

# WRITING ACROSS THE CURRICULUM AT CSM



5/31/11

Past, Present, and Future

## Executive Summary

Created in 1998 as a subcommittee of the Undergraduate Council, the Writing Across the Curriculum (WAC) Committee is, in this committee membership transition period, mapping potential future pathways at CSM. After describing Committee activities to date, the WAC Committee makes recommendations for the future of the WAC Program at CSM. Specific recommendations include 1) Updating committee membership, 2) Searching for a new, experienced WAC Director, 3) Transforming a WAC Program into a Communication across the Curriculum Program, 4) Addressing threats to a sustainable future for WAC, 5) Addressing common misconceptions about WAC, 6) Reconsidering assessment approaches, 7) Positioning leadership as a potential research focus for the WAC Program, and 8) Investigating connections between WAC Programs and student retention/graduation rates. Through August 1, 2011, the WAC Committee invites and welcomes comments on these recommendations from report recipients—President Scoggins, Provost Parker, Assoc. Provost Harrison, LAIS Division Director Davis, LAIS faculty, all WAC liaisons, old and new WAC Committee Members, Director of Assessment Schneider, and any interested others in the CSM community.

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# Writing Across the Curriculum at CSM

## PAST, PRESENT, AND FUTURE

### I. BACKGROUND AND INTRODUCTION

Shortly after liftoff on a cold January morning in 1986, the Space Shuttle Challenger disintegrated. This tragic event remains one of the U.S.'s most public engineering disasters. Multiple aspects of this failure have been studied, including the role communication played among engineers (Winsor, 1988; Winsor, 1990; Herndl, Fennell, & Miller, 1991). Engineers at Morton Thiokol, the contractor that designed the solid-rocket boosters, thought the joint that sealed the O-ring was unsafe when operating under cold conditions. Those engineers sent their test data to their own managers and NASA personnel, assuming that both would arrive at the same conclusion. However, the managers at NASA placed more stock in the 24 previous, successful launches as evidence of the joint's safety. What was missing from the contracting engineers' communication was not data, but a clearly conveyed *rationale for their interpretation of that data*. The engineers assumed that data speak for themselves. In short, by communicating numbers only, they failed to communicate effectively (Winsor, 1996).

Writing Across the Curriculum (WAC) exists at the Colorado School of Mines (CSM) for multiple reasons, one of which is to reduce the aforementioned blind spot and accentuate the role effective communication plays in the professional lives of engineers, applied scientists, and others educated at CSM. To understand how WAC is enacted, a brief overview of the history of WAC at CSM is warranted. After that historical overview, recommendations are provided for the future of the WAC Program at CSM.

### II. HISTORICAL OVERVIEW OF WAC AT CSM

Unlike many transient educational trends in higher education, WAC has a robust history of over forty years in the U.S. As a cross-curricular innovation that began around 1970 (Bazerman et al., 2005), WAC diffused rapidly, and by 1988, nearly 50% of higher education institutions had WAC Programs (McLeod, 1989). CSM's WAC Program was created in 1998, and our WAC Program has been strategically designed to position CSM graduates to effectively communicate technical and nontechnical ideas, making

our graduates more capable, employable, and competitive for future promotions.

In a 2006 publication, over 1,600 employers—representing diverse geographic locations, industry types, company sizes, educational attainment levels, and experience evaluating engineers—were asked to rank all ABET Criterion 3 competencies. At the top of all those competencies of engineering graduates, the one ranked first—even above technical competencies—was the ability to communicate effectively (Lattuca, Terenzini, & Volkwein, 2006). Clearly, the career success of CSM graduates depends to some degree on their ability to communicate ideas to diverse audiences. Further, a vibrant democracy and dynamic public policy depend on informed citizens capable of communicating ideas in diverse public forums.

## WAC Program Drivers

At CSM, WAC emerged in the 1990s from five primary drivers:

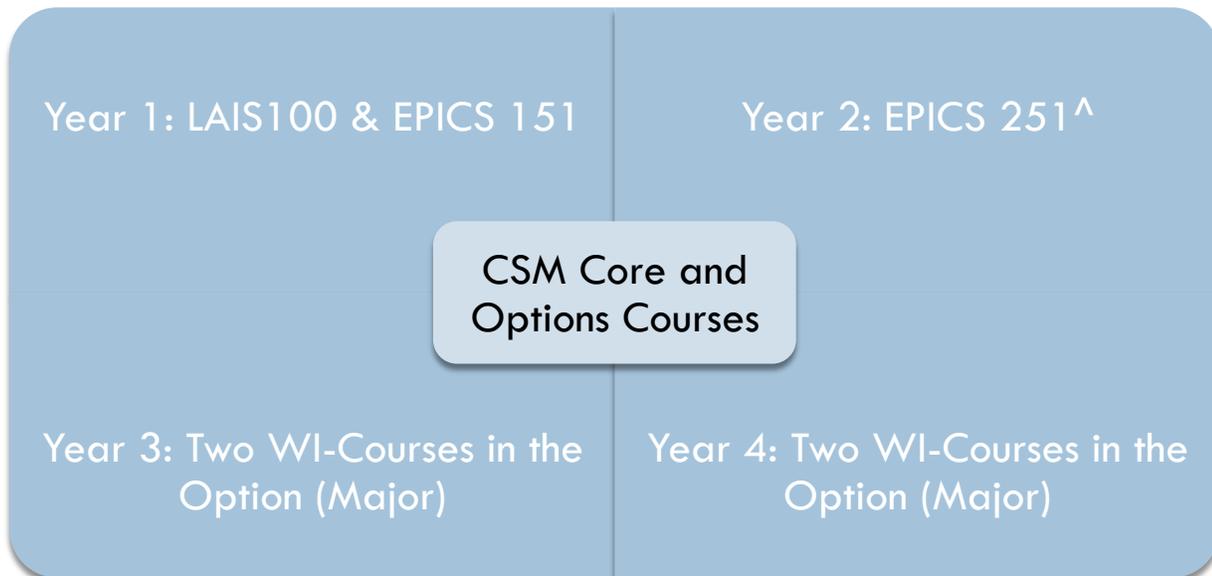
- *Faculty Support:* In AY 1995-96, Barbara Olds surveyed CSM faculty in department or division meetings by asking two questions: 1) How satisfied are you with the writing skills and abilities of graduates in your program? 2) What should be done, if anything, to improve your graduates' writing? Those meetings resulted in strong faculty support to launch a WAC program. A WAC Working Group, headed by Olds, studied possibilities and made recommendations. Those recommendations aligned with an earlier endorsement from the Curriculum Reform Steering Committee, which had recommended "a continuum of communications usage throughout the junior and senior years, anchored by four required option courses designated as communications intensive."
- *Industry Feedback:* Via discussions during Career Fairs and in other venues, both faculty and administrators reported input from employers regarding CSM graduates' overall capabilities. Generally, CSM graduates were reputed to be technically excellent, yet fell short in the area of communication, especially writing.
- *Alumni Input:* Both anecdotally and through a 1994 alumni survey, CSM alumni reported seeing graduates from other engineering programs promoted ahead of them; one of the primary reasons hinged on communication skills.
- *Administrative Leadership:* Through curriculum reform and development mini-grants and other means, the CSM administration supported the implementation of the WAC Program as consistent with the Graduate Profile and the overarching goal of graduating outstanding professionals.
- *WAC Research:* Ample scholarship supported the notion that the teaching of disciplinary writing is integral to initiating apprentice or novice members into a disciplinary community (Winsor, 1996; Berkenkotter, Huckin, & Ackerman, 1988; Berkenkotter & Huckin, 1993). Such scholarship builds on the foundational idea that the teaching of writing is a shared responsibility spread across all disciplines (e.g., Connelly, & Irving, 1976; Maimon, 1981; Davis, 1984; Bernhardt, 1985). Thus, the teaching of *disciplinary* writing belongs in disciplinary courses, whose instructors are supported by WAC resources such as workshops, consultations, and online materials.

## WAC Program Benefits

Although the above drivers were diverse in origin, they shared a common goal: to enable CSM graduates to communicate technical and nontechnical ideas effectively to a range of audiences. Beyond that goal, four primary benefits emerge from a WAC Program, as embedded within the WAC Mission Statement (see Appendix A):

1. *Institutional Value* - WAC exists at CSM because the ability of Mines graduates to communicate their ideas during their career at Mines and thereafter is a key institutional value. This value is anchored in multiple ways, such as the CSM Graduate Profile, which states that graduates from CSM “must have the skills to communicate information, concepts and ideas effectively orally, in writing and graphically.” A WAC Program benefits CSM by ensuring that we continue working toward such ends.
2. *Consistent Practice* - WAC is also founded on the idea that communication skills atrophy quickly through disuse and require consistent practice to be developed. To provide such practice, a sequence of writing-intensive courses occurs throughout the undergraduate curriculum.
3. *Learning and Critical Thinking* - WAC is predicated on the understanding that writing fosters learning and critical thinking across the disciplines (e.g., Bean, 1996). Research and practice confirm that writing is a tool that can enhance the learning and critical thinking skills students need in all fields of study (e.g., Britton, 1970; Britton, Burgess, Martin, McLeod, & Rosen, 1975; Langer & Applebee, 1987; Russell, 2001).
4. *Disciplinary Access and Literacy* – Finally, WAC exists so undergraduates at CSM gain a deeper understanding of discipline-specific writing conventions and techniques. Infused with such an understanding, future professionals position themselves to effectively communicate technical and nontechnical ideas to audiences outside and within their fields. Research suggests that the ability to communicate like peers within one’s field facilitates membership and legitimacy in one’s profession (e.g., Bazerman et al., 2005). Hence, the WAC Program emphasizes writing-intensive courses across the entire curriculum, including within the options (majors), as noted in Figure 1.

Additional benefits may also emerge in terms of CSM graduates’ communication-for-leadership abilities, a topic discussed below.



**Figure 1: Writing-Intensive (WI) Core and Options Courses at CSM**

<sup>^</sup> EPICS 251 is not required of all CSM Options (Majors)

## WAC Committee Accomplishments, 1998-2011

Acting on broad faculty and administrative support, in spring 1998, John Trefny created the WAC Committee as a subcommittee of the Undergraduate Council. Committee members included faculty from, among other areas, Chemical Engineering, Engineering, LAIS, and Metallurgical and Materials Engineering. Five of the original seven members have served on that Committee from its origin through AY 2010-11.

In its first few years, the Committee realized several important accomplishments:

1. *Identified WAC Liaisons* – The WAC Committee identified one faculty member to serve as a liaison between his or her home department or division and the WAC Committee to facilitate effective communication and shared decision-making. Liaisons were identified in all undergraduate-degree granting programs as well as in programs with strong interests in WAC such as ESE, LAIS, and the Library. A list of current WAC liaisons appears in Appendix B.
2. *Constructed a Mission Statement* – The WAC Program’s mission statement is a product of research on WAC, discussions with WAC liaisons, and decisions made within the WAC Committee (see Appendix A).
3. *Co-Created WAC Goals/Objectives and Writing-Intensive Course Guidelines* - Between spring 1998 and spring 1999, the WAC Committee collaborated with WAC liaisons to forge consensus documents on WAC goals and objectives and writing-intensive guidelines, documents that were approved by Undergraduate Council in spring 1999 (See Appendix C). The guidelines contain several stipulations, including two primary ones:
  - a. That all undergraduate-degree granting departments and divisions identify upper-level courses as writing intensive (WI); generally, these include two junior-level and two senior-level courses. Since AY 2001-02, with approval from the Undergraduate Council, these courses have been marked as “WI” in the *CSM Undergraduate Bulletin*.
  - b. Over the four-course sequence, a recommended minimum word count is 15,000; assuming an average of 300 words/page, this is a total of 50 pages of text, to be distributed across the four courses in any manner the department/division deems appropriate. This flexibility was deliberately built in so courses in which writing was a logical fit (e.g., Senior Design) could integrate more writing than courses wherein less writing made more sense. At <http://writing.mines.edu/wicourseguidelines.htm>, the full WI-Course Guidelines appear (see also Appendix C). A schematic of the CSM WAC Program course sequence appears in Figure 1.
4. *Launched WAC Summer Workshops* - In the summer of 1998, we initiated WAC summer workshops for faculty interested in learning strategies for integrating writing into technical courses as well as acquiring the tools with which to (re)design, implement, or pilot writing-intensive courses. These workshops have remained the bedrock of the WAC outreach effort through 2011. All participating faculty completed WAC workshop evaluations, and these results were incorporated into annual reports.
5. *Showcased “Best Practices” in WI Courses* – When CSM faculty requested examples of effective writing integration in technical courses, in fall 2000 the WAC Director (Leydens) interviewed one faculty member from each of the 11 undergraduate degree-granting departments/divisions, and created a web site spotlighting diverse ways of integrating writing into technical courses. This faculty resource remains available at <http://writing.mines.edu/bestpractices.htm>.

6. *Developed Online Faculty Resources* – Also responding to faculty request, the WAC Committee began adding online faculty resources. The Writing Program web-presence now includes 67 printed pages of online materials. Between 1999 and 2011, our resource and online tutorial database has expanded significantly due largely to faculty requests, and those materials remain available at <http://writing.mines.edu/FacultyResources.htm>.

Select WAC accomplishments are summarized in Table 1a below.

**Table 1a: Key WAC Numbers, 1998-2011**

Number	Description
>90	Mines faculty participating in Summer Teaching and Learning/WAC Workshops.
100	Percent of Mines faculty Teaching and Learning/WAC Workshop participants who responded affirmatively when asked whether they would recommend the Workshop to their colleagues.
100	Percent of undergraduate-degree-granting departments or divisions that demarcate their writing-intensive courses in the <i>Undergraduate Bulletin</i> .
67	Total printed pages of Writing Program online content.
0	Votes against the writing-intensive guidelines that were proposed by the WAC Committee and approved by Undergraduate Council in April 1999.

Collectively, these added dimensions to WAC have contributed to a stronger WAC Program, as noted by a former CSM administrator quoted below.

**I cannot praise enough what the WAC effort and the entire Writing Program has brought to Mines. Without these efforts the institution would be a far less effective educational institution without the level of positive visibility it has earned in recent years on both educational and research fronts. The appointment of Dr. Leydens and the development of WAC and the Writing Program under his leadership have proven to be a wise and productive investment for the School.**

**--Arthur B. Sacks, former Director of the Guy T. McBride Honors Program, Associate Vice President for Academic and Faculty Affairs, and Director of the Division of Liberal Arts & International Studies. May 2011.**

## WAC Workshop Outcomes

After the August 2011 WAC Workshop, over 90 CSM faculty members will have participated in these summer workshops. On a campus with just over 200 faculty members, this is a significant percentage. Also significant are the quantitative and qualitative workshop outcomes. Key features of the quantitative workshop evaluation results are summarized here:

- Of all workshop participants, 100% responded affirmatively when asked whether they would recommend the workshop to colleagues.
- More recently, participants were asked to indicate whether the workshop met its four learning objectives, and 100% agreed or strongly agreed for each of the objectives.
- Participants said the workshop either met (15%) or exceeded (85%) their overall expectations.
- At least one participant has participated in the workshops from 100% of CSM undergraduate-degree granting departments and divisions.

Qualitative findings also indicate strong participant satisfaction, but add the dimension of why participants were satisfied. Some recurring patterns occur in evaluations:

- When asked to comment on workshop strengths, participants accentuated the sound, practical ideas for integrating writing in technical courses.
- Participants described the specific curricular changes they would make under three main categories:
  - Improved knowledge on evaluating their students' writing
  - Augmented ability to inject assignments with critical thinking components and
  - Enhanced capacity for integrating exploratory/informal writing.

Collectively, the workshops have provided the WAC Program a higher campus profile, one that should at a minimum be maintained, as emphasized in the quote below.

**The Writing Across the Curriculum Program was born in the campus-wide curriculum reform project of the late 90's, and driven by the statement in the Mines Graduate Profile calling for our graduates to be skilled in communications. Personally, I believe that engineers and scientists must be as good at writing as they are at mathematics, and so it was obvious that our students' writing had to be contextual and pervasive across all semesters of the curriculum. Armed with some initial NSF funding, and subsequent support from the Office of Academic Affairs, Jon Leydens [and the WAC Committee] designed and implemented the WAC Program. Over the years, through the Summer WAC Workshops and other WAC initiatives, the Program helped equip many Mines faculty with techniques to inject writing into the mainstream of our technical curricula. One of the highlights for me was reading the faculty evaluations of the Summer Workshops, which were always stellar!**

**Our graduates will have an edge on their peers if they can write well and speak with eloquence. I hope that the next generation of the WAC program continues to fulfill this imperative.**

**--Nigel Middleton, Current Senior Vice President for Strategic Enterprises and former Provost, Executive Vice-President for Academic Affairs and Dean of Faculty, Vice-President for Academic Affairs and Dean of Faculty, and Associate Vice-President for Academic Affairs. May 2011**

## WAC Consultations with Faculty

In the fall of 1998, after the first summer Workshops, the WAC Committee realized that a new and important question had emerged: What happens to faculty who participate in the summer workshops and have follow up questions or need additional consultation? Our response to this growing need was to dedicate expert resources to such consultations.

**We still use the information that [Jon Leydens] provided [for EGGN413, Computer Aided Engineering], and it has been very useful to guide the students and continue enhancing their writing expertise.**

**-- Bob King, Professor, Division of Engineering. May 2011**

Between 1998-2011, the WAC Program provided consultations to 113 CSM faculty members (see Appendix D). These consultations varied widely in terms of time and scope, from brief consultations on the pedagogical viability and integration of new assignments or assignment sequences to more detailed explorations of the articulations among several courses (such as EPICS I & II or MEL Labs I-III). In some cases, resources were designed for classroom lectures and interactive discussions. In cases in which the instructor asked Dr. Leydens to co-design and deliver a classroom lecture or workshop, we forged a specific agreement. After Dr. Leydens delivered such lectures/workshops to students once or twice—with the course instructor present—that instructor was expected to deliver the lecture or workshop thereafter. Faculty comments regarding recent consultations appear below.

**Jon Leydens visited my Ph.D.-level Research Methods class in 2010 to provide a guest lecture ... [in which he] engaged students in an interactive activity on the characteristics of effective research article introductions. His lecture was so popular that I have made a point of asking him to present this same material to my 2011 class. His slides are posted on the Blackboard site for the course, and I leave the course up permanently as a resource for our Ph.D. students.**

**--Graham Davis, Professor, Division of Economics and Business**

**[After discussing assignment approaches with Jon Leydens,] I found that having students think and write down responses first and then discuss them ... led to deeper thinking and more meaningful in-class discussions. Also, [Jon Leydens] and I had discussed how to 'build' [scaffold] students up in their writing and analyses of their [Statistics] class projects from initial idea to completed reports.**

**--Mandy Hering, Assistant Professor, Department of Mathematics and Computer Science**

## Research and Scholarly Presentations

A dozen research publications emanated from WAC Program-related activities. These publications include seven articles in peer-reviewed journals, two peer-reviewed conference proceedings papers, and three invited contributions, to an encyclopedia, book, and online archive. The peer-reviewed articles appeared in prestigious journals, such as the *Journal of Engineering Education*, *Journal of Geoscience Education*, and *IEEE Transactions on Professional Communication*. Together, these dissemination efforts have boosted the national and international profile of CSM's WAC Program. The publications were largely interdisciplinary in character; along with Jon Leydens, CSM co-authors included Barb Moskal (MACS), Paul Santi (GE), Barbara Olds (LAIS), Ron Miller (ChE), and Jen Schneider (LAIS). The complete list of publications appears in Appendix E.

Of the 29 scholarly presentations on WAC-related topics, members of the WAC Committee gave three types: five campus-wide, 21 national, and three international presentations. Of those presentations, eight were invited talks that arose from the above-mentioned scholarship. Those presentations are listed in Appendix F.

## WAC Revenue and Operating Expenses

From 1997-2011, WAC revenue generated from intra- and extramural grants totaled \$257,411. Those grants funded a variety of initiatives, including K12-higher education WAC collaborations, a writing conference held at CSM, the development of web-based writing tutorials, the purchase of computers and other instructional technology for the Computerized Writing Classroom in 105 Stratton Hall, and stipends for faculty members from all CSM departments/divisions who participated in summer WAC workshops. A complete list of all grants earned appears in Appendix G.

In the past few years, the operating expenses for the WAC Program have consisted of 2/3 of a course release per annum, provided to Dr. Leydens to administer the program. Administrative responsibilities include facilitating all WAC summer workshops, from registration through the final participant evaluation, and all follow-up consultations with faculty. Additional responsibilities include keeping current with WAC scholarship and providing programmatic leadership, vision, and direction in and outside of WAC Committee Meetings, so the WAC Program maintains its local, national, and international profile. For instance, in 2010, Dr. Leydens was asked to write a capital campaign proposal to garner Foundation support for a transformation from WAC to a Communication Across the Curriculum Program (detailed

below). Also included in the responsibilities are annual reports and other actions. The remaining 1/3 of a course release comes from providing support and supervision to the LAIS Writing Center and to First-Year Writing. For instance, this included leading a major learning outcomes assessment project in Nature and Human Values in 2008-09, and designing the rationale for expanded Communication Center space in the future remodeled Arthur Lakes Library. A summary of salient numbers appears in Table 1b.

**Table 1b: Key WAC Numbers, 1998-2011**

Number	Description
113	Faculty who received course-specific consultations from the WAC Program.
15,000	Minimum number of words to be written by undergraduates across four writing-intensive courses in their majors to meet writing-intensive guidelines.
\$257,411	Intra- and extramural funding raised for WAC-related initiatives.
12	Research articles and other publications on WAC-related issues.
29	Scholarly presentations on WAC-related topics: of those, five occurred at CSM, 21 nationally, and three internationally. Of the talks, eight were invited, including five domestic and three international talks.
2/3	Of one annual course release, the total budget for the WAC Program.

### III. RECOMMENDATIONS FOR THE FUTURE OF WAC

The WAC Committee recommends that in the future, a focus remain on building the WAC Program's local, national, and international reputation. This should be achieved via multiple means: continued scholarly publications, intra- and extramural grants, on campus and off campus presentations, summer workshops and consultations, invited talks and workshops, and continued professional enrichment via participation at WAC conferences.

However, WAC at CSM is also at an important crossroads, and the Program needs to be revitalized in several crucial ways, as detailed in the recommendations below.

1. *Update Committee Membership* – Due to retirement and other reasons, the WAC Committee membership declined in AY 2010-11, and the old and new Committee membership appears in Table 2.

Table 2: Old and New WAC Committee Members

WAC Committee, 1998-2011	WAC Committee, 2011-
Bob King, EG Jon A. Leydens, LAIS [chair] David Matlock, MME Ron Miller, ChE Cathy Skokan, EG	Cortney Holles, LAIS Tracy Gardner, ChE Junko Munakata-Marr, ESE David Matlock, MME Ron Miller, ChE [chair] Soon-to-be-named Faculty, EG

Fortunately, two longtime WAC Committee members will remain—David Matlock and Ron Miller—to help ease the transition.

2. *Search for an Experienced Leader* – Since the WAC Director and Committee Chair, Dr. Leydens, is stepping down as of May 2011, and since no other LAIS faculty members currently have professional education and experience running a WAC Program, the WAC Committee recommends a search for an experienced WAC Program Director. That person should be sought no later than AY 2012-13 (fall 2013 start date at the latest). This WAC Program Director would also be able to fill crucial cross-curricular gaps, such as leading the transition from a WAC to a CxC Program (detailed below), teaching LAIS601—Academic Publishing, and more.
3. *Transform from a WAC Program into a CxC Program* – For the past few years, the WAC Committee has been laying the foundation for the transformation from a WAC Program into a digital-age Communication across the Curriculum (CxC) Program. The need for program modernization stems largely from interfaces between human communicators and communication technologies. Today, writing no longer occurs as a communication mode distinct from other communication modes (such as oral, visual, and electronic communication), yet many writing programs still employ pre-digital-age approaches. A modernized CxC Program stands to become a leader in digital-age communication, so graduates learn integrated multimodal communication skills and possess the ability to leverage the most appropriate features of interconnected modes of communication. As more CSM graduates become better integrated and confident communicators in their respective fields, they will likely augment their own chances for career promotion and leadership. Other institutions with strong engineering and science programs are also rising to these digital-age challenges, such as Iowa State, Georgia Tech, Louisiana State, and Ohio State. A more detailed rationale for this proposal and a list of CSM supporters appear in Appendix H.
4. *Address Threats to a Sustainable Future for WAC* – Three primary threats should be addressed:
  - a. Since 1998, the institutional terrain in which WAC is situated has shifted. CSM faculty once placed considerable emphasis and pride in excellence in undergraduate teaching, whereas today a stronger research focus exists. Certainly these two are not mutually exclusive, yet the research emphasis today is unequivocal. On the positive side, this shift will lead CSM to greater research and overall prestige. However, the shift also can lead to less pedagogical risk-taking and innovation, especially among new tenure-track faculty; such faculty are already set in certain work habits seven years later, when the pressure to pull in funded research and publish continues unabated. Thus, curricular

- initiatives that depend on broad-based campus support and pedagogical innovation, such as WAC, are at risk. Despite this, interest remains strong among individuals who find that pedagogical experimentation leads to better student learning. Hence, methods for addressing this threat need to be developed.
- b. A second institutional shift has occurred. A limited number of full-time faculty exist in several departments or divisions, such as the Division of Engineering. Divisions that have both a large number of students and a large number of adjuncts sit at a disadvantage in their ability to effectively implement a WAC program. Often, the reality of adjunct work—regardless of the quality of adjunct faculty—involves limited time on campus (other than in the classroom), which reduces adjunct professional development opportunities. For logical reasons, adjunct faculty also tend to be more transient and lack a long-term commitment to CSM, which negatively impacts WAC implementation. This phenomenon impacts some depts./divisions more than others, and particularly those with low ratios of students to full-time faculty. Addressing this concern is a campus-wide equity issue.
  - c. Some LAIS faculty either do not value or know much about WAC activities, and thus may see a course release and/or smaller class sizes for a WAC Director as unjustified. In a professional context in which teaching and scholarship are the primary metrics of success, often service and administrative activities—no matter how valuable they may be to the university as a whole—are difficult to measure and understand. The next WAC Director should keep LAIS colleagues informed of WAC activities. Also, methods need to be identified so the next WAC Director has a *fair yet sustainable* workload and future.
5. *Address Common Misconceptions about WAC* – A study conducted by the WAC Director in AY 2010-11 revealed a disparity of perspectives between CSM faculty who have and have not taken WAC summer workshops. Faculty from undergraduate degree-granting departments and divisions were surveyed, as were last year’s WAC workshop participants. Although the latter represent a small sample size, faculty who have taken the workshop tend to recognize the following documented common misconceptions (Bean, 1996; Bazerman et al., 2005) as *misconceptions*:
- Emphasizing writing and critical thinking takes time away from course content.
  - Writing assignments are not appropriate for technical courses.
  - Integrating ungraded writing is pedagogically suspect and ineffectual.
  - Learning technical content, not writing about it, is what helps students learn to become more integrated members of their respective disciplines.

Misconceptions persist for several reasons. For instance, we tend to teach similarly to how we were taught, and embedded in that instruction are assumptions that we rarely have occasion to question. How the reconstituted WAC Committee decides to address these persistent misconceptions will be their decision. Continued summer workshops are recommended, but additional measures will likely be necessary.

6. *Reconsider Approaches to Assessment* – The WAC Director’s involvement with campus-wide writing assessment should expand from the current focus on working with individual courses and departments and divisions in preparation for ABET or HLC accreditation visits. In addition, useful

cross-curricular materials and interactions should be developed that will assist all programs, perhaps by working in conjunction with the newly hired Director of Assessment.

7. *Position Leadership as a Potential Research Focus* - In the future, the WAC Committee should consider expanding research on CxC as a vehicle for the development of leadership capacities. Many prominent engineers in history have assumed leadership roles, including Samuel Florman, Henry Petroski, and Jimmy Carter, to name a few, and these engineers had one characteristic in common: they were all effective communicators. Effective leadership requires effective communication, and is in high demand in industry, as indicated by the aforementioned 2006 study on ABET graduation competencies (Lattuca et al., 2006). Such interest in effective communication is matched by Mines alumni, who in 2009 provided the most enthusiastic response to a *Mines Magazine* article in the past decade—to an article about the WAC Program. Engineers seeking to take technical ideas from abstract thoughts to market-ready realities will need to be able to convey the benefits of their technical ideas to a wide array of stakeholders as well as to shift the courses of their organizations as new opportunities arise; hence, understanding how communication bolsters leadership capabilities deserves additional study.
8. *Investigate Connections between WAC Programs and Student Retention/Graduation Rates* – Recent work by Paul V. Anderson and others raises important questions about WAC and student retention (e.g., Gonyea & Anderson, 2009). That study indicates that to achieve positive student learning outcomes, the amount of writing overall in a WAC Program is not as important as the amount of writing that elicits engaged, deep learning. Deep learning occurs via higher-order learning, integrative learning, and reflective learning. Drawing from National Survey of Student Engagement results, that study shows that writing can be a catalyst for deep learning and greater levels of student engagement; hence, writing that fosters deep learning may be associated with higher retention and graduation rates. Investigating such connections can be of value to CSM.

## IV. CONCLUSION AND INVITATION

As a Committee, we have maintained for the past 13 years that the WAC Program fills a critical gap at CSM. We hope future WAC initiatives build from the established foundation with a spirit of innovation. Through August 1, 2011, the WAC Committee invites and welcomes comments on the above recommendations. Comments can be sent to the committee at [wac@mines.edu](mailto:wac@mines.edu).

We would also like to acknowledge all the faculty members who have participated in summer workshops and who have engaged in WAC consultations, as well as the support from individuals in the CSM Administration and the Trefny Institute. Collectively, these colleagues have made our WAC work challenging, meaningful, and productive. A special thank you goes to Bob King, Jon Leydens, and Cathy Skokan for their 13 years of service to the WAC Committee.

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## APPENDIX A: WAC MISSION STATEMENT

Source: <http://writing.mines.edu/mission3.htm>

Writing Across the Curriculum (WAC) exists at the Colorado School of Mines in part because the ability of Mines graduates to communicate their ideas during their career at Mines and thereafter is a key institutional value. WAC is also founded on the idea that communication skills are teachable and require consistent practice if they are to be developed. Just as a good skier learns to ski well by skiing often and learning from mistakes, a good writer learns to write well through practice and reflection. Those who have achieved a high level of performance in playing a sport, a musical instrument, or anything else know that to be good at something takes consistent self-discipline and training. Writing is no different. One does not typically learn to be an excellent writer in one course, just as one does not learn to be an excellent skier or tennis player in a handful of lessons. Therefore, a sequence of writing-intensive courses occurs throughout the undergraduate curriculum. In their core courses, students receive ample practice and direct writing instruction in Nature and Human Values, as well as some practice and writing instruction in EPICS (the Engineering Practices Introductory Course Sequence). A small amount of writing exists in Human Systems. Collectively, these courses establish a general foundation to be developed in writing-intensive courses at the junior and senior levels within each student's major.

WAC is also in place at CSM because writing fosters learning and critical thinking in the content of any discipline. Research and practice confirm that writing is a tool that can enhance the learning and critical thinking skills students need in all fields of study.

Finally, WAC is a vital component of the undergraduate curriculum at Mines because writing facilitates students' entrance into their discipline's "discourse community." Writers will take writing-intensive courses at the junior and senior level within their own disciplines so they can become familiar with the techniques and writing conventions common to their specific discipline. When students have a deeper understanding of those conventions, they are in a better position to effectively communicate ideas both to lay readers and to those within their field.

## APPENDIX B: WAC LIAISONS

<b>Department or Division</b>	<b>WAC Liaison</b>
Chemical Engineering	Ron Miller
Chemistry/Geochemistry	Mark Seger
Economics and Business	Scott Houser
Engineering	TBA
** Environmental Sci. and Engineering	Junko M. Marr
Geology/Geological Engineering	Reed Maxwell
Geophysics	Jeff Andrews-Hanna
** LAIS	Cortney Holles
** Library	Lisa Dunn
Mathematical and Computer Sciences	Barb Moskal
Metallurgical and Materials Engineering	Reed Ayers
Mining Engineering	Kadri Dagdelen
Petroleum Engineering	Bill Eustes
Physics	Frank Kowalski

\*\*Not an undergraduate degree-granting department or division.

## APPENDIX C: WAC GOALS AND OBJECTIVES AND WRITING-INTENSIVE GUIDELINES

In spring 1999, WAC goals and objectives and writing-intensive guidelines were approved by Undergraduate Council.

### Goals and Objectives

Source: <http://writing.mines.edu/goalsandobjectives.htm>

1. Students should be able to communicate information, concepts, and ideas effectively in writing. This will include an ability to:

1.1 Carry out effective process strategies—to organize, draft, and revise written documents effectively.

1.2 Write to a variety of audiences and for a variety of purposes.

- organize for any audience
- communicate with audience-appropriate terminology and language
- cite sources appropriate for the intended audience and purpose
- use discipline-specific conventions

1.3 Make a logical written presentation.

- effectively convey convincing evidence to support claims and rebut counter arguments
- construct persuasive, tactful arguments

1.4 Write clearly, concisely, and precisely in a variety of formats including memos, reports, and proposals.

- write grammatically correct prose
- seamlessly incorporate tables and figures into written documents

2. Students should be able to acquire and use technical information from various sources, including electronic retrieval systems.

**This will include an ability to:**

2.1 Concisely and precisely summarize and synthesize large amounts of complex information.

2.2 Communicate engineering and scientific principles by showing the applications of those principles to problems in engineering and/or applied science.

2.3 Read critically by evaluating the credibility of information sources including the effectiveness of claims and supporting evidence.

## APPENDIX C (CONTINUED)

3. Students should value written communication as an integral component of their academic and professional careers.

### **This will include demonstrated:**

3.1 Appreciation of writing as a learning and thinking tool.

3.2 Appreciation of the role writing plays in one's career.

3.3 Confidence in using writing as a communication tool.

## Writing-Intensive Guidelines

Source: <http://writing.mines.edu/wicourseguidelines.htm>

Prepared by the Writing Across The Curriculum Committee

Approved by the CSM Undergraduate Council on April 14, 1999

The assumptions underlying the guidelines below include the following:

- Faculty should have as much decision latitude as possible in every facet of writing-intensive (WI) courses.
- Faculty should have access to the resources they need to be able to design, implement, and revise WI courses in the Options.
- Faculty should receive stipends for attending WAC Workshops that focus on WI courses.
- WI course guidelines should foster faculty ownership; only when we as faculty members value written communication as a vital tool for teaching course content and as a vital skill for CSM graduates will WI courses succeed in conveying the importance of writing to students.
- WI courses should foster:
  - Knowledge of the course content
  - Learning and critical thinking
  - Understanding of discipline-specific writing conventions

### **Specific Considerations**

WI Course Designers should consider the:

- Variety of formats appropriate to the discipline over the four-course sequence (abstracts, research papers, memos, resumes, proposals, short, long, lab, and progress reports, etc.).
- Variety of types of thinking and writing students should do over the four-course sequence (application, evaluation, synthesis, etc.).

## APPENDIX C (CONTINUED)

- Role the following will play in the course:
  - Revision
  - Peer review
  - Informal writing (exploratory; process; learning; not evaluated)
  - Formal writing (product; demonstration of learning; graded)
  - Discipline-specific writing conventions.
- If only one assignment is required, it should be prepared in stages (scaffolded) throughout the semester.
- All assignments need clear and explicit guidelines and assessment criteria.
- Lengthy, formal assignments need to include written and/or oral feedback on drafts and final papers; draft feedback can occur during peer and/or instructor review.

### WI Course Design Specifics

- The design of any WI course should demonstrate why faculty value written communication skills and should integrate written communication as a tool to achieve course objectives rather than a requirement tacked on as an afterthought.
- Written materials should receive a percentage of the overall course grade that is representative of the thinking involved in their production and of the importance they play in meeting course objectives. For example, if a lab course grade includes six lab reports and four oral reports, 60% of the grade would be based on written materials. A recommended minimum is 40% of the overall course grade.
- Written materials should include both informal and formal writing.
- Written materials should include a mixture of individually and collaboratively produced work.
- Over the four-course sequence, a recommended minimum word count is 15,000; assuming an average of 300 words/page, this is a total of 50 pages, to be distributed across the four courses in any manner the department deems appropriate.
- Whenever feasible, WI course syllabi should appear on the Web so other faculty can view a variety of approaches.

### Assessment Considerations for Designers of WI Courses

- What are the writing goals and objectives we hold for Mines students? (See Goals and Objectives.)
- What are the department criteria that define "effective written communication"?

## APPENDIX C (CONTINUED)

- What are the performance standards that will help us determine whether students have met departmental and institutional writing goals? (See Assessment Matrix for this and many of the following points.)
- Should student achievement be measured and reported in the aggregate or individually?
- If individually, what happens if a student does not meet standards?
- At what point should students be assessed?

How should the feedback we receive on assessments inform and affect future assessment methods and instructional practices?

### **Writing Intensive Courses by Department or Division**

Regardless of a student's major at the Colorado School of Mines (Mines), writing is a vital component of his or her undergraduate curriculum because writing facilitates students' entrance into their discipline's "discourse community." Writers will take writing-intensive (WI) courses at the junior and senior level within their own disciplines so they can become familiar with the techniques and writing conventions common to their specific discipline. When students have a deeper understanding of those conventions, they are in a better position to effectively communicate ideas both to lay readers and to those within their field.

Please see the current CSM Undergraduate Bulletin for the most up-to-date listing of WI courses. All such courses are marked WI.

## APPENDIX D: WRITING CONSULTATIONS WITH CSM FACULTY 1998-2011

Year	# of Faculty	Dept./Div.	Course/Faculty	Nature of Consultation
1999	16	EPICS	EPICS151/Bob Knecht (lead instructor)	Redesigning in-class writing workshops
2000	13	Engin.	EGGN250 and 350-- Multi-Disciplinary Engineering Labs/Bob King (lead instructor)	Designed and presented on using rubrics effectively for MEL faculty
2000	0 (same as above)	Engin.	EGGN250 and 350-- Multi-Disciplinary Engineering Labs/Bob King (lead instructor)	Presentation on grading writing efficiently and effectively in MEL Labs.
2000	2	Petroleum Engin.	Different PE undergraduate courses.	Designed/presented an hour-long session on evaluating student writing for a group of PE TAs.
2001	1	Petroleum Engin.	PEGN682/lead instructor	Presentation for graduate students on peer review processes in research proposal writing.
2001	11	Chem.Eng. Chemistry EB Engin. Geology Geophysics MACS MME Mining Petrol. Eng. Physics	CRGN312-313/Miller CHGN490/S. Daniel EBGN402/G. Davis EGGN250,350,450/B.King GEGN403/L.G. Closs GPGN494/T. Boyd MACS370/Underwood  MTGN445/Matlock MNGN428&9/Dagdelen PEGN311/Eustes PHGN315/Kowalski	Consulted with and interviewed each faculty instructor to showcase diverse pedagogical approaches to integrating writing in technical courses. Findings published on the WAC Web page under "Best Practices."

Year	# of Faculty	Dept./Div.	Course/Faculty	Nature of Consultation
2001	2	Environ. Science and Engin.	EGGN335/Junko M. Marr	Co-planned the process by which writing would be integrated into a summer field session course taught by ESE faculty.
2002	18	Engin.	EGGN250,350,450M ulti-Disciplinary Engineering Labs/Tom Grover (lead instructor)	Designed/ delivered seven hour-long presentations in spring & fall 2002 on multiple communication topics.
2003	5	McBride Honors Program	HNRS201/Juan Lucena (Honors Program Director, Course Coordinator)	Designed and presented this three-hour workshop for McBride Honors Program faculty on integrating writing into comparative political and economic systems.
2004	12	Geology and Geol. Engin.	All GE course and all GE faculty.	By invitation, discussed WAC, writing evaluation, and the role of the Writing Center at a Dept. of Geology faculty meeting.
2005	1	Chemistry and Geochemistry	An upper-division writing-intensive course in Chemistry	Provided instructional resources on Writing in the Disciplines
2005	1	Engineering	All EG Courses/Bob King	Consultation on writing performances of Engineering Div. undergraduates
2005	14	LAIS	Update on WAC/All LAIS faculty	At 2005 LAIS faculty retreat, provided an update on WAC activities to date.
2006	1	Engineering	Course in Electrical Circuits/Ravel Ammerman	Discussed the innovative process by which R.A. addresses student misconceptions on circuit concepts.
2007	1	Engineering	EGGN363, Soil Mechanics Laboratory/ Mike Mooney	Designed/Presented an intervention on audience & purpose, and helped revise course objectives, report writing guidelines, and a lab report scoring rubric.
2007	3	Petroleum and Geo.	PE Senior Design/J. Miskimmins, J. Curtis & Linda Battalora	Designed/Presented on collaboratively/ team-written reports to reduce disjointed/ piecemeal outcomes.

Year	# of Faculty	Dept./Div.	Course/Faculty	Nature of Consultation
2007-08	4	Geophysics	Faculty from the Center for Wave Phenomena	Co-created a two-part pathway for graduate students to improve their writing: individual consultations with D. Witters for 1-2 semesters followed by taking LAIS601.
2008	1	Division of Engineering,	EGGN413, Computer Aided Engineering/Bob King	Facilitated the revision of 7 pp. Short Report Format Guide for laboratory reports, on figures, tables, and major sections.
2008	2	Petroleum Engineering,	PEGN 439, Multidisciplinary Senior Design (with students from PE, GE, GP)/J. Miskimmins & Linda Battalora	Refined a PowerPoint slide show on collaborative/team report writing, so course faculty can now deliver that presentation.
2009	1	CSM Center for Space Resources	EGGN498, Intro. to Space Resources./Angel Abbud-Madrid	Consultant to, regarding integrating writing in large classes.
2009	1	Engineering Physics	PH Dept./Tom Furtak	Consulted with Dept. Head on methods to motivate PH Dept. faculty to be more prolific in publishing by creating a faculty writing group.
2009	1	EB	EBGN695, Research Methods/Graham Davis	Designed/Presented to Ph.D. students in regarding the writing of doctoral theses and research article introductions.
2010	1	MACS	MATH 530, Statistical Methods I./Amanda S. Hering	Consulted regarding the design of a scaffolded assignment
2010	1	Chemical Engineering	CHEN 460, Bioprocess Engineering/John Persichetti	Commented on a novel assignment to foster concept retention and synthesis.
<b>TOTAL</b>	<b>113</b>			

## APPENDIX E: WAC-RELATED SCHOLARLY PUBLICATIONS

- Leydens, J. A. (1998). To not lose them at the beginning: Nature and human values as a writing-intensive course. *American Society for Engineering Education Annual Conference Proceedings*, Seattle, WA, S2761 pp. 1-7.
- Olds, B. M., Leydens, J. A., & Miller, R. L. (1999). A flexible model for assessing WAC programs. *Language and Learning Across the Disciplines*, 3(2), 123-129.
- Moskal, B. M. & Leydens J. A. (2000). Scoring rubric development: Validity and reliability. *Practical Assessment, Research & Evaluation*, 7(10): [8 printed pages] online at <http://PAREonline.net/getvn.asp?v=7&n=10>.
- Olds, B. M. & Leydens, J. A. (2001). A graduate course on academic publishing. *Proceedings of the Frontiers in Education Conference*. Reno, NV, S1G pp. 2-6.
- Childers, P., Johanek, C., Leydens, J. A., Mullin, J., Pemberton, M., Rickly, R., & Palmquist, M. (2002). "Academic.Writing forum: Writing centers and WAC." *Academic.Writing*. [http://wac.colostate.edu/aw/forums/spring2002/index\\_flat.htm](http://wac.colostate.edu/aw/forums/spring2002/index_flat.htm).
- Leydens, J. A., Moskal, B. M., & Pavelich, M. J. (2004). Qualitative methods used in the assessment of engineering education. *Journal of Engineering Education* 93(1), 65-72.
- Leydens, J. A. (2005). Plagiarism. In C. Mitcham (Ed.), *The Encyclopedia of Science, Technology, and Ethics* (pp. 1411-1413). Detroit: Thompson/Gale.
- Leydens, J. A. & Santi, P. (2006). Optimizing faculty use of writing as a learning tool in geoscience education. *The Journal of Geoscience Education* 54(4), 491-502.
- Leydens, J. A. & Olds, B. M. (2007) Publishing in scientific and engineering contexts: A course for graduate students. *IEEE Transactions on Professional Communication* 50(1), 45-56.
- Leydens, J. A. (2008). Novice and insider perspectives on academic and workplace writing: Toward a continuum of rhetorical awareness. Special Issue on Engineering Communications, *IEEE Transactions on Professional Communication* 51(3), 242-263.
- Schneider, J., Leydens, J. A., Olds, B. M., & Miller R. L. (2009). Guiding principles in engineering writing assessment: Context, collaboration, and ownership. In *Assessment in Writing*, (pp. 65-83), M. C. Paretto and K. M. Powell (Eds.), *Assessment in the disciplines series* (Vol. 4), Tallahassee, FL: Association of Institutional Researchers.
- Leydens, J. A. & Schneider, J. (2009). Innovations in composition programs that educate engineers: Drivers, opportunities, and challenges. *Journal of Engineering Education* 98(3), 255-271.

## APPENDIX F: SCHOLARLY PRESENTATIONS ON WAC

### For the CSM Community

Leydens, J. A. (2010, February). Not your parents' writing pedagogy: How writing can foster learning in engineering and science courses. Presented at the CSM Pedagogy Seminar, Co-sponsored by Physics and the Center for Engineering Education.

Leydens, J. A. (2000, March). Unblocking writer's block. Presented for Colorado School of Mines faculty, staff, and students. Spring 2000 WAC Workshop Series.

Leydens, J. A. & Loshbaugh, H. G. (1999, April). Models for success: WAC in engineering and the sciences. Presented to Colorado School of Mines faculty as part of the Spring 1999 Writing-Across-the-Curriculum (WAC) Workshop Series.

Leydens, J. A. (1999, February). Designing and using rubrics. Presented for Colorado School of Mines faculty as part of the Spring 1999 WAC Workshop Series.

Leydens, J. A. (1998, October). Writing and learning across the curriculum. Presented for Colorado School of Mines faculty, sponsored by the CSM Office of Teaching Effectiveness.

### At National Venues

Leydens, J.A. (2011, May). Integrative learning to enhance critical thinking. Co-facilitated with members of The Institute for Learning and Teaching for over 40 Colorado State University faculty members. Invited.

Leydens, J.A. (2011, April). A communication divide in engineering and social justice. Presented at the Conference on College Composition and Communication, Atlanta, GA in the Special Interest Group meeting of EngiComm: Communication in the Engineering Curriculum, on the theme, "Engineering Communication Praxis: Teaching, Theory, and Research."

Leydens, J.A. (2010, May). Short-circuiting engineers' assumptions: A belief mapping activity to destabilize conceptual frameworks about writing. Presented at the 10th International Writing Across the Curriculum Conference, Bloomington, IN.

Leydens, J.A. (2010, January). Discipline-influenced reasons why engineering writers value yet struggle with writing. Presented to the English Department Faculty at the United States Air Force Academy, Colorado Springs, CO. Invited.

Leydens, J.A. (2009, March). Discipline-influenced reasons why writers encounter difficulty: Insights from engineering writers. Presented at the Conference on College Composition and Communication, San Francisco, CA.

## APPENDIX F: (CONTINUED)

Leydens, J.A. (2008, May). 'We have learned as much as we have given.' What engineering practitioners have to teach WAC scholars about WAC theory and pedagogy. Presented at the 9th International Writing Across the Curriculum Conference, Austin, TX.

Leydens, J.A. (2007, September). Sustainability through serendipity: Writing proposals with, for, and about the community. Presented at the Conference on Teaching Sustainability through Service-Learning, Fort Collins, CO. Invited.

Leydens, J.A. (2007, March). Role and identity transformations in writing that matters: When students connect civic and personal meanings. Presented at the Conference on College Composition and Communication in New York, NY.

Leydens, J. A. (2006, May). Why engineers find writing difficult and what they (and we) can do with those difficulties. Presented at 8th International Writing Across the Curriculum Conference, Clemson, SC.

Leydens, J. A. (2006, March). Program description: Campus writing program at the Colorado School of Mines. Presented during the Writing Across the Engineering Curriculum Special Interest Group meeting at the Conference on College Composition and Communication in Chicago, IL.

Leydens, J. A. (2005, March). Opening the gates for engineering voices: Writing in the disciplines and in the professions from the perspectives of insiders. Presented at the Conference on College Composition and Communication in San Francisco, CA.

Miller, R. L. & Leydens, J. A. (2005, March). Writing to learn and writing to communicate in science, math, engineering, and technology courses. Presented for STEM and other faculty at the United States Air Force Academy in Colorado Springs, CO. Invited.

Moskal, B. M., Leydens, J. A., & Pavelich, M. J. (2003, November). Useful concepts in quantitative and qualitative assessment. Three-hour workshop presented at the Frontiers in Education Conference, in Boulder, CO.

Olds, B. M. and Leydens, J. A. (2001, March). Closing the loop: How WAC program assessment can help students and inform instructors. Presented at the Conference on College Composition and Communication in Denver, CO.

Williams, J. M. & Leydens, J. A. (2001, March). Assessing engineering communication. Presented this session on ABET's 2000 site visits to CSM and Rose-Hulman Institute of Technology during the special-interest group meeting of engineering communicators at the Conference on College Composition and Communication in Denver, CO.

Leydens, J. A. (2000, August). Integrating communication components in technical courses. Presented to engineering faculty developing a Fundamentals of Engineering course at Michigan Technological University in Houghton, MI. Invited.

Leydens, J. A. (2000, June). Designing and using writing rubrics. Presented to computer science faculty from multiple US institutions participating in a Computer Ethics Workshop hosted by the CSM Math and Computer Science Department in Golden, CO.

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## APPENDIX F: (CONTINUED)

Leydens, J. A. (2000, April). Developing effective assessment rubrics. Three-hour workshop presented at the Best Assessment Practices Symposium, Rose-Hulman Institute of Technology in Terre Haute, IN.

Leydens, J. A. (1999, March). Writing Across the Engineering Curriculum at CSM. Presented during a Special Interest Group meeting of Engineering Communications professionals at the Conference on College Composition and Communication in Atlanta, GA.

Leydens, J. A. (1998, June). Nature and human values: A first-year course. Presentation during a session with multiple CSM colleagues presenting their own papers at the American Society for Engineering Education Annual Conference in Seattle, WA.

Sacks, A. B., Wiedenhoef, R., Leydens, J. A., Flynn, C., & three colleagues from the Jefferson County School District. (1998, March). Stepping into grade 9-college connections. Presented at the Colorado Language Arts Society Conference in Colorado Springs, CO.

### At International Venues

Leydens, J. A. (February, 2008). Exploring rhetoric: A faculty workshop on applied rhetoric. For faculty in the Department of Applied Science and Engineering and the Engineering Communication Centre, University of Toronto, Toronto, Canada. Invited.

Leydens, J.A. (February, 2008). The role of communication in the advancement of engineering and science: A case study. For students and faculty in the Department of Applied Science and Engineering and the Engineering Communication Centre, University of Toronto. Invited.

Leydens, J. A. (March, 2005). Writing across the curriculum in the United States and at the Colorado School of Mines. Presentation for Latin American college administrators, engineering and other faculty at the *Universidad Sergio Arboleda* in Bogotá, Colombia. Note: Due to airline reservation glitches, I was unable to attend, and my talk was presented by a colleague. Invited.

## APPENDIX G: WAC EARNED REVENUE

### Total from All Grants: \$257, 411.

- A \$50,000 grant from the Colorado Commission on Higher Education. Co-authored with the CSM Honors Program Director Barbara Olds, Division of Liberal Arts and International Studies Director Arthur Sacks, the grant was entitled "Writing Across the Curriculum: A Joint Effort by the Colorado School of Mines and Jefferson County R-1 School District" awarded in fall 1997.
- A \$6,675 Conference Grant from CCHE to enable Writing/Language Arts leaders from around the state to share the activities of a variety of K12-Higher Education partnerships and to discuss common issues surrounding the assessment of writing. The conference was held on the Colorado School of Mines campus on February 6, 1998, awarded in fall 1997.
- A \$19,000 grant through the XSEL Project, a CCHE-funded program designed to catalyze interest in the sciences and other academic fundamentals among high school students. The grant funded the programming of a series of web-based writing tutorials available via the Writing Program home page. Co-authored with Dr. Joe Sneed in fall 1997.
- CSM Technology Fee for \$31,561 to purchase computers for the Computerized Writing Classroom in 105 Stratton Hall; proposal co-written with Dan Miller of LAIS and Rich Ferris of Computing, Communications and Information Technologies; awarded January 2011.
- CSM Technology Fee for \$20,263 to purchase computers for the Computerized Writing Classroom in 105 Stratton Hall; proposal co-written with Jen Schneider of LAIS and Rich Ferris of the Computing Center; awarded in fall 2005.
- CSM Technology Fee for \$3,526 for 11 flat screen monitors for the Computerized Writing Classroom in 105 Stratton Hall; proposal co-written with Rich Ferris, awarded in fall 2004.
- CSM Technology Fee for \$2,300 to acquire a document camera for the LAIS Computerized Writing Classroom, 105 Stratton Hall. Grant awarded in spring 2002.
- CSM Technology Fee Proposal for \$60,286 to replace aging computers in the LAIS Computerized Writing Classroom and to fund data cable installation in the renovated space in 105 Stratton Hall. Co-written with LAIS Division Director Arthur Sacks in spring 2001.
- For Workshop Grants, \$63,800 (six \$5,000, two \$4,000, one \$3,800, and one \$3,500 in 1998-2007, and one \$6,500 and two \$6,000 in 2009-2011). Sources included the Colorado School of Mines Mini-Grants (Curricular Reform Grant, Curriculum Development Grants, grants via the Vice President for Academic Affairs, via the VP for Educational Innovation, and via the Trefny Institute). These grants primarily funded stipends for over 90 faculty members from all CSM departments who attended Writing-Across-the-Curriculum (WAC) workshops in the summers of 1998-2007 and 2009-2011. The workshops give faculty additional tools with which to (re)design, implement, or pilot writing-intensive courses. More recently, the workshops have focused on using writing to foster change in students' conceptual frameworks.

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## APPENDIX H: RATIONALE FOR THE TRANSFORMATION TO A CXC PROGRAM

For the past few years, the WAC Committee has been laying the foundation for the transformation from a WAC Program into a digital-age Communication across the Curriculum (CxC) Program. The need for program modernization stems largely from interfaces between human communicators and communication technologies. Today, writing no longer occurs as a communication mode distinct from other communication modes.

Some universities are leading the charge toward multimodal communication. At Iowa State University, for instance, it is accentuated because “written communication is now virtually inseparable from oral, visual, and electronic [WOVE] modes of communication, not just in the academy, but also in the professions, in business, and in the public sector.” The Iowa State WOVE approach acknowledges that writing is often produced through collaboration with colleagues, conveyed in diverse electronic means, and frequently presented orally at conferences with visual data representations, yet many writing programs remain locked in 20<sup>th</sup> Century approaches. Other institutions with strong engineering and science programs are also rising to these digital-age challenges, such as Georgia Tech, Ohio State, and Louisiana State University.

In addition to CSM’s emphasis on effective communication in the Graduate Profile, the National Academy of Engineering, in *The Engineer of 2020*, accentuates the importance of “a world where communication is enabled by an ability to listen effectively as well as to communicate through oral, visual, and written mechanisms [WOV]. Modern advances in technology will necessitate the effective use of virtual communication tools [E].”

A multimodal CxC Program has several potential benefits for CSM. Most students today have only a vague notion of how diverse communication modes interface. Our vision is a CXC Program that enables CSM students to graduate with significant advantages: more integrated multimodal communication skills and the ability to leverage the most contextually appropriate features of diverse and interconnected modes of communication. As more CSM graduates become better integrated and confident communicators in their respective fields, they will augment their own chances for career promotion and leadership. Such leaders are also more likely to be appreciative alumni.

Also, CSM would gain needed expertise. At present we lack a scholar with a background in how written communication interfaces with oral, visual and electronic communication. The search for such an individual (advocated in recommendation #2 above) can enable CSM to forge meaningful cross-curricular connections among the critical components in WOVE and to strengthen a culture of communication at CSM. After all, what good are even brilliant ideas if they are not effectively communicated?

## APPENDIX H (CONTINUED)

In summary, a modernized CXC Program stands to become a leader in digital-age communication by

- Building off the foundation created by the WAC Program
- Transforming into a CXC Program that emphasizes multimodal, digital-age communication via workshops and tutoring available to the campus community through the CxC Program, specifically the LAIS Writing and Communication Center.

Additional benefits could accrue in terms of alumni giving. When the winter 2008-09 issue of *Mines Magazine* ran the cover story entitled, “Writing: The Skill Many Engineers Wish They Didn’t Need,” the Editor said the number of responses from alumni readers far exceeded any he had ever received. Clearly, CSM alumni care deeply about the quality of a Mines education, and they gave quite positive feedback at seeing that writing is woven throughout Mines’ undergraduate curriculum. This positive sentiment should not go untapped.

Beyond the WAC Committee Members, the idea of moving toward a CxC Program is supported by multiple CSM faculty members, such as those noted below:

- Joel M. Bach, Associate Professor, Division of Engineering
- Graham A. Davis, Professor, Division of Economics and Business
- Uwe Greife, Professor, Physics
- Kevin L. Moore, Professor, Division of Engineering
- Marcelo Simoes, Associate Professor, Division of Engineering
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