their own settings, including their majors and their future career area. Each project requires them to become more involved with specific settings and the larger community. (Detailed descriptions of the portfolios are available at <http://www.tamucc.edu/~cardenas>.) The three portfolios are “Writing on the Job: Understanding Workplace Literacy”; “Applying for a Job: Recognizing and Implementing Strategies”; and “Responding to a Community Need: Generating Viable Solutions.”

Students Benefit in Many Ways:

- They make a connection between the classroom and the community.
- They put into practice the knowledge gained in their coursework.
- They construct a broader definition of learning and knowledge.
- They learn to operate within the expectations of their future workplace.
- They model the kinds of writing typical of a particular setting.
- They become familiar with various genres of writing and conventions they must follow.
- They begin to understand the kind of expertise that a workplace demands.
- They identify skills and tools they must possess to become effective and valued employees.
- They gain a sense of the clients served by the written and oral presentations.
- They discover the personal values of individuals who interact with them as they work through the assignments.

Students respond positively to their experiences, and we see these changes in the statements students make in frequent memos they write to inform classmates (not just the instructor) about their progress. One student wrote about visiting with a Safety and Occupational Health Specialist at the Corpus Christi Army Depot and learning that the docu-

ments he writes “are very important, because people have been injured, and he must document the injuries and study the circumstances to prevent the accidents from recurring.” A second student, an engineering major who worked with an engineer, created for part of his Workplace Literacy portfolio a memo explaining the status of the design phase for a new aircraft jack. This task required that the student include with the memo a diagram showing the parts of the jack and the progress to date on each of the design sections. Not only did this student develop a writing product related to his future career area, he also implemented skills that he was currently learning in his engineering classes.

We also see these changes in the comments we receive from students at the end of the semester: “I like being able to make decisions for myself,” and “I have learned how to work through a project more on my own without having the teacher tell me what to do.” Students find the changes challenging at first, but by semester’s end they have a much greater understanding of writers and managers’ writing and responsibilities. Students learn from other students as they collaborate in groups and share details about their projects and the many choices made to get the job done. They leave knowing about the methods they employed as well as methods other students discovered and used. At the end they realize that by making certain choices they can actually shape outcomes, for better or worse, and they are more connected to and prouder of the final products they develop.

Our students learn about writing not just within the context of rules of form, style, and correctness, but in the context of a decision making process for achieving results. This work crosses curriculums and engages the community.

Connecting to the Larger University Community

During the fall of 2001 we sent a survey to all university faculty (360) to learn how faculty in other departments use writing in their courses. We wanted to develop stronger connections between their assignments and our writing programs. We chose a survey to gather first-hand information from as many faculty members as possible. We also prepared questions and conducted face-to-face interviews with faculty in every department across campus. These conversations uncovered which writing skills students bring into their classes and the kinds of help they need.

While many of these interviews were held one-on-one, we were able to attend a faculty meeting of the Nursing and Health Sciences Department as a group. Interviews have also been held with the Accounting, Economics and History faculty members. These interviews formed new connections to other Colleges within the University: the School of Business and the School of Arts and Humanities. Answers to two questions from the interviews (What kinds of practice in communications (written and oral) do your majors need? and How do you think this practice could be improved, perhaps with collaboration with the English department?) elicited information we have used to make changes.

Overall, teachers in these first four groups indicated their students need practice in critical thinking and in documenting sources, especially online sources. The Nursing faculty noted that clear, concise, non-ambiguous writing is most important. For example, nurses have to be sensitive and not use language that frightens the patients or their families; they have to use unbiased language (and actually be unbiased); they must have a clear sense of their audience; and they have to practice concise documentation, especially when charting information.

The Nursing faculty pointed out another important issue that we often confront when we are planning WAC initiatives. Since there is not much room in their curriculum for adding another course, we have to find other ways to support writing in their program. They suggested a technical writing course that would link to their core courses and also use the nursing texts. We have had initial discussions with the Nursing faculty to begin planning such a course.

Faculty from the other departments also shared valuable information regarding the writing skills their students need, which has helped faculty in the FYWP revisit the focus of some courses. For example, many of the faculty interviewed said that their students do need more practice in critically analyzing what they are reading, and they need more practice in stating a claim and backing it up with evidence. Also, as a result of the interviews, the first semester of the FYWP sequence has been redesigned so students now work on developing arguments.

Conclusion: Integrating Writing across the Curriculum— A Model Built on Community Needs

We are doing many things at TAMU-CC to help students improve writing skills. All of our FYWP and TPWP classes are held in computer classrooms. More collaboration is encouraged in the linked courses, especially between the composition faculty and seminar leaders. Students in the TPWP are involved with the community in many ways, and discussions have begun to incorporate more service learning opportunities in the FYWP. And while we have never had a formal program in place for WAC, the data we are compiling from these surveys, interviews, university connections and community connections will continue to contribute to the WAC that is in fact, if not in name, going on at our university.



WAC in an Urban and Bilingual Setting: Writing-to-Learn in English y en Español

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Responding to a 1999 City University of New York (CUNY) Board of Trustees resolution mandating a five-year university-wide WAC Initiative, Hostos Community College/CUNY, an urban, bilingual community college with a predominantly Spanish-speaking, low-income student population, has established a comprehensive WAC program. The Hostos Initiative reflects the University-wide philosophy that writing ability is developed through extensive writing practice across a broad range of academic experiences at all levels of a student's academic life and draws on research which illustrates the inter-relationship between language and learning (Barnes, *et al.*, Britton, Emig, Martin *et al.*).

Engaging in campus-wide dialogues on pedagogy and collaborating with seven, on-campus CUNY graduate student Writing Fellows, by spring 2002, over forty Hostos faculty had implemented WAC strategies and assignments in a variety of disciplines ranging from the liberal arts and math and sciences to allied health professional programs. At least thirty-five courses had been modified to incorporate or refine writing assignments, including both low-stakes "writing-to-learn," and "high-stakes," (Elbow) formal graded assignments. In addition, seven courses were, for the first time, designed and designated Writing Intensive (WI). Pleased with the progress of our work, it seemed that the WAC Initiative had at least minimally affected almost all academic areas of the College. Yet if Hostos were to remain true to its bilingual mission, an important application of WAC still remained.

Bilingual WAC

As a college committed to providing academic and career opportunities to all who seek it, Hostos provides a transitional bilingual education program offering English-as-a-Second Language (ESL) students college-level courses in English or Spanish along with graduated levels of ESL instruction. The planned outcome of this model is that eventually all of a student's courses will be taken in English.

While the pedagogical effectiveness of writing-to-learn and speaking-to-learn practices for advanced and post-ESL students mainstreamed into English-language content courses was established over the course of a four-year study through both quantitative and qualitative measures (Hirsch), little research has been undertaken to see if a WAC pedagogy would be useful to those elementary ESL students taking coursework in Spanish. Recognizing our bilingual mission and desiring all students to use writing not merely to demonstrate knowledge, but to create it, we began to explore the use of WAC principles and practices in courses taught in Spanish. Our goals were to: 1) provide writing practice and improve writing proficiency for students in their native language; 2) use writing as a means of learning and making sense of course material; and 3) contribute to research on the connections between proficiency in the native language and the acquisition of the second language (Cummins, Roberts).

Here we examine two sections of "Introduction to Humanities," one offered in English and the other in Spanish, taught in spring 2002 by Professor Carmen Marin. Professor Marin's sudden and untimely death in August 2002 meant not only a great personal loss for all her colleagues but also left it to others to undertake the difficult but essential task of sharing her pioneering work. Our close collaboration with her in our roles as WAC Coordinator and Writing Fellow allowed us to actively participate in these evolving endeavors. Though having lost the invaluable opportunity to consider with her some of the implications of this work, we will examine the approaches used by Professor Marin to implement WAC in her Spanish-language section along with some of the ways she utilized writing in her English-language section of "Introduction to the Humanities." Portions of assignments written in Spanish have been translated into English, and full-length copies of all assignments are available on the Hostos WAC website: www.hostos.cuny.edu/wac. From our perspectives and hop-

ing to convey some of Professor Marin's enthusiasm, intellectual curiosity, and self-reflective teaching practices, we consider the effects of writing in these classes as well as the implications for WAC in a bilingual setting.

Introduction to the Humanities in Spanish

Professor Marin, a self-proclaimed "WAC convert," was a well respected and long time faculty member who was familiar with WAC theory and practice, believed in its tenets and was eager to be one of the first to explore the introduction of WAC to the bilingual component of the college's offerings.

The students in her Spanish-language section of Introduction to the Humanities were enrolled in the first level of ESL and had limited English-language proficiencies. When asked her goals for her students and how the Fellow could help her attain these, Professor Marin replied, "I would like you to help me get my students to think through writing in a logical, clear and individual manner. Once they have learned the facts, I would like them to think for themselves. I want them to feel empowered, to develop their own voice, to understand that their thoughts, their intellects, are as valid and as important as anyone else's. I want my students to feel good about themselves." Drawing on Fulwiler's "Why We Teach Writing in the First Place," both Professor Marin and Writing Fellow Carolina De Luca agreed that the scope of their effort would not be the production of a final product or a final term project, but rather an engagement with writing to initiate and sustain a cognitive process. The focus of writing would be an undertaking of either a personal, exploratory, or critical analysis of the subject matter. This kind of writing, often termed "writing-to-learn" or "expressive function" (Britton, 1975), is language close to the self, revealing the speaker as well as her topic. Often the language of a first draft, it recognizes that, "language facilitates discovery by crystallizing experience" (Fulwiler 27). For this class, then, writing was a means of inspiring students to learn through the act of writing with the expectation that given time and practice, their writing would also improve.

The class proceeded on the further assumption that improved proficiency in one's native-language would lead to greater proficiency in acquiring English, the second-language. The expectation was that through working on both form and content in their native language, adult ESL students would

translate this improved writing proficiency in Spanish into their writing in English, a concept of great interest to researchers in bilingual education.

The thirty lower-level ESL students in this class, ranging in age from 18 to 35, and speaking little or no English, came from a variety of Hispanic cultures, extending from the Caribbean Isles to Central and South America. Most of them held jobs, had families and children to take care of, and went to school full time. One of the more difficult hurdles in teaching a class united by language yet radically diverse in cultures, dialects and experiences, was to find appropriate textbook materials that spoke to these different backgrounds. This was particularly difficult to do as there were few course materials written in Spanish. Professor Marin located a general reader with primary sources (*Obras Maestras*) and a cultural/historical textbook (Fernandez, *et al.*), both edited in Spain. Each inevitably read culture and history through an essentially Iberian slant. The paucity of appropriate materials and the narrow, cultural visions of both readers resulted in instructor-generated materials and the need to create a series of low-stakes, informal assignments that would make sense to a culturally diversified, yet linguistically unified student population.

Introducing students to Shakespeare's *Hamlet* provided challenges for all. Professor Marin had been dissatisfied with a previous assignment that had led to largely "Yes/No" student responses. She now revised the assignment to engage students on a more personal level and lead to more thoughtful writing. Though lengthier, the original assignment, excerpted below, had actually provided less opportunity for writing:

¿Por qué dicen que Hamlet está loco?
¿Cree que sea cierto o no?
(*Why do they say that Hamlet is crazy?*
Do you think that this is certain?)

In the revision, only one question was asked, but it was more relevant to the students' lives and unthreatening as an ungraded low-stakes writing assignment:

- *Considere el monólogo de Hamlet Ser o no ser ... como ejemplo de auto-valoración/examen de vida, y haga tanto con la suya. Tome en consideración los*

puntos discutidos en clase y su relación con los valores relativos en los códigos personales.

- *(Consider Hamlet's soliloquy, "To be or not to be..." as an example of self-evaluation/examination of one's life, and apply it to your own life. Take into consideration the issues discussed in class and their relation to your own personal values.)*

While this one question may have been more difficult, the results of this revision were impressive. While a few students worked at home on their own, most approached either the Professor or the Writing Fellow asking questions about the meaning of Hamlet's soliloquy. One-on-one, they went over the assignment—low stakes, students learned, does not necessarily mean easy. Confronting student difficulties with accessing *Hamlet* and drawing on research which underscores the need for learners to make a connection between new and known material for learning to occur, (Britton, 1982; Bruner), another low-stakes assignment was developed asking students to think and write about a period in their lives when they, or someone they knew or read about, had to make a crucial decision. They were then to write about the moral implications and responsibilities arising out of such a decision. All of the students wrote extensively, and as a result of this self-reflective writing activity, they returned to Shakespeare with a new understanding of Hamlet's soliloquy.

For example, a twenty-two year old Cuban student wrote about his journey from Cuba to the U.S., which took place on a raft over a period of days. Out at sea he had almost lost his life. Some of his travel companions never made it to the shores of Florida. At the journey's outset, he had to choose whether to stay in Cuba and face the prospect of a grim future or to leave his family behind, and come to the U.S. to get an education and a job in order to send money back home. His touching and moving account titled "Amleto el Cubano," ("Hamlet the Cuban") while syntactically awkward and grammatically imprecise, was logical, reflective, and analytical. Significantly, it permitted him to now identify with Hamlet's dilemma:

"Yo me sentía como Amleto. Un Amleto Cubano, encadenado entre dos opciones muy difíciles.

¿Combatir y partir por los Estados Unidos, o morir de una muerte espiritual en Cuba?”

(“I felt like Hamlet. A Cuban Hamlet chained between two very difficult choices. To fight and leave for the United States, or to stay and die of a spiritual death in Cuba?”)

The Writing Fellow’s role as collaborator was not limited to faculty. As the mediator between student and professor, she was able to gauge what skills students needed to hone as well as to see where assignments succeeded and failed. Viewing the Writing Fellow as more of a peer, students felt comfortable confiding their confusions or difficulties. This ability of a Writing Fellow to identify areas of student concern and provide valuable information to faculty has been mirrored throughout our project by other faculty/fellow partnerships. The collaboration between Professor Marin, students and Writing Fellow produced great gains in pupil comprehension and interest in *Hamlet*. Yet both professor and Writing Fellow shared the view that, in spite of their success, students felt estranged from “white” Western texts and characters who, from ages past, spoke a different, almost unintelligible language to them.

The challenge of further engaging students in texts important to a study of the humanities was better met in an assignment based on a visit to New York’s Metropolitan Museum of Art which revised an older “Museum Visit” project that had been prepared, years earlier, for an English speaking, “Introduction to the Humanities” class. That project had been quite extensive and required student responses to Egyptian, African, Greek, Japanese and European art and artifacts.

Before re-writing this assignment, students were asked if they had ever been to the Metropolitan Museum. Professor Marin was surprised to discover that not only had students never been to the Metropolitan, but also they had also never been to a museum of any kind. Indeed, her students rarely even traveled to the wealthy neighborhoods of Manhattan’s Upper East Side, for as a thirty-year-old Mexican mother of two expressed, “We have no business down there.”

The original assignment assumed that the English speaking class had already been exposed to art. It asked specific,

technical questions such as the uses of light in Rembrandt, *chiaroscuro* technique in Vermeer, and aesthetic and theoretical questions. It assumed that students knew where the works of art were located within the huge building of the Metropolitan. Yet while the assignment implied a level of sophistication on the student's part, it was, in essence, a factual listing of observations with little space for analytical reflection.

For the revision of this assignment for her Spanish-speaking class, Professor Marin decided that nothing was to be assumed: No previous contact with art, no familiarity with the Upper East Side of Manhattan, and certainly no knowledge of the physical space of the Metropolitan Museum. The assignment's goals were to provide: 1) exposure to art, 2) more opportunity for writing in Spanish, 3) an awakening of the senses and initiation into an aesthetic process, 4) an articulation of feelings deriving from aesthetic observation and analysis, and 5) opportunity for individual student work.

Professor Marin and her Writing Fellow engaged in much discussion as they revised this assignment. Now divided into four instead of six parts and prefaced with an introduction, it included a cover picture of the Metropolitan, directions by subway or bus, a floor plan of the museum *in Spanish* with markings above the location of the works they were to find, admission fee information, student ID policies and rules of appropriate museum behavior. Before distributing the project, both Professor Marin and the Writing Fellow tried it themselves, a key step, they had discovered, in creating effective assignments. This preview of responses allowed Professor Marin to organize the assignment logistically and to assess its manageability. Selections are presented below:

Arte Romano:

Roman Art:

Busca el "Cubiculum from Boscoreale"
(*Find the "Cubiculum from Boscoreale"*)

¿Te gustaría vivir en un cuarto así?
¿Por qué o por qué no?
(*Would you like to live in a place like this?
Why or why not?*)

Caminando de la Galería Greco-Romana en dirección a la Galería Africana, se encontrará con una serie de bustos/cabezas a su izquierda. Considere las siguientes definiciones de arte:

(Walking to the African gallery from the Greek and Roman section, you will find a series of sculpted busts/heads on your left side. Observe these works. Now think about these two definitions about art:)

Arte Representativo- una representación fiel y veraz del objeto copiado.

(Representational art: a faithful, real-life representation of a copied object.)

Arte Figurativo- una imagen que simboliza un concepto o idea, sin ser fiel o real.

(Figurative art: an image that symbolizes a concept or idea, without being real life-like.)

¿Definiría estos bustos como arte representativa o figurativa? ¿Por que?

(Would you define these busts as representational or figurative art? Why?)

Analysis

The rationale in selecting this visit to the Metropolitan Museum of Art was a desire for students to *use* the city, to read their urban setting as a textbook they could discover and decipher. The Metropolitan is for many the quintessential New York, urban museum. Professor Marin, a Puerto Rican with a strong sense of education as a democratic right for all, believed that simply to enter such an august building would allow her disenfranchised students to feel the awe of being a part of something new and obviously important. In addition, she wanted her students exposed to the art of the dawning of Western civilization. Yet it was also important that students become acquainted with the abstraction of African Art, and with a culture, which much like their own, was not mainstream or politically part of the status quo. In the months following September 11, 2001, it was relevant that students walk through the “Arms and Armor” gallery and observe that objects of self-defense and destruction could be beautiful and considered, paradoxically, “art.” In a culture plagued by gun-toting fanatic-

ics and to an inner city audience often familiar with shoot-outs in their own backyards, such a paradox resulted in many reactions:

“Ahora se lo que significa la palabra paradoja. El diccionario la describe como una cosa imposible a definir sin encontrar una contradicción. No es una consecuencia de el arte la destrucción de 9-11. ¡Pero las armas en esta galería son tan bellas!”

(Now I know what the word paradox means. The dictionary describes it as a contradiction. The destruction of 9-11 is not a consequence of art. But the weapons in this gallery are so beautiful!)

The task to view Bronzino’s “Portrait of a Young Man” and pose questions they would ask if he suddenly came alive, connected students to the work of art:

“¿Cuales materias estudias a la universidad? A mi me gustaria estudiar economia. Veo que estas leyendo un libro. ¿Cual es su titulo y te gusta leer? A mi no me gusta mucho leer. Prefiero escribir.”

(What do you study at the university? I would like to study economics. I see that you are reading a book. What is its title? I don't like to read. I prefer to write.)

In choosing and explaining their selection of a favorite painting, students not only engaged intellectually, but also formed a personal relationship to the aesthetic. Not surprisingly, all the students chose religious icons from the High Middle Ages or early Renaissance as their favorite piece. Mostly Catholic and born to Christian cultures, it perhaps seemed natural to choose something to which they could so closely relate.

The assignment concluded with the pivotal question Professor Marin wanted her humanities students to consider:

¿Que es el Arte?

(What is art?)

When the students returned to class a few weeks later, there was much enthusiasm. Most had gone to the Museum twice, the second time bringing either siblings, children, parents or friends. Though the assignment required a long trip downtown and extensive writing, there was a great sense of accomplishment and satisfaction.

Introduction to the Humanities in English

This English-language section was comprised of thirty Hispanic students who were enrolled in the upper levels of Hostos' Intensive ESL Program, which provides content-based instruction in all language skills and is designed to bring a selected group of students through three semesters of ESL in just two.

Though the syllabus for this class was almost identical to the Spanish one, for this section, Professor Marin and Writing Fellow Adrian Wisnicki, took a very different approach. Greater in scope and radically altered in structure, the English-language arts appreciation assignment was not limited to a museum trip, but added a visit to student-selected architectural sites and theater performances as well as Internet research. It also required students to write five-paragraph essays at the end of each section. For example:

Theater Assignment

During the play I want you to be as observant as you can...and whenever you notice something interesting, make sure you note it down.

For example, before the play starts, be sure to think about things such as:

- What does the theatre look like?
- Where is your seat in regards to the stage?
- What is people's behavior like at the theatre?

And when the play is on:

- What is the audience's attitude and behavior?
- What did you notice about the play?
Do any parts stand out?
- Is it convincing, real, familiar or strange to you?

After seeing the play, write a five-paragraph essay including your personal feelings about the experience.

In comparing the two assignments, we observed that the English speaking class was perceived as having greater access to both cultural sites and technology and a greater sense of aesthetics. They had choices with regard to selecting sites and a broader range of subjects to discuss. The required essays demanded higher levels of expressive communication than the Spanish-language assignment to answer a series of ques-

tions. Professor Marin also assumed capabilities on their part extending beyond language use. She viewed them as better prepared to handle difficult cognitive tasks and better able to negotiate the intricacies of New York City. The English speakers were expected to know more and to do more than their Spanish-speaking counterparts.

Implications

Professor Marin's idea of the classroom as an arena providing freedom of expression for all students, and her understanding of writing as a tool for accessing intellectual and social emancipation, was highly democratic. To her very diverse Spanish audience – mostly new to this country and its language – writing in all its critical and creative capacities, meant entering and challenging a system that often dismissed and excluded them. The differences in the assignments, based on assumptions about students and their preparedness, do not obscure the fact that in both classes students were given opportunities to use writing to make meaning and to make sense of course material.

For Professor Marin, the humanities were a fundamental part of everyone's education. Responses to the class assignments demonstrated that aesthetic experience reported and translated into writing allowed the work of art to become tangible and relevant. Grappling with artwork was no longer an abstract assignment to be rushed through and submitted for a grade, but was rather intended to be a meaningful process of growth and discovery. Art was not a means to the end of expressing judgment, but the beginning of a process of inquiry—a process of discovering meaning, a process of discovering self. Writing was a means of engaging in this exploration. For the students in both these classes writing-to-learn and learning to write were part of an ever-evolving process. Our examination of the pedagogical practices undertaken in these classes indicates that in a bilingual setting, there appears to be a place for bilingual WAC.

Dedicated to the memory of our beloved friend and colleague, Professor Carmen Marin.

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Models in Algebra and Rhetoric: A New Approach to Integrating Writing and Mathematics in a WAC Learning Community

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“We can have words without a world but no world without words or other symbols” (6).

— Nelson Goodman, *Ways of Worldmaking*

This paper documents an ongoing experiment designed to integrate the teaching of college algebra and college rhetoric and writing at Montgomery College in Conroe, Texas. These are the first two college-level math and English courses that students take within the college’s core curriculum. Our approach focuses on the concept of models and model building and might be easily adapted to a variety of math and writing classes. We believe we have maintained the necessary rigor of both disciplines while providing a foundation which links them.

The primary aim of this experiment is educational enrichment and enhanced critical thinking. We make no claims that learning to do algebra or to write becomes “easier” as a result of the focus on models. Nor do we claim learning to do math and to write is somehow the same enterprise. Nevertheless, our students have demonstrated that yoking the two disciplines by focusing on models provides a powerful critical instrument they can use to enhance their critical ability across a variety of interdisciplinary contexts.

Writing as a Full Interdisciplinary Partner versus the Traditional Handmaiden Approach

Traditionally, when a writing course is linked to math or some other technical subject, say biology or engineering, despite the best of intentions, the writing component functions as little more than a handmaiden to the presumed more difficult subject. For example, in a linkage between biology and writing, all too often the writing assignments amount to little more than writing about the biological content. The writing is assumed not to be a content course, per se. Students might produce summaries of chapters in the biology book to check their understanding, or write a research paper on a biological topic. In engineering they might learn to write unambiguous accounts of complex problems and solutions. In both instances, however, the writing is merely “at the service” of the other discipline.

This is the case even in as nuanced a presentation as we find in Meier and Rishel’s *Writing in the Teaching and Learning of Mathematics*, in which the role of writing is to elucidate the mathematics: “Mathematics is often described by writing faculty as a ‘content discipline,’ which means, to be blunt about it, there’s something there to write about” (3). While acknowledging that “mathematics is embedded in language” (90), Meier and Rishel never extend their view of the “teachable” relation between math and writing to be much more than the need for clear and precise expression. This asymmetry between the disciplines, one the master and the other the handmaiden, becomes the point of departure for our approach, which uses the idea of models to initiate a more interdisciplinary dialogue between the two disciplines.

Learning Community Approach

Our courses are integrated into a block-style “learning community.” Such course linkages offer a wonderful opportunity to establish not only disciplinary interconnections but also to bridge traditional curricular and institutional separation. This parallels the approach Zawacki and Williams have called “Writing Across Curricular Cultures” (111) in their recent study of the role of WAC-oriented learning communities. Our community convenes twice a week for 3 hours each meeting. We share the same students and attend the other’s “classes.” In this way we model by our conduct what the community is about. We use the term “class” loosely because we vary the order of instruction. Some days we do algebra first and some days we begin with the writing. Whichever one goes first, that discussion is often punctuated with observations and questions that connect the one discipline to the “other.” Sometimes we proceed

more dialogically, with the math and writing more fully intertwined, for example, as we integrate discussion of a reading and some journal writing into an algebra lesson.

The goal is to set out what amounts to a “grammar of algebra” alongside that of a “grammar of rhetoric.” More precisely, it is to demonstrate the degree to which the “grammar,” that is the traditional manner of thinking and expressing in each discipline, is mirrored in the other. Students come to recognize that algebraic notation is a form of argumentation. It is not just a representational but a persuasive exercise. A particular notation, for example, typically suggests a certain course of action. They also come to realize that learning to write means appreciating the structural relations among writer, audience, topic and context, just to name a few factors.

The special support Montgomery College provides learning communities allows preferential scheduling and a budget for “meet and feed” get-togethers and other social activities (fieldtrips) to enhance the community aspect of learning. The students tend to support one another better in such an environment. If someone is absent a classmate invariably volunteers to email or call him/her to pass on the current assignment. We get to know and value our students much better than in traditional classes.

What is a Model?

We begin with a working definition of model as a “representation of a state of affairs or relations.” Such a state of affairs might be mathematical, say the equation $2x+6=25$, economic, historical, literary or rhetorical. To begin, we examine model airplanes, toy soldiers and plastic “models” of all kinds to discover how these conceptually and pragmatically function. The class inductively creates a taxonomy of functions as follows: Models

- represent,
- predict the future,
- imply narrativity,
- persuade,
- reveal, and
- conceal.

The class divides into smaller discussion groups of 3 or 4 to analyze the “show and tell” models we have provided or that the students have brought from home. For example, a model airplane represents the relations between its constituent parts. The model allows us to predict the way an actual plane would look whether or not we have ever seen one. More-

over, the model possesses an implicit narrative component; that is, we cannot help but remember or perhaps imagine some experience of a plane, or of something familiar that will help us interpret the model. This could be based on personal experience or just imagination. The point is that some reliance on narrative is implicit in both the structure of the model as well as in our process of understanding it. The model also includes a very powerful persuasive aspect in that we thus come to believe, on the basis of the model, what an airplane is. We remain persuaded until another purported model of the same entity appears on the scene and challenges our assumptions.

The two aspects of models that we focus on the most are that any model necessarily reveals at the same time that it conceals. Models are always provisional. Like stories and other verbal constructs, or even history, they are constructed from a point of view. For example, the model airplane may not include any of the internal engineering needed for it to fly. Thomas Kuhn's notion of the conceptual "paradigm" or "accepted model or pattern" (23) comes to mind; that is, a set of assumptions that serve as conditions of possibility for what we take to be "real." The history of science, as well as of algebra and rhetoric, is essentially the history of competing paradigms, each built and advanced from alternative points of view. For example, the gradual acceptance of imaginary numbers in algebra is one such instance of this.

Early in the course when we introduce models and model building, we read Henry Louis Gates' essay, "What's in a Name?" (5-6). This autobiographical piece about the power of names in the construction of (personal) identity allows us to move from visual to verbal models. Knowing the name of someone or something influences our understanding of and interaction with the person or thing. The act of naming is itself a model building activity. What's in a name? As Shakespeare might observe, nothing, and everything.

Knowing or recognizing the name of an algebraic equation, function or relation sets in motion "orders of operations" necessary to solve for an unknown or to represent the mathematics in alternative ways, say in a linear as opposed to a graphic model. That is, learning algebra is largely becoming aware of the different kinds of algebraic and other mathematical models that allow us to "do" algebra. Not only this, it allows us to understand that how we solve and represent a problem and its solution is itself to construct a model, espe-

cially in that many problems may be solved in different ways. Doing algebra is using and building models no less than is learning to write.

Models and Rhetoric: “Modeling to Learn”

The writing and rhetoric components of the learning community are deeply embedded in the language of modeling. For instance, at the beginning of the course when presenting “strategies of invention” or ways to get started, we portray freewriting, brainstorming, clustering and outlining as model building activities. These are ways to represent thinking. To outline is to construct a model, say of an essay or an argument. The very idea of an essay is to “assay” or “test” a set of ideas. What is a draft but a model under construction? Close reading, which we stress in both the rhetoric and algebra components, means to build a virtual model of textual interpretation. Students become intrigued, as a matter of fact, to encounter our insistence on reading ordinary “word problems” as closely as if they were poems. The fear many have of this special kind of math problem is in fact often due to not knowing how to read carefully. We encourage them to draw pictures and model what they find in the language before rushing to solve the problem.

Aristotle’s familiar topics or modes of rhetorical presentation are not only ways to model forms of expression but also the mind in the process of engaging the world. The familiar strategies of narrative, cause and effect, definition, classification and division, comparison and contrast, as well as deduction and induction are all ways we build models and thus create coherence out of the flow of our experience. Each strategy manifests its own power and limitation to represent; it both reveals and conceals at the same time.

The units of the rhetoric and writing part of the course are as follows:

- Models of self, family and community,
- Models of play, literature and art,
- Models across the curriculum,
- Models of language and gender,
- Models in media,
- Models in politics and the postmodern world.

One of the first writing assignments is for each student to construct a model of his/her family, embedding or positioning themselves within this structure. They may use any graphic means they wish to accomplish this although most create a standard genealogical tree

model. Some prefer to use Venn diagrams. They are then asked to describe the powers and limitations of this model to represent the “real” situation at home: Who actually has the most power and influence? Does the model reflect any outside factors such as grandparents or divorced parents? Needless to say, in today’s complex social world, these models can get quite involved. There are typically lines of filiation going every which way in these models.

Next, the students ask a member of their immediate household to draw a family model from their point of view so they can compare it with the earlier one. It is always enlightening to see the “same” reality modeled in an alternative manner. Finally, we ask the students to translate, as best they can, their original model into an algebraic expression such as the following: $X + [(Y + 1/2D) + (1/2S + 1/3G)] = 1$

Let X be a divorced parent living outside the family unit while the other parent, Y, raises the three children, D, S and G, each with varying degrees of connection to this parent. The point is to explore both the advantages and disadvantages of translating one way of modeling, graphic, into another, linear. Typically students discover that by making a model they actually come to an enhanced understanding of their particular family dynamic. That is, they gain insight they could not have achieved without the advantage of the cognitive distancing effect the model affords: “I never realized how much our two relationships affected the entire family, positively and negatively” (used by permission).

In the unit on play we take Johan Huizinga’s discussion of this concept in *Homo Ludens* (1-27) and use it to write analyses of any number of “rule-governed” activities, such as going to war, advancing a lawsuit, making music, or even shopping. We want the students to learn how to apply a “totalizing” model of human behavior to represent a variety of contrary activities. In so doing, the students expose both the explanatory power and severe limitation of Huizinga’s model, which they discover manifests great utility and yet in the final analysis is just one provisional model of culture and human action among many others.

Our concern with play opens up to a unit on learning to read literary texts, especially drama and poetry. We present literary genres, say epic, tragedy, comedy, or lyric, as alternative ways to model human experience that a writer selects to suit his/her personal as well as social purposes. Such choices are not unlike the ones any writer makes to build a text. Interpreting literature includes hermeneutically

learning to “play by the rules” of a particular genre, for instance the sonnet, while not completely limiting oneself to those “rules.”

In our unit on media and advertising the students learn to deconstruct the consumerism of ads and commercials by considering the models of gender, age, sex, and social class that advertisers use. They write papers in which they explore how alternative images model personal and social forms of desire.

Following our unit on models across the curriculum, which we explain in a separate part of this paper, we conclude the semester’s reading and writing with two ways to model postmodern experience. We focus on two key models, that of “entropy” in Thomas Pynchon’s short story, “Entropy,” and Don De Lillo’s trope of “white noise” in his novel, *White Noise*. Students explore the power and limitation of these alternative “lenses” through which they scrutinize the contemporary political and cultural scene.

Models in Algebra: “Learning to Model”

The following examples from algebra illustrate selected Aristotelian modes or topics. We stress to the students the degree to which these conceptual and rhetorical strategies model thinking in both disciplines. We use algebra to model Aristotle’s modes as an introduction to the nature of algebraic argumentation and persuasion. In this way the algebra ironically seems “to serve” the rhetoric.

Narrative

How do some topics in algebra illustrate narrativity? We emphasize that reading some algebraic expressions is like reading a narrative in that we establish an “order of operations,” a computational order, and the relationships between the parts in the expression. This allows us to demonstrate the coherence of the form as a whole. As in literature, the ability to recognize the genre of expression aids the reader in being able to interpret the text.

For example, in algebra the formalism $(f \circ g)(x) = f(g(x))$ stands for the composition of two functions f and g . The genre here is what is called “the algebra of functions.” The formula is intended to be read as a sequence of events, as in a narrative, namely, first compute the number $g(x)$ and then use this number to compute $f(g(x))$.

This step-by-step process is similar to an auto assembly line: first put on the wheels, then the engine, then the doors, etc.

Another example would be how to interpret

$$f(x) = (x - 3)^2 + 1, \text{ to sketch the graph of this function.}$$

This notation is written to suggest that the student first draw a basic parabolic shape, move this shape to the right 3 units, and then lift it up 1 unit. The sequence of graphs tells the “story” (See Figures 1-3 below).

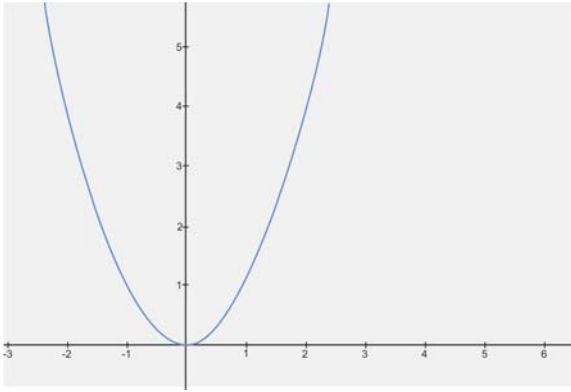


Figure (1) $y = x^2$

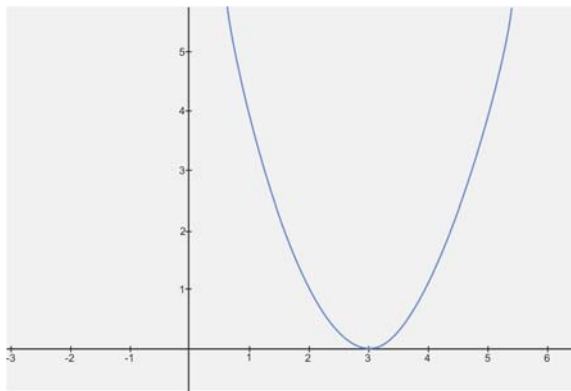


Figure (2) $y = (x - 3)^2$

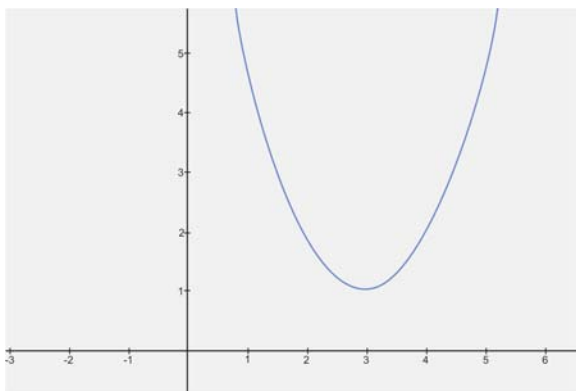


Figure (3) $y = (x - 3)^2 + 1$

Cause and Effect

What is an example in algebra that illustrates cause and effect? One example would be the problem of finding the intercepts of the graph of an equation. The idea is this: an equation in two variables determines some curve. The problem is to find the coordinates of the points where this curve crosses the horizontal (x-axis) and the vertical (y-axis). To find where the curve crosses the x-axis, the student sets the y variables in the equation to zero. This cause then has the effect of allowing the student to solve the equation for x. This number (or numbers) is (are) where the curve crosses the x-axis. The student uses a similar procedure to find where the curve crosses the y-axis

Definition

Being able to do algebra effectively requires a firm grasp of definition and the notation used to represent definitions. Before a student can evaluate any expression or solve any equation he/she must be able to recognize the assumptions implicit in the notational set-ups.

For example, consider the equation $2^x = 7$. To solve this for x, the student must use two definitions. First, the student uses the definition of logarithm base 2. Basically, the logarithm base 2 of a number, $x = \log_2(7)$, is an exponent so that 2 raised to this exponent is 7. In other words $x = \log_2(7)$ is defined to mean $2^x = 7$. The student must

then use a second definition to rewrite logarithm base 2 into a quantity that can be put into a calculator to get the final answer. The second definition is

$$x = \log_2(7) = \frac{\log(7)}{\log(2)}$$

or approximately 2.8073.

Classification and Division

As an example of classification and division, the student learns to recognize differences between equations and group them in types, for example, linear equations, quadratic equations, quadratics in form, and exponential equations. Knowing these types aids the student in selecting appropriate techniques to solve the equations. Each of the equations listed below is an example of the four types listed above.

- $3(x - 2) + 6 = 5x + 2$
- $x^2 - 5x + 1 = 0$
- $x^4 - 5x^2 + 1 = 0$
- $2^x = 7$

Comparison and Contrast

The student uses this mode in the example of the so called “symmetry tests” for the graph of an equation in two variables x and y . For example, a curve is said to be symmetric with respect to the vertical (y -axis) if the y -axis acts like a mirror between two halves of the curve. To use the test, the student compares and contrasts an equation in x and y with a new equation obtained by replacing x by $-x$. If the two equations are equivalent, the graph of the original equation will be symmetric with respect to the y -axis.

Deductive Reasoning

Deductive reasoning moves from the general to the specific. An algebra student would use deductive reasoning when applying, for example, the quadratic formula. This formula essentially states that the solution to any quadratic equation in the form $ax^2 + bx + c = 0$ is given by the formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} .$$

For example, the student would use

this formula to solve, say, $3x^2 + 5x + 1 = 0$, by first identifying $a = 3$, $b = 5$, and $c = 1$, and then substituting these into the formula.

Inductive Reasoning

Going the other way, from specific to general, an algebra student would use this reasoning in describing all the solutions to the linear inequality problem $2x + 1 \leq 11$. In this problem, the student is asked to describe all numbers x so that 2 times x plus 1 is less than or equal to 11. The student could verify that this works for $x = 1, 2, 3, 4, 5$ but not for $x = 6, 7, \dots$ By studying these individual examples, the student can then reason that the solution is all numbers less than or equal to 5.

Multiple Representations

A running theme of our community is to emphasize how we use models to make multiple representations of a state of affairs. Here is an example of this from algebra.

Problem: Find the domain of the function

$$f(x) = \frac{1}{x - 2} .$$

(The domain of a function is the set of all numbers x so that the right-hand side of the function is a defined number. In this case, since a fraction cannot have zero in the denominator, x cannot be equal to 2.)

The answer may be written in many different ways; four of them are as follows:

The answer may be written in many different ways; four of them are as follows:

- (1) All real $x \neq 2$
- (2) $\{x \in \mathfrak{R} \mid x \neq 2\}$
- (3) $(-\infty, 2) \cup (-2, \infty)$



We emphasized in class discussion the advantages and disadvantages of each of these models. For example, the sentence (1) is easy to read. The set notation (2) emphasizes the fact that the domain of a function is a set of numbers. The interval notation (3) provides a notion of directionality and scale on the number line, and the graph (4) gives a visual sense to the solution not readily available in the other three models.

Models Across the Curriculum

Near the middle of our semester we invite several guest speakers to the class to present the use of models in their disciplines. Each provides a brief reading for the students and moderates a discussion. Our goal is for the students to see first hand the way professionals in a variety of fields use models in their daily work.

Dr. Betsy Powers, a social historian, discussed the idea of history itself as always linked to competing models of time, say linear, cyclic, upward or downward trending. She also brought in some demographic data and guided the students as they profiled the population of a small mid-western farming community and village based on these census “facts.”

Dr. Olin Joynton, a philosopher, discussed Descartes’ preference for an architectural metaphor of building or laying a solid foundation in the latter’s search for epistemological certainty.

Dr. Sunita Cooke, a biologist, led a discussion of the modern scientific or experimental method as a model of exploration. She then discussed the way biologists and other scientists construct and test models as part of their experimental work.

Finally, Mark Stelter, a professor of criminal law and an attorney, discussed the ways judges rely on particular models of interpretation in order to “make sense” of the Constitution.

Fieldtrip

We visit the Houston Museum of Science to explore how the various models of scientific principles displayed there help us “see” what otherwise would be invisible and thus harder to comprehend. For example, we spend considerable time at Foucault’s Pendulum, a model that allows us to experience what we cannot readily observe, namely, the rotation of the earth under our feet. We ask the students to do some calcula-

tions using the pendulum and they also write about how various scientific models on display both reveal and conceal at the same time. For example, the model of the solar system we view on the front steps and portico of the museum, stretching a hundred feet or so in length, adequately represents the relative distances between the planets but conceals the vast spaces which are really between each planet. The model necessarily displays and distorts at the same time.

While at the museum, typically at the chemistry exhibit, we also consider the aesthetic implications of certain scientific models, for example the display of different chemical bonds and structures. We ask the students to reflect on what would lead them to consider a scientific model beautiful, if not a work of art. This opens up to considerations about the nature of form, elegance and beauty which allows us to discuss the aesthetic implications of scientific model building.

Group Research Projects

During the final three weeks or so we divide the community into research teams of 3 or 4 students. Each team explores the application of a particular mathematical model in a discipline, for example physics, chemistry, medicine or even political science.

The students read about the model, study all the variables in the algebraic notation for the model including units of measure, and work some numerical examples of the formula. They also make graphs of the model where applicable. Physical phenomena are in general functions of many variables. The main value of a mathematical model is that it helps the students see which variables are most significant. This helps them understand what the model reveals and conceals.

Each group divides the labor and writes up what they have done, focusing especially on the alternative ways they discover they have to display their solutions. They make an oral presentation to the community using PowerPoint. Some of the projects to date are as follows:

- Model of Richter Scales,
- Model of Decibel Scale,
- Model of Radioactive Decay,
- Drug Metabolism,
- Newton's Law of Cooling,
- Doppler Effect (sound waves),

- Bernoulli's Equation (fluid pressure),
- Model of Weighted Voting Systems, and
- Model of How to Generate Drivers' License Codes.

The WAC Initiative at Montgomery College sponsors a Student Presentation and Critical Thinking Conference each semester, and one or two of our teams invariably present their work at this meeting, to which the entire college community is invited.

Learning Outcomes

In her cover letter to her final course portfolio, one of our students writes as follows: "Our study of models has . . . made me look deeper into things than I would have before. . . . Models are what we look to for guidance and inspiration, and now I have more insight as to how everything really does relate to each other" (used by permission).

By the end of the semester, as evidenced in their group projects and in their final portfolio statements, the majority of the students "got it." There were no sudden breakthroughs. None were expected. However, we did see a gradual and palpable consciousness raising over the course of the semester. Did they learn to do algebra and improve their writing? Yes. All the curricular outcomes for college algebra and writing were met. But it is what else they learned that matters most.

The key outcome we discovered in our students was their increased awareness of their daily reliance on models of all kinds. Even more important, they came to see themselves not as passive users but active builders of models. We saw this most significantly, of course, in the way they began to think and express themselves about algebra and rhetoric. They possessed a vocabulary that allowed them to solve problems in both disciplines and then discuss the power and limitations of the way they chose to solve them.

They came to appreciate, moreover, the value of trying to understand one thing in terms of another, which is the very nature of metaphor and modeling. In so doing they became at once more acute critics of models as historical and provisional constructions and therefore more comfortable with the idea of ambiguity and multiple interpretations.

The key outcome was their demonstration, especially in their final group projects, of the multiple ways they could model and meaningfully assess their variable solutions to the discipline-specific algebra problems. For example, each group

was charged to discuss the strengths and weaknesses of presenting their solutions in different ways, say in a graphic or linear manner. This was as important as correctly solving the problem. They also became aware that the format they used to write up their final projects was itself a model, a conventional form for reporting experimental results.

Although they obviously wrote “about” algebra we avoided having the writing merely serve the mathematics because the real object of our linked courses was model building, and not merely algebra or rhetoric/writing. The focus on models enabled us to elude the either/or situation that traditionally separates mathematics and the humanities, and enabled us to make connections where traditionally few if any have been presumed to exist.

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Invited Panels on Writing the Future: Leadership, Policies, and Classroom Practices

Sixth National Writing across the
Curriculum Conference
Rice University campus,
Houston, Texas
March 7-9, 2002

Thursday Plenary:

Processes for Thinking about WAC's Future

Chris Thaiss, Professor, George Mason University

Carl Lovitt, Associate Dean, Pennsylvania State
University

Julie Zeleznik, Researcher, Iowa State University

Carol Holder, past director, California State University
Institute for Teaching and Learning

Susan McLeod, Professor, University of California at
Santa Barbara

Moderator: Linda Driskill, Professor, Rice University

Panel 1: What Leadership, Goals, and Policies Can Ensure That Students Communicate Well in Multicultural Environments and International Commerce?

Carol Geary Schneider, President of the Association of
American Colleges & Universities

Neal Lane, University Professor, Rice University.

Formerly National Science Advisor to President Clinton

Rebecca Burnett, University Professor, Iowa State
University

Jonathan Monroe, Professor and Knight Writing
Program Director, Cornell University

Daniel Chavez, President, Grupo Vidafel,
Guadalajara, Jal. México

Moderator: Deborah Andrews, Professor,
University of Delaware

Panel 2a: What Must Be Done to Ensure That College Students Communicate Well in Their Fields?

Lee Odell, Professor, Rensselaer Polytechnic Institute

Gene Levy, Provost, Rice University

Chris Anson, Professor, North Carolina State University

Martha Townsend, Professor, University of
Missouri at Columbia

Michael Pemberton, President, National Writing
Centers Association; Georgia Southern University

Aaron Krawitz, Professor, Mechanical & Aerospace
Engineering, University of Missouri, Columbia

Regina Kecht, Professor, Center for the Study
of Languages, Rice University

Moderator: Deborah Bosley, Director of Writing
Programs, University of North Carolina Charlotte

Panel 2b: What Must Be Done to Integrate K-12 Students' Writing and Learning?

Wanda Bamberg, Aldine Independent School District,
Houston, TX

Sandra Broadnax Betts, Principal, District 1525 Illinois

Viola Garcia, School Board Member, Aldine Independent
School District, and Assistant Professor, University of
Houston Downtown

Moderator: Joseph O. Milner, Professor, Wake Forest
University

Panel 3a: What Must Be Done to Ensure That College Students Communicate Well in Their Fields?

Ed Segner, President and Chief of Staff,
EOG Resources, Inc.

Sharon Quiroz, Editor, *Language and Learning
across the Disciplines*

Ken Cox, Department of Chemical Engineering,
Rice University

Brian Huot, Director of Composition,
University of Louisville

Tracy Volz, Assistant Director,
Professional Communication Project, Rice University
David Joliffe, Professor, DePaul University
Mary Burgan, General Secretary, American
Association of University Professors
Moderator: Steven Youra, Cornell University

***Panel 3b: What Must Be Done to Integrate
K-12 Students' Writing and Learning?***

Michael Dressman, Dean, College of Humanities
and Social Sciences, University of Houston Downtown
Consentine T. Morgan, Dean of Academic Affairs,
Ballou High School, Washington, D.C.
Linda McNeil, Co-Director, Rice University Center
for Education; Editor, *American Educational
Research Journal*
Christie McWilliams, Teacher, Huntsville, TX
High School
Claudette Goss, Oklahoma Department of Education
Moderator: Art Young, Professor, Clemson University

***Panel 4: How Can Technology and
Intellectual Property Provisions
Enhance Writing across the Curriculum***

Elizabeth Tebeaux, Professor and Director of Distance
Education, Texas A&M University System.
Andrea Lunsford, Professor of Rhetoric and Critical
Thinking, Stanford University
Patricia Williams, Professor and Director, Academic
Enrichment Center, Sam Houston State University
Angela Williams, Professor, The Citadel
Hugh Burns, Professor, Texas Woman's University
Diane Dowdey, Associate Director, Academic Enrichment
Center, Sam Houston State University
Claire Bartlett, Director, Center for the Study of
Languages, Rice University
Moderator: Mike Palmquist, Colorado State University,
Editor, *Academic Writing*



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