

Assessing The Need For Technical Writing Skills Among Construction Science Graduates

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Abstract

The purpose of the study was to determine industry's perception regarding the need for technical writing skills among Construction Science graduates. A standard Likert style survey was used to gather the data related to the technical writing skill set of construction science graduates. This survey was sent to members of Texas A&M University's Department of Construction Science Career Fair Database and faculty members of in the Associated Schools of Construction. The results of the survey were used to analyze whether industry and faculty perceive technical writing skills to be a necessity. The data was analyzed by administering one-sample and two-sample t-tests to the responses for the corresponding questions on the survey. The results from the study indicate that good technical writing skills are perceived to be important for the graduates with a major in Construction Science.

Statement of the Problem

Peoples' ability to communicate effectively through the use of technical, written, communication skills can greatly affect their career. An individual's capacity to write effectively is usually regarded as a first-rate attribute. It can be categorized equally with a person's professional skills and knowledge. Written technical report is a critical component to all tasks of significant importance.

Given this importance, industries report that students graduating from technical programs are generally not well prepared for the writing requirements of the contemporary workplace¹. Industries naturally have their own set of terminology committed to the specific requirements and situations exclusive to their form of business. Communicating effectively within an industry is a direct result of an individual's ability to understand and use the industry's vocabulary and communication practices. Effective written communication skills can assist in the acquisition of sought-after contracts and clients as well as assist in maintaining optimal relationships with vital customers.

Project documentation is critical to the success of many companies. Understanding and learning how to prepare a variety of construction documents is of the utmost importance to construction professionals. This purpose of this study was to assess the skills of the students graduating with a major in construction. Along with assessing the writing ability of the graduates, the study also attempted to rank the importance of certain construction documents used within the construction industry.

Research Objectives

The objectives of the research were to find out the views of members of the construction industry and faculty members of construction education programs:

1. About the need for construction science graduates to possess good technical writing skills.
2. About the need for construction science graduates to perform certain written communication tasks to a satisfactory level.

Hypotheses

Following hypotheses were tested for the study:

1. Industry professionals and faculty members of construction education programs believe that construction graduates should possess good technical writing skills.
2. Industry professionals and faculty members of construction education programs perceive that graduates of construction programs should be able to complete certain written communication tasks satisfactorily.

Definitions

Writing in the Discipline: This approach is based on the understanding that each discipline has its own conventions of language use and style and that these conventions must be taught to students so that they might successfully participate in academic discourse.

Career Fair Database: This term refers to Texas A&M University's listing of all companies that attend the Construction Science Department's biannual corporate career

fair. The listing is comprised of the following elements: corporation name, individuals' names, titles, addresses, phone numbers and email addresses.

Construction Industry Advisory Council (CIAC): The purpose of the CIAC is to support and promote the Construction Science program at Texas A & M University. The organization is comprised of both individual and corporate members that provide student scholarships, support student chapters of professional societies and student competition teams. The Council also produces research reports on topics of current interest to the industry faculty development, including the support of faculty memberships to, and participation in, professional societies.

Associated Schools of Construction (ASC): A professional association for the development and advancement of construction education. This professional association is a collective body of faculty members from various construction education programs across the country. This listing is comprised of the following elements: university name, individuals' names, titles, addresses, phone numbers and email addresses.

Assumptions

The study started with some assumptions that include:

1. The individuals from the industry surveyed in this study had a thorough awareness of the communication capabilities of recent construction graduates.
2. The faculty members surveyed in this study had a thorough awareness of the communication capabilities of recent construction graduates.
3. The responses made to the survey were not biased.
4. The surveying instrument was valid and that it measured what it was designed to measure.

Limitations

1. This study was limited to those companies listed in the career fair database of Texas A&M University.
2. This study was limited to those faculty members that are active members of the Associated Schools of Construction.
3. This study focused on the technical written communication skills of construction graduates only.

Review of the Literature

Overview

With the growth of the U.S. college student population in the 1960's and early 1970's universities and community colleges recognized that a high percentage of students had problems writing effectively². Leaders in industry have stated that for nearly 50 years, the continuing weakness of graduating technical students has been their lack of written communication skills¹.

The inability to communicate effectively does little to enhance the image of a company. In fact, it proves to be detrimental. Good writing skills are necessary in order to communicate with clients, as well as with partners and co-workers. How successfully a company communicates potential problems and issues will largely depend on the writing and communication skills of the company employees³. In the construction profession, reading and writing are paramount to an individual's performance in successfully completing a project⁴.

Every industry has an undefined list of terms that are essential to the specific requirements and situations unique to that industry. An individual can successfully communicate within an industry when they have mastered the terminology and methods of communication relevant to that industry. When students graduate from their respective programs, they will be given a wide range of activities and projects that will require them to exhibit acceptable documentation and writing skills². There are few commercial endeavors that use and rely on written language skills as much as construction contracting does⁵.

Being unable to acceptably execute these basic skills, new graduates will find themselves at a considerable disadvantage⁴. Many construction programs offer courses in subject areas ranging from building materials and methods to structures and environmental systems. It would be logical to believe that these are the skills essential to one's success in the construction industry⁵. In reality, the most important skill to be taught is the ability to write effectively⁵.

It is no secret that construction education graduates are deficient in possessing adequate writing skills for entering the business community⁶. Understanding that these skills need to be improved is the first step in correcting the problem⁴.

Teaching Relevant Material

In order to fill the void in writing skills educators must focus their attention on writing as a fundamental communication skill⁶. It is important not only to make students write, but to have them write on subject areas relevant to their studies⁴. It appears to be nonproductive to teach writing without concurrently teaching the subject matter⁶. According to Wright⁶, if educators expect writing skills to be developed only in English

specific-type courses, it is imperative that such courses be provided relevant content and set the context in the students' limited experience in language usage ⁶.

Employers demand that entry-level employees effectively write as it relates to specific conditions of a particular project ⁴. Professionals spend approximately 20 percent of their time writing reports of some sort. Graduates must know how to write competently and exhibit this competency immediately on entering the industry in order to be successful ⁵.

If the problem has been readily identified it would be the assumption of many that colleges and universities would make the development of first-rate writing skills an important goal and assign some of their best instructors to the accomplish the task. Unfortunately, this is typically not the case ¹.

Many professors in English departments usually specialize in a particular form of literature and not in English composition. Many will privately admit that they do not nor want to know how to teach composition writing courses. Many of these professors are poorly prepared to evaluate the obscure information usually entailed in technical topics. Since the information cannot be judged on content, most instructors will invariably revert to issues of format and technique. In short, the writing in many areas of composition and technical writing courses does not reflect the kinds of writing that the modern workplace expects students to do ¹.

Writing-Across-the-Curriculum

Regardless of the style and amount of writing in specific English courses, the evidence was apparent. A "gap" appeared between the writing competency displayed in a composition course and the writing performance in the type used by the individual students' professional disciplines ². The response to this performance gap has led to what is now termed writing in the discipline (WID) ².

This method of writing allows students to become accustomed to the style of writing associated with their disciplines and immerses them in the professional dialogue of their field ².

Writing across the curriculum at its onset uses the approach that every teacher, instructor or professor should become aware and should introduce into his respective classroom and curriculum, the requirement of student participation by writing ⁶.

Writing across the curriculum is a theory of writing rested on the basis of deeming writing as a revised process, not a consecutively manufactured product. Other theoretical components of writing across the curriculum can be summarized as follows:

1. An interdisciplinary dialogue on writing that brings writing into as many classrooms as possible
2. Brief and varied (cross-disciplinary) writing forms that receive both instructor and peer responses

3. Focuses on writing as learning – the principle that cognitive processes involved in writing and knowledge acquisition are very similar ².

Without a requirement to master writing skills, the graduate is initially handicapped in his/her chosen professional world. This handicap continues until these skills are acquired⁶. This despite dramatic increases in mandatory reading, writing, and speech courses; writing-across-the-curriculum initiatives; and the heavy emphasis placed on writing skills by business and industry. It is unknown as to why this crucial skill has been and is still being so inadequately addressed. This is considered by some to be the greatest failure of the higher educational system ¹.

Need and Promotion

By not teaching our students to read critically and to write logically and clearly, we unsuspectingly limit their personal and professional horizons ¹. An employee's ability to advance in an organization may be dependent on that person's ability to communicate both verbally and with the written word ⁵. Most all help wanted advertisement for technical people specifically requires well-developed written communication skills ¹. It is important to note that the ability to write effectively assumes a much larger role as one advances in a technical career. This causes the problem to grow to unsuspected heights.

Without adequate written communication skills, an employee may be passed over for promotion ³. Almost every technical person can recall cases of ambitious and technically adept colleagues passed over for promotion because they could not write well enough to meet the demands of a higher position ¹.

Research Methodology

Data Acquisition

A total number of 400 Chief Executive Officers were randomly selected from Texas A&M University's Department of Construction Science Career Fair database. Another 400 of faculty members teaching at different schools of construction were randomly selected from the web site of Associated Schools of Construction. A structured survey instrument was prepared to collect the data. It was administered via email in hopes for a speedy response, but individuals had the opportunity to mail in their responses as well. Some chose this option. Respondents were given two weeks to respond. A few days prior to the deadline, an email reminder was sent. Due to a poor response rate relative to the population, an extension of a week was given to those who had not yet had the opportunity to respond. The total number of responses was 81—57 from the industry and 24 from the faculty.

Data Analysis

The statistical methods adopted for the analyses of the data related to null hypothesis 1 were one- and two-sample t-tests. A one-sample t-test compares a mean score of a sample to a known value. A two-sample t-test assesses whether the means of two groups are statistically different from each other at a specified level of significance or p-value. The p-value for the tests was set at 0.05.

The method adopted for analyses of the data related to hypothesis 2 was doing a rank order of different tasks. It was done using the scores for the different tasks perceived to be important both by the industry and the faculty.

Variables

In order to find out the perceived importance of technical writing, the variable measured was Overall Technical Writing Skills (*TECWRITE*). It is the reported importance of overall technical writing skills for construction science graduates.

In order to find out the perceived importance of writing skills relevant to the profession, the following variables were measured:

Bid package (*BID*): It is the reported importance of skill for writing complete bid proposals by construction science graduates.

Business Letters (*LETTER*): It is the reported importance of skill for writing business letters by construction science graduates.

Meetings (*MEETING*): It is the reported importance of skill for writing the agenda and minutes of business meetings by construction science graduates.

Change order (*CHANGE*): It is the reported importance of skill for writing requests for changes in construction items by construction science graduates.

E-mail (*EMAIL*): It is the reported importance of skill for writing e-mail by construction science graduates.

Internal memorandum (*MEMO*): It is the reported importance of skill for writing internal correspondence documents of specific project information by construction science graduates.

List (*LIST*): It is the reported importance of skill for writing comprehensive crew and drawing distribution lists by construction science graduates.

Log (*LOG*): It is the reported importance of skill for recording written accounts of inspections, meetings, or telephonic communications by construction science graduates.

Notices (*NOTICE*): It is the reported importance of skill for notices of safety, compliance, etc. by construction science graduates.

Report (*REPORT*): It is the reported importance of skill for writing job-related reports by construction science graduates.

Request for Information (*RFI*): It is the reported importance of skill for writing request for information by construction science graduates.

Schedule of Values (*VALUE*): It is the reported importance of skill for writing schedule of values by construction science graduates.

The variables were measured on a Likert scale ranging from 1 to 5. The respondents were asked to reply in terms of whether they agree or disagree with a particular statement related to the above variables. Values were assigned to the responses as follows:

TABLE 1

Assigned Values to Different Responses

Response	Assigned value
Strongly Agree	5
Agree	4
Undecided	3
Disagree	2
Strongly Disagree	1

Results of the Study

Null Hypothesis 1

Industry professionals and faculty members of construction science programs believe that construction graduates are not required to possess good technical writing skills.

A one-sample *t*-test was first performed to test this hypothesis. The data measured for the variable *TECWRITE* was used for the purpose. The mean scores of industry and faculty for the variable were found to be 4.70 and 4.58 respectively. The *t*-test was performed on the mean scores against a specified value of 3, which is the value for “undecided.” The results are shown in Table 2.

TABLE 2

Results of One-sample T-test for Null Hypothesis 1

Group	<i>N</i>	<i>df</i>	Mean	<i>t</i> -value	Prob> <i>t</i>
<i>Industry</i>	57	56	4.70	17.01	<0.0001
<i>Faculty</i>	24	23	4.58	11.86	<0.0001

The results indicate that *t*-values obtained for the test were 17.01 for industry and 11.86 for faculty mean scores, both at a level of significance of less than 0.0001. It signifies that mean scores measured for this variable for the groups are significantly different from and higher than (since the *t*-value is positive) the value against which they was tested.

Therefore, the null hypothesis was rejected.

A two-sample *t*-test was performed to ascertain whether there was any statistically significant difference in perceptions by the faculty and the industry regarding the importance of overall technical writing skills (*TECWRITE*) of construction graduates. The test does not provide any evidence of inequality of the means for perceived importance of this variable between the two groups at the level of significance of 0.05. The results are shown in Table 3.

TABLE 3

Results of Two-Sample T-test for Null Hypothesis 1

Variable	<i>t</i> -value	Prob> <i>t</i>
<i>TECWRITE</i>	-0.67	0.5052

Null Hypothesis 2

Industry professionals and faculty members of construction education programs perceive that graduates of construction programs are not required to be able to complete certain written communication tasks satisfactorily.

A one-sample *t*-test was performed to test this hypothesis. The data measured for the variables related to writing skills relevant to the profession were used for the purpose. The *t*-test was performed on the mean scores of the variables for both the industry and the faculty against a specified value of 3, which is the value for “undecided.” The results are shown in Table 4.

A two-sample *t*-test was performed to ascertain whether there was any statistically significant difference in perceptions by the faculty and the industry regarding the importance of the variables related to writing skills relevant to the profession. The test does not provide any evidence of inequality of the means for all the task variables between the two groups at the level of significance of 0.05. The results are shown in Table 5.

TABLE 4

Results of One-Sample T-test for Null Hypothesis 2

Variable	Group	<i>N</i>	<i>df</i>	Mean	<i>t</i> -value	Prob> <i>t</i>
<i>REPORT</i>	Industry	57	56	4.37	12.67	<0.0001
	Faculty	24	23	4.63	13.83	<0.0001
<i>LOG</i>	Industry	57	56	4.46	14.51	<0.0001
	Faculty	24	23	4.38	8.75	<0.0001
<i>LETTER</i>	Industry	57	56	4.68	17.28	<0.0001
	Faculty	24	23	4.54	10.47	<0.0001
<i>MEETING</i>	Industry	57	56	4.60	17.13	<0.0001
	Faculty	24	23	4.38	11.70	<0.0001
<i>RFI</i>	Industry	57	56	4.60	15.09	<0.0001
	Faculty	24	23	4.83	23.59	<0.0001
<i>BID</i>	Industry	57	56	4.37	11.49	<0.0001
	Faculty	24	23	4.67	14.46	<0.0001
<i>MEMO</i>	Industry	57	56	4.39	14.41	<0.0001
	Faculty	24	23	4.38	11.70	<0.0001
<i>EMAIL</i>	Industry	57	56	4.42	14.68	<0.0001
	Faculty	24	23	4.50	11.14	<0.0001
<i>NOTICE</i>	Industry	57	56	4.37	12.04	<0.0001
	Faculty	24	23	4.50	11.14	<0.0001
<i>LIST</i>	Industry	57	56	4.28	10.73	<0.0001
	Faculty	24	23	4.33	11.57	<0.0001
<i>CHANGE</i>	Industry	57	56	4.46	11.86	<0.0001
	Faculty	24	23	4.75	16.13	<0.0001
<i>VALUE</i>	Industry	57	56	4.26	9.99	<0.0001
	Faculty	24	23	4.25	9.06	<0.0001

TABLE 5

Results of Two-Sample T-test for Null Hypothesis 2

Variable	<i>t</i> -value	Prob> <i>t</i>
<i>REPORT</i>	1.40	0.1658
<i>LOG</i>	0.44	0.6625
<i>LETTER</i>	-0.80	0.4256
<i>MEETING</i>	-1.36	0.1774
<i>RFI</i>	1.38	0.1701
<i>BID</i>	1.50	0.1370
<i>MEMO</i>	-0.07	0.9478
<i>EMAIL</i>	0.46	0.6492
<i>NOTICE</i>	0.67	0.5040
<i>LIST</i>	0.26	0.7921
<i>CHANGE</i>	1.45	0.1504
<i>VALUE</i>	-0.06	0.9513

The results indicate that all the *t*-values obtained for the test are statistically significant at the level less than 0.0001. It signifies that mean scores measured for the variables for this null hypothesis are significantly different from and higher than (since all the *t*-values are

positive) the value against which they were tested. Therefore, the null hypothesis was rejected. The two-sample *t*-test does not provide any evidence of inequality of the means for all the task variables of the two groups at the level of significance of 0.05.

Rank Order of the Tasks

Based on the mean scores for the variables related to writing skills relevant to the profession, a rank order of the tasks was made using rank procedure. The results are shown in Table 6.

TABLE 6

Rank Order of Variables

Variable	Rank score	Rank in order of importance
<i>LETTER</i>	12	1
<i>RFI</i>	11	2
<i>REPORTS</i>	10	3
<i>LISTS</i>	9	4
<i>NOTICES</i>	8	5
<i>EMAIL</i>	7	6
<i>LOGS</i>	6	7
<i>BID</i>	5	8
<i>MEETING</i>	4	9
<i>MEMO</i>	3	10
<i>CHANGE</i>	2	11
<i>MISC</i>	1	12

Summary and Conclusions

Significance of Study

Project documentation is critical to the success of many companies. Understanding and learning how to prepare a variety of construction documents is of the utmost importance to construction professionals. This study assessed the skills of the students graduating with a major in construction science. Along with assessing the writing ability of the graduates, this study also ranked the importance of certain construction documents used within the construction industry. Based on the results of task rankings, specific recommendations may be made to the relevant departments teaching technical writing for construction graduates. The information may be used as the structural formwork in establishing a construction-oriented technical writing class for construction education programs.

Conclusions

The study has revealed that both the construction industry and the faculty engaged in providing undergraduate level education in construction perceive that it is important for the graduates in construction science to possess good technical writing skills.

It was also found that all the written communication tasks included in the survey were found to be important. The mean scores related to the tasks were higher than four (4), which is the mean mathematical value for the response “Somewhat Agree.” The responses actually leaned more closely to “Strongly Agree” based on the mean scores derived. The study reveals that the graduates in Construction Science are expected to be able to complete written communication tasks relevant to their profession.

Recommendations for Further Study

Based on the results of the study, recommendations may be made to the schools of construction to modify their curriculum for technical writing reflecting the tasks deemed important for Construction Science graduates. A longitudinal study may be done to assess the impact that the modified technical writing course on the industry in future.

The method in which the instrument was administered needs to be reconsidered. It was believed that distributing the survey using email would encourage a speedy response. That belief proved to be invalid. Unfortunately, many of the construction industry’s professionals have not yet mastered the digital age. It is apparent that the best method of administering the survey is still through the United States Postal Service. Until the “digital gap” between generations is narrowed, surveys should still be sent in stamped envelopes.

References

1. Bradney, David D. & Courbat, Michael E., 1998, “Technical Writing: Higher education’s self-inflicted wound”, *Tech Directions*, Vol. 57, pp. 33-36.
2. Ray, Christopher S. & Stilter B., 2000, “Documentation: A building construction management model for teaching writing in the discipline”, *Proceedings of the 36th Annual Conference of the Associated Schools of Construction*, pp. 67-76.
3. Ray, Christopher S., 1999, “Course development in construction writing and documentation”, *Proceedings of the 35th Annual Conference of the Associated Schools of Construction*, pp. 57-71.
4. Ray, Christopher S., 1998, “An action plan for developing and implementing writing skills in construction project administration”, *Proceedings of the 34th Annual Conference of the Associated Schools of Construction*, pp. 43-52.
5. Maher, R.P., 1990, “A need for teaching writing skills in construction education”, *Proceedings of the 26th Annual Conference of the Associated Schools of Construction*, pp. 41-43.
6. Wright, E.H., 1987, “Total integrated across curriculum writing”, *Proceeding of the 23rd Annual Conference of the Associated Schools of Construction*, pp. 91-94.

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