

TECHNICAL WRITING FOR CONSTRUCTION SCIENCE GRADUATES

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Abstract—The purpose of this study was to determine the perceptions of the construction industry as well as the construction educators regarding the need for technical writing skills among Construction Science graduates. An instrument was prepared to gather the data related to the technical writing skill set of construction science graduates. This instrument was sent to the CEO's of the construction companies, identified from 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 determine the importance of different construction documents used within the construction industry for which good technical writing skills are essential. The data was analyzed using stepwise and multiple regression techniques. The results from the study indicate that capability of writing business letters, request for bid information, e-mails, and miscellaneous items such as schedule of values and submittals are important in terms of technical writing. All these factors were found to be related to the overall capability of technical writing skills among Construction Science graduates at a level of significance of 0.05.

Index terms — Construction Science, Construction Documents, Technical Writing.

STATEMENT OF THE PROBLEM

A person's 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. Professionals in all disciplines, including construction, spend a considerable amount of their time in writing technical reports. It 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 workplace [1]. 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. The purpose of this study was to identify the importance of different construction documents used within the construction industry. This information in turn will be used as the structural framework in establishing a construction oriented technical writing class at Texas A&M University.

REVIEW OF 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 effectively [2]. Leaders in industry have stated that for nearly 50 years, the continuing weakness of graduating technical students has been their lack of written communication skills [1].

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 employees [3]. In the construction profession, reading and writing are paramount to an individual's performance in successfully completing a project [4].

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

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respective programs, they will be given a wide range of activities and projects that will require them to exhibit acceptable documentation and writing skills [2]. There are few commercial endeavors that use and rely on written language skills as much as construction contracting does [5].

Being unable to acceptably execute these basic skills, new graduates will find themselves at a considerable disadvantage [5]. 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 industry [5]. In reality, the most important skill to be taught is the ability to write effectively [5].

It is no secret that construction education graduates are deficient in possessing adequate writing skills for entering the business community [6]. Understanding that these skills need to be improved is the first step in correcting the problem [4].

Teaching Relevant Material

In order to fill the void in writing skills educators must focus their attention on writing as a fundamental communication skill [6]. It is important not only to make students write, but to have them write on subject areas relevant to their studies [4]. It appears to be nonproductive to teach writing without concurrently teaching the subject matter [6]. According to Wright [6], 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 [2].

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:

- o An interdisciplinary dialogue on writing that brings writing into as many classrooms as possible.
- o Brief and varied (cross-disciplinary) writing forms that receive both instructor and peer responses.
- o A focus 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 acquired [6]. This is 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].

METHODOLOGY

Data Collection Procedure

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 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 number of responses was 81 — 57 from the industry and 24 from the faculty. The rate of response was only 20.25 percent.

Variables and their Operationalization

Overall Technical Writing Skills (TECWRITE)

It is the reported importance of overall technical writing skills for construction science graduates.

Business Letters (LETTER)

It is the reported importance of skill for writing business letters by construction science graduates.

Schedule of Values (VALUE)

It is the reported importance of skill for writing schedule of values by construction science graduates.

Request for Information (RFI)

It is the reported importance of skill for writing request for information by construction science graduates.

E-mail (EMAIL)

It is the reported importance of skill for writing e-mail by construction science graduates.

Notices (NOTICE)

It is the reported importance of skill for notices of safety, compliance, etc. by construction science graduates.

All the variables were measured using a 5-point unidimensional scale, ranging from "strongly disagree" to "strongly agree." A value of 1 was assigned if the respondents "strongly disagree" with a particular statement, elevating to a value of 5 if the respondents "strongly agreed" with the statement.

RESULTS

A multiple regression analysis was performed in order to ascertain the relationship between overall technical writing skills of construction science graduates and the importance of their ability to write business letters, schedule of values, request for information, e-mails, and notices. Regression analysis is a modeling technique for identifying a function that describes the relationship between a dependent and one or more independent variables. The following model was used for the analysis;

$$TECWRITE = \beta_0 + \beta_1 LETTER + \beta_2 RFI + \beta_3 EMAIL + \beta_4 NOTICE + \beta_5 VALUE + e \quad (1)$$

Where

β_0 = Intercept

β_1, β_2 , etc. = Regression coefficients, and

e = error term.

The results of the analysis are shown in Table 1.

TABLE 1

Multiple Regression Analysis of Overall Technical Writing Skills

Variable	Regression Coefficient	T	p< T
LETTER	0.31447	3.30	0.0015
RFI	0.27084	2.46	0.0160
EMAIL	0.29769	2.26	0.0267
VALUE	0.19502	2.20	0.0311
NOTICE	0.19178	1.67	0.0993
Intercept = 0.64141		Model $R^2 = 0.59$	
Model $F = 21.32$		Adjusted $R^2 = 0.56$	
$p < F < 0.0001$		$DF = 5, 80$	

The F -value of the model used for the multiple regression analysis was found to be statistically significant at a level much lower than 0.05. This statistic basically tests how well the model, as a whole, accounts for the dependent variable's behavior. The predictive efficacy of the model was found to be moderately high with an R^2 of 0.59 and an adjusted R^2 of 0.56. R^2 is the coefficient of determination of the model. The larger the value of R^2 , the better the fit of the model, and higher is its predictive efficacy.

The results indicated that writing skills for business letters, request for information, e-mails, and schedules of values were perceived to be important for construction science graduates. These independent variables were related to overall technical writing skill at the level of significance lower than 0.05. Only variable found not related to overall technical writing skill at this level of significance was writing of notices.

CONCLUSION

Effective skills are important for any professional. An industry depends on the ability of the skillful use of its communication practices by individuals employed by it. The study reveals that writing of construction related business letters, request for information, skillful use of electronic communications, and preparation of schedules of values are important for construction science graduates. Both the construction industry and faculty perceive that in order to achieve technical writing skills with reference to the industry, the construction science graduates should focus on achieving excellence in these industry-specific areas.

It may be worthwhile to include the topics that have been found to be important in the curriculum for technical writing for Construction Science students. A longitudinal study may be done to assess the impact that the modified technical writing course has had on the industry.

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