

Communication in the workplace:
What can NC State students expect?

A research report

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Preface

This report grows out of one of the most successful assignments used in NC State's English Department courses that prepare undergraduate engineering, management, and other scientific and technical students for the communication 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 20–30% of their time at work writing and another significant portion in high-stakes oral communication. Students often find themselves being lectured by an engineer or an accountant about how important writing is to their career, how damaging the consequences of poor communication are, and how important the student's English 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 20 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.

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. And when many students gather the same kind of information at the same time, we acquire information that has statistical power, as well as anecdotal richness.

We have harnessed the power of large numbers twice, during the spring semester of 1996 and spring semester 2001 for a five-year follow-up study. In both cases, faculty in the English Department coordinated their assignments so that the results of many interviews could be compiled and compared. This report is the result of our second collaborative effort among students, instructors, and the many working professionals who agreed to be interviewed.

*Dr. Carolyn R. Miller
Professional Writing Program Director, 1995–2002*

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The questionnaire, revised somewhat from the one used in 1996, was prepared by the 2000–01 Professional Writing Committee in the English Department: Carolyn Miller (chair), David Covington, Sarah Egan, Andy Huyck, Steve Katz, Jamie Larsen, and Lynn Setzer.

The NC State Alumni Office provided a list of alumni who had graduated within the past five years in the same fields as those of our students, to assist students in finding someone to interview.

The Faculty Center for Teaching Learning Fund and the Dean’s Office of the College of Humanities and Social Sciences supported this research with matching grants in the summer of 2001 that provided time to begin the data analysis.

The data analysis could not have been completed without the help and advice from Joy Smith, Application Analyst Programming Consultant in the NC State Statistics Department. Joy conducted the factor analysis and analysis of variance, and advised Jamie Larsen in how to interpret the survey data. Jamie Larsen, Andy Huyck, and Shaun Slattery coded the qualitative data, which provides some of the most interesting information in the following report.

Jamie Larsen and Carolyn Miller wrote the report, and Amy Sprague prepared it for publication in PDF and HTML formats.

Introduction

Why did we do this study?

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 NC State (as well as nationwide) have heard this complaint from their advisory boards and other industry contacts. But it is hard for curriculum designers and instructors to know why these complaints are being made and what they mean. Exactly what kinds of communication tasks can graduates of NC State 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?

For many years, the three courses in the English Department's Professional Writing Program (ENG 331, 332, and 333, which focus, respectively, on technical, business, and scientific communication), were the primary means of curricular response to the concerns of employers. Thus, those of us in the program felt the need to gather information about communication tasks in the workplaces to which students in these courses will go.

In 1996 we did a survey very similar to this one, which began to answer these questions (it is available at <http://courses.ncsu.edu/eng331/common/resources/survey/index.htm>). That report has proven very useful in our teaching and course planning. But communication practices in the workplace are changing so fast that five years later we thought it would be worthwhile to conduct a new survey, to see if we could track any changes, or at least to confirm the results for another generation of students.

In addition, there have been important changes at NC State in the past five years. Notably, the Campus Writing and Speaking Program was established in July 1997 to support the revised General Education Requirement in Writing and Speaking.* This requirement was revised in 1997 to indicate that all upper-division courses “should incorporate significant writing and speaking experiences,” so that student skills will develop continuously across the curriculum and throughout their undergraduate years.†

These developments mean that all faculty and administrators at NC State are interested in the writing and speaking capabilities of students, as they have never been before. Faculty in every curriculum are working to incorporate writing and speaking assignments into their courses. Thus, the Professional Writing Program needs to play a role in the campus-wide effort to improve student communication.

We hope this report will be useful to the NC State community. It can help us to understand the communication tasks students will face as they enter the workplace; it can also help us to address students' responsibility not only to engage effectively in those tasks but also to improve workplace practices.

* See <<http://www2.chass.ncsu.edu/CWSP/index.html>>.

† See <http://www.ncsu.edu/provost/academic_programs/ger/wrtspk/index.html>.

How did we do the study?

During the spring semester 2001, faculty members and students in 36 sections of NC State's courses in technical, business, and scientific communication (ENG 331, ENG 332, and ENG 333) conducted a coordinated series of 725 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. To assist students in finding suitable persons to interview, we made available a list of NC State alumni who had graduated within the past five years in fields similar to their majors.

The 725 students who did the interviewing were enrolled in the following colleges at NC State:

Agriculture and Life Sciences	123
Design	3
Education and Psychology	9
Engineering	258
Undergraduate Affairs	8
Humanities and Social Sciences	12
Management	190
Natural Resources	22
Physical and Mathematical Sciences	42
Textiles	48
Undetermined	10

The professionals responded to a structured questionnaire and commented informally about their workplace experience. A copy of the questionnaire is included in Appendix A. The questions emphasize writing but also seek information about various forms of oral communication. Students wrote reports on their interviews, providing us not only with the responses to the questionnaire but also with accounts of their discussion, which often included interesting verbatim quotations from those interviewed.

This report presents the quantitative results from the questionnaire and explores the implications of the discussions in the student reports. In Appendix B we explain the coding system used for compiling this qualitative information. We report means for the quantitative data in Appendix C. We also subjected the responses to a factor analysis and an analysis of variance to test for correlations and comparisons among items, and these results are given in Appendix D. Finally, a list of the employers of all those interviewed is given in Appendix E.

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

Who responded to the survey? (questions 1–3)

Although we received 725 responses to the questionnaire, we reduced the initial database containing the survey and interview results to 632, based on completeness of data and fit of respondents into the professional categories of interest. This database reflects a substantial increase from the 378 professionals in our report five years ago.

The majority of these professionals work for organizations with over 500 employees (60%), while 20% work for companies that employ fewer than 50 people, and 20% work for companies with 50–500 employees. Overall, 74 % worked for private industry, 2% for nonprofits, and 24% for local, state, or federal government. NC State and the North Carolina state government employ many of the professionals interviewed (106), but many private companies were also represented through multiple interviews of their employees (e.g., IBM with 33, NORTEL with 17, and Glaxo Smith Kline with 15). Appendix E provides a complete list of the 452 employers represented in our sample.

Over half (56%) of the interviewees graduated from NC State, which is a little higher than the 46% in our report five years ago. The average year of graduation for the group is 1990, with a range from 1955 to 2001. This range of dates enables us to look for differences between entry-level and experienced employees. We divided the responses into two groups, 232 who graduated within the past five years, representing entry-level employees, and 373 who graduated five years ago or more, representing experienced employees (27 did not provide this data, or were in professions other than the seven that we grouped).

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

Education	51	8%
Engineering	136	22%
Finance, Accounting, and Banking	76	12%
Management	145	23%
Marketing and Sales	67	11%
Programming	72	11%
Research	85	13%

Results for each of these groups are given in the second part of this report.

We had asked the students to interview someone who has a job they would like to have, and 59% of them interviewed someone with a degree in the same field as their major.

Why and to whom do they communicate? (questions 3, 7, 10, 13)

As a group, the respondents told us that 55% of their writing is produced in response to someone else's request or requirements, which is very similar to what we found five years ago (52%). They direct most of their writing to clients and customers (30%), but managers (23%) and peers (22%) follow close behind. Patterns of oral communication are similar: 27% with clients and customers, 24% with peers, and 21% with managers.

The respondents indicated that most documents they read are written by internal co-workers, specifically, peers (21%) and managers (20%), in addition to such external sources as clients and customers (18%) and suppliers (15%). The factor analysis showed a strong correlation between reading, writing, and oral communication with the same audiences; that is, those who read the most from managers, or vendors, were most likely to also write to those same audiences and communicate orally with them as well (see Appendix D for the factor analysis results).

The analysis of variance showed no differences in the communication patterns in organizations with 50–100 employees and those with 100–500 employees, so we combined those categories to produce the following results:

In **small** companies (fewer than 50 employees), there is more customer communication (33%) than in medium (21%) and large companies (22%), including written, oral, and reading of customer documents. There is, however, less communication with managers (24%), and less reading of documents written by peers (15%).

In **medium**-sized companies (50–500 employees), professionals write more memos than in small or large companies.

In **large** companies (over 500 employees), professionals send more e-mails than in small or medium sized companies. There is also more written and international communication to peers.

In the comments in the reports, respondents described great diversity in the audiences for both written and spoken communication. Internal audiences, for example, include a variety of support personnel including production people, quality assurance, and maintenance, up to the Board of Directors and Vice Presidents in some cases. Respondents emphasized the importance of adapting communication to the needs of different types of audiences. As one programmer put it,

“The biggest communication problem I see day-to-day both in writing and oral communication is not tailoring the message to the audience, especially in terms of getting the level of detail right.”

However, an engineer noted that it's sometimes difficult to anticipate the audience:

“You never know who will read your reports. You may be at a public meeting and somebody with a Ph.D. in environmental engineering hammers you because of a discrepancy in your report.”

The purposes for communication are also varied, and later in this report when we discuss the results for each professional field, we provide details on the different types of documents and communication events mentioned for each field. But in general, respondents noted that they communicated in order to get approval for current and long-term projects, to give bad news, to resolve conflicts with contractors and clients, to coordinate efforts with co-workers, and to persuade managers with proposals. One commented on the need to put decision-makers in a positive position, with multiple options. A marketing professional said,

“People read what I write to see the ‘bigger picture’ of what is happening with product development. This allows them to make decisions regarding funding or deployment strategy/actions for new products.”

Many commented on the difficulty of getting through to busy people, as a finance professional noted:

“I have to grab my reader's attention in milliseconds in order to achieve my goal.”

How do they spend their time writing at work? (questions 8, 9, 12)

From the student reports, we found that professionals spend 30% of their time writing on the job. **Figure 1** shows in more detail that 49% of the respondents spend between 11% and 30% of their time writing, and another 32% spend between 31% and 50% of their time this way. Both of these percentages are only slightly higher than what we found five years ago, which indicates that workers still spend about a third of their work time writing, planning, reviewing, and revising documents. As a marketing professional commented,

“There is not a day that goes by at work when I am not reading, writing, or editing.”

The professionals as a group reported that 23% of their time on the job is spent collaborating with others to plan and write documents. This percentage is higher than the 15% figure from five years ago. **Figure 2** shows that a sizeable proportion (31%) spends 11-30% of their time collaborating in their writing.

One interesting trend was that professionals now spend more of their time writing e-mail (25% of their work time) than they did five years ago (11%), and e-mail is the most frequent form of written communication used. Other forms are formal documents (20%), memos (12%), letters (10%), and websites (4%).

Many of the respondents described elaborate internal review processes, especially for formal documents or those intended for external audiences. Reports or other documents may be reviewed by managers or peers, sometimes multiple times, to ensure clarity and coherence. Both comments below are from engineers, but review was mentioned by all professional areas:

“The consequences that could result from an ineffective document are the exact cause of the many signatures required to approve the documents. In other words, the necessity of checks and balances is great at our company.”

“Things are always proofread and approved by several other engineers.”

Other respondents described the use of templates for specific kinds of documents, sometimes as many as 30 different ones; in some cases, these templates are used to protect against liability, and they may also automatically record submission dates for reports.

Even with all the writing that is done on the job, one manager noted that the biggest problem in his organization is “writing that doesn’t happen.”

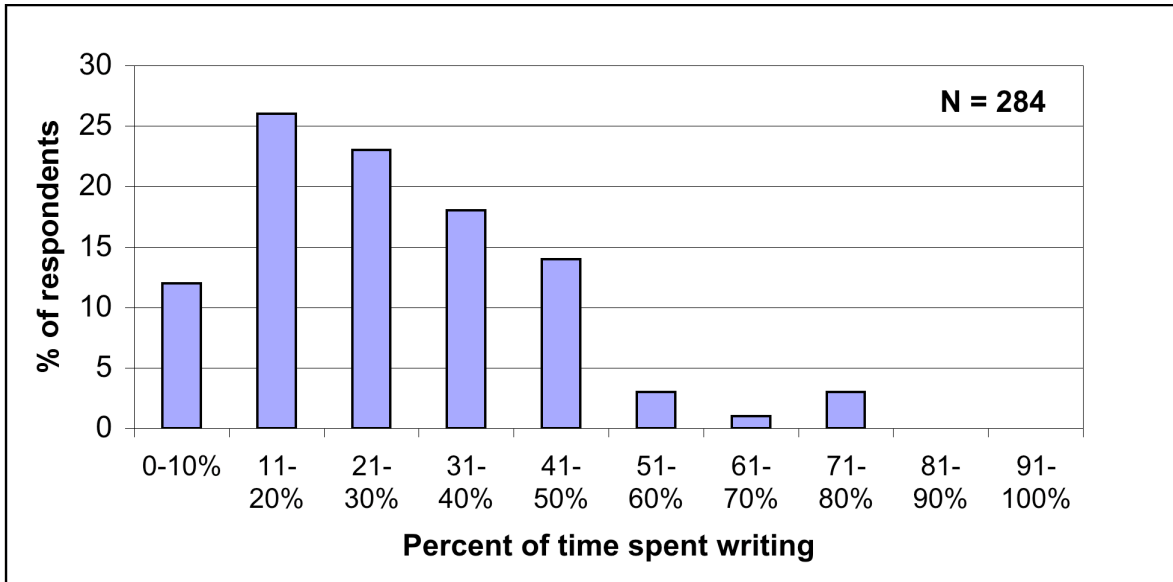


Figure 1. Amount of time spent writing at work.

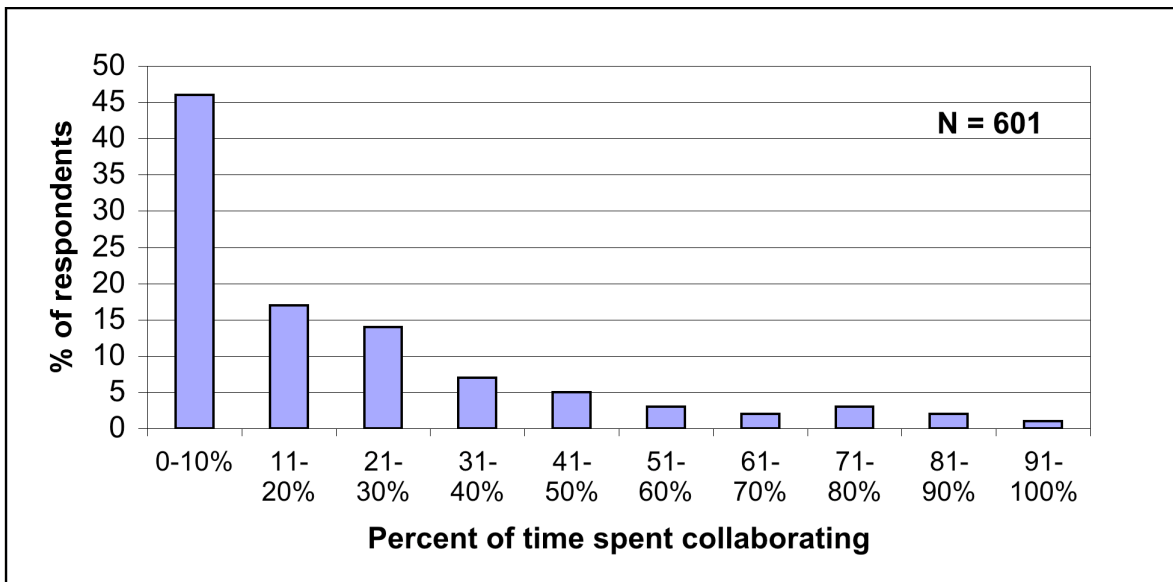


Figure 2. Amount of time spent writing collaboratively at work.

How important is their writing? (questions 4–6)

The majority of professionals interviewed (90%) indicated that oral and written communication were a part of their performance appraisals. When asked how important the quality of their writing is for the performance of their jobs, the respondents said it was either essential (43%) or very important (45%). Less than 1% said it was irrelevant. **Figure 3** shows these percentages graphically, which are almost identical to our results five years before.

A strong majority, 84%, rated the importance of their writing to their own career advancement as essential (36%) or very important (48%), and only a few (2%) said it was irrelevant. **Figure 4** shows these figures, which also mirror what professionals indicated five years ago, when 82% linked quality of writing to their advancement.

Writing is equally important regardless of size of organization. In companies with over 500 employees, 50–500 employees and fewer than 50 employees, the ratings of importance of writing to job performance were very close to the mean for the entire group. **Figure 5** shows these comparisons. Similarly, the importance of writing to career advancement is also essentially the same regardless of size of organization.

When comparing the way entry-level employees experienced employees rated the importance of writing to their job performance, we found less difference than there was five years ago, when many more experienced than entry-level employees said it was essential or very important. **Figure 6** shows this comparison.

In commenting on the importance of effective communication, many respondents echoed the sentiment expressed by a marketing professional, that

“Every document is a reflection of me, my work, and those I represent.”

A research professional noted that

“Lack of writing ability is a huge handicap. I would say it is probably the major thing that holds back people from being successful professionally.”

And a programmer said,

“Anyone who is not a skilled writer will be viewed as unintelligent.”

Several noted the consequences of ineffective communication, including these comments from a manager, a programmer, and a finance professional:

“Poor communication by people with my responsibilities can lead to company-wide declines with a loss of earnings and profits. It can lead to a loss of jobs as well.”

“Ineffective writing has led to loss of contract bids.”

“Ineffective writing could cause me to lose a sale and consequently fail at my job.”

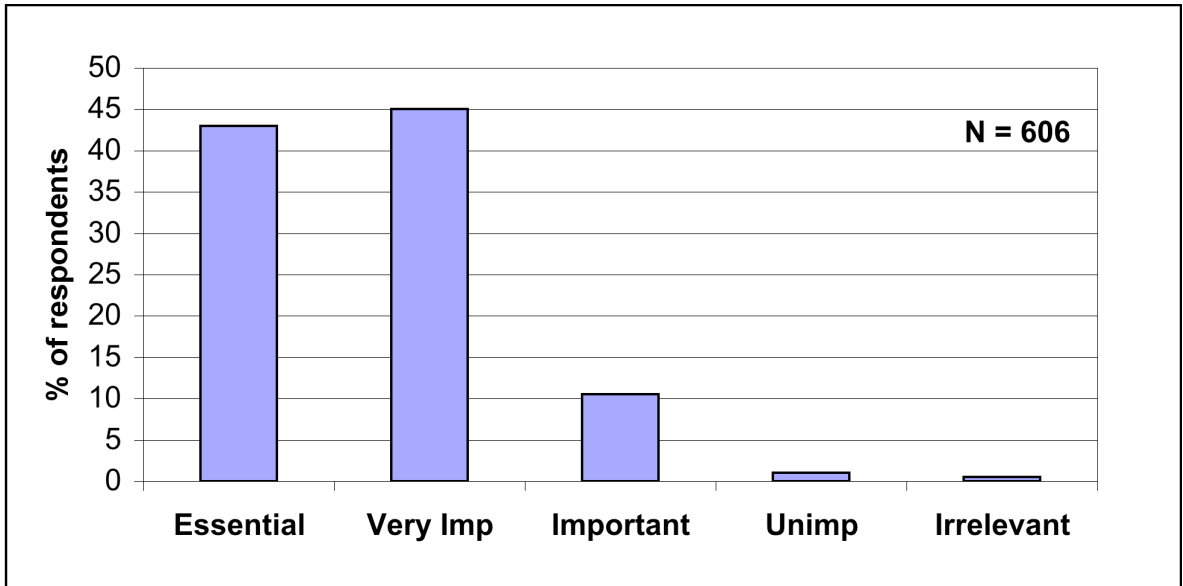


Figure 3. Importance of writing quality to job performance.

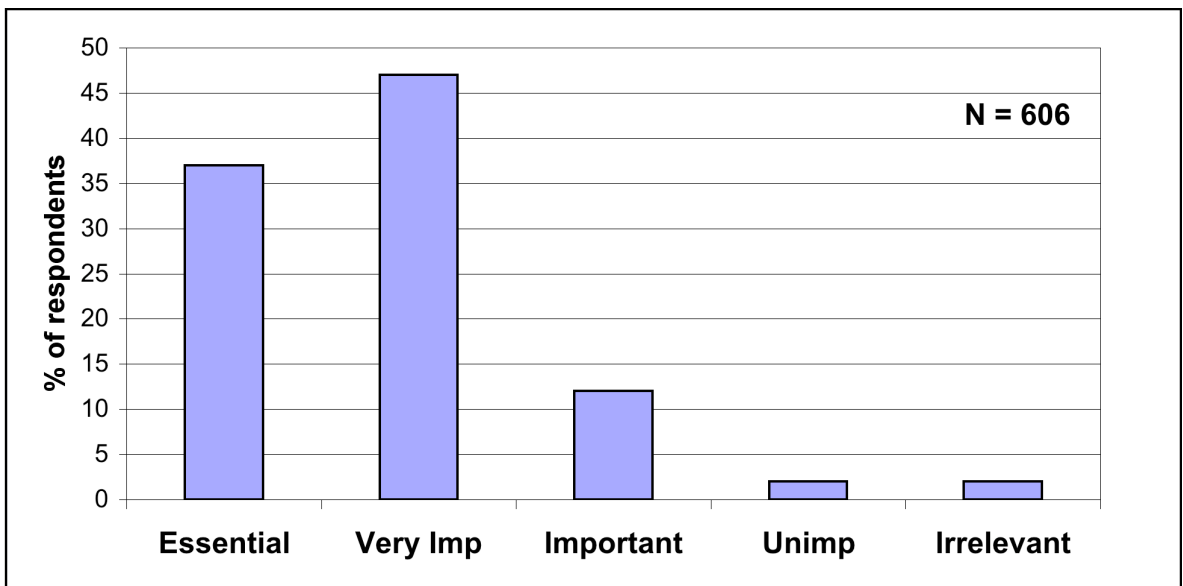


Figure 4. Importance of writing quality to career advancement.

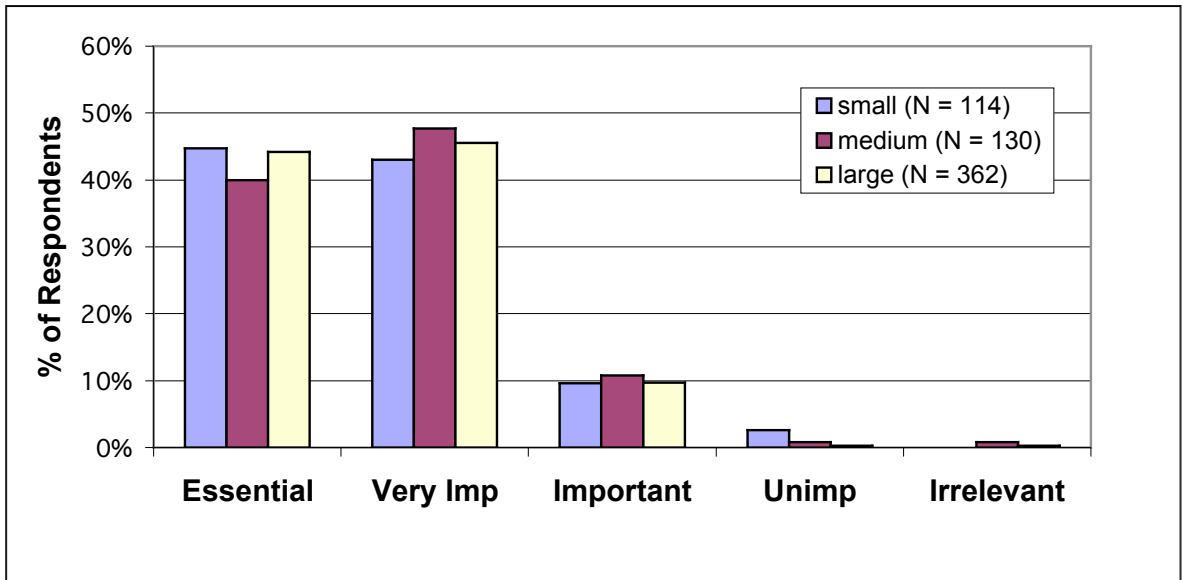


Figure 5. Importance of writing quality to job performance by size of organization.

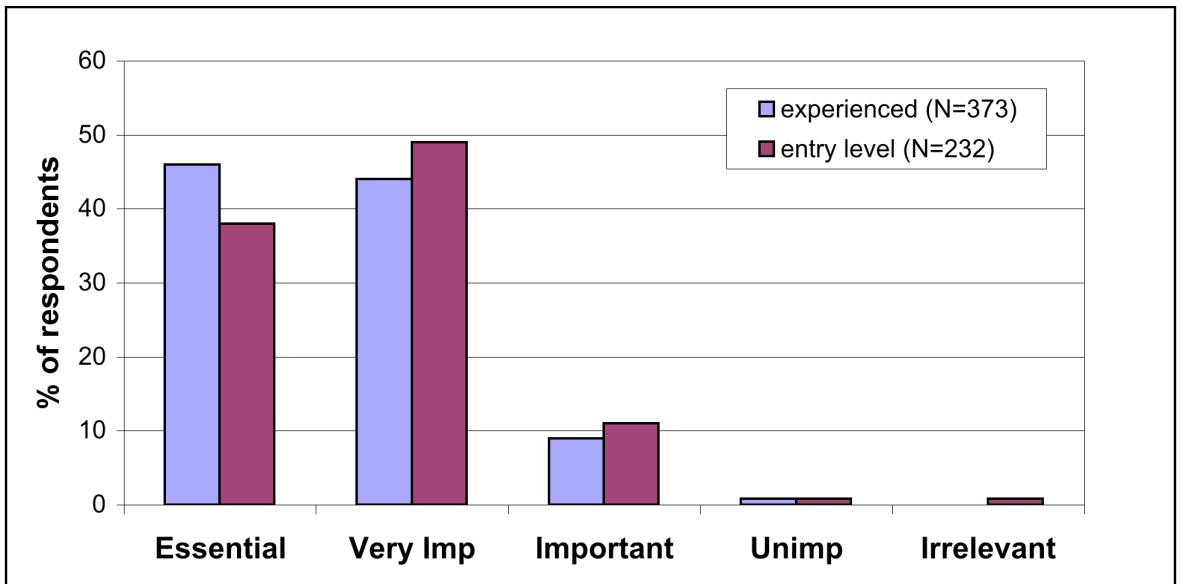


Figure 6. Importance of writing quality to job performance by experience level.

Do they communicate with people of other nations and cultures? (questions 14 & 15)

Two-thirds (67%) of the professionals surveyed indicated that they spend some percentage of their time communicating on the job with people from other countries. Global communication primarily involved customers (27%) and peers (24%), and a smaller amount with vendors (15%).

Many respondents emphasized the extra care that international communication requires, with extra attention to wording and simplicity, and knowledge of foreign customs and communication preferences. The consequences of miscommunication, according to one respondent, can be “disastrous.”

Researchers noted the importance of global communication to science, with new ideas traveling quickly to many research sites and the American scientific community benefiting from the broadening of its knowledge base. Although English has become the international language for science, it still poses problems for those for whom it is not their native language.

Comments from most professional fields focused on the increase of international communication with the advent of new communication technologies. E-mail is by far the most frequent means of international communication, with some use of the telephone and teleconferencing. One worldwide company uses teleconferencing in almost every meeting.

Although the interviews did not elicit many comments about international communication, the high number of professionals who are involved in it suggests that we need to know more about the role it plays in the workplaces our students will enter.

What forms of oral communication do these professionals use? (question 12)

On the questionnaire, we asked the professionals to specify what percentage of their time was spent orally communicating either one-on-one or in group meetings.* One-on-one communication included 40% in person and 30% on the phone. Group meetings consumed a large percentage of their work time (36%), but group teleconferences only took about 8% of their work time. In marketing and finance, one-on-one oral skills figured more prominently than in the other fields, whereas group meetings were more frequent in education and management.

The professionals noted that oral communication skills are vital in collaboration, teamwork, brainstorming, and problem-solving activities. These skills also maintain connections between co-workers, keeping everyone updated, and help form professional relationships. In addition, as one researcher noted,

“It is extremely important to maintain good, friendly, and open contacts with a variety of people in order to receive help when it is needed.”

Discussion in the student reports emphasized that peers and managers form impressions of a person’s competence based on oral communication, just as they do with writing. Confidence is necessary in oral communication, so that the audience will have confidence in the information provided and the decisions recommended.

Some professionals had comments about specific oral skills needed in the workplace; for example, one manager noted,

“Many people find it hard to visualize what you are saying over the phone; therefore it takes special explanation skills to accomplish a complete understanding and visualization over the phone.”

Others discussed the complex relationships between oral and written communication; the following statements from an educator and two marketing professionals note strengths and weaknesses of each mode in different situations:

“You can’t always communicate with writing. Sometimes you have to rely on your speaking skills to get your message across.”

“Oral communication without written acknowledgement is a dangerous business style.”

“It is my company’s job to insure that our clients have ‘got it’ by the end of our meeting, because I know they won’t be going back over the formal documents any time soon.”

* These figures add up to more than 100%, suggesting that some respondents understood our question to apply to total time spent in oral communication and some understood it to apply to total work time.

How is technology affecting the communication patterns of professionals?

The questionnaires indicated extensive use of e-mail, telephone, teleconferencing, and websites, and the details in the student reports revealed more about how these technologies are used and how their advantages and limitations are perceived in the workplace.

The increasing use of e-mail sparked many comments from the respondents, indicating that it is both a vital workplace tool and a huge annoyance. Many find e-mail too informal and too frequent, deleting many messages without reading them, especially if they are long. On the other hand, e-mail can be treated as formal communication that provides a “paper trail” on a project. As one manager remarked,

“Greater care should be taken when people write e-mails because most of the time we print those out and they become official documents in a sense.”

The importance of clarity even in casual e-mail messages was emphasized many times, as by this engineer:

“Managers do not like to have to ask for a clarification in an e-mail message.”

One change from five years ago is that professionals commented repeatedly that they have concerns about the security and reliability of information accessed electronically. Many companies employ internal “firewalls” to protect the security of information that is exchanged via e-mail. One engineer described an additional security measure:

“Every e-mail message sent has a misdirection disclaimer—anyone who receives e-mail as a result of misdirection is instructed to delete it immediately under penalty of lawsuit. The information transmitted in some e-mails is extremely sensitive, and could undermine the success of the company if it fell into the wrong hands.”

Because of concerns about reliability, many respondents indicated that if they use information available on the Internet, they also have to spend additional time verifying its accuracy. The following comments from a programmer and a manager are representative:

“I usually try to verify that the information I receive from the web is accurate before I attach my name to it.”

“Reliability of online information is a major concern and we go to great lengths to authenticate that information.”

How did they learn to write at work? (question 2)

We asked whether respondents had taken a college course designed to prepare them for writing on the job and whether it was required. And although we did not ask any question specifically about how they learned to write on the job, the discussions in the student reports revealed a wealth of information about this process.

Over half our respondents (57%) had taken a college course in technical, business, or scientific writing that was designed to prepare them for writing on the job, and 49% of those indicated that this course was required for their majors.

Most of the comments indicated that a course in technical writing was very useful in preparing for workplace communication. In fact, said one engineer, technical writing was “the most useful course taken in college.” A programmer indicated that

“Most of the writing skills I have were gained in college. On the job, you will typically be given a format to follow, but the skill of writing cohesively and understandably was gained throughout college.”

And an NC State engineering alumnus said,

“The technical writing class at NCSU was very valuable in teaching me how to organize a document so that someone seeking information may read it quickly. Organization of a document is probably one of the most important factors.”

But many professionals emphasized that there was much to be learned on the job. They learned through “practice,” through “trial by fire,” and “the hard way.” One programmer said,

“I had to learn what the executives were looking for and to make them understand what I was doing.”

An engineer noted,

“When you get negative feedback, you learn what not to write.”

And a marketing professional pointed out the limitations of the college course:

“NOTHING tops the real thing. No matter how much preparation, nothing compares to what you learn 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: education, engineering, finance, management, marketing, programming, and research.

The results in the following sections rely on the factor analysis and analysis of variance (see Appendix D). The factor analysis produced seven factors that grouped the survey variables into clusters related by communication audience (Customer, Peer, Manager, Subordinate, Vendor, Regulator, and General Public). In the analysis of variance, we found 43 variables where there were significant differences related to size of organization or job title ($p < 0.05$), from which we could draw conclusions about communication differences between professional fields. In addition, eight of these variables had a significant interaction between size of organization and job title, which showed how communication practices vary based on both the size of an organization and the professional field (see Appendix D for the table of p-values).

In these sections, we also discuss trends indicated in the discussions in the student reports, especially the audiences and types of documents and communication situations mentioned by each group.

Education (51 respondents)

This group comprises 8% of our database and consists primarily of professionals with teaching responsibilities, most of them faculty at NC State or another university. Educators, when compared to the other six professional groups, engage in significantly less one-on-one oral communication on the phone (17% of their time as compared to 31% overall), and they also participate in the most group meetings (49% of their time).

Educators communicate with the general public more than any other professional group. They had the highest mean scores for reading, writing, and orally communicating with public audiences. Their public audiences are presumably their students.

Educators also read subordinates' documents more frequently than the other professions (15.03 %) (again, presumably those of their students). They read the fewest number of documents written by regulators, vendors, and managers. Overall, they have the least amount of communication, both written and oral, with vendors, and the fewest number of group teleconferences.

In their comments, several educators expressed concern about the reliability of online information. Subscriptions to journals, and login passwords are both seen as indications that online sources can be trusted. One educator made this comment about how he decides what websites are trustworthy:

“Most sites [I use] are non-biased educational resources. The only private sites I use are those more for general information and that are not altered in order to promote someone’s interest or to falsify evidence.”

Several commented on the persuasive effects of writing, even in the educational setting:

“Effective writing can often be persuasive and get people to do things they otherwise might not have wanted to do.”

Education, continued

Educators' audiences and documents are related to their research and classroom responsibilities.

Audiences

Students

Designers

National Science Foundation

Editors

Documents

Assignment guides

Syllabi

Newsletters

Evaluations of student work

Flowcharts

Research proposals

Letters of recommendation

Journal articles

Meeting announcements

Program changes

Teaching plans

Engineering (136 respondents)

This group includes professionals in chemical, civil, electrical, environmental, and mechanical engineering (22% of the total database). They hold positions as technicians, project engineers, design and process engineers, project managers, operations managers, and consultants.

Engineers in large companies with over 500 employees, when compared to the other six professional groups, engage in significantly more written communication with managers (38%).

Also, compared with the other groups, engineers have the least amount of both oral and written communication with the general public (1-2%) and spend the least amount of time writing collaboratively (18%). Our findings show no change from our survey five years ago in the amount of writing engineers do by the request of others (61%).

When looking at oral communication trends, we found that engineers engage in the most one-on-one in-person communication (44%), the most teleconferences (12%), and the most oral communication with managers (24%), and vendors (14%).

Engineers pointed out that since electronic forms of communication are as prevalent as paper documents then there is a need for instruction in proper e-mail etiquette. One prior NC State student stated that his English 331 course had taught him how to write a “fact outline” to plan what he will say in his e-mail messages. Many engineers pointed out that ineffective writing can cause misunderstandings, rejection by clients of proposals, and even money, with “small” mistakes costing more than \$10,000:

“Engineers like details. You would be surprised at the confusion that can arise if something is not exact.”

“Lack of documentation results in lots of wasteful re-engineering.”

“Ineffective writing is like shooting yourself in the foot.”

Engineers also had many comments about the benefits of effective writing:

“Effective writing on my part results in better production, which results in happy customers, money saved, and happy executives.”

“A positive outcome of effective writing is that you quickly become identified within your organization as someone who produces material worth reading ... for consideration of an idea or an initiative that you have undertaken.”

“Effective writing generally leaves the customer with few questions and the desire to sign a contract.”

“Effective writing leads to faster resolution of network outages, whereas ineffective writing can cause costly delays, such as repeating work already performed.”

Engineering, continued

Engineers' audiences and documents reflect a lot of attention to quality assurance activities and reports accounting for their work to management:

Audiences

OSHA
Human resources
Safety engineers
FDA
Production workers
Quality support
Maintenance personnel
DOT
CEO

Documents

Purchase orders
Specifications and contracts
Protocols and quality procedures
Standing operating procedures (SOPs)
Test reports
White papers (management readers)
Feasibility studies and proposals
Internal engineering notices
Sales proposals
Environmental impact studies
Process documents for ISO standards
Safety incident investigation reports
Requests for authorization (RFA)
Contracts, scope of work for contractors
Minutes of meetings
Lockouts (safety procedures)
Patent applications
Progress reports, monthly reports
Functional specifications and features requirements

Finance, Accounting, and Banking (76 respondents)

This category, 12% of the database, includes financial management specialists who work for banks and investment firms, accountants (both staff accountants and those who work for accounting firms), and bankers.

As we found five years ago, finance professionals still have the least amount of international communication with either internal or external audiences. They also still do the most oral communication one-on-one on the phone (42%), by a significant margin. Interestingly, finance professionals do the *least* oral communication one-on-one in person (37%).

With this larger database, we find that finance professionals have significantly more oral communication with customers than the other professional groups do (42%), and more written communication with managers in smaller companies (less than 50 employees). Across all sizes of organizations, finance professionals have the most written and oral communication combined with managers, regulators, and customers (see the analysis of variance in Appendix D).

Finance professionals have the most to say about oral communication on the job. They stress that good oral skills create a competent appearance to others in the workplace. Also, professional phone skills are vital for them:

“If your customers cannot understand what you are talking about, they will not have very much confidence in doing business with you.”

Many view e-mail as too informal in tone, and one professional recommends that when e-mailing someone for the first time, a formal tone and statement of authorization (i.e., who suggested the e-mail be sent) should be used. One respondent offered the following specific point about getting a reader’s attention:

“If the subject line in the e-mail doesn’t grab them, they will delete the message in a whimsy.”

Another commented about the need to address different kinds of audiences:

“In this type of work environment, it is important to be flexible with your writing. The audience to whom the document or memo is written will change regularly.”

Other comments from finance professionals focused on the consequences of ineffective communication:

“If the proposals are not clear then they will be denied, which will make me look bad.”

“There is a potential for loss of clients without having that certain level of professionalism. It’s embarrassing to send out documents with bad grammar and simple misspellings.”

Finance, Accounting, and Banking, continued

Finance professionals' audiences and documents reflect the statistical findings showing their numerous exchanges with managers and regulators:

Audiences

CEO
Vice Presidents
IRS
Bank Underwriters
Board of Trustees
CPA's
Consultants
Investors
Planners
Customers and clients

Documents

Players contracts (responsibilities to client)
Annual reviews (read by management)
Audit reports
Invitation for bids
Internal management analysis reports
Monthly revenue forecasts
Press releases, media alerts
Risk assessments
Trade blotters (3 pg. daily record of duties)
Spreadsheets
Power-point presentations
Monthly reports

Management (145 respondents)

The managers in this sample come from a variety of organizations and backgrounds, including engineering, programming, sales, and marketing. They represent 23% of the database. Their primary responsibilities center on directing people and projects.

Managers had the highest percentage of time spent writing on the job (33%). One noted,

“My work is communication ... that’s how I get work done.”

As we found five years ago, managers have the most written (18%) and oral (27%) communication with subordinates. However, they do not communicate the most with vendors from other countries, as they did five years ago (18% as compared to 37%).

Managers read the fewest documents written by peers (13% as compared to researchers with the highest at 33%). However, they read the most documents written by their managers (23%). As a group, managers write fewer formal documents than the other six professional groups (14% as compared to researchers with the highest at 28%). One offered this advice about informal memo writing:

“Keep memos concise, and be specific about what you are asking for or the outcome you desire; then, and perhaps most important, FOLLOW-UP and hold individuals accountable.”

Managers stress the need for good writing skills. Consequences of ineffective writing can be “cataclysmic” and result in lost bids, reduced productivity, and stalled careers. One manager said that misleading data had even caused a company to move to another city. Other comments included the following:

“Ineffective writing creates the impression that the content may also be flawed.”

“In our organization, the consequences of ineffective writing can be devastating. In this era of just-in-time inventories, we cannot afford lost time, production, or quality due to barriers in communication.”

Finally, this comment shows a healthy respect for the difficulties that writing can pose:

“It’s easy to write poorly but it takes quite a lot of work to write well.”

Management, continued

The following audiences and types of communication mentioned by managers are consistent with the quantitative finding that managers frequently communicate with internal audiences, but also indicate they do have some external and public audiences:

Audiences

Support staff
Non-profit groups
Media
Human resources
Legislators
Lawyers
Sales representatives
Board of Directors
Plant workers

Documents

Policy revisions
Strategy and high-level design documents
Press releases and brochures
Dismissals and reprimands
Project status reports
Control plans
Petitions (to lawyers and clients)
Quality reports
Purchase orders
Executive summaries
Performance appraisals
Sales plans
Newsletters
Safety awareness bulletins
Request for proposals
Product spec sheets

Marketing and sales (67 respondents)

This group consists primarily of mid-level professionals directly involved with clients and vendors and represents 11% of our sample. They all seem to feel that they are front-line representatives of the company and its product.

Marketing and sales professionals write the fewest documents to peers in all size companies (11% as compared to the highest of 35%). However, along with financial professionals, they write more to customers than the other professional groups (see the analysis of variance in Appendix D). They write the most memos (17%) and letters (15%) of all the professional groups but among the fewest e-mails. One commented on the importance of all this paperwork:

“If the matter is important and affects our business, it will go on paper to protect the company.”

As found five years ago, marketing professionals are by far the most involved with communicating to international customers (42% compared to 27% for the entire sample). They offered specific advice for communicating with international audiences. They said communication must be tailored to different cultures, and that politeness was crucial when interacting with international suppliers. One noted that the trend is for more global communication because of better prices of commodities.

As they did five years before, marketing professionals still use the phone more frequently than other groups except for those in finance. These respondents had the least oral communication in group meetings (28% as compared to the highest by educators with 49%). The importance of communication on the job was emphasized by this comment:

“Anything that improves your communication skills is a worthwhile investment of your time. Communication is what business is all about.”

Many of these respondents emphasized the way that communication creates personal impressions, as this comment illustrates:

“Poor writing skills are not impressive and tend to show what kind of person someone is –if sloppy then they tend to be sloppy with everything else and if neat usually neat and caring in their work.”

Marketing and sales, continued

The major types of communication and audiences mentioned by marketing professionals reflect their frequent interactions with customers.

Audiences

Sales representatives
Media
Partners
CEO
Customers
Managers

Documents

Price letters
Progress reports, status reports
Proposals (many in Excel format)
Mass mailings
Budget reports
Shipping reports
Project quotes
Work orders
Post event reports
Press releases
Letters to government regulators

Programming (72 respondents)

These professionals are primarily those who write computer software and document its use for both internal and external audiences. They represent 11% of our database.

As in our prior survey, programmers still spend the most time in paperless communication, including writing e-mails (30%) and creating websites (10% as compared to all other professions with less than 5%). They spend the least amount of time writing letters (3%, compared to the group mean of 10%).

Programmers' international communication has increased from five years ago, and compared to the other professions they communicate the most frequently with managers from other nations (13%, compared to the group mean of 9%).

Programmers spend the least amount of time communicating with subordinates and regulators, and the least amount of time orally communicating with the general public (1%, compared to the group mean of 4%). They spend the most time orally communicating with other programmers in larger companies (42%).

These professionals indicate that they gather information for their writing primarily through oral communication with peers and vendors. Working collaboratively is important and helps bind a team together from the beginning to the end of a product's development cycle. Many of the comments concerned the use of communication to achieve this coordination:

“Bad communication leads to misunderstandings which leads to bad or erroneous design decisions. In short, the product we intend to build does not work as we wish!”

“If you write bad documentation no one knows where you are on a project.”

One comment emphasized the importance of audience awareness:

“A manager needs to know what action he needs to take and just enough knowledge about the problem to articulate its level of importance and urgency.”

Other comments noted the ways that communication relates to the work of the company, the careers of the programmers, and the needs of users:

“The most important document in the company is the proposal.”

“Promotions and raises are reviewed each year when the budget is distributed; an effective writer can convince his/her manager and the other managers ... why they should get more money or a promotion.”

“If my writing is ineffective, then people cannot get the quality of service that they expect and deserve.”

Programming, continued

The following audiences and documents exemplify how programmers communicate with internal audiences and with customers:

Audiences

Developers
Finance personnel
Testers
Program analysts
Quality assurance
Editors
Management

Documents

Design documents
Purchase evaluations
Functional specifications
Instructions, tutorials
Case documents
Release notes (known programming bugs)
Product proposals
System level design document
Technical white papers (for management)
Trouble tickets (problems that need fixing)
Weekly work plans
Performance analysis reports (baselines)
Component descriptions
Status reports
Quality assurance documents

Research (85 respondents)

The research professionals in our sample work in private, public, and academic laboratories, where their primary responsibilities involved research. Researchers represent 13% of our database.

There are fewer differences with what we found five years ago for the communication patterns of the researchers than for any other group. Of all the groups, researchers still spend the most time collaborating in their writing (28% as compared to 26% five years ago). They write more to their peers and read more peer documents, both nationally and internationally, than any other professional group. They also produce the most formal documents (27%). The importance of this frequent communication is reflected in the following comment:

“You may be the greatest scientist in the world, but it doesn’t mean a thing if you can’t communicate your research effectively to others.”

Researchers acknowledge the importance of staying aware of what other researchers are doing, nationally and internationally. They view research as a cooperative process that depends on good communication skills for the exchange of information. Effective writing promotes a scientist’s career, and poor writing diminishes credibility. One commented:

“If you can’t articulate your ideas, you don’t get funded, you don’t get published. The bacteria just hang out in the petri dishes and nothing gets done.”

Of all the groups, researchers communicate less frequently with customers (14%). Although they write the fewest number of e-mails and website materials, many noted that the Internet is an important source for scientific writing. One noted:

“The web is the future of the literature search.”

Research, continued

The following audiences and documents reflect the emphasis on communication with other researchers:

Audiences

Editors
Principal investigators
Laboratory workers
Media
Department head
Marketing representatives
Government regulators (FDA)

Documents

Conference papers
Grant proposals
Technical papers
Journal manuscripts
Recommendations
Clinical reports
Standard operating procedures
Regulatory compliance submissions
Letters of opinion
Technical bulletins

What do professionals say about college instruction in writing and speaking?

In the student reports, we found many suggestions made by the professionals about what should be taught in professional communication courses. Over half of the respondents (57%) had taken a technical writing course as undergraduates, and many indicated that this course was a major factor in their success on the job; others stressed the importance of courses in public speaking and interpersonal communication. Of particular value for those who had taken one of these courses were learning to capture and keep a reader's attention, learning acceptable business formats, and learning to write proposals.

Several professionals urged that professional communication courses emphasize the use of "real-world" industry situations and assignments over textbook scenarios. Other suggestions were that students learn to give PowerPoint™ presentations, to work in teams, to use conflict management skills, and to prepare "perfect" resumes.

Since e-mail is such an important mode of communication, many of our respondents recommended the teaching of effective use of e-mail. Of particular importance here are learning to be both brief and clear, to maintain a professional tone, and to create a readable format. Since e-mail is often treated as a casual means of communication, it can "lose some of its importance" if it is not written with attention to "e-mail etiquette." One professional noted that the same care should be taken for writing e-mails as for writing memos and letters. Another recommended that more attention be paid to instruction in informal writing techniques, such as brief descriptions and bulleted lists.

What did the student interviewers learn from the assignment?

In reading the student reports, we also gained some insight into how students reacted to the interview assignment. One called the assignment a “reality check” because it showed how much writing has to be done in the workplace. In this final set of quotations we give the students the last words. We think these demonstrate the valuable lessons they learned.

“I found it amazing how severe the consequences were if the quality of his documents was not exceptional. One mistake could cause [him] to lose his job or the company to lose a contract.”

“I also found it interesting to see the wide audience ... and how he must change his style to fit the reader.”

“If you do not give people enough information, they will create their own.”

“In talking with [him], I noticed that he often used the words ‘quickly’ and ‘effectively.’ The business world is fast paced and has no time for laggards.”

“It shocked me to learn just how much time is spent communicating professionally, especially for a salesperson.”

“One thing I found ... surprising was the extreme amount of emphasis that [he] put on documenting and backing up your communication with notes from meetings, faxes, phone calls, etc., for future reference.”

“As a result of the interview, I now realize that writing is an important part of my chosen field, and essential for my career advancement in that field of work.”

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

Like the study we did in 1996, the data we report here from 2001 overwhelmingly affirm the central importance of communication in the workplace. Both the quantitative results of the questionnaire and the qualitative information from the student reports show that communication, both written and oral, is an integral part of the work of technical, business, and scientific professionals in fields that NC State students represent.

The importance of communication, both written and oral, is shown both in the amount of time it consumes on the job and in the central role it plays in getting work done. Its importance is also demonstrated by the fact that 90% of our respondents indicated that communication is part of their job performance appraisals.

Our study also provides us with a snapshot of the great diversity of communication tasks and patterns that pervade the workplace. These tasks and patterns constantly evolve, adapting to innovations in technology and changes in socio-economic conditions. Professionals in each major area of our survey can expect somewhat different challenges, but all of them must be prepared to be flexible and to continue learning.

Communication is not a separate task, tacked on to professional work; rather, it is part and parcel of that work. Collaboration, problem-solving, evaluation, managing change—all take place in and through communication.

The education we provide to students must help them prepare to be productive professionals, able and willing to contribute to the technical, intellectual, and social challenges of the workplace. But at the same time, a university curriculum should not be dictated by economic or corporate interests. It is our challenge as educators to prepare students to evaluate and improve existing practices, not merely to adapt to the world as they find it.

Faculty in professional communication, like faculty elsewhere in the university, must learn about the worlds their students will enter at graduation, as we have done with this study, but we must also contribute to the effort to make those worlds more humane and more responsible.

Appendix A

Survey questionnaire

Interview Questionnaire

**Interview Questionnaire
Communication in the Workplace**

Student Interviewer: _____

ENG _____ **Section** _____

Professional Data

1. What is your company name and job title? _____
2. What is your educational background? School _____ Field/Degree _____ Year _____
 Did you take a college course in technical, business, or scientific writing that was designed to prepare you for writing on the job? Yes _____ No _____
 If yes, was the course required? Yes _____ No _____
3. How large is your company? 50 or fewer _____ 50-100 _____ 100-500 _____ over 500 _____

Writing and Speaking on the Job

4. Are oral and written communication a part of your performance appraisal? Yes _____ No _____
5. How important is the quality of your writing for the performance of your job?
 Essential _____
 Very important _____
 Not very _____
 Unimportant _____
 Irrelevant _____
6. How important is the quality of your writing to your career advancement?
 Essential _____
 Very important _____
 Not very _____
 Unimportant _____
 Irrelevant _____
7. What percentage of your writing is produced in response to someone else's request (i.e., not on your own initiative)? _____%
8. What percentage of your time is spent working with others to plan and write documents? _____%
9. What percentage of your time is spent writing the following:
 Memos _____% Email _____% Letters _____% Formal printed documents _____% Websites _____%
10. What percentage of your writing is sent to:
 Vendors or suppliers _____% Regulators _____% Clients or customers _____% General public _____%
 Managers (internal) _____% Subordinates (internal) _____% Peers (internal) _____%
11. What percentage of what you read at work is written by:
 Vendors or suppliers _____% Regulators _____% Clients or customers _____% General public _____%
 Managers (internal) _____% Subordinates (internal) _____% Peers (internal) _____%
12. What percentage of your time is spent orally communicating in the following ways:
 One-on-one: In person _____% Phone _____% Group Meetings: In person _____% Teleconference _____%
13. What percentage of your oral communication is with the following:
 Vendors or suppliers _____% Regulators _____% Clients or customers _____% General public _____%
 Managers (internal) _____% Subordinates (internal) _____% Peers (internal) _____%

Global/International Communication

14. What percentage of your time communicating on the job is with people from other countries? _____%
15. What percentage of your international communication is with the following:
 Vendors or suppliers _____% Regulators _____% Clients or customers _____% General public _____%
 Managers (internal) _____% Subordinates (internal) _____% Peers (internal) _____%

Follow-up questions for discussion

1. What types of documents do you write?
Please use the names you usually call them and describe their contents, length, format, how often you produce them, for whom, and their importance.
2. Why do people read what you write?
What decisions or actions does your writing affect?
3. Where do you get the information that you use in writing?
Do you use internal or external contacts to find information?
How often do you go online to do research?
Is security or reliability of online information a concern for you or your organization?
4. How did you learn to do the writing you have to do in your work—on the job, workplace training, college course, etc.?
Of these, what were the most useful aspects of the training you have received in writing?
5. Please describe any examples of the consequences of effective or ineffective writing within your organization.

Appendix B

Qualitative analysis

Each of the student reports was read and coded for issues that had been identified in our 1996 research, as well as new issues, such as the impact of the internet and the importance of oral and group communication. As we read for this additional information, we also extracted and cross-referenced quotations from both the respondents and the students.

Socialization

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

Rhetorical situation

- audiences, internal and external
- purposes of writing
- types of documents

Pedagogy

- recommendations for instruction

Process

- drafts, number generated
- collaboration practices
- review and editing practices

Technology

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

International

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

Oral communication

- impacts and issues of oral communication on the job

Appendix C

Descriptive statistics

Mean responses to all questions for the whole group and for the major subgroups. Responses to question 1 were used to create the subgroups (job title) and the list of organizations in Appendix E (company name).

Totals	All 632	EDU 51	ENG 136	FIN 76	MGR 145	MKT 67	PGM 72	RES 85
Question 2: Educational Background								
Graduation year	1990	1987	1993	1989	1985	1991	1995	1992
NC State Grad	42% Y	21% Y	58% Y	41% Y	37% Y	33% Y	49% Y	52% Y
Writing course	55% Y	27% Y	71% Y	63% Y	52% Y	54% Y	68% Y	48% Y
Course required	73% Y	64% Y	80% Y	84% Y	68% Y	60% Y	82% Y	71% Y
Question 3: Size of organization								
<50 employees	20%	24%	13%	19%	21%	33%	17%	15%
50–100	9%	8%	7%	10%	15%	6%	7%	7%
100–500	11%	3%	14%	9%	16%	10%	11%	16%
>500 employees	60%	65%	66%	62%	48%	51%	65%	62%
Question 4: Communication part of performance appraisal								
	90% Y	93% Y	88% Y	88% Y	90% Y	94% Y	79% Y	95% Y
Question 5: Importance of writing quality to job performance								
Essential	43%	62%	37%	48%	44%	32%	22%	58%
Very important	45%	30%	53%	42%	47%	45%	58%	36%
Not very	10%	8%	8%	10%	8%	23%	15%	5%
Unimportant	1%	0%	1%	0%	1%	0%	5%	0%
Irrelevant	1%	0%	1%	0%	0%	0%	0%	1%
Question 6: Importance of writing quality to career advancement								
Essential	36%	54%	31%	38%	35%	31%	20%	52%
Very important	48%	33%	53%	56%	51%	42%	53%	42%
Not very	12%	12%	13%	5%	12%	21%	20%	3%
Unimportant	2%	1%	2%	0%	1%	2%	5%	1%
Irrelevant	2%	0%	1%	1%	1%	4%	2%	2%
Question 7: Percentage of writing in response to request (not on own initiative)								
	56% Y	40% Y	61% Y	67% Y	53% Y	49% Y	65% Y	55% Y
Question 8: Time spent writing collaboratively								
	23% Y	21% Y	18% Y	27% Y	25% Y	20% Y	19% Y	28% Y
Question 9: Percentage of time spent writing in the following modes								
Memos	12%	10%	11%	16%	15%	17%	4%	8%
E-mail	25%	22%	24%	28%	27%	22%	30%	20%
Letters	10%	12%	8%	12%	12%	15%	3%	6%
Formal docs	20%	22%	19%	23%	14%	17%	20%	28%
Websites	4%	3%	2%	4%	1%	4%	10%	1%

	All	EDU	ENG	FIN	MGR	MKT	PGM	RES
Totals	632	51	136	76	145	67	72	85

Question 10: Percentage of writing sent to the following audiences

Vendors/supplier	9%	3%	17%	11%	11%	11%	5%	5%
Regulators	5%	2%	8%	9%	6%	2%	2%	6%
Clients/customer	30%	24%	26%	40%	28%	44%	30%	18%
General public	8%	16%	2%	6%	8%	11%	5%	8%
Managers	23%	17%	25%	33%	23%	16%	24%	22%
Subordinates	11%	13%	10%	13%	18%	9%	8%	9%
Peers	22%	22%	20%	19%	12%	12%	31%	35%

Question 11: Percentage of reading written by the following sources

Vendors/supplier	15%	4%	21%	16%	18%	17%	17%	11%
Regulators	7%	1%	11%	14%	5%	9%	2%	7%
Clients/customer	18%	13%	16%	27%	19%	21%	20%	12%
General public	8%	11%	5%	8%	7%	5%	9%	10%
Managers	20%	17%	22%	18%	23%	23%	22%	18%
Subordinates	10%	15%	9%	13%	14%	8%	6%	6%
Peers	21%	24%	18%	18%	13%	16%	26%	33%

Question 12: Time spent orally communicating in the following ways

One-on-one in person	40%	40%	44%	37%	42%	38%	39%	40%
One-on-one by phone	30%	17%	29%	42%	33%	38%	29%	27%
Group meetings in person	36%	49%	35%	28%	47%	28%	33%	35%
Teleconference	8%	2%	12%	10%	7%	10%	8%	9%

Question 13: Percentage of oral communication with the following audiences

Vendors/supplier	9%	3%	14%	11%	11%	10%	6%	5%
Regulators	3%	2%	3%	4%	2%	3%	1%	4%
Clients/customer	27%	25%	20%	42%	28%	39%	22%	15%
General public	6%	12%	3%	6%	7%	6%	1%	5%
Managers	21%	13%	24%	23%	23%	21%	23%	21%
Subordinates	17%	22%	14%	13%	27%	14%	12%	15%
Peers	24%	25%	25%	20%	14%	14%	35%	32%

Question 14: Percentage of communication time spent with people from other countries

	10%	12%	8%	6%	9%	8%	7%	15%
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Question 15: Percentage of international communication with the following audiences

Vendors/supplier	15%	2%	32%	13%	18%	16%	22%	5%
Regulators	1%	1%	2%	2%	1%	1%	0%	2%
Clients/customer	27%	20%	19%	32%	27%	42%	29%	22%
General public	4%	7%	1%	5%	4%	2%	1%	6%
Managers	9%	7%	12%	10%	10%	5%	13%	6%
Subordinates	5%	7%	3%	2%	14%	4%	1%	5%
Peers	24%	36%	20%	18%	15%	9%	28%	42%

Appendix D

Statistical analysis

Factor analysis

Four survey questions involve similar variables related to professionals' communication behavior (see Appendix A, questions 7, 10, 11, and 13). These performance-based questions lend themselves to a factor analysis to construct summary scores for correlated activities. The rotated factor pattern revealed the following seven factors with high loadings on three or more items:

Factor 1:	Writing sent to vendors	.82
	Reading documents written by vendors	.80
	Oral communication with vendors	.79
Factor 2:	Writing sent to regulators	.78
	Reading documents written by regulators	.83
	Oral communication with regulators	.79
Factor 3:	Writing sent to clients or customers	.83
	Reading documents written by clients or customers	.81
	Oral communication with clients and customers	.80
Factor 4:	Writing sent to general public	.76
	Reading documents written by the general public	.75
	Oral communication with the general public	.72
Factor 5:	Writing sent to managers	.79
	Reading documents written by managers	.77
	Oral communication with managers	.78
	Writing in response to someone else's request	.44
Factor 6:	Writing sent to subordinates	.84
	Reading documents written by subordinates	.81
	Oral communication with subordinates	.80
Factor 7:	Writing sent to peers	.84
	Reading documents written by peers	.83
	Oral communication with peers	.78

These factors show that written, oral, and reading patterns correlate closely with audience, regardless of size of organization or job title. In addition, Factor 5 reveals that those who communicate frequently with managers also tend to write at the request of the manager.

Analysis of variance

The analysis of variance (ANOVA) shows significant differences between variables that had no interactions with size of organization or job title. Professions are listed in order of highest mean for each variable (LSMEANS), and the CODE column indicates that those items with the same letter are not significantly different.

Communication (written, reading, oral) with customers (CUSTOMER)

Title	LSMEAN	CODE
Finance	36.38	A
Marketing	34.80	A
Management	24.96	B
Programming	23.97	B
Engineering	20.80	B
Educators	20.62	BC
Researchers	14.72	C

Communication (written, reading, oral) with managers (MANAGER)

Title	LSMEAN	CODE
Finance	35.12	A
Programming	33.40	A
Engineering	33.13	AB
Management	30.42	AB
Researchers	29.15	B
Marketing	27.11	BC
Educators	21.62	C

Communication (written, reading, oral) with regulators (REGULATOR)

Title	LSMEAN	CODE
Finance	8.91	A
Engineering	7.52	AB
Researchers	5.51	B
Marketing	4.68	B
Management	4.49	BC
Educators	1.70	C
Programming	1.39	C

Oral communication by phone (OPHO)

Title	LSMEAN	CODE
Finance	42.35	A
Marketing	37.87	AB
Management	32.62	B
Engineering	28.96	BC
Programming	28.58	BC
Researchers	26.73	C
Educators	16.69	D

Time spent writing letters (LETTER)

Title	LSMEAN	CODE
Marketing	15.03	A
Management	12.18	A
Finance	12.00	A
Educators	11.58	AB
Engineering	7.57	B
Researchers	6.27	B
Programming	2.97	C

Writing sent to customers (WCUST)

Title	LSMEAN	CODE
Marketing	44.25	A
Finance	40.20	A
Programming	29.55	B
Management	27.82	B
Engineering	26.49	B
Educators	24.10	BC
Researchers	18.08	C

Analysis of variance

P-values for variables showing significant differences between professions based on job title, size of organization, or both (bold p-values are significant at <0.05).

Dependent Variable	Job Title	Size of Organization	Size and Job Title
EMAIL	0.2259	<.0001	0.3059
FORMAL	0.0006	0.4284	0.5933
GP	0.0013	0.6347	0.7432
GTELE	0.0656	0.1143	0.7185
LETTER	<.0001	0.0725	0.6439
MEMOS	<.0001	0.0103	0.1052
OCUST	<.0001	<.0001	0.045
OGP	0.0039	0.4436	0.0402
OMGR	0.2622	<.0001	0.6527
OPEER	<.0001	0.0004	0.0537
OPER	0.7501	0.1081	0.4027
OPHO	<.0001	0.2405	0.9305
OREG	0.1579	0.3393	0.1899
OSUB	<.0001	0.8702	0.1543
OVEN	<.0001	0.1383	0.3723
RCUST	0.0044	0.0109	0.138
RGP	0.4287	0.0216	0.229
RMGR	0.293	<.0001	0.5181
RPEER	<.0001	<.0001	0.3487
RREG	<.0001	0.0137	0.005
RSUB	0.0009	0.3001	0.0696
RVEND	0.0014	0.0261	0.7684
WCUST	<.0001	<.0001	0.2911
WEB	<.0001	0.5495	0.0564
WGP	0.0017	0.7594	0.6651
WMGR	0.0097	<.0001	0.0302
WPEER	<.0001	<.0001	0.1107
WRCOL	0.0525	0.4688	0.7354
WREG	0.0117	0.102	0.5589
WRREQ	<.0001	0.3845	0.0173
WSUB	0.0002	0.1618	0.0689
WVEND	<.0001	0.2721	0.5042
INT	0.0454	0.4922	0.4628
IVEND	0.0003	0.0019	0.6471
IREG	0.9187	0.9541	0.7161
ICUST	0.3789	0.2085	0.2446
IGP	0.2964	0.371	0.2986
IMGR	0.8193	0.1549	0.4912
ISUB	0.0089	0.805	0.9876
IPEER	0.0007	<.0001	0.4488
CUSTOMER	<.0001	<.0001	0.0637
PEER	<.0001	<.0001	0.04
MGR	0.0021	<.0001	0.07
SUB	<.0001	0.3	0.08
VEND	<.0001	0.04	0.59
REG	<.0001	0.02	0.09
GP	0.0093	0.2382	0.57

Appendix E

Employers of survey respondents

The following list contains the names of the 452 companies whose employers agreed to be interviewed for this report. A number is shown if more than one employee was interviewed.

ABB Power T&D Company - 2
Abbot Laboratories
Accenture - 4
Adidas
After Hours Animal Hospital
Air-Flow Technologies Inc
Alan Vester Automotive
Alcatel - 4
Alcoa
Alexander Central High School
Alexandria, Virginia
Allegiance
Alltel Pavilion
American Express - 3
American Homestar Corporation
American Kennel Club
American Power Company - 2
Analytical Instrumentation
Arris Interactive
Arthur Anderson
Astrazeneca
AT&T - 4
Autumn Corporation
Aventis Crop Science - 2
Averitt Express
Bally Design
Bank Branch & Trust Company
Bank of America Corporation - 3
BASF
Battelle
Battleground Restaurant Inc.
Bayer Corporation - 2
BB&T
BEA Systems
Beanie & Cecil, Inc.
Bear Sterns
Becton Dickinson
Bell & Howell, Corporation
BellSouth Telecommunication - 3
Bentwood Nursery
Best Buy
Beta Systems, Inc.
Beverly Grant Inc.
Big Ape Gym

BioID
BKB
Blue Circle Cement
BMW of North America
Boiling Springs YMCA
Booth's Associates, Inc.
Border Concepts, Inc.
Bowater Newsprint - 2
Bozell Worldwide
Brigeston Forestor
British Oxygen Company
Brookfield Zoo
BTI
Buehler Motor, Inc.
Building Blocks, Inc.
Burroughs & Chapin
Burroughs Wellcome
Calendar Central
Camille Patterson
Campbell Alliance
Campus Crusade for Christ
Captive Fashions
Cardinal Club
Cargill, Inc.
Carolina Golf Club
Carolina Hurricanes
Carolina Med Center
Carolina Mills - 2
Catalytica Pharmaceuticals
Catawba Mem Hospital
Caterpillar, Inc. - 3
Cato Industries - 2
Central Carolina Bank
Central Marketing. Inc.
Centura Bank - 2
Certain Teed
Charlotte Meck
Cherry, Bekaert & Holland - 2
Cicada Consulting Group
Cirent Semiconductors
Cisco - 3
Citigate
City of Hamilton, EE Department
City of Kinston
City of Lexington
Clariant
Clarkston
Cogent Neuroscience
Colonial LLC
Computer Digital Solution
Cone Mills - 2
Consolidated Diesel Company

Corning
Cornwallis Road Animal Hospital
Cotton Inc. - 2
Coventor, Inc.
CP&L - 2
CRB Engineers Inc. - 3
Credit Suisse First Boston
Criser & Troutman Consultants
Crowder Construction Company
Culp, Inc.
Cystic Fibrosis Foundation
Cytec Industries
Dairy Records Mgt Service
Dalton Engineering & Associates
Dan Deter, Inc.
David Knight
DCS Corporation
Delsar, Inc.
Delta Air Lines
Denstev International
Department of Environmental Natural Resource
Devsoft
Dixon Odom, Inc. - 2
Doctor Vision Center
Dow AgroSciences
Dow Chemical Company
Dr. Ann Bogard, MD
DSM Catalytica - 2
Duke Flour Daniel
Duke Management Company
Duke Power - 4
Duke University - 3
Duracell
Earth Technology
East Carolina Farm Credit
Eastern Research Group
Eastman Kodak
ECI Telecom
Eckerds
Edgecombe Metals
Elan Pharmaceuticals
Embassy Suites
EnergyUnited
Eng Controls Internatl, Inc.
ENG Solutions
Engage.com
Engineers USA
Environmental Investigation
EPA - 6
Ericsson - 3
Estee Lauder
Ettain Inc.

Evergreen Funds
Falls Village Veterinary Hospital
Family Dollar Stores, Inc.
Ferguson Enterprises
First Union Natl Bank - 5
Fish Analytical Services
Food Lion
Footprint on the Sun Theat
Fox Eye Care Group
Frank Harmon Associates
Freeborders.com
Fujitsu
Gate Concrete Products
Gayle H. Smith CPA
General Data Systems Inc
General Dynamics - 2
General Electric - 5
General Motors
Georgia Pacific
Gerrit Gast
Gibraltar Labs
GKN Automotive - 2
Glaxo Smith Kline - 15
Glen Raven, Inc.
Glenoit Mills
Governors Club
Grady, Whitley & Company
Greater Raleigh Convention & Visitor Bureau - 3
Gregory Poole Equipment
Hayes-Barton Pharmacy
Hazen & Sawyer, Inc.
HealthSouth Sport Medicine
Healthy Back Store
Helps Internat. Ministries
Hendrick Motorsports
Hill Spinning Mill
Honeywell - 2
Hospitality Group Management
Howard Perry & Walston
IBM - 33
iEntertainment Network
Ind Agents Computer Service
Independent Finance Planners
Indicium Design
Industrial Air, Inc.
Infinite Technology
Ingersoll-Rand
Inspire Pharmaceuticals
International Foundation for Electrical Systems
Intelligent Information Systems
Interior Wood Specialists
International Paper - 3

Intersil Corporation
Invensys Powerware - 2
Jacobs Supply Tech
Jamesco Inc.
JC Penney
JD Beam, Inc.
JD Construction LLC
Jet Stream Communication
Jim Merritt Consulting - 2
John Deere - 4
Kalbacker & Associates
Kao Special Americas,LLC
Kaye Consulting
KCH Services, Inc.
Kelly Springfield Tire Company
Kight's Medical Corporation
Kildaire Animal Medical Center
Kimberly-Clark
Kimley-Horn & Associates - 3
King Farms of St. Paul
Kinston Neuse Corporation
Klaussner Furniture Industries
K-Mart
KPMG Consulting
Kraft Foods
Kuempel Service, Inc.
LabCorp
Las Margaritas
Latham Walters Engineer
Layers
Leggett & Platt, Inc.
LIPS, Inc.
Lochmere Golf Course
Lockheed Martin - 2
Logan Accounting
Lord Corporation
Louis Tropicals
Lucent Technologies
LVL7 Systems
Mabry Insurance
Maconite Corp.
Magellan Labs
Magnequench Inc.
Majestic Marble & Glass
Malcolm Pirnie Inc.
Mallinckrodt Inc. - 3
Martin Marietta
Mayview Convalescent Center
McGladrey & Pullen, LLC
McHugh Software International., Inc.
MCI Worldcom
McKim & Creed

Med University of South Carolina
Meddrey, Forest & Etringer
Merck & Comp., Inc.
Mercury Data Systems
Merrill Lynch - 3
MHI Brownstone Hotel
Microsoft - 2
Miller & Long Concrete
Milliken & Company
Modus Media International
Moen
Montgomery Public School
Moore & Van Allen
Morgan Stanley Dean Witter
Motorola Automotive & Industrial Electronics Group
Mr. Dundarbak's
MSC International
NASA - 2
Nash-Rocky Mount School
National Gypsum Company
National Life
National Weather Service - 2
Natural Resource Conserv
Naval Aviation Depot
Naval Research Labs
NC CDTF
NC Department of Administration
NC Department of Agriculture - 2
NC Department of Transportation - 4
NC Geological Survey
NC Museum of Science
NC News Network
NC Rural Center
NC SBI
NC SRT, Inc.
NC State University - 88
NC Techonolgy Development Authority
NC Utilities Commission
Nelson/ScribnerAssoc.Inc
NetIQ
NetOctave Services
Network OSS
Nevalan Technologies
New Pert ARP Church
Nextel Communications
NIEHS - 8
Norozymes
Nortel - 17
North State Steel
Novartis Animal Health
New York State Department of Environmental Conservation
Oakridge Outfitters

OA Services
Oblio Telecom
Obrien Atkins Pro Architecture
P&A Administrative Services - 2
Paradigm
PCOMPANY
Penske Racing
Perry Automotive
PF Chang's China Bistro
Philips Semiconductors
Pitt County Memorial Hospital
Pletus Technology Group
Powell & Partners Advertis
Poyner & Sprull
PPG Industries
Pratt & Whitney
Precision Fabrics
Prestonwood Country Club
Price Waterhouse Coopers
Proctor & Gamble - 2
Progress Energy (CP&L)
Providence Baptist Church
PSNC Energy
Purdue Farms
PYA Monarch
Quality Homes Superstore
Queensboro Steel
Quest Engineers & Consult
Quickkill Pest Services
R.J. Reynolds - 2
Radiant Systems
Raleigh Medical Group
Raleigh Neurosurgical Clinic
Rasmussen Research
Raymond James Financial Services
R-C Agriculture Consulting & Research
Red Hat, Inc.
Red Lobster
Redback Networks Inc.
Research Triangle Institute
Rexnord
RF Hardware Design
Rhone Ponleno
Richland Creek Community Church
Riley Produce
Risk Management Associates
River City Café
Riverbanks Zoo
Riverside Bank
Rockwell Automation
Royter Industries, Inc.
SA Boney & Associates

Sagemark Consulting
SAIC
Salem Castle, Inc.
Sam's Factory Outlet
Samsung Chemicals
Sapiens Americas
Sara Lee Underwear
SAS - 6
SBS Technologies
Science Application International
Senternet Inc.
Sentrisystems
Shop 2012
Shurtape Tech Inc.
Siebel Systems - 2
Sieck Floral Products
Silver Creek Entertainment
Sir Walter Chevrolet
Smith Consulting
SoftSolutions, Inc.
SOS
Southern Test & Research Lab
Spectrum Labs
Sprint PCS - 2
Square D Company
SRA International
St. Paul Insurance Company
Starnes & Killian PLLC
State Employee's Credit Union - 5
Stone Ferris Designs
Stony Point Animal Hospital
Street Legal Performance
Suitt Construction
Sun Microsystems
Synetron Technologies
Syngenta - 2
T.P. Technologies
Targetbase
Texas Instruments
The Flying Saucer
The Guthrie Group
The Hotel Roanoke
The John Meadows Company
The Limited
The Little Gym of Raleigh
The Maxim Group
The Navigators
The Reusche Group
Thomas Parker General Contractors
Time Warner Cable
Titan Atlantic Construction
Tompkins Associates

Town & Country Veterinary Hospital
Town of Cary
TR Lawing Realty Inc.
Triangle Brick Company
Triangle Economic Research
Tumbling Colors
Tyco Electronics
Tyco Healthcare
UCAR Emulsion System
Ultimus, Inc.
UNC-Chapel Hill - 6
UPS - 2
US Air Force - 2
US Army
US Department of Interior
US Fish & Wildlife Service
US Navy - 6
US Nursing
US Patent & Trademark Office
Utah Museum of Natural History
VCA Triangle Tower Animal
Vector Marketing Corporation
Venture Management
Verizon Inc.
VideoTelCom
Vitafoam USA Inc.
Wachovia Investments - 2
Wake County Pubic School
Wallace Sports Management
Warren County Economic Development
Waste Industries, Inc.
Waterworks Supply Company
Weck Closure Systems
Wellman
Weyerhaeuser - 2
Willamette Industries
WilMed Healthcare
Windwise Inc.
Winston Salem State Univiversity
Wireless Multimedia Solution
WORLDCOM - 4
YMCA
York International
Zagaroli Classics