Communication in the Workplace:

What Can NCSU Students Expect?

A Research Report
by Carolyn R. Miller, Jamie Larsen, and Judi Gaitens

About the Center

The Center for Communication in Science, Technology, and Management (CCSTM) provides a focus for the study of communication practices and problems within the contexts targeted by the land-grant mission of North Carolina State University. Communication forms the connectionsbetween science and society, between technology and policy, between management and its constituencies. The work of the Center will enhance undergraduate and graduate education, enrich faculty expertise, and strengthen connections to statewide industry and institutions and to the public.

Specific objectives are the following:

1. **To initiate and develop sponsored research projects** on communication issues and problems in scientific, technological, and management contexts in order to improve current practices and to produce better theoretical understandings that can translate into better research and instruction in the future.

2. **To use the results of research to enhance and improve the education** of graduate and undergraduate students in writing, speaking, and the use of communication technologies, not only at NCSU but also across the nation through dissemination of successful curricular innovations.

3. **To foster cooperative relationships for interdisciplinary problem-solving** on the communication dimensions of environmental policy, information networks, technology transfer, risk management, and the like.

4. **To provide public service to enhance communication and understanding** between scientific and technical experts, on the one hand, and policy-makers and the public, on the other.

The CCSTM will directly connect the resources of the College of Humanities and Social Sciences to NC State's traditional emphasis on science and technology, providing a place where communication and rhetorical studies, the historic center of education, can be brought to bear on contemporary problems in a technological society. The work should enrich NC State's contribution to the progress of science and technology as well as enhance the education offered to both graduate and undergraduate students.

The CCSTM is supported by continuing funds from the Provost's Office.

To contact the Center:

Kelley Sassano, Program Assistant
Box 8105, North Carolina State University
Raleigh, NC 27695
919-515-6053
fax: 919-515-6071
kelley_sassano@ncsu.edu

Contents

Figures

Appendices

Preface

This report is based in one of the most successful assignments used in NCSU's English Department courses that prepare undergraduate engineering, management, and other preprofessional students for the writing they will do in the workplace. The assignment asks students to interview someone who has a job they would like to have in five years about the writing and other communication tasks the job involves.

The students are usually astonished (and appalled) to discover in these interviews that technical and business professionals spend 20–25% of their time at work writing and another significant portion in high-stakes oral communication. They often find themselves being lectured by an engineer or an accountant on how central writing is to their career, how damaging the consequences of poor communication are, and how important the student's writing course is.

Students write up the results of their interview and share them with each other, as well as with their instructors. Most of what they discover in these interviews confirms national survey results from the past fifteen years. However, students are never astonished when they read these survey results in a textbook or hear about them in a classroom lecture. The impact of first-hand information from a role model they themselves have selected is far greater than a teacher or textbook can have.

But this assignment is not only a successful teaching strategy; it can also be a valuable source of information for instructors and curriculum planners as they try to keep up with the changing practices and problems of the workplace. Consequently, in the spring semester of 1996, faculty in the English Department decided to coordinate their assignments so that the results of many interviews could be compiled and compared. This report is the result of that collaborative effort among students, instructors, and the many working professionals who agreed to be interviewed.

Carolyn R. Miller
Director, CCSTM

Acknowledgments

This report rests on the work of the 378 students who conducted the interviews and wrote up their results, as well as the professionals who spent time talking about their work.

The questionnaire was designed by Cindy Haller and Carolyn Miller.

The following teachers supervised and coordinated the work of the students in their English 331 and 332 classes, spring semester 1996 (a total of 19 class sections):
Kathy Auman
Sally Drucker
Judi Gaitens
Cindy Haller
Jamie Larsen
Joan McCool
John O'Connor
Susan Pond
Marlene Szymona
Morris Vaughan

The Center for Communication in Science, Technology, and Management supported those who worked in the summer of 1996 to analyze the data and prepare the report.

Jamie Larsen coded and entered the data and ran the descriptive statistics on the quantitative data from the survey forms. Dr. Charles H. Proctor and Joy Smith of the NCSU Statistics Department performed the factor analysis and regression analysis and advised us on how to interpret the results. Jamie, Judi Gaitens, and Patricia Watson coded the qualitative data from the student reports. Carolyn, Jamie, and Judi prepared the report. Kelley Sassano handled the production work.

Introduction

One of the most frequent comments that employers make about college graduates is that their communication skills aren't adequate for the workplace. Faculty and administrators in most technical programs at NCSU (as well as nationwide) have heard this complaint from their advisory boards and other industry contacts. But communication practices in the workplace are changing so fast that it is hard for curriculum designers and classroom teachers to know why these complaints are being made and what they mean. Exactly what kinds of communication tasks can graduates of NCSU expect to do in the workplace? How are electronic technologies and global economies affecting these tasks? What affects the quality and results of their communication—both oral and written? And how important is this component of their overall work responsibilities—and why?

During the spring semester 1996, faculty members and students in NCSU's courses in technical and business communication (ENG 331 and ENG 332) conducted a coordinated series of 378 interviews with working professionals that students identified as appropriate role models for their own careers. Although this was not a formally randomized survey, we aimed to ensure relevance of the information (for both students and faculty) by asking students to interview someone with a job they would like to have in about five years. The professionals responded to a structured questionnaire and commented informally about their workplace experiences. A copy of the questionnaire is included in Appendix A. The questions emphasize writing but also seek information about various forms of oral communication.

This report presents the quantitative results of the survey and explores the implications of the informal comments as given in the student reports. In Appendix B we explain the coding system used for compiling this qualitative information. We report means, medians, and standard deviations for the quantitative data in Appendix C. We have also subjected the responses to a factor analysis and a regression analysis to test for correlations and comparisons among items, and these results are given in Appendix D.

We hope this report will be useful to the NCSU community. It can help us to understand the communication tasks students will face as they enter the workplace as well as to address their responsibilities not only to engage effectively in those tasks but also to improve workplace practices.

What do professionals tell us about writing and speaking on the job?

Who responded to the survey? (questions 1–4)

The majority of the 378 professionals interviewed work for private companies (76%), while 19% work in government and 5% for non-profit organizations. A little over half of them (57%) work for organizations with over 500 employees, 16% for medium-sized organizations with 100–500 employees, and 27% for small organizations under 100. NCSU and the North Carolina state government employ many of the professionals interviewed (66), but other companies were also represented through multiple interviews of their employees (e.g., IBM, Bell Northern Research, NORTEL, SAS, Glaxo-Wellcome, and Duke Power Company). Appendix E contains a complete list of the employers represented in our sample.

Nearly half (46%) of the interviewees graduated from NCSU. The average year of graduation for the group is 1984 with a range from 1956 to 1995. This range of dates enables us to look for differences in how new hires and experienced employees communicate on the job. We divided the responses into two groups, 106 who graduated within the past five years, representing entry-level employees, and 234 who graduated five years ago or more, representing experienced employees (138 did not provide this data).

In order to determine differences in communication practices among professions of the respondents, we grouped the professionals into the following seven categories based on their titles and descriptions of their workplace responsibilities:

Engineering	124 respondents
Management	61
Marketing and Sales	42
Programmers	29
Financial, Accounting, and Banking	27
Research	21
Other	74

The 378 students who did the interviewing represented the following NCSU colleges:

Agriculture and Life Sciences	42 students
Education and Psychology	1
Engineering	159
Humanities and Social Sciences	20
Forest Resources	16
Management	78
Physical and Mathematical Sciences	14
Textiles	43
undetermined	5

We had asked them to interview someone who has a job they would like to have, and 74% of them interviewed someone with a degree in the same field as their own major.

Why and for whom do they write? (question 6)

As a group, the respondents told us that they write most often at someone else's request (52%) and much less often on their own initiative (33%). Because they so often write to meet a need defined by someone else, respondents emphasized being aware of their readers and writing to meet their needs. As one manager explained,

> *"When I pick up a memo from my desk, I want to be able to immediately determine why this person is sending me this. What do they need or want? What type of response, if any, do they expect from me?"*

Knowing the audience, according to respondents, means judging how much detail to include and how technical to be. Many respondents complained about new employees who try to impress the reader with technical terms. Sometimes it is necessary to explain technical ideas in non-technical terms, but

> *"You need to know how to make things sound simple without making them sound condescending."*

Adapting to the audience also includes deciding on the appropriate medium for the message, including use of the best format. And grammatical correctness is important to audiences, as well. Readers become offended or angry if they receive a document full of errors.

Internal audiences include peers and coworkers, managers, technicians, plus a variety of support personnel including production people, quality assurance and maintenance. External audiences include customers and clients, vendors, contractors, and regulatory agencies, especially the EPA (Environmental Protection Agency) and the ISO (International Standards Organization). The regulatory audiences are one reason legal ramifications loom as a large concern in respondents' writing; even a letter can be a legally binding document. A related worry is the inadvertent release of proprietary information to external audiences.

Some respondents emphasized the importance of tone and diplomacy in gaining readers' attention and assent. Readers, they said, can be critical and sometimes competitive and are often resistant to new ideas. A confident tone influences how seriously readers take a document. In a nutshell,

> *"You can be an Einstein in your field, but if you cannot convey the information, it is worthless."*

In addition to the comments about writing prompted by the survey questions, professionals from all disciplines emphasized the need for good oral communication skills. From phone conversations, to sales calls, to meetings, to formal briefings, speaking and listening skills are often needed. One respondent went so far as to say that

> *"Almost all job descriptions require good written and oral communication skills."*

How do they spend their time writing? (questions 5 and 8)

We asked what percentage of their work time respondents spent on writing, including planning, reviewing, and revising. Across all professions, workers spend nearly one third of their time writing (31%). The percentage seems to increase where logs and notebooks are important to establishing individual contributions. Figure 1 shows in more detail that 43% of the respondents spend between 11 and 30% of their time writing, and another 26% spend between 31 and 50% of their time this way.

Our question about how much time professionals work together collaboratively planning and writing documents revealed that across the professions workers spend about 15% of their time in collaboration. What collaboration means and whether it includes problem-solving, project development, or the writing itself, varies; some collaboration also includes reviewing documents. Figure 2 shows that a large proportion (63%) spend less than 10% of their time collaborating in their writing, but 24% spend 11 –30% of their time doing so.

The analysis reveals that for employees in public organizations, compared with those in private firms, there is a strong association between writing collaboratively, participating in formal meetings, and producing formal documents.

Peer review is a common form of collaboration in writing, especially for internal documents; one company, for example, has a strict peer review policy designed to protect its reputation and financial security. The supervisor is often the reviewer for external documents. Many professionals said that because the company's image and reputation are on the line in external documents, they get as many reviews as they can. In small firms, everyone including the president may review important documents.

As professionals answered these questions, they also described their writing processes. Across the professions, they produce multiple drafts, usually from two to five, but one respondent admitted to doing as many as 20 if time permits. Informal memos, whether paper or e-mail, often are produced in a single draft, but electronic processing allows for continuous revision during this process; others noted the need to print copies for themselves, finding it difficult to make serious revisions on-screen.

Writers produce multiple drafts to ensure clarity and accuracy, especially where legal and regulatory issues are involved. They also review and revise to be sure they meet audience expectations. Team projects are subject to continual peer review, which assures accuracy of the information and helps document the status of the project and coordinate the work of the team. One person noted,

> *"As a project engineer, you are expected to write*
> *well and also review the writing of others."*

In addition to peer or supervisor reviews, writers may also ask clients to preview the documents. When clients are involved in the review, the project design as well as the writing can change as expectations are clarified and unexpected problems are solved.

Though respondents agree that revision is important for clarity and accuracy, they also note that time constraints and deadlines limit the number of drafts possible. When time is short, planning and organizing may have to be done in the writer's head. As one said,

> *"Everything is driven by time. You have to use*
> *what is most efficient."*

Many respondents complained about writing under conditions of constant interruption and distraction; several noted having to take an office computer home to write in peace.
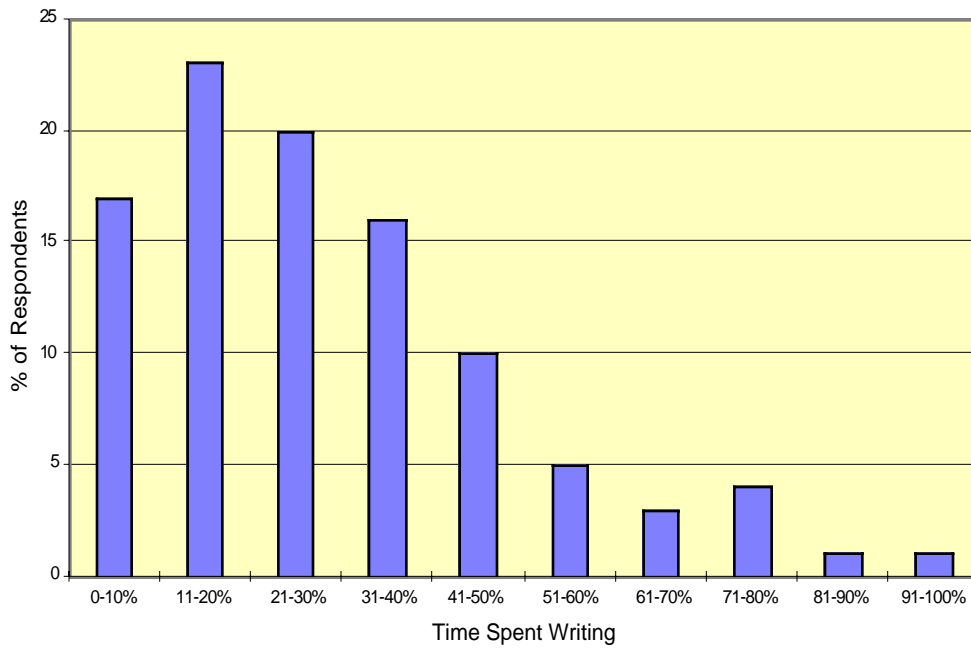
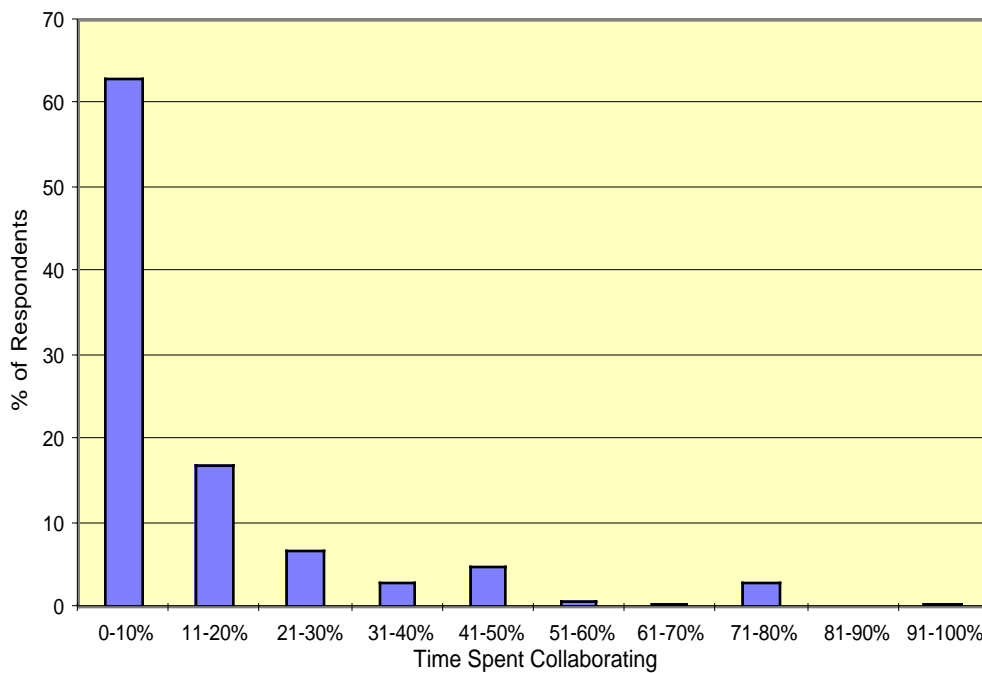**Figure 1.**   **Amount of time spent writing at work**

Figure 2.   **Amount of time spent writing collaboratively at work**

How important is their writing? (question 7)

When asked how important the quality of their writing is for the performance of their jobs, 90% of the respondents said it was either essential (50%) or very important (40%). None said it was irrelevant (see Figure 3).

When asked how important the quality of their writing is for their own career advancement, 82% said essential (45%) or very important (37%), and only a few people (2%) in marketing and management said it was irrelevant (see Figure 4).

According to the regression analysis, employees who graduated before 1991 (more experienced employees, who had been on the job more than 5 years) rated the importance of writing quality to job performance higher than those who graduated after 1991 (less experienced or entry-level employees). Figure 5 shows this difference as well, with more experienced than entry-level employees reporting writing as "essential" to job performance. Also, in companies with over 500 employees, writing quality is significantly more important for career advancement than it is in smaller organizations.

In the informal comments, many respondents went further than our two questions to point out that the quality of both their writing and their oral communication was very important to the advancement and prosperity of the company for which they worked:

> *"Communication skills make the difference between excellence and mediocrity in a company's success."*

> *"The quality of writing can make or break the product."*

Others noted the consequences of poor communication. One person who works for a transportation department noted that if recommendations were wrong, people's lives would be endangered by collapsing bridges. Another said,

> *"One document had an either-or statement in it which after litigation cost this company $50,000."*

The credibility of the writer is also at stake in both written and oral communications: One programmer pointed out that through reading other people's writing,

> *"There have been times where I would already have an opinion about a person before I ever met them."*

Several respondents pointed out that because upper management knows them only through their writing, quality is very important both to them and to the managers. Managers notice good writing and gain confidence in the writers. One respondent knew people who had been fired for poor writing, and another noted that inappropriate responses to writing could only have "hazardous results."

Other respondents emphasized the crucial role of oral communication in building their careers. One noted,

> *"If you sound intelligent, that is how you are viewed."*
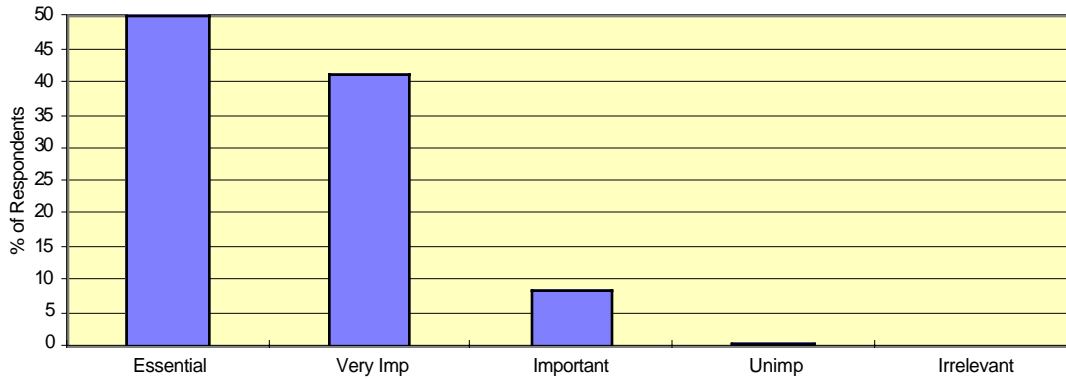
Figure 3. **Importance of writing quality to job performance: all respondents**
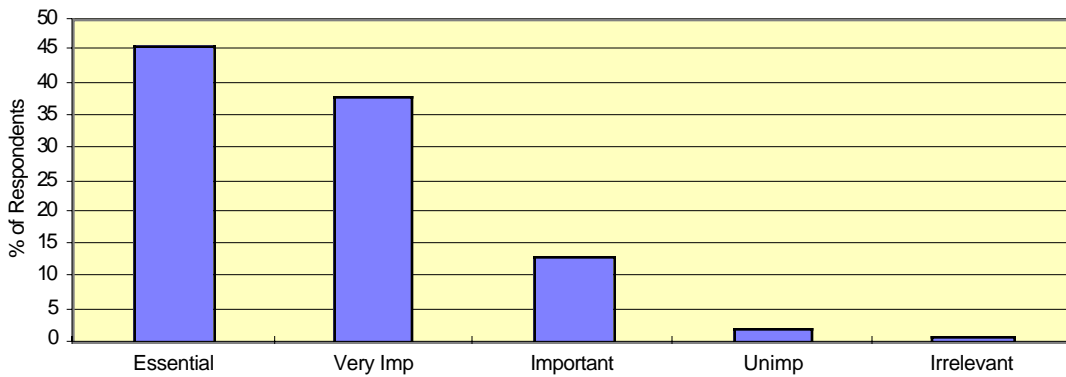
Figure 4. **Importance of writing quality to career advancement: all respondents**
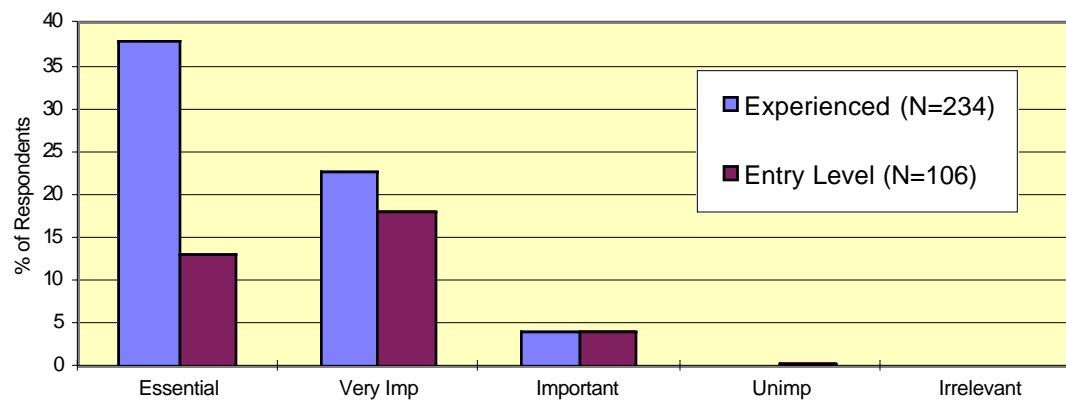
Figure 5. **Importance of writing quality to job performance: comparison of experienced and entry-level employees**

Do they communicate with people of other nations and cultures? (question 9)

Two-thirds of the respondents reported being involved in some kind of international or intercultural communication. Most reported communicating with international co-workers (59%) or clients (56%), and many fewer with international vendors (26%). Communicating with coworkers from other countries negatively correlates with phone use, which suggests that most of this type of communication is done in writing (e.g., e-mail or fax).

A negative correlation exists between communication with clients and customers and communication with coworkers. This correlation indicates that the more time a professional spends communicating with international external audiences the less time will be spent communicating with international coworkers.

A number of respondents commented on the special care they had to take with documents that were to be translated—into French or Spanish, Korean or Japanese. Even for documents that were not to be translated, they noted that because their readers often had very basic knowledge of English they had to limit their use of technical jargon and slang. Some noted that readers in other cultures expected a greater degree of formality and courtesy. One pointed out that even in writing for English speakers in other nations (such as Canada and Australia), greater care must be taken to be clear. Often, noted another, the use of visuals can be especially useful in international or intercultural communication.

One respondent noted that there were different preferences for communication technologies in different cultures: for example, Koreans prefer videoconferencing, Americans prefer phone and e-mail, and Italians prefer face-to-face or "snail mail." Perhaps the most unusual comment was that in some European countries employment resumes were expected to be handwritten, because of the belief that a person can't hide anything from a handwriting analyst.

What communication technologies do they use? (question 10)

We asked respondents to indicate what proportion of their communication at work was done with various communication modes (face-to-face conversation, formal meetings, informal memos, formal documents) and technologies (telephone, e-mail, fax, videoconferencing).

For the modes of communication, the mean responses indicate that 29% of communication takes place in face-to-face mode, 11% in formal meetings, 10% in informal memos, and 12% in formal documents. For the technologies, the mean responses indicate that 27% of communication is conducted by telephone, 11% by e-mail, 7% by fax, and 1% by videoconference. One possible source of confusion in these responses (indicated by the informal comments) is that many informal memos are sent by e-mail, so we cannot know whether respondents considered these categories equivalent or different.

Many respondents commented that e-mail reduces the need for oral communication; others noted that e-mail has replaced the written memo but still easily provides a log or a "virtual paper trail." Sometimes e-mail is used to continue the conversation from meetings, and sometimes it precedes a meeting:

> *"Some of the most important requests and job assignments are initially briefed through e-mail before a face-to-face meeting begins,"*

noted one respondent. E-mail is generally seen as inexpensive and efficient, particularly in international communication. It is also convenient; as one person said,

> *"You can't spill coffee all over it."*

Others noted the disadvantages of e-mail, as well: it encourages communication without rational reflection, and although it seems easy and informal, it is difficult to judge the impression one is making. Many respondents thought the informality of e-mail may lead to a relaxation of standards of expression.

Other respondents described work situations in which faxes and web pages were playing central communication roles. A few commented on the use of preformatted documents as new practices that both save time and introduce new constraints.

The factor analysis reveals that phone use correlates negatively with e-mail use, an indication that time spent using e-mail reduces the amount of time spent communicating orally. Phone use also correlates negatively with face-to-face communication. Fax use correlates positively with phone use and informal memos. The positive phone correlation is not surprising; however, the positive relationship with informal memos may indicate that fax is not used as frequently with formal documents.

The regression analysis also shows that companies with over 500 employees tend to use more e-mail and videoconferencing than smaller companies.

How did they learn to write at work?

We did not ask any specific question that addressed this issue, but the informal comments revealed a wealth of information about how new employees learn to perform the communication tasks that are required of them and how those tasks change over time.

Much of what the respondents knew about their workplace writing they'd learned from experience on the job, from reviewing and imitating company documents, from talking to supervisors and colleagues, from being asked to revise. One learned to write in a business format from his secretary. Some consulted guidebooks, and quite a few had taken company-sponsored workshops in writing, some as part of an orientation for new employees.

But some had no help at all and had to learn by making mistakes. One pointed out that,

> *"What they can't teach you in school is office politics. . . . The major issue is figuring out what people want and do not want to be bothered with in a report."*

Other things they had to learn on the job were to be authoritative, professional, and diplomatic; many had to spend some time and effort learning to adjust their own style to company formats and managers' preferences. And many emphasized that they'd had to learn to be more concise than they had been in college; one said,

> *"The most important tool that should be taught to future engineers is how to reduce a wordy stack of information into a simplified one or two pages."*

What they had to know changed over time; in some cases, respondents wrote more early in their careers and later relied on various forms of oral communication, while others found that career advancement meant more writing. With advancement, some noted that their audiences increased in both number and diversity and that the stakes were higher for both oral and written communication.

Many of the respondents (61%) had taken a college course that helped prepare them for on-the-job communication tasks. Most found these courses beneficial in preparing them for the seriousness and variety of these tasks, but a few found their courses of little use. One noted that what was taught in courses contradicted company requirements or managers' demands, and entry-level employees are not in a position to resist these demands. The consensus was that a college course can be helpful in providing general strategies but that much of the specific knowledge needed has to be acquired on the job.

The regression analysis shows that professionals who took a course in their formal education to prepare them for writing on the job are more likely than those who did not take such a course to write collaboratively, participate in formal meetings, and produce formal documents. Also, the professionals who had technical writing training are more likely to use e-mail and videoconferencing on the job.

Were there significant differences among professional fields?

In the sections that follow, we report significant differences in mean scores among the fields for which we had sizable subgroups: engineering, management, marketing and sales, computer programming, finance, and research. With our sample size of 378, any difference over 5–8% between means for the entire group and any subgroup is significant.

One response that showed no difference between the full sample and any subgroup is the mean time spent writing (31%). Others that showed very little variation across fields were the use of the modes (face-to-face, meetings, informal memo, formal document) and media (phone, e-mail, fax, and videoconference) of communication.

We also list trends indicated in the qualitative comments, especially the audiences and types of documents and communication situations mentioned most often by each group.

In sorting the respondents into fields, we had a final group we called "other," which included 74 respondents so diverse that we could make no generalizations. This group includes teachers, farmers, extension agents, nurses, nutritionists, personnel officers, veterinarians, attorneys, statisticians, and golf course superintendents, among others. There were 16 or fewer of any one description.

Since 74% of the respondents held a degree in the same field as the student doing the interviewing, we believe that the results we present here about the different professions are relevant to what students can expect in the workplace when they graduate.

Engineering (124 respondents)

This group includes professionals with degrees in chemical, civil, electrical, environmental, and mechanical engineering. They hold positions as technicians, project engineers, design and process engineers, project managers, operations managers, and consultants.

Since engineers represent a third of the entire group, the data for most of their responses is very close to the group mean. One difference is that engineers do 60% of their writing by request (compared to 52% for the group as a whole).

In their informal comments, engineers emphasized the importance of conforming to company policies and style, of being able to convince readers of ideas and findings, and of having good oral communication skills. As one student reported, "Gone are the days when an engineer could design and build a product and marketing personnel would present it to the prospective clients." Many noted the importance of first paragraphs and of correct grammar and spelling. Much of their writing, although it seems purely informational, is used to set strategies for future action. Engineers must be persuasive to government regulators, as well, to receive permission to complete projects. One concluded that

> *"Engineering is a small part of the job.*
> *Communicating your idea is probably the most*
> *important thing."*

Engineers' audiences become more diverse with career advancement, and the amount of oral communication increases.

Audiences	**Documents**
peers	informal memos
managers	progress reports
customers	proposals
vendors	test plans and results
regulatory personnel	procedures and instruction manuals
machine operators	specifications
technicians	status reports
support personnel	formal investigation reports
quality assurance	minutes of meetings
production	letters to customers
maintenance	executive summaries
	regulatory control documents
	e-mail
	data logs

Management (61 respondents)

These respondents include managers in enterprises such as engineering, software, and consulting firms, as well as sales managers in a variety of organizations. They all have responsibilities for directing people and projects.

Managers indicate that a higher portion of their writing is unsolicited in comparison to the other professions (43% compared with the 33% group mean). Managers also indicate the highest frequency of communication with vendors or suppliers from other nations and cultures (37% compared with 26%).

Managers emphasized over and over the need to be aware of readers and respond accordingly. One went so far as to say that while he writes he keeps thinking of himself as a reader and writes to minimize his efforts. Several managers complained about new employees writing to impress, not to communicate. To meet the needs of managers as readers, writing must be succinct and specific, and it must offer judgments, not just pure information; introductions and summaries are particularly important to them. One said,

> *"If your story is about a bear, bring on the bear.*
> *Don't wait two pages later to introduce it."*

These managers also repeatedly stressed the importance of oral communication, in face-to-face meetings, in conferences, and in formal presentations.

Audiences	Documents
customers	proposals
clients	progress or status reports
government safety agencies	periodic reports
vendors	requests
sales reps in the field	sales summaries
superiors	strategic plans
technical staff	minutes and agendas for meetings
hourly workers	performance reviews
peers	policies and instructions
investors	general-purpose letters (e.g., thank-you's)
contractors	insurance policies

Marketing and Sales (42 respondents)

This group consists primarily of mid-level professionals directly involved with clients and vendors. Most had backgrounds in business or liberal arts. They all seem to feel that they are front-line representatives of the company and its product.

Marketing personnel are the most involved with communicating to international customers (71% compared with 56% for the entire sample) and coworkers (83% compared to 59%). Marketing personnel also differ from the other professionals in the use of communication media. They use the phone the most frequently (36% compared with 27%) and are the least likely to use e-mail or videoconferencing.

Time constraints were particularly pressing for these professionals, who emphasized both the limited time for writing and the limited time readers had for reading; attaining clarity and brevity in one or two drafts is thus a valuable skill. Several mentioned the importance of graphs and tables in both writing and oral presentations and the need to know graphing software and desktop publishing programs. Some were concerned about the use of e-mail as a "faceless" communication channel that is informal but makes it hard to know what impression is being made on a reader.

Several noted the variety of kinds of writing they do, and one commented,

> *"In business there are far fewer big reports than in college, but more small letters and memos."*

Audiences	Documents
other managers, various levels	proposals
peers	letters
subordinates	informal memos
vendors	sales call reports
clients or customers	preprinted forms
news media	periodic and progress reports
competitors	strategic plans
	requests for proposals
	advertising
	articles and information for mass media
	estimates
	compliance reports
	evaluations
	partnership agreements

Computer Programming (29 respondents)

These professionals are primarily those who write computer software and document its use for both internal and external audiences.

Programmers do most of their writing by request (60%, compared to 52% group mean). They report a significantly lower amount of communication with international clients or customers than the other professions (43% compared with 56%); most of their international contacts are with co-workers (67% compared with 59% group mean).

These professionals spend the most time communicating via e-mail (23%, compared with 11%); this type of paperless communication may explain why programmers rated the importance of the quality of their writing to job performance lower than all the other professionals (only 35% rated it as "essential," compared with at least 50% in all the other fields). The regression analysis shows that programmers are the most likely to use e-mail and videoconferencing. One said,

> *"Over two-thirds of everything said in a formal meeting or document is now said via e-mail."*

Programmers noted that ineffective writing increases the amount of communicating needed and that oral communication is often used to make points missed in written documents.

Audiences	Documents
customers	critical design reviews
vendors	status reports
peers	instructions for installation and operation
managers	memos
external organizations	work requests
	daily activity logs
	proposals and sales documents
	product specifications
	formal test reports

Finance (27 respondents)

This category includes financial management specialists who work for banks and investment firms, accountants (both staff accountants and those who work for accounting firms), and bankers.

Financial professionals indicate that they have no communication with international vendors or suppliers and they communicate with international co-workers less frequently than other groups (47% compared with 59% group mean). They communicate somewhat more often by phone (35% compared with 27% mean). On all other measures, they were very close to the group mean.

Accounting reports must follow the guidelines of the AICPA (American Institute of Certified Public Accountants), but the findings must be expressed clearly enough for a public audience to understand. Charts and graphs are often used for emphasis and to convey detail; documents also can include audit review notes and the minutes of meetings. Because many business decisions are made on the basis of these documents, the writer's credibility and advancement are at stake.

Accountants, financial officers, and bankers report being under time constraints in their writing, with strict deadlines, and they don't have time to read unclear documents. One pointed out that

> *"Late information is usually useless information."*

Oral communication is also an important part of the work of these respondents, especially face-to-face conversations and meetings with clients.

Audiences	**Documents**
supervisors	audit reports
peers	investment proposals or recommendations
clients	financial plans
general public	informal memos
regulators	letters
	business plans
	periodic reports
	ledger accounts

Researchers (21 respondents)

This group includes professionals who work in government and academic laboratories, as well as those engaged in research and development in private industry. Their backgrounds include biochemistry and engineering.

Researchers, in comparison to the other six categories of professions, spend less of their writing time responding to someone else's request or requirements (44% compared with 52% group mean). They also spend less time communicating by phone (17%, compared with 27%). Perhaps the less frequent use of this oral medium explains why researchers gave the highest rating for the importance of writing quality to their career advancement (57% rated it essential and 38% very important). One respondent emphasized,

> *"No matter how perfect the information is, if it does not stand out to the reader it will be passed over."*

Researchers spend more time than other groups writing collaboratively—26% compared to 11–17% in the other groups. Their collaborations are with peers and superiors to produce formal documents. The regression analysis substantiates these patterns by showing that researchers spend a significant amount of time writing collaboratively, working in formal meetings, and producing formal documents.

Researchers are the most involved in communication with people of other nations and cultures (81%, compared with 66%). They are the least involved in communicating to international clients or customers; however, 100% indicate that they communicate with international coworkers.

Audiences	Documents
peers	lab notebooks
supervisors	research protocols
other investigators	proposals
external, nonspecialist audiences	technical reports
upper management	scientific articles
	letters of recommendation
	work orders
	technical summaries
	project plans
	status reports
	minutes of meetings

What other insights did the respondents offer?

The following issues sifted out from our reading of the discussions that students offered in their reports. Although we do not have any quantifiable data on these issues and can draw no firm conclusions, we offer them as interesting aspects of the communication responsibilities of working professionals.

Oral vs. written communication

The student reports made many comments regarding the relationship between oral and written communication and contrasting their advantages and disadvantages. Some respondents commented that oral communication is important because it enables an audience to grasp issues quickly and to resolve questions immediately. Speakers can get a better grasp of the situation and audience when they face their audience. Oral communication is often helpful for making points that are missed in written memos—missed either by the writer or by a reader. It can be more important in employee evaluation because of the immediate impression it makes. And it is more productive in problem-solving sessions when details must get worked out among several people. It is always used when big decisions are to be made.

On the other hand, oral communication can be vague and is easily forgotten. One respondent noted that oral presentations are always backed up with written documents. Writing, according to another, reduces the chance of misinterpretation and provides proof of what is discussed and decided. Many respondents commented on the need to create a paper trail in order to preserve information for the future.

Standardization vs. creativity

One respondent remarked that in her workplace writing there is very little room for creativity or personal expression because the reader needs to be led directly from the information available to an assessment or decision. Other professionals felt constrained by the standard style and company formats that they were expected to adhere to. They emphasized again and again the importance of being accurate and meeting all standards—factual, grammatical, and structural—in what they wrote and said.

In contrast, one student described a professional who seemed extremely creative in using her discretion and sense of timing to be influential in making policy recommendations "without stepping on anyone's toes." One manager noted that his writing reflects all his managerial skills. After the interview, one student concluded that "careers can be made or broken depending upon how well you write, but there is still a place for personality and humanity in business writing." Another student commented that business communication "does not have to be devoid of personality or humor and warm wishes. Creativity does not have to be lost in business writing, but you need to keep in mind that time is valuable."

How do these results compare with other surveys?

For those familiar with other research on communication in the workplace, the information our students gathered for this report presents few surprises. Its value is to confirm that the patterns reported in other studies are still valid and are valid specifically for NCSU students. In addition, our study includes information about international communication and changing communication technologies that many earlier studies do not address.

We summarize below the results from other research projects, both those with national scope and those with specific application to NCSU.

Published research on workplace communication

A number of studies on the workplace communication tasks of technical professionals were published in the 1970s and 1980s. A review of the 50 surveys published before 1985 includes the following generalizations (Anderson, 1985):

1. Some 20 surveys that asked about time spent writing conclude that writing consumes a substantial portion of the workday for college-educated workers. The average time given is 20% of their work time.

2. Surveys that asked about oral communication indicate that college-educated workers spend more time in oral communication than in writing, although because the data are hard to compare no average is given.

3. Communication is one of the most important job-related skills for most college graduates. It is ranked among the top job skills in surveys of managers, business administration alumni, engineers, and other technical graduates.

4. Ten surveys that asked about the importance of writing to career advancement concluded that it was highly important or essential.

5. When writing is compared with oral communication, oral communication is almost always rated more important.

6. Workers devote a substantial effort to each of the three major stages of the writing process: planning, drafting, and revising.

7. Collaborative writing is important in all fields surveyed.

8. Of the four studies that inquired about audience, all indicate that professionals must address a variety of audiences both internal and external to their place of employment, not just one or two kinds.

9. The typical worker prepares many different kinds of documents but most commonly letters and memos, and then short reports and instructions.

10. Many college-educated workers believe that the writing done in the workplace is of poor quality.

Survey of NCSU Cooperative Education Students

A recent study of the communication tasks of entry-level technical employees was conducted by a master's student in Technical Communication at NCSU (Boyette, 1995). She received mail responses from 85 NCSU Cooperative Education students enrolled in engineering curricula, all of whom had at least 3 semesters of co-op experience.

These students reported that they spent 26% of their work time creating written communications and almost 56% communicating orally. The majority of this time is spent communicating with internal audiences, peers and supervisors; about half as much time is spent with external audiences such as vendors, customers, regulators, and the media.. Nearly 53% spend more than half of their work time using electronic communication technologies. The oral communication tasks performed most frequently were personal activity and status reports, group meetings, instructions, and formal presentations. The written communication tasks performed most frequently were instructions or procedures, descriptions, activity reports, and design reports.

1995 survey of NCSU alumni

A 1995 survey of NCSU alumni also provides information about communication in the workplace. This survey was mailed to over 7,000 graduates from 1991, 1992, and 1993, with sampling stratified by curriculum; responses were received from over 3,000 (University Planning and Analysis).

One question asked how important written and oral communication skills were to the current work of the alumni:

	written communication	oral communication
very important	53.7%	46.0%
important	30.8	26.6
moderately important	11.4	16.2
of limited importance	2.7	7.4
not important	0.6	2.5

A related question asked the alumni how well NC State had prepared them in these areas:

	written communication	oral communication
excellent preparation	16.9%	13.3%
good preparation	43.2	32.0
average preparation	28.4	30.8
fair preparation	7.8	13.4
poor preparation	2.7	7.7

Other questions related to some of our results showed that basic computer skills are very important (nearly 40%), ability to work in teams is very important (50.7%), thinking creatively is very important (49.5%), and the ability to work with diverse persons is very important (43.1%). In none of these areas does the quality of preparation at NCSU match the level of importance alumni attributed to these abilities.

What are the most important things we learn from this study?

The results of our study point overwhelmingly to the importance of preparing students for communication responsibilities in the workplace. Both the quantitative results and the qualitative information show that communication is an integral part of the work of technical and management professionals in fields that NCSU graduates represent.

As noted above, our quantitative results are not markedly different from those of other studies. We did find a somewhat greater average time spent writing on the job (31% compared with 20–25% in earlier surveys). We did not ask a direct question about time spent in oral communication, but the data on modes and technologies of communication suggest that this occupies a great deal of time and is at least as important.

As other surveys have shown, we found that professionals in all the major professional subgroups must communicate with a variety of people, including international audiences. The wide variety of documents they all work with suggests that their purposes for communication are quite varied, as well.

Collaboration, management review, and peer review are common aspects of writing in the workplace. Multiple drafts are the norm, but deadlines often limit the revision process. And, as might be expected, communication technologies are changing the choices and patterns of communication available.

Most interesting to us, the qualitative information in our study suggests that communication in the workplace is understood by those who do it as complex and multidimensional. Oral and written communication are seen as related to each other and compensatory for each other. Problem-solving, critical analysis, strategy, teamwork, and persuasion are seen as important dimensions of practical communication tasks. Adapting to and managing change are also important aspects of workplace communication, particularly in the areas of communication technology and audience diversity.

What issues does this study pose for NCSU?

We see several issues for NCSU.

- First, of course, the faculty and administration should be concerned to ensure that the students we graduate are prepared to communicate adequately—and on occasion, even eloquently—in the world in which they will live and work. The thorough integration of communication into all aspects of professional and technical work suggests that instruction and practice in communication should be integrated into all aspects of the curriculum. The mandate of the 1992 General Education Requirements that writing and speaking be integrated into upper-division courses in each major speaks directly to this need. Courses in writing and oral communication can complement this instruction by helping students gain explicit knowledge about communication strategies and principles. And, as the people our students interviewed said again and again, continuous practice is essential.

- Second, keeping up with change is a challenge for faculty, as well as for our graduates. We need to be well informed about trends and issues in communication as it is practiced outside the academy, as well as inside. Maintaining contact with workplace practice through our own students is one method that is effective both for teachers and for students. But we need to see the information we gather as individual teachers in a wide context. To do so, we need to compare the information we gather with other sources of information about the workplace and about new curricular developments.

- Third, we should think carefully about the relationship between the workplace and the academy. A university education is not just about job training, and a university curriculum should not be dictated by economic or corporate interests. But the university must be (as it always has been) responsive to society and responsive to the needs of students to become productive members of society. Beyond that, part of the mission of higher education has also been to look beyond immediate problems and to prepare students to change and improve existing practices, not merely to adapt to the world as they find it.

  Teachers of professional communication face a particular version of this third issue. They constantly find discrepancies between communication practices that are supposed to be effective and those that are actually preferred and accepted in the workplace. Are the criteria for "good writing" or "effective speaking" to be derived from academic research and theory or from actual practices? Should faculty be in the business of learning how things are done in the workplace or of improving inadequate practices there? The answer has to be "both!" There must be interchange and learning on both ends. But since these two agendas can conflict with each other, managing them both is no simple task, and we must work constantly to balance one against the other.

References

Anderson, Paul V. "What Survey Research Tells Us About Writing at Work." *Writing in Nonacademic Settings*, ed. Lee Odell and Dixie Goswami. New York: Guilford, 1985. 3–83.

Boyette, Gladys Hill. *Communication in the Workplace: A Survey of Cooperative Education Students.* M.S. Thesis, North Carolina State University, 1995.

University Planning and Analysis, North Carolina State University. "1995 North Carolina State University Alumni Survey." 1996.

Appendix A
Survey questionnaire

WRITING AFTER GRADUATION: STANDARD INTERVIEW QUESTIONS

1. What is your job title? _____

2. What is your educational background? degree _____ year _____

   Are you a graduate of NCSU?   yes _____   no _____

   Did your formal education include a course that prepared you   yes _____   no _____
   for writing on the job?

3. How large is the organization you work for?

   100 or fewer employees _____   100–500 employees _____   over 500 employees_____

4. Which best describes your employer?

   private industry _____   government _____   nonprofit _____

5. About what percentage of your work time do you spend on writing   _____ %
   (include planning, reviewing, and revising time)?

6. What percentage of your writing is produced in response to someone else's request   _____ %
   or requirements?

   What percentage is produced on your own initiative?   _____ %

7. How important is the quality of your writing for the   essential   _____
   performance of your job?   very important _____
                                                             not very   _____
                                                             unimportant   _____
                                                             irrelevant   _____

   How important is the quality of your writing to   essential   _____
   your career advancement?   very important _____
                                                             not very   _____
                                                             unimportant   _____
                                                             irrelevant   _____

8. What percentage of your work time is spent working with others to   _____ %
   plan and write documents?

9. Are you involved in communication with people of other nations and cultures? yes _____ no _____

   If yes, are these people best described as

   vendors or suppliers _____clients or customers _____ coworkers in your organization _____

10. What proportion of your communication at work is done in the following ways?

    phone   _____ %   face-to-face conversation   _____ %
    e-mail   _____ %   formal meetings   _____ %
    fax   _____ %   informal memos   _____ %
    videoconferencing _____ %   formal documents   _____ %

1. What types of documents do you write? Please use the names you usually call them and describe their contents, length, and format.

2. Which of these types of documents do you write routinely (over and over again) and which do you produce only occasionally? Which are most important?

3. Who reads your writing? your manager? others in your own work group? peers or subordinates? people outside the organization (vendors, regulators, clients, etc.)? Please be specific.

4. Why do readers read what you write? What decisions or actions does it affect?

5. How many drafts do you usually produce for your most important documents? Do these drafts get reviewed by others? If so, who?

6. How did you learn to do the writing you have to do in your work—on the job, workplace training, college course, etc.?

7. Where do you get the information that you use in your writing?

8. What were the most useful aspects of any formal and informal training you've received in writing?

9. What are the major problems with writing in your organization? Discuss some examples of the consequences of ineffective writing?

10. How has your approach to writing changed since you started your career?

Appendix B
Qualitative analysis

To perform the qualitative analysis of the student reports, we read approximately 25% of them in a preliminary round to determine the kinds of information we were likely to find. After that reading we formulated the following categories for coding the information. During the final reading we also extracted and cross-referenced quotations from both the professionals and the students.

Rhetoric
    audiences, internal and external
    purposes for writing
    document types beyond those mentioned on the survey

Writing Process
    drafts, number generated
    review and editing practices
    collaboration practices

Socialization
    on-the-job training and mentoring
    expectations versus reality
    sources of information for writing
    relationships—among peers, with supervisors, toward clients

Technology
    impact of word processing software
    impact of advances in hardware, including use of e-mail

Pedagogy
    recommendations for instruction

International
    impacts of international audiences, internal and external
    issues that surface in companies with international audiences

Miscellaneous
    oral communication
    other information

Appendix C
Descriptive statistics

	All (378)	ENG (124)	MGT (61)	MKT (42)	PGM (29)	FIN (27)	RES (21)	Other (74)
Question 2: Educational background								
Graduation year	1984	1987	1980	1982	1986	1982	1989	1983
NCSU Grad	46% Y	61% Y	30% Y	40% Y	64% Y	19% Y	52% Y	41%
Writing course	61% Y	64% Y	57% Y	68% Y	68% Y	70% Y	52% Y	50%
Question 3: Size of organization								
< 100 employees	27 %	19%	21%	45%	29%	26%	24%	28%
100–500	16%	17%	20%	12%	7%	11%	19%	14%
> 500 employees	57%	64%	69%	43%	64%	63%	57%	32%
Question 4: Type of employer								
private	76%	83%	85%	96%	90%	61%	57%	50%
government	19%	15%	5%	2%	3%	35%	43%	42%
nonprofit	5%	2%	10%	2%	7%	4%	0%	8%
Question 5: Time spent writing (planning, reviewing, revising)								
Time spent writing — Mean	31%	32%	31%	30%	30%	29%	37%	31%
Med	25	30	25	25	25	23	35	30
SD	20.30	19.91	18.66	21.50	20.30	21.73	19.61	20.86
Question 6: Time spent writing in response to request or on own initiative								
Writing by request — Mean	52%	60%	48%	49%	60%	54%	44%	47%
Med	50	60	40	50	75	50	50	50
SD	31.29	29.57	30.02	31.52	32.77	32.69	26.28	32.05
Writing unsolicited — Mean	33%	26%	43%	38%	32%	31%	35%	33%
Med	25	20	38	25	25	20	40	25
SD	28.02	24.52	30.13	28.29	29.26	30.74	23.94	28.16
Question 7: Importance of writing quality to job performance, career advancement								
Performance								
Essential	50%	49%	54%	61%	35%	52%	53%	50%
Very imp	40	47	39	24	42	41	33	43
Important	8	4	7	15	20	7	14	7
Unimportant	1	0	0	0	3	0	0	0
Irrelevant	1	0	0	0	0	0	0	0
Advancement								
Essential	45%	47%	51%	57%	31%	41%	57%	35%
Very imp	37	40	34	17	52	48	38	38
Important	14	11	13	10	14	11	5	20
Unimportant	2	2	0	0	3	0	0	4
Irrelevant	2	0	2	7	0	0	0	3

	All (378)	ENG (124)	MGT (61)	MKT (42)	PGM (29)	FIN (27)	RES (21)	Other (74)
Question 8: Time spent writing collaboratively								
Mean 15% Med 10 SD 18.18	17% 10 18.12	15% 10 18.10	11% 10 19.97	15% 10 13.61	13% 10 13.68	26% 15 25.54	13% 10 17.59	
Question 9: Communication with people of other nations and cultures?								
Any	66% Y	66% Y	61% Y	59% Y	72% Y	63% Y	81% Y	66% Y
Vendors	26% Y	35% Y	37% Y	25% Y	19% Y	0% Y	19% Y	19% Y
Clients	56% Y	56% Y	62% Y	71% Y	43% Y	53% Y	24% Y	63% Y
Co-workers	59% Y	65% Y	59% Y	83% Y	67% Y	47% Y	100% Y	56% Y
Question 10: Proportion of communication with modes and technologies								
Phone	Mean 27% Med 21.5 SD 19.54	24% 20 17.58	30% 25 21.47	36% 30 18.23	20% 20 11.65	35% 25 22.23	17% 13 16.04	30% 25 20.73
E-Mail	Mean 11% Med 5 SD 15.06	12% 5 13.43	13% 5 19.12	5% 0 9.22	23% 25 13.70	14% 5 20.38	16% 15 13.13	64% 2 10.71
Fax	Mean 7% Med 5 SD 7.81	7% 5 7.80	7% 5 9.46	9% 5 6.96	5% 5 4.43	7% 5 8.21	5% 5 5.86	6% 5 7.86
Video-conference	Mean 1% Med 0 SD 2.89	1% 0 3.34	1% 0 2.14	0.5% 0 2.42	1.5% 0 3.12	1.5% 0 5.10	1% 0 2.12	0.3% 0 1.13
Face-to-Face	Mean 29% Med 25 SD 9.40	27% 20 18.88	25% 20 15.31	29% 20 21.78	24% 20 14.06	31% 28 20.09	34% 30 16.12	37% 35 21.78
Formal meetings	Mean 11% Med 10 SD 10.24	11% 10.10	12% 10 11.47	8% 5 5.83	10% 10 7.57	10% 5 9.56	16% 15 13.07	10% 5 10.78
Informal memo	Mean 10% Med 5 SD 12.81	10% 10 10.43	9% 5 11.14	9% 5 15.10	9% 5 14.21	15% 5 21.73	13% 10 18.96	8% 5 7.31
Formal documents	Mean 12% Med 7 SD 14.50	13% 10 14.13	11% 7 14.30	9% 5 8.71	9% 5 8.68	16% 8 22.62	16% 12 13.31	11% 5 15.53

Appendix D
Statistical analysis

Factor analysis

Five survey questions involve similar variables related to the respondents' communication behavior (see Appendix A, questions 5, 6, 8, 9, and 10). These performance-based questions lend themselves to a factor analysis to construct summary scores for correlated activities.

We used principal axes followed by varimax rotation factor analysis calculations to analyze the related performance-based data. The rotated factor pattern revealed the following five factors with high loadings on two or more items:

Factor 1:	Writing time at work	.65
	Writing collaboratively	.68
	Formal meetings	.61
	Formal documents	.55
Factor 2:	Writing by someone else's request	.84
	(Writing by own initiative	-.83)
Factor 3:	Fax	.73
	Informal memos	.67
Factor 4:	E-mail	.82
	Videoconferencing	.64
Factor 5:	Face-to-face conversation	.84
	(Phone	-.64)

To interpret the factors revealed by these high loadings, we have assessed the functions shared by the co-occurring communication behaviors as follows:

Factor 1: Time spent writing at work appears to be connected to the time spent collaborating with others, participating in formal meetings, and producing formal documents.

Factor 2: The interpretation of this factor seems obvious. There is an inverse relationship between solicited and unsolicited writing.

Factor 3: Fax use relates to informal memos, perhaps indicating that the fax medium is used for more informal communications.

Factor 4: The high loading scores for e-mail and videoconferencing highlight that there is difference between the communication practices of professionals with access to such technology and the communication practices of those without it.

Factor 5: Face-to-face conversation negatively relates to phone use. This may indicate that different choices in what type of oral media a professional uses also reflects different purposes.

Regression analysis

A regression analysis was run on selected factors to determine whether there were significant regression coefficients that might indicate a causal relationship. Regression was also run on question 7, which included evaluative information. We show below the regression runs with significant p values (any value of Pr > F less than 0.05). Question numbers from the questionnaire are included with independent variables.

Dependent variable: Factor 1

Independent variable	Pr > F
Size of organization (#3)	0.61
Type of employer (#4)	0.082
Graduation year (#2)	0.65
Professional field (#1)	0.033
NCSU graduate (#2)	0.99
Writing course (#2)	0.03

Dependent variable: Factor 4

Independent variable	Pr > F
Size of organization (#3)	0.0001
Type of employer (#4)	0.45
Graduation year (#2)	0.89
Professional field (#1)	0.0001
NCSU graduate (#2)	0.59
Writing course (#2)	0.062

Dependent variable: Question 7A, Importance of writing quality to job performance

Independent variable	Pr > F
Size of organization (#3)	0.91
Type of employer (#4)	0.24
Graduation year (#2)	0.0023
Professional field (#1)	0.20
NCSU graduate (#2)	0.90
Writing course (#2)	0.71

Dependent variable: Question 7B, Importance of writing quality to career advancement

Independent variable	Pr > F
Size of organization (#3)	0.0058
Type of employer (#4)	0.32
Graduation year (#2)	0.44
Professional field (#1)	0.066
NCSU graduate (#2)	0.51
Writing course (#2)	0.78

Appendix E
Employers of survey respondents

The following list contains the names of the companies whose employees agreed to be interviewed for this report. A number is shown if more than one employee was interviewed.

ABB Power T&D Company, Inc., Raleigh, NC	3
ABS Distributors, Inc.	
Ad Street Advertising	
Adroit Medical Systems, Loudon, TN	
Advanced Environmental Technical Services	
Air Products Chemicals Inc.	
Allied Chemical	
Allied Fibers	
Allied Signal	
Alphanumeric Systems, Inc.	
American Airlines, Cary, NC	
American Sterilogical Company (AMSCO)	
American Effird, Mt. Holley, NC	
Analog Devices, Greensboro, NC	2
Anderson Consulting	2
Apex Veterinary Hospital	2
Arckosian Entertainment Inc.	
Ashland Chemical	
Atlantic Veneer, Morehead City, NC	
AT&T, Inc.	
AWT Environmental Consulting Firm, Raleigh, NC	
Basyc Consulting Group	
Baxter	
Bayview Industries, Oak Creek, WI	
BB&T	
Belk Hudson Leggett Co., Chapel Hill, NC	
BellSouth Telecommunications, Gainsville, GA	
Beverly Knits, Gastonia, NC	
Big Sky Bread Company	
Black & Veatch	
Blackman-Uhler	
Blue Cross & Blue Shield of NC	
Blythe Construction Company, Charlotte, NC	
Bell Northern Research (BNR)	7
Bobbitt Construction, Raleigh, NC	
Burlington Industries	
B.A. Hughes & Associates	
B.R. Kornegay Land Surveying & Engineering, Goldsboro, NC	
Cameron & Barkley, Electrical Supplies	
Camp LeJeune Marine Corps Base	
Cardinal Healthcare	
CarMax, Raleigh, NC	
Carolina Cable & Connector	
Carolina Country Club	
Carolina Title Insurance	
Central Carolina Bank, Durham, NC	
Champion International Corp.	2

Char Grill Companies	
Chelsea Laboratories	
Cleveland County Memorial Library	
Coastal Physician Group	
Competitive Advantage Marketing Consultants, Raleigh, NC	
Consumer Computing Device Development, Raleigh, NC	
Corning, Wilmington, NC	
Cortina Fabrics, Inc., Burlington, NC	
Cotton, Inc.	4
Covalent Research Alliance	
Coastal Engineering & Surveying, Kitty Hawk, NC	
CP&L	2
CSX Transportation	2
Custom Travel Group	
C&K Components, Inc., Newton, MA	2
Deep River Mills, Chapel Hill, NC	
Deluxe Printing & Graphics, Hickory, NC	
DialCom	
Duke Power Company	5
DuPont Inc.	2
Eastman Chemical Corp.	
Eddie Bauer, Inc., Raleigh, NC	
Electrical Supply Company, NC	
Epley Associates, Inc., Raleigh, NC	
Ericcson	4
Fairlane Associates, Inc., Dearborn, MI	
Farm Credit, Inc., Greenville, NC	
FDH, Inc.	
First Citizens Bank & Trust Co.	
First Colony Life Insurance, Lynchburg, VA	
FMC Corp., Baltimore, MD	
Gannett Fleming Engineers & Planners	
GE Aircraft Engines, Evandale, OH	
GE Capital, Raleigh, NC	
GE Nuclear Fuels	
GE Plastics	
GE Transportation Systems	
Gelato Amare	
General Motors	2
Georgia State, Department of Transportation	
Georgia-Pacific, Skippers, VA	
Geotechnologies, Inc.	
Gillman Paper Comp., Yulee, FL	
Glaxo-Wellcome	5
Goldsboro Milling Comp.	
Greene Comp., Hyannis, MA	
GTE Mobilenet Southeast Region	
Hallmark Woodcraft, Durham, NC	
Harris Inc.	
Haywood Community College, Clyde, NC	
High Point Chemicals	
Hoechest Celanese	2
Home Health Agency, Chapel Hill, NC	
IBM	17
Intel Corp., Chapel Hill, NC	
Interface Tech, Inc., Raleigh, NC	

JC Penney, Cary, NC	2
Jim Garner Associates	
John Deere, Inc.	
J.C. Bradford Brokerage Firm, Nashville, TN	
J.C. Howard Farms, Deep Run, NC	
Kelly Springfield Tire, Fayetteville, NC	
Kimley-Horne & Associates	
Koray Built, Inc.	
Lawyers Cooperative Publishing	
Lord Corp., Cary, NC	2
Lowry Engineering, Inc., RTP, NC	
Maddux	
McKinny & Silver	
Medtronic Inc.	
Metering & Measurement, Elizabethtown, NC	
Mickey Body Comp., Inc., High Point, NC	
Microfibres	
Millken	2
Mitchell-Wilson Associates, P.C.	
Mitsubishi	
Moore & Associates, Raleigh, NC	
National Environmental Technologies	
Nations Bank, Charlotte, NC	
North Carolina State Government	24
North Carolina State University	36
Nello L. Teer Company	
NORTEL	7
North Ridge Country Club	
North Software Systems, NC	
Oldham Tooling Company	
Paine Webber, Raleigh, NC	
Patton Corp.	
Peace Corp.	
Perdue Industries	
Peurson & Whittmen	
Pharmaceutical Product Development, RTP, NC	
PMW Plastics, Inc.	
Prestonwood Country Club	
Pritsker Corp., West Lafayette, IN	
Proctor & Gamble	2
Quail Corners Animal Hospital	
Radian Corp.	
Raleigh Police Department	
Raleigh Parks & Recreation	
Ralph Whitehead Associates	
Regional Acceptance Corp., Garner, NC	
Revell-Monogram, Charlotte, NC	
Rhone-Poulenc	
RJR Nabisco, NC	
RK&K Consulting, Baltimore, MD	
Roo Express, Garner, NC	
Rubbermaid	
RUST Environmental	
R.J. Reynolds Tobacco Company	
Sara Lee Corp.	5
SAS (6)	

Saslow's Jewelers, Henderson, NC	
Sheehan Sales, Inc.	
Siemens, Raleigh, NC	
Smith Barney	
Smith & Holmes, P.C.	
Softworld Inc.	
SOLO (Singles Offering Life to Others), Raleigh, NC	
Southeastern Laboratories, Greensboro, NC	
Southern Foods, Inc.	
Square D	4
Stanley Associates	
Subcon Inc.	
Suntechnologies, Raleigh, NC	
Tekelec Corp.	
Texas Instruments, Lexington, NC	2
Textile Clothing Technology	
Transworld Radio	
TRC Environment Corp.	
Triangle Bank, Raleigh, NC	
Triangle Environmental Inc.	
Tri-Point Medical, Raleigh, NC	
Twin Holly Farm, Hamptonville, NC	
Unifi, Inc., Sanford, NC	
Union Carbide Corp., Cary, NC	
Unitrode Corp., Cary, NC	
UPS	
United States Government (12)	
Vaillancourt Agency	
Virginia, Department of Transportation	
Vivra, Edenton, NC	
Wachovia Bank	
Wake Medical Center	
Western Auto, Durham, NC	
Westvaco Corp., Covington, VA	2
Weyerhauser (4)	
Willamette Industries, Marlboro Mill	
Williams Overman Pierce	
Withers & Ravenel Environments Engineering, Raleigh, NC	
WRAL TV 5, Raleigh, NC	
WW Transmission	
Wyeth-Lederle, Pediatrics, Sanford, NC	