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Academic background characteristics and prediction of job performance

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**Academic Background Characteristics and
Prediction of Job Performance**

A Thesis

**Presented to
the Faculty of the Department of Psychology
San Jose State University**

**In Partial Fulfillment
of the Requirements for the Degree
Master of Science**

by

Shawn C. Beatty

December, 1998

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ABSTRACT

ACADEMIC BACKGROUND CHARACTERISTICS AND PREDICTION OF JOB PERFORMANCE

by Shawn C. Beatty

Academic achievement has long been relied upon as a gauge of future career success; the assumption being that there is a direct relationship between academic achievement in college and vocational success (Muchinsky & Hoyt, 1973). The goal of this study was to determine if academic background characteristics (i.e., college quality, academic performance and level of education) could be used to predict the success of recent college graduate engineers. Archival academic background data were collected for a sample of 267 recent college graduate engineers. A survey assessing their organizational citizenship behavior (OCB), job performance and general success was administered to their managers. The results showed that level of education and GPA were significantly related to higher levels of OCB but not to higher levels of job performance. College quality was not significantly related to any of the dependent variables. The general implications of this study, its limitations and recommendations for further research are also discussed.

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**Academic Background Characteristics and
Prediction of Job Performance**

Running Head: ACADEMIC BACKGROUND CHARACTERISTICS

Abstract

Academic achievement has long been relied upon as a gauge of future career success; the assumption being that there is a direct relationship between academic achievement in college and vocational success (Muchinsky & Hoyt, 1973). The goal of this study was to determine if academic background characteristics (i.e., college quality, academic performance and level of education) could be used to predict the success of recent college graduate engineers. Archival academic background data were collected for a sample of 267 recent college graduate engineers. A survey assessing their organizational citizenship behavior (OCB), job performance and general success was administered to their managers. The results showed that level of education and GPA were significantly related to higher levels of OCB but not to higher levels of job performance. College quality was not significantly related to any of the dependent variables. The general implications of this study, its limitations and recommendations for further research are also discussed.

Academic Background Characteristics and

Prediction of Job Performance

With the growing shortage of qualified employees in the labor market, the employment of recent college graduates continues to rise in high-tech companies (Northwestern University Lindquist-Endicott Report, 1994). As college recruiting becomes more competitive and companies spend more money to attract, train and retain recent college graduates, it is important to ensure that the company's college recruiting is aimed at attracting those graduates with the best chances of success. When recruiting recent college graduates for engineering positions, employers in the high-tech industries often give considerable weight to the applicant's academic background (Schick & Kunnecke, 1982). Companies send recruiters to top-ranked engineering schools and offer premium salaries to attract and retain graduates of these programs. The assumption is that this "top talent" will have higher levels of job performance and make a greater overall contribution to the organization than graduates from average engineering programs (Schick & Kunnecke, 1982; Ferris, 1982). But is this assumption valid? This study will attempt to determine if academic background significantly predicts the job success of engineers in the high tech industry.

For the purposes of this study a recent college graduate is defined as an individual who has been recruited right out of school and usually has little, if any, professional work experience. Recent college graduates differ in their level of degree obtained (e.g.,

bachelor's, master's, Ph.D.), the quality and reputation of their academic program or school and their academic performance as measured by grade point average (GPA).

These variables, referred to as academic variables, are important in the realm of recruiting and selecting recent college graduates. College recruiters rely heavily on these academic characteristics to distinguish recent college graduate applicants in the absence of professional experience and demonstrated job performance. The recruiters' premise is that these academic background characteristics are predictive of the employee's job performance and potential level of contribution to the company. According to this screening methodology, an applicant with a 3.95 GPA and a Bachelor of Science in electrical engineering from MIT (ranked number 1 among electrical engineering programs by the Gourman Report) should be a better hire than an applicant earning the same degree from the University of Kansas with a 2.6 GPA (Gourman, 1996).

Academic achievement has long been relied upon as a gauge of future occupational success; the assumption being that there is a direct relationship between academic achievement in college and vocational success (Muchinsky & Hoyt, 1973). Graduate programs use measures of academic success to determine admission eligibility of applicants. Employers often use these measures as a basis for selecting entry-level college graduates. But can employers count on these background characteristics to reliably predict employee success?

This study was designed to provide employee selection guidance by analyzing the academic backgrounds of entry-level engineering recruits of a large high tech company in

Silicon Valley to determine if these backgrounds are significantly related to job performance, organizational citizenship behavior (OCB) and general job-related success. Specifically, three academic background characteristics - college quality, GPA and level of education (bachelor's, master's, Ph.D.) - shown to be important in recruiting and selecting entry-level college graduate engineers were examined (Lavigna, 1992). While previous research has examined the predictive ability of various academic variables and job performance, this research extends this body of literature by looking at academic background variables and their relationship to behaviors not specified in formal job descriptions but shown to be important to the efficiency and effectiveness of the organization (i.e., organizational citizenship behavior).

College Quality and Job Performance

College quality refers to the quality of the academic program attended. Higher quality programs are typically found in the top-ranked, prestigious public and private universities which are more academically selective in their admission requirements. These programs offer the advantages of well-stocked libraries, modern equipment and professors renowned for their research (Howard, 1986). But why is the quality of an individual's education important? It is generally believed that the quality of a person's educational background is a relatively good indicator of their potential future performance (Ferris, 1982). This belief is based upon two commonly accepted assumptions. First, it is expected that graduates of higher quality colleges tend to be better trained or educated than graduates of lesser quality institutions (Ferris, 1982).

Second, it is commonly assumed that their higher quality education will contribute to higher levels of job performance. These beliefs are evident in the recruiting practices of most companies today which require a bachelor's degree as the minimum qualification for an engineering position. Inherent in this requirement is the belief that to adequately perform the job of an engineer, the candidate needs the specific education and training provided by a college education. This being the case, it stands to reason that a higher quality education should enable the employee to perform the job better than an employee from a lesser rated school.

Research assessing the ability of college quality to predict job performance is mixed (Howard, 1986; Wise, 1975; Schick & Kunnecke, 1982; Ferris, 1982; Lavigna, 1992). Several studies have found support for a positive relationship between college quality and job performance. In a longitudinal study at AT&T, for example, the relationship between college quality and management performance, as demonstrated in assessment centers and later promotions, was examined (Howard, 1986). The results showed college quality to be a meaningful predictor of management performance. Managers from the higher quality colleges were rated higher on intellectual ability, advancement motivation, nonconformity and general effectiveness than their peers from lesser rated colleges. Using salary progression as a measure of job performance, Wise (1975) found that the more selective the school, the higher the rate of increase in salary for any grade point average. Schick and Kunnecke (1982) also found support for the relationship between college quality and performance in a longitudinal study that spanned

the decade of 1968-1978 and used engineering/scientific personnel at an aerospace company as participants. They found that graduates of the prestigious schools outperformed those of the lower-rated schools when comparing average salary increases.

Some studies focusing on college quality and job performance have yielded more discouraging results. Ferris (1982), using auditors employed in a large professional accounting firm as participants, found no significant relationship between the quality of the educational institution attended and job performance as measured by both subjective performance appraisals and average salary increases. Lavigna (1992), using government 'research generalists' employed by a public sector organization, also found no relationship between college quality and assessed performance. However, this study was limited by the fact that it was done in a government agency where salary limitations or "caps" may have restricted their ability to attract students from top schools. As a result, the agency may have actually been more successful in hiring the best students from the less prestigious and/or selective schools who were as competent as graduates from the most selective schools. This lack of variability in college quality could have led to the non-significant correlations between college quality and performance found in this study. High-tech companies do not have the same salary limitations found in government agencies. Because many large high-tech employers find themselves in competition with each other for a limited number of top engineering graduates from the top-rated schools, they must be able to offer competitive new graduate salary rates and offer packages frequently including stock option grants and signing bonuses.

Lavigna's (1992) ability to generalize the validity of his results is also limited by the requirements of the participants' jobs and work settings. Because they were working in a 'research generalist' position where most critical skills could be learned on the job, these employees probably relied less on the knowledge and skills acquired in college, at least in the early career stages. On the other hand, entry-level engineering positions in the high-tech industry are very demanding in their knowledge and skill prerequisites requiring graduates to draw heavily upon their education in the day-to-day performance of their jobs.

Given that most of the research on college quality and success focused on non-technical occupations, the need for additional research focusing on such technical professions as engineering is warranted. Although the research is mixed, a relationship between college quality and job performance is expected to be found in this study. As mentioned earlier, engineering positions are very demanding in their knowledge and skill prerequisites, requiring recent college graduates to draw heavily upon their education. In addition, since they are recent college graduates, the participants in this study cannot rely on extensive prior work experience for the performance of their jobs. Therefore, their education, and more specifically, the quality of their education, is expected to play a significant role in their success as new engineers.

GPA and Job Performance

It is commonly assumed that those who have achieved greater success in their academic endeavors possess greater knowledge than less academically successful

individuals and as a consequence are likely to perform more effectively in a professional capacity (Ferris, 1982). It has also been suggested that the drive or motivation demonstrated in college in the pursuit of better grades is likely to be sustained in industry and subsequently rewarded by higher performance ratings (Schick & Kunnecke, 1982). Thus, an individual's GPA, like quality of educational institution, would seem to be a good predictor of job performance. As the major measurement of academic performance, GPA is reflective of an individual's success in school. Assuming that recent college graduate engineers rely heavily on their education in the day-to-day performance of their jobs, it stands to reason that their GPA, a measure of success in learning, would also predict their future job performance.

The research supports employers' beliefs that grades are an important predictor of job performance (Campion, 1978; Zikmund, Hitt, & Pickens, 1978; Muchinsky & Hoyt, 1973; Lavigna, 1992; Dye & Reck, 1988; Colarelli, Dean & Konstans, 1987; Wise, 1975; Harrell & Harrell, 1974; Weisbrod & Karpoff, 1968; Taylor, Smith & Ghiselin, 1966). For example, two meta-analyses (Samson, Graeu, Weinstein, & Walberg, 1984; Cohen, 1984) including over 100 studies looked at grades as predictors of adult accomplishment and found significant correlations ($r = .15$ and $r = .20$, respectively). These meta-analyses operationalized adult accomplishment as amount of salary earned, number of promotions received, success in graduate school, job performance and several other achievements. In their meta-analysis Dye and Reck (1988) found a correlation of .18 between grades and measures of job performance when correcting for measurement reliability. In a more

recent meta-analysis examining the relationship between grades and job performance, Roth, Be Vier, Switzer and Schippmann (1996) found an overall correlation of .35 when correcting for range restriction and measurement reliability suggesting that GPA is in fact a valid predictor of job performance.

Among the studies on GPA and job performance reviewed only one could be found that focused on the discipline of engineering. Muchinsky and Hoyt (1973) looked at the ability of grades to predict occupational success among engineering graduates. In their study supervisors rated the performance of engineers on 10 factors or constructs believed to be important to the successful performance of any engineering-related job. Among their findings, they discovered that participants whose grades were in the lowest quartile were rated lowest on the creativity-originality construct. Those in the first, second and third quartiles were rated approximately equally on this factor. This may partially substantiate the college recruiting efforts of employers who recruit top engineering graduates with the expectation that they will bring, among other things, their ingenuity and creativity to the company. The main limitation of Muchinsky and Hoyt's (1973) study was that their sample included engineering graduates from only one university. The authors suggested future research using a sample of engineering graduates from a variety of universities.

As suggested by prior research, GPA seems to be an important predictor of job performance (Lavigna, 1992; Dye & Reck, 1988; Colarelli et al., 1987; Wise, 1975; Harrell & Harrell, 1974; Weisbrod & Karpoff, 1968; Taylor et al., 1966; Samson et al.,

1984; Cohen, 1984). Of this research, however, only one study examined the engineering occupation (Muchinsky & Hoyt, 1973). Thus, additional research exploring the GPA-performance link in the field of engineering, where grades are given considerable weight in employment selection decisions, is needed (Schick & Kunnecke, 1982). It is expected that engineering employees with higher GPAs will be better performers than those with lower GPAs.

Level of Education and Job Performance

It is commonly held among employers that educational achievement, in terms of level of education attained, is easily transferred directly into the job and is therefore an important predictor of job performance (Wooldredge, 1979). Some authors argue that those earning advanced degrees have better on-the-job performance than those earning only bachelor's degrees because advanced degree-holders have a higher need for achievement and knowledge (Pascarella, 1975; Herbert, 1977; Muchinsky & Hoyt, 1973). Given the popular belief that those who pursue graduate degrees are higher achievers and performers, are expectations of higher performance from those earning graduate degrees legitimate?

Schick and Kunnecke (1982) examined the grades and job performance, as measured by salary progression, of employees with engineering and scientific degrees at a large aerospace company. They found that over a ten-year period there was no significant difference in average monthly increases in salary between employees with bachelor's degrees and those with master's. The salary progression of the two degree holders was

the same; once hired, they received roughly the same percentage average raises. These authors concluded that subjective criteria such as personality, attitude or motivation may be a more effective determinant of success on the job than degree awarded. One limitation of Schick and Kunnecke's (1982) research is that they did not include Ph.D.'s in their study and thus may have missed a distinction among levels of graduate education and salary performance.

In a study of accountants, Ferris (1982) found similar results with respect to level of education and job performance as reflected in salary progression. The mean salary paid to individuals with an advanced degree was significantly greater than the mean salary paid to those not possessing an advanced degree at both the time of hire and after one year; however, upon reaching senior level the salary differential was not statistically significant. Apparently, participants with bachelor's degrees received larger percentage and absolute salary increases than those possessing advanced degrees.

Examining the performance appraisals of employees in government managerial positions, Ariss and Timmins (1989) found no statistically significant difference in work performance between master's degree holders and bachelor's degree holders. From a pair of longitudinal studies conducted at AT&T spanning the decades 1955 - 1985, Hall (1985) reported that research psychologists at AT&T found that employees with master's degrees possessed greater administrative and interpersonal skills and more motivation for money and status than those with bachelor's degrees, but evidently, not better performance or greater intellectual ability.

Counter to common belief, it appears from the research that there is little evidence to support a relationship between level of education and job performance as reflected in both performance appraisals and salary progression. Therefore, it is expected that level of education will not be significantly related to job performance among the recent college graduate engineers in this study.

Organizational Citizenship Behavior

Although researchers have examined the relationship between academic background and performance, little research to date has examined the relationship between academic background and organizational citizenship behavior (OCB). OCB is defined as “extra-role” behavior that is not a formal role requirement of the employee’s position. It is individual contribution which goes above and beyond what is expected of the employee. Organ (1988a) identified five specific categories of organizational citizenship behavior: Altruism, Conscientiousness, Sportsmanship, Courtesy and Civic Virtue. In addition, Organ (1988a) expanded the definition of job performance to include OCB. Citizenship behavior is neither directly nor contractually rewarded by formal reward systems within the organization. Nevertheless, OCBs ultimately improve the effectiveness and efficiency of the organization and are often recognized as important and valuable by organization leaders (Organ, 1988a; Orr, Sackett, & Mercer, 1989; MacKenzie, Podsakoff, & Fetter, 1991; Werner, 1994; Motowidlo & Van Scotter, 1994; Borman, White, & Dorsey, 1995). Given its benefit to the organization, it is important to

look at OCB in addition to in-role performance to determine if recent college graduates with certain academic backgrounds will contribute more in terms of extra-role behavior.

Organizational citizenship behavior has been researched extensively in work settings and much of the recent research has broken it down into two broad categories of OCB activities: OCB directly beneficial to specific individuals (OCBIs) and OCB beneficial to the organization (OCBOs) (Smith, Organ & Near, 1983; Organ & Konovsky, 1989). OCBIs are targeted toward specific individuals in the organization and through benefiting them, these behaviors indirectly benefit the organization. Examples include helping new employees learn their jobs and picking up work for a sick employee. OCBOs, on the other hand, have general benefit to the organization and include behaviors such as having an above average attendance record.

OCB and job performance. The relationship between OCB and individual productivity and job performance is difficult to measure due to the broad nature of citizenship behavior itself. It encompasses a wide variety of general behaviors including cooperation, helpfulness, suggestions and altruism. Because citizenship behavior is often subtle, it is difficult to measure. It may contribute more to the performance of co-workers than to the employees performing them as they may sacrifice their immediate productivity in performing the citizenship behavior (Smith et al., 1983).

In any case, employees performing repeated acts of citizenship behavior are likely to be noticed by their supervisors. This behavior is likely to influence the supervisor when appraising the employee's performance particularly when the employee's

citizenship behavior has a direct benefit on the supervisor's own job, which it often does (Smith et al., 1983). Several studies have shown supervisors believe that employee citizenship behavior such as loyalty, morale and attendance contribute to employee productivity and the dollar value of their performance despite the fact that the direct effect of these behaviors on organizational output cannot always be measured (MacKenzie et al., 1991; Katzell & Yankelovich, 1975; Orr et al., 1989). Using insurance agents as participants, MacKenzie et al. (1991) found that sales managers did discriminate between several different types of organizational citizenship behavior in their subjective performance evaluations and that these OCB dimensions were clearly distinct and independent from measures of in-role performance. They concluded that, in addition to in-role productivity, managers give consideration to extra-role contributions in their performance evaluations of subordinates. MacKenzie et al. (1991) showed that a portion of the variance in supervisory ratings could be accounted for by OCBs.

Given that OCB is reflected in performance ratings as the research has shown, how does it influence managers in writing performance appraisals? According to the norm of reciprocity, managers may give higher performance ratings to employees who perform organizational citizenship behaviors because the extra-role behavior may have significant positive effects on both the organization and the supervisor's job (Gouldner, 1960; MacKenzie et al., 1991). For example, when a seasoned employee voluntarily goes beyond the formal in-role requirements of his job to help a new employee, this will not only help the organization become more efficient but could also allow the supervisor to

dedicate her own time to more critical functions. Given the benefits to the supervisor from the employee's OCB, the supervisor may "reciprocate" the citizenship behavior provided by the employee in the performance evaluation process or the supervisor may appraise the employee favorably in the review because it is "the fair thing to do" (MacKenzie et al., 1991). Given the potential significant impact of OCBs on organizational effectiveness, company recruiters should identify individuals likely to make this form of contribution (i.e., going over and above expected role requirements).

OCB and academic background. Support for a link between educational level and prosocial behavior was found in a study by Gergen, Gergen and Meter (1972). They found educational level was positively correlated with general social responsibility. Smith et al. (1983) speculated that years of education can be related to social class background and cited studies that found a greater sense of altruism and social responsibility in the middle-class than in lower class participants. They also speculated that formal education may make employees more competent to give constructive help. It may be that formal education fosters social norms of cooperation, helping and sensitivity to others' needs (OCBIs) leading to a greater collective sense of social responsibility (Krebs, 1970). One way that formal education may do this is by requiring students to work together on group projects. Many engineering graduate programs require extensive group-project work as part of their curriculum. Individuals who work in task groups characterized by reciprocal interdependence have been shown to display increased levels of citizenship behavior (Smith et al., 1983). Group work in school may heighten

individuals' awareness of a collective sense of social dependence and responsibility. This being the case, graduate students, having had more exposure to group work in school, may display higher levels of OCB. It is expected that educational level will be significantly related to higher levels of OCB.

When looking at college quality and academic performance in relation to OCB, the graduates of higher quality colleges and those earning higher GPAs may exhibit higher levels of citizenship behavior because they are used to going above and beyond the minimum requirements, putting forth the extra effort required to achieve success in school. OCB is a construct that can be generalized from the full-time work environment to other contexts such as the college setting (Organ & Hui, 1995). Citizenship behaviors in the workplace, OCBOs in particular, are what one would expect to find among high achievement-oriented engineering students at a top-ranked engineering program. Examples of these behaviors include having above average attendance and punctuality and volunteering for things that are not required. In a field study looking at the citizenship behavior of university students in their residences, Organ and Hui (1995) found that their subjects' inclination toward achievement-striving was strongly related to GPA and to OCB. It may be that extra effort in the form of citizenship behavior helped them gain entrance into the more competitive colleges and successfully graduate with high GPAs. As in most careers, to succeed as an engineering student, and later as an engineer, requires discipline and dedication. To the extent that citizenship behaviors contribute to success in school, those employees who attended the high quality colleges

and earned the high GPAs may practice these behaviors more in their jobs than their peers earning lower GPAs and attending lower quality schools.

A thorough review of the research on the relationship between academic variables and job performance and OCB indicates that, with the exception of level of education and job performance, they should be positively related. The literature review also indicates that more occupation-specific research is needed particularly in technical occupations such as engineering (Roth et al., 1996). With respect to the field of engineering, the few studies that have been found are largely outdated, having been conducted in the late 1960's and 1970's. This, along with the fact that many of the studies are inconsistent in their findings, warrants the need for additional research in this field.

Hypotheses to be Investigated

The purpose of this study is to determine if academic background characteristics are significantly related to job performance, organizational citizenship behavior and success on the job.

Based on prior research, the following hypotheses are proposed:

Hypothesis I: Participants from higher quality colleges have significantly higher levels of job performance than those from lower quality institutions.

Hypothesis II: Participants with higher GPAs have significantly higher levels of job performance than those with lower GPAs.

Hypothesis III: Level of education is not significantly related to job performance.

Hypothesis IV: Participants from higher quality colleges have significantly higher levels of OCB than those from lower quality institutions.

Hypothesis V: Participants with higher GPAs have significantly higher levels of OCB than those with lower GPAs.

Hypothesis VI: Participants with higher levels of education have significantly higher levels of OCB than those with lower levels of education.

Method

Participants

The participants in this study were 267 recent college graduate engineers in a high-tech company in Silicon Valley (referred to subsequently as the organization or the company). Using PeopleSoft, the company's human resources information system, an initial sample population was generated of 387 recent college graduate engineers. In order to be included in the initial sample, employees had to have received a technical/engineering degree between 1993 and 1997 and be classified in a technical position within the company. Recent college graduate engineers who received degrees within the past five years were chosen as participants because it was thought that any effect college education might have on an employee's on-the-job behavior would be most significant within the first five years of employment. During this time the education is still relatively "fresh in the mind" and the transfer of knowledge from college to the job should be the greatest. It was believed that during the first few years after graduation new employees would rely more heavily on their education to perform the duties of the job.

The average time since graduation for the participants ($N = 267$) was 2.66 years.

Seventy-eight participants (29%) earned degrees in 1997, 54 participants (20%) in 1996, 48 participants (18%) in 1995, 55 participants (21%) in 1994 and 32 participants (12%) graduated in 1993.

The participants ranged in age from 22 to 53 with the average age being 29. Two-hundred eighteen (82%) of the participants were male and 49 (18%) were female. One-hundred fifty-six participants (58%) were Asian/Pacific Islander, 95 (36%) were White, 9 (3%) were Black and 7 (3%) were Hispanic. As expected of recent college graduates, the average amount of prior, related work experience was a low 2.18 years. The average length of service with the company was also low (1.32 years) as was the average total experience (prior experience + years of service with company) of the participants (3.51 years).

A comparison sample was generated of all employees classified in engineering positions based in the company's headquarters in Silicon Valley in order to see how representative the sample of recent college graduates was of the larger engineer population. Of the 2,202 engineers, 83% were male, the average age was 36, and 50% were White, 43% were Asian/Pacific Islander, 4% were Hispanic, 2% were Black and 0.2% were American Indian/Alaskan Native. The breakdown by degree was as follows: 43.5% held bachelor's degrees, 28.8% held master's degrees and 18.6% held Ph.D's. Comparatively, this larger sample closely approximated the gender and level of educational attainment distribution of the sample used in this study. With respect to

ethnicity, it should be noted that in the sample used in this study ($N = 267$) the Asian/Pacific Islanders (58%) significantly outnumbered Whites (38%). This is in contrast with the larger population ($N = 2,202$) in which Whites (50%) outnumbered Asian/Pacific Islanders (43%). Since the sample used in this study consisted of recent college graduates only and the larger sample included all employees this observation could likely be the result of a recent increase in the population of Asian/Pacific Islanders in the universities from which the company recruits and/or hires.

Instrument

The survey, which consisted of 42 items in three sections, was developed by the researcher in consultation with management. A copy of the survey is provided in Appendix A. The first section of the survey consisted of 28 items including 17 items measuring company-specific success factors and 11 items measuring organizational citizenship behavior. Managers responded to these items on a 6-point scale ranging from 1 'Strongly Disagree' to 6 'Strongly Agree.' The items were placed in random order. The second section of the survey included eight items measuring job performance. Managers responded to these items on the company's 5-point performance rating scale ranging from 1 'Fails to Meet Requirements' to 5 'Far Exceeds Requirements.'

The final section of the survey included items assessing the managers' awareness of their new graduate employees' educational background and the length of time they had supervised the employee. The data from this section was not analyzed but a summary of the managers' responses is included in Appendix E.

Dependent variables. Job performance was measured by seven items measuring different dimensions of job performance and an eighth item measuring overall performance. The 7-item scale (PERF) was taken from the company's New College Graduate Performance Appraisal form, and item 8 (PERFORM8) asked managers to rate the employee's overall performance.

Organizational citizenship behaviors were measured by 11 items developed by Williams and Anderson (1991). Six of the 11 items measured organizational citizenship behaviors beneficial to specific individuals (OCBIs) and 5 measured organizational citizenship behavior beneficial to the organization (OCBOs). In their research Williams and Anderson (1991) reported reliabilities for their OCBI and OCBO scales of .88 and .75, respectively. The individual item means and scale means are displayed in Appendix B.

While job performance was one measure of success used in this study, the 17 SUCCEss items were more of an exploratory measure designed to target what success meant in the organization. Interviews were held with 6 managers of recent college graduate employees in which they were asked 2 questions: "what behaviors do you look for in new college graduate employees?" and, "what behaviors distinguish the most successful new graduate employees?" The 17 SUCCEss items measuring these "success" behaviors were generated from the managers' responses to these questions.

Independent variables. For each participant archival data on their academic background (name of school, level of degree, GPA) was obtained from PeopleSoft.

Name of school attended, level of degree and major are required on the company's employment application. The employment application does not ask for GPA. However, because GPA is often volunteered by the applicant on the employment application and is sometimes found on the applicant's resume, it was available for approximately half of the participants (47%). Within the three levels of degrees GPA appears to be missing approximately equally for each group. Among the participants earning bachelor's, GPA was missing for 62 (52%) of the participants. GPA was missing for 51 (56%) of the participants with master's and for 29 (52%) of the participants holding Ph.D.'s.

The 9th Edition of the Gourman Report (Gourman, 1996), a rating of undergraduate programs in the U.S., was used to distinguish the quality of the colleges and universities attended by the participants with bachelor's degrees in this study. For those earning master's degrees and Ph.D.'s, the 8th Edition of the Gourman Report (Gourman, 1997), a rating of graduate degree programs in the U.S., was used to distinguish quality of the colleges and universities. The Gourman Report is the only qualitative guide to American institutions of higher education which assigns a precise, numerical score on a continuous scale ranging from 0.00 to 4.99 in assessing the strengths and shortcomings of each school and program (Gourman, 1996). In addition, it is the most comprehensive ranking publication of American institutions of higher education that exists. College recruiters in the company where this study was conducted rely on the Gourman Report as a reference in distinguishing quality among colleges and universities, ultimately determining which ones they will visit on recruiting trips. For a

more detailed summary of college quality as defined by the Gourman Report, including a complete list of the criteria considered in the evaluation of each educational program and institution, see Appendix D.

Procedure

Each participant in the initial sample of 387 was sent an email in which they were informed that they were selected to participate in this study because they had received an engineering degree within the past five years. They were told that their manager would be contacted to complete a survey on them regarding their work-related behaviors unless they chose to withdraw from the study. They were assured that this action would in no way affect their employment status with the company. Thirteen employees in this initial sample withdrew themselves from the survey resulting in a sample size of 374. Of the 374 surveys sent out, 267 were completed and returned yielding a high response-rate of 71%.

The managers of the 374 employees who consented to participate in the study were sent an email survey regarding their employees' work related behaviors via the company email system. Managers were chosen because they were the most qualified to evaluate the performance of their recent graduate employee. Since they are in a supervisory position, they should be familiar with their employees' performance against the requirements of the position. In addition, they already have the responsibility for appraising their employees' performance in the annual focal review cycle.

In cases where managers supervised more than one recent college graduate employee, they were sent a separate email survey for each employee. In the introduction to the survey managers were informed that participation in the survey was voluntary and that the employee for whom they were completing the survey had given his or her consent. In addition, managers were told that for each completed survey they would receive a voucher which they could apply towards a lunch at any of the company's cafes. It was believed that offering an incentive was necessary to achieve a sufficient response rate. After completing all the items on the survey, the responses were automatically sent back to the researcher as a return email from the manager's computer.

Results

The purpose of this study was to determine if academic background characteristics are related to job performance, organizational citizenship behavior and success on the job. This section explores the relationships between the predictors (college quality, level of education and GPA) and the dependent variables (job performance, OCB and job success).

Principal Components and Reliability Analyses

The coefficient alpha reliability estimate for the 7-item PERFormance scale was adequate ($\alpha = .87$). As noted earlier, the survey instrument included 11 items (6 measuring OCBI and 5 measuring OCBOs) from previous work measuring organizational citizenship behavior (Williams & Anderson, 1991). The reliability

estimates of the OCBI and OCBO scales were .78 and .81, respectively. The reliability of the overall OCB scale was also adequate ($\alpha = .85$).

Because this was the first time the 17 SUCCEss items were used in research, a principal components factor analysis using varimax rotation was conducted as an exploratory technique to describe its construction and identify underlying constructs. Eigenvalues equal to or greater than 1.0 were considered robust and meaningful. Cronbach's alpha was then computed to examine the internal consistency of each factor. An alpha level of .70 was considered reliable (Hair, Anderson, Tatham, & Black, 1992). Factor loadings above .50 were used to distinguish the factors.

Among the 17 items on the SUCCEss scale 3 factors emerged as robust and meaningful in the principal components analysis (See Table 1 for a complete presentation of the factors and their loadings). The communalities for each of the 17 SUCCEss items are also displayed in Table 1. As can be seen, the highest communality appeared for "Demonstrates eagerness to learn" (.81). This large communality indicates that a large amount of the variance in this item has been accounted for by the three extracted factors. In comparison, the lowest communality appeared for "Communicates well" (.50). The small communality of this item indicates that a large portion of its variance is not accounted for by the three extracted factors. The three factors accounted for 65.4% of the variance in the SUCCEss items. The first factor accounted for 52.2%, a large portion of

Table 1

Factor Loadings for Items in SUCCess scale

Item	Factor 1	Factor 2	Factor 3	Comm
Efficient and Focused on Job (EFFICFOC)				
Handles conflicting demands and priorities well	0.82	0.10	0.31	0.78
Demonstrates efficiency in work	0.79	0.30	0.17	0.74
Figures out how to overcome obstacles on own	0.77	0.40	0.00	0.75
Stays focused on work	0.68	0.22	0.32	0.61
Demonstrates potential to be an effective manager	0.64	0.36	0.25	0.60
Communicates well	0.61	0.23	0.36	0.50
Exhibits Eagerness and Enthusiasm (EAGENTHU)				
Demonstrates eagerness to learn	0.18	0.78	0.41	0.81
Demonstrates eagerness to try new things	0.28	0.73	0.19	0.65
Displays excitement and enthusiasm about job	0.19	0.73	0.06	0.57
Is not afraid "to get hands dirty" on the job	0.32	0.59	0.37	0.58
Displays confidence in abilities	0.52	0.53	0.10	0.56
Assumes accountability for work and commitments	0.50	0.51	0.39	0.66
Shows initiative to complete tasks without being asked	0.50	0.50	0.36	0.63
Takes Direction Well (TAKESDIR)				
Will assume a subordinate role when appropriate	0.06	0.24	0.75	0.63
Is a good listener	0.47	0.05	0.72	0.75
Takes direction well	0.41	0.37	0.63	0.70
Demonstrates flexibility	0.32	0.49	0.53	0.62

Note: Values presented represent the factor loadings for each question. For each question the communality is specified.

the total variance, and was defined by Efficiency and Focus on the Job. The second factor accounted for 7.2% of the total variance and was defined by Exhibiting Eagerness and Enthusiasm. The third factor accounted for 6.0% of the total variance and was defined by Assuming a Subordinate Position and Taking Direction Well. The coefficient alpha estimates for these scales were all adequate; $\alpha = .89, .88, .86$, for Efficiency and Focus on Job (EFFICFOC), Exhibiting Eagerness and Enthusiasm (EAGENTHU), and Assuming a Subordinate Position and Taking Direction Well (TAKESDIR), respectively.

Descriptive Statistics

Table 2 reports the means and standard deviations for each variable. GPA ranged from 2.10 to 4.00 with an average GPA for the participants of 3.47. The average GPA for the 120 participants (45%) who earned bachelor's degrees was 3.14. For the 91 participants (34%) who earned master's degrees the average GPA was 3.72 and for the 56 participants (21%) who earned Ph.D's the average GPA was 3.79.

The average college quality (COLLQUAL) rating for the schools attended by the participants was 3.88 or "Good," according to the Gourman Report (1996). In addition, COLLQUAL was found to be negatively skewed. For a more detailed summary of the quality of the institutions attended by the participants, see Appendix D.

With respect to the dependent variables, Table 2 reveals that the highest mean occurred for the OCB scale ($\underline{M} = 5.02$) which included the 5 OCBO and 6 OCBI items. The OCB scale also had the smallest standard deviation, $\underline{SD} = .48$. This suggests little variability, as managers did not use much of the scale. Of the SUCCess scales, the lowest

mean occurred for the Efficiency and Focus on Job scale (EFFICFOC), $M = 4.73$.

Overall, the scale means were high indicating that the managers tended to rate the participants favorably on the statements. The standard deviations of the scale means were small and close ranging from .48 for the OCB scale to .78 for the Efficiency and Focus on Job scale (EFFICFOC).

The mean for the PERFormance scale, which included 7 items measuring different dimensions of employee's performance, was 3.52 while the mean for PERFORM8, the overall measure of performance, was 3.55. This indicates that the average overall performance of the sample was midway between a 3 "Meets Requirements" and a 4 "Exceeds Requirements" rating.

Inter-correlations Among the Variables

Inter-correlations among the variables are reported in Table 2. Among the independent variables, a strong correlation was observed for GPA and LEVEL of degree ($r = .58, p < .01$) indicating that as participants obtained higher educational degrees their GPA also increased. GPA was also significantly correlated with college quality ($r = .23, p < .05$) indicating that participants attending the higher quality schools tended to earn higher GPAs.

The linear associations between the dependent variables are all fairly strong ranging from .29 ($p < .01$) for PERFORM8 and OCBO to .94 ($p < .01$) for EAGENTHU and SUCCess. The two performance measures (PERF, PERFORM8) had moderately strong correlations with overall OCB ($r = .56, p < .01$ and $r = .46, p < .01$, respectively)

Table 2

Correlation Matrix

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
1 OCB ^a	5.02	.48	(.85)										
2 OCB ^b	4.98	.54	.91**	(.78)									
3 OCBO ^a	5.01	.60	.88**	.62**	(.81)								
4 SUCC ^a	4.97	.61	.79**	.78**	.66**	(.94)							
5 EFFICFOC ^a	4.73	.78	.67**	.67**	.61**	.93**	(.89)						
6 EAGENTHU ^a	5.15	.62	.70**	.71**	.57**	.94**	.77**	(.88)					
7 TAKESDIR ^a	4.99	.64	.80**	.77**	.76**	.85**	.72**	.74**	(.86)				
8 PERF ^b	3.52	.54	.56**	.56**	.37**	.65**	.56**	.58**	.45**	(.87)			
9 PERFORM8 ^b	3.55	.72	.46**	.46**	.29**	.61**	.54**	.56**	.39**	.84**			
10 LEVEL ^c	1.76	.78	.17*	.13	.12	.11	.05	.14*	.04	.05	.06		
11 COLLQUAL ^d	3.88	.97	.07	.07	.01	.01	-.04	.04	-.04	-.07	.03	.18**	—
12 GPA ^e	3.47	.49	.21	.11	.27*	.16	.10	.20*	.10	.11	.16	.58**	.23*

Note: Parenthetical values on diagonals are coefficient alpha reliability estimates from the sample; n = pairwise deletion; range $\bar{n}$ = 76 - 264.

** $p < .01$, * $p < .05$, 2 tailed significance. OCB = Organizational Citizenship Behavior; OCBI = Organizational Citizenship Behavior Individual; OCBO = Organizational Citizenship Behavior Organization; SUCC = Success Scale; EFFICFOC = Efficiency and Focus; EAGENTHU = Eagerness and Enthusiasm; TAKESDIR = Takes Direction Well; PERF = Performance Scale; PERFORM8 = Overall Performance; LEVEL = Level of Education; COLLQUAL = College Quality; GPA = Grade Point Average.

^aScale was 1 = Strongly Disagree; 2 = Disagree; 3 = Slightly Disagree; 4 = Slightly Agree; 5 = Agree; 6 = Strongly Agree.

^bScale was 1 = Fails to Meet Requirements; 2 = Meets Some Requirements; 3 = Meets Requirements; 4 = Exceeds Requirements; 5 = Far Exceeds Requirements.

^cScale was 1 = Bachelor's; 2 = Master's; 3 = Ph.D.

^dScale was 0.00 = Not Sufficient; 2.01-2.49 = Marginal; 2.51-2.99 = Adequate; 3.01-3.59 = Acceptable; 3.61-3.99 = Good; 4.01-4.49 = Strong; 4.51-

4.99 = Very Strong.

^eScale was 0.00-4.00.

and SUCCess ($r = .65, p < .01$ and $r = .61, p < .01$, respectively) indicating that as employees demonstrate higher levels of job performance, they also demonstrate higher levels of OCB and SUCCess behaviors. Among the performance measures, the strongest correlation was observed between the PERFormance scale and the SUCCess scale ($r = .65, p < .01$). The lowest correlation was observed between OCBO and PERFORM8 ($r = .29, p < .01$).

College Quality (COLLQUAL) was not significantly correlated with any of the dependent variables. Thus, Hypotheses I and IV, which stated that those from the higher quality colleges have significantly higher levels of job performance and OCB, respectively, than those from lower quality institutions, are not supported in this study. A weak correlation ($r = .18, p < .01$) was observed for COLLQUAL and LEVEL of education suggesting that as employees pursued advanced degrees, the schools that they attended were progressively higher in quality.

GPA was significantly related to two of the dependent variables. A correlation of .27 ($p < .05$) was observed for GPA and OCBO, indicating that the participants earning higher GPAs tended to demonstrate higher levels of OCB beneficial to the organization. A correlation of .20 ($p < .05$) was found for GPA and EAGENTHU indicating that the participants who earned higher GPAs tended to display more eagerness and enthusiasm. GPA was not significantly correlated with the performance variables. Therefore, Hypothesis II, which stated that participants with higher GPAs have significantly higher level higher job performance than those with lower GPAs, is rejected.

LEVEL of education had very low correlations with the dependent variables and only two were statistically significant. A correlation of .17 ($p < .05$) was observed for LEVEL of degree and OCB indicating that the two are positively related. Therefore, Hypothesis VI, which stated that participants with higher LEVELs of education have significantly higher levels of OCB than those with lower LEVELs of education, is supported. LEVEL of Education was not significantly correlated with the overall SUCCess scale. However, a low correlation ($r = .14$, $p < .05$) was observed for LEVEL of education and EAGENTHU indicating that as employees attain higher levels of education, they tended to display more eagerness and enthusiasm.

As a final analysis, scatterplots of the variables were run to determine the linearity of the relationships and explore the possibility that non-linear relationships might exist. No non-linear relationships were found among the variables.

Multiple Regression

The primary research objective was to determine if the academic variables could predict job performance and OCB. Because there was no theoretical reason for any predictor to be stronger than another, standard multiple regression was performed to assess the overall relationship between each of the dependent variables and the predictors. It was also performed to ascertain how much of the relationship is contributed uniquely by each independent variable. In total, nine regression analyses were performed - one for each variant of the dependent variables (OCB, OCBI, OCBO, SUCCess, EFFICFOC,

Table 3

Standard Multiple Regression of Academic Variables on Dependent Variables

Variables	OCB β	OCBI β	OCBO β	SUCC β	EFFICFOC β	EAGENTHU β	TAKESDI R β	PERF β	PERFORM β
GPA	0.10	0.01	0.23	0.17	0.11	0.24	0.11	0.09	0.17
COLLQUAL	-0.05	-0.01	-0.15	-0.05	-0.14	-0.04	-0.06	-0.00	0.06
LEVEL	0.18	0.17	0.12	0.00	0.03	-0.05	0.00	0.03	-0.05
	$R^2 = 0.06$ $R^2_{adj} = 0.02$	$R^2 = 0.03$ $R^2_{adj} = 0.00$	$R^2 = 0.10^*$ $R^2_{adj} = 0.06$	$R^2 = 0.06$ $R^2_{adj} = 0.02$	$R^2 = 0.03$ $R^2_{adj} = -0.01$	$R^2 = 0.04$ $R^2_{adj} = 0.02$	$R^2 = 0.01$ $R^2_{adj} = -0.01$	$R^2 = 0.01$ $R^2_{adj} = -0.01$	$R^2 = 0.03$ $R^2_{adj} = 0.01$

* $p < .05$

EAGENTHU, TAKESDIR, PERFormance, PERFORM8). The result of the regression analyses appears in Table 3. The results of these analyses showed a significant relationship for only one of the dependent variables. For the OCBO scale the regression equation was significant ($R = .31$, $F(3, 84) = 2.99$, $p < .05$; $R^2 = .10$, $R^2_{adj} = .06$). GPA ($\beta = 0.23$, $t = 1.65$, ns), COLLQUAL ($\beta = -0.15$, $t = -1.38$, ns) and LEVEL ($\beta = 0.12$, $t = 0.85$, ns) did not contribute significantly to the prediction of OCBO. Altogether, only 10% (.06 adjusted for effects on the population) of the variability in OCBO was predicted by knowing GPA, COLLege QUALity and LEVEL of education.

Discussion

The purpose of this study was to determine if academic background characteristics are significantly related to occupational success in the field of engineering. More specifically, this study investigated whether college quality, level of education and GPA were significantly related to job performance and organizational citizenship behavior. The relationship among these academic variables and a newly created measure of overall success among recent college graduate engineers was also investigated in an exploratory manner. This section will discuss the results of this study and how they relate to the literature reviewed and the hypotheses proposed. The general implications of this study, its limitations and recommendations for further research will also be discussed.

Summary of Results

Based on prior research, it was hypothesized that employees who earned degrees from the higher quality institutions would demonstrate higher levels of job performance and OCB than those from the lower-ranked schools (Wise, 1975; Schick & Kunnecke, 1982; Howard, 1986; Lavigna, 1992). Contrary to expectations, college quality (COLLQUAL) was not significantly related to any of the dependent variables. Thus, engineers from the higher quality colleges did not display higher levels of job performance and OCB than their co-workers from the lesser ranked institutions.

The results of this study were consistent with Ferris (1982) and Lavigna (1992) who found no relationship between college quality and performance. Perhaps similar to Lavigna's (1992) conclusions, the organization in which this study was conducted may have similar success in hiring the "top" graduates from all schools and degree levels thus minimizing the chances of finding performance distinctions across the academic variables. This is likely credited to an effective college recruiting and selection process which is screening out less-qualified candidates. The presence of range restriction supports this argument. The fact that COLLQUAL was negatively skewed is likely due to the company's emphasis on recruitment from the more academically-selective schools.

Based on the findings of this study, the preferential recruitment and hiring of recent college graduate engineers from the more prestigious institutions may be of no greater benefit, at least in terms of demonstrated job performance, extra-role behaviors

and success in the organization as defined by managers. The organization may do just as well recruiting recent college graduate engineers from the lower-quality institutions.

Research on the link between GPA and job performance has yielded largely positive results showing GPA to be a significant predictor of performance appraisal scores (Lavigna, 1992; Dye & Reck, 1988; Colarelli et al., 1987; Wise, 1975; Harrell & Harrell, 1974; Weisbrod & Karpoff, 1968; Taylor et al., 1966; Samson et al., 1984; Cohen, 1984). Many employers believe that grades are important predictors of job performance maintaining that intelligence, motivation and other abilities relevant to the job are found in grades (Campion, 1978; Zikmund et al., 1978; Baird, 1985). In line with prior research, it was hypothesized that those engineers earning higher GPAs would be more successful, demonstrating higher job performance and performing more citizenship behaviors. Counter to expectations, GPA was not significantly related to performance. In this study it appears that academic achievement does not effectively transfer to the workplace to result in higher performance as is popularly held (Muchinsky & Hoyt, 1973). Why, against popular perception and previous research, was GPA not significantly related to performance? The non-significant results may be due, in part, to the fact that GPA ($M = 3.47$) was only available for 125 (47%) participants and was negatively skewed. Since GPA was not requested on the employment application it was available only for those participants who volunteered it on their applications or resumes. It seems reasonable to expect that the participants who volunteered their GPA on their application or resume were those with the higher GPAs. This was supported as all of the

participants in this study had reasonably high grades. This being the case, restriction of range in GPA is a likely explanation for the absence of a significant relationship between GPA and performance.

While GPA was not significantly related to job performance, it was significantly related to OCBO such that those with higher GPAs were more likely to exhibit citizenship behaviors on behalf of the organization. OCBO-behaviors have general benefit to the organization and include behaviors such as having above average attendance (Smith et al., 1983; Organ & Konovsky, 1989). One explanation for the positive relationship between OCBOs and GPA could be that those with higher GPAs performed OCBO behaviors in college and simply transferred these behaviors to the organization. The OCBO items are conducive to high academic achievement and similar to what one would expect of "good student behaviors" (e.g., does not spend a great deal of time socializing at work, has an above average attendance record). These behaviors may have contributed to their earning high grades in college. In addition, as mentioned, employers believe that grades are important predictors of job performance maintaining that intelligence, motivation and other abilities relevant to the job are found in grades (Campion, 1978; Zikmund et al., 1978; Baird, 1985). These results seem to substantiate this belief to the extent that OCBOs deal with an employee's motivation to respect the organization (i.e., adheres to informal rules designed to maintain order, conserves and protects organizational property).

GPA was also found to be significantly related to a dimension of success called Exhibiting Eagerness and Enthusiasm (EAGENTHU) such that those earning higher GPAs tended to be more eager and enthusiastic than those with lower GPAs. Since Exhibiting Eagerness and Enthusiasm is one factor of the overall SUCCEss scale identified by managers, it appears that employees who earn higher GPAs are more successful, at least in this area. One explanation for this relationship is that academic achievement and eagerness and enthusiasm are related such that engineering students earning higher GPAs did so, in part, because they were more eager to learn and succeed in school. Whether or not those engineers earning higher GPAs were more enthusiastic and eager before entering college, they may have developed progressively higher levels of eagerness and enthusiasm which were reinforced as they earned high grades. Intuitively, this seems to make sense in that one would expect those with higher academic achievement to be more eager and enthusiastic about their studies. It is likely that their eagerness and enthusiasm carried over to their jobs where it was perceived by their supervisors as a factor of success.

It was hypothesized that LEVEL of education would not be significantly related to job performance but would be significantly related to OCB such that those with advanced degrees would exhibit higher levels of OCB than participants earning only a bachelor's degree. Both of these hypotheses were supported. While LEVEL of education was significantly correlated with OCB ($r = .17, p < .05$), it was not significantly related to job performance. Popular perception holds that educational achievement is easily

transferred directly into the job, and therefore, those earning graduate degrees should have better on the job performance. Similarly, it is commonly held among employers that individuals who have achieved graduate levels of education will be better performers than those with only a bachelor's degree (Wooldredge, 1979; Pascarella, 1975; Herbert, 1977). Despite this perception, prior research showing otherwise led to the hypothesis that no relationship would be found between these variables (Schick & Kunnecke, 1982; Ariss & Timmins, 1989; Hall, 1985).

Why do employees who are more educated demonstrate higher levels of OCB? Evidence to explain this may be found in the research on demographic characteristics such as educational level and social class background and their influence on social behavior. Educational level was found in a review by Gergen et al. (1972) to be positively correlated with general social responsibility. Not surprisingly, the OCB measures in this study (e.g., helps others who have heavy workloads, assists supervisor with his/her work without being asked, gives advance notice when unable to come to work) are similar to the socially responsible behaviors measured by Gergen et al. (1972). Afterall, OCB is socially responsible behavior. Smith et al. (1983) speculated that years of education may be related to social class background citing studies that found a greater sense of altruism and social responsibility in the middle-class than in lower-class participants.

Given the preceding conclusion, the higher levels of OCB may be due more to the social background of the individuals who go on to achieve graduate level education than

to the higher education itself. Or it could be that formal education may make employees more competent to give constructive help through fostering social norms of cooperation, helping and sensitivity to others' needs (Smith et al., 1983; Krebs, 1970). It may also be that students are rewarded with higher grades for performing OCBs in graduate school thereby reinforcing their extra-role behaviors. The OCBs they are demonstrating in their jobs are likely very similar to the ones they demonstrated in graduate school (e.g., has an above average attendance record, does not spend a great deal of time surfing the internet, does not spend a great deal of time socializing). In addition to being job-related behaviors, these OCBs are also good study habits or disciplines that would contribute to higher academic performance in graduate school. Following this explanation, it seems logical that the employees with graduate degrees may have developed these patterns of OCB in school and transferred them to the workplace.

LEVEL of education was also significantly correlated ($r = .14, p < .05$) with Exhibits Eagerness and Enthusiasm (EAGENTHU). This relationship seems to make sense as the items on the EAGENTHU scale (e.g., displays excitement and enthusiasm about job, assumes accountability for work and commitments, demonstrates eagerness to learn, displays confidence in abilities) are behaviors that one would expect to find in high achievers. These items deal with motivation and drive to learn, which one would expect to find in individuals pursuing advanced degrees.

Limitations and Future Research

As mentioned, one obvious limitation of this study was the restriction in range for GPA as well as the fact that it was only available for approximately half (47%) of the participants. The absence of significant results in this study may also have been due to the restriction of range in college quality, performance ratings and in the OCB and SUCCEss items. In general, the participants tended to come from higher quality schools and be rated high on the performance, OCB and SUCCEss items. While this may be a limitation in this study, it speaks highly of the organization in terms of its recent college graduates and the recruitment and selection process that brought them into the organization. The high means observed for these variables indicate the these graduates are “successful” and performing well. Another limitation may be the high percentage of male participants in this study. Although still expected in the field of engineering, this bears caution in generalizing the results of this study.

This study has several advantages over previous research because the organization hires college graduates with diverse academic and demographic backgrounds and recruits from a large number of colleges and universities. Another advantage of this study was that it employed different methods of data collection for the independent and dependent variables, thus minimizing common method variance. The dependent measures (OCB, SUCCEss, PERFormance) were collected in a survey while the independent variables (COLLege QUALity, LEVEL of education, GPA) were collected from archival sources.

The results of this study may be generalized to other high-tech companies employing recent college graduate engineers. However, since this study was designed for and conducted on recent college graduate engineers, care should be taken in generalizing these results to seasoned engineers with more experience. In addition, the results with regard to college quality should be interpreted with caution as these findings are dependent upon the current college quality ranking of the Gourman Report. While there is no evidence to doubt the accuracy of Gourman's rankings, it should be noted that ranking college quality is largely a subjective process.

With respect to college quality, it was mentioned that many employers attribute their expectation of higher performance from graduates of high quality schools to the fact that these graduates learn more than those from the lower quality schools. This study did not measure academic knowledge based on college quality. The study measured college quality and job performance defined by the seven constructs taken from the organization's performance evaluation, none of which specifically addressed academic or job knowledge. Future research could look more specifically at the academic knowledge or job knowledge of graduates from schools of varying quality and how this may relate to job performance.

With respect to LEVEL of education, future research could attempt to confirm the author's expectation that graduate students exhibit higher levels of OCB and eagerness and enthusiasm in graduate school just as they were found to do on the job. Future research could also explore the similarities of the employment setting to that of the

academic setting, especially as it pertains to OCB and exhibiting eagerness and enthusiasm.

Implications

This study has several implications for the recruitment and selection of recent college graduate engineers. First, with respect to college quality, popular perception holds that graduates from the higher quality schools, having greater academic knowledge because they learn more than those from lower ranked schools, will be better performers than those from lower ranked institutions (Wise, 1975). This perception is shared by many high-tech companies, evidenced by their competitive recruitment of recent college graduate engineers from top-ranked schools like MIT and Cornell. In terms of job performance, OCB, and job-related success, graduates from the top quality institutions appeared to do no better than those from lower ranked institutions. Therefore, organizations may do just as well recruiting recent college graduate engineers from institutions ranked lower in quality. In doing so the organization may even reduce salary expenses as employees from the top-ranked schools typically command higher initial salaries (Rosenbaum, 1984; Ferris, 1982; Schick & Kunnecke, 1982; Morgan & Duncan, 1979; Wise, 1975; Wales 1973; Solmon, 1973; Weisbrod & Karpoff, 1968).

Because college quality was not found to be significantly related to job performance, OCB or job success, it was concluded that it may not be any more advantageous for the organization to recruit recent college graduate engineers from the high quality schools versus recruiting from the lesser rated schools. The researcher

assumed that most organizations who competitively recruit engineering graduates from the top quality do so because they believe that these graduates will be better performers and more successful as a result of their higher quality education. However, it should be mentioned that recruiting engineers from the higher quality colleges over the lower ranked institutions may bring other benefits to the organization outside of job performance and job success. Organizations may recruit graduates from the top quality programs simply for the “prestige” effect or because they have entered into partnerships with colleges where they donate equipment to the labs in exchange for greater company exposure and recruitment opportunities.

With respect to academic performance, high-tech companies may do well to pay attention to GPA in the recruitment of recent college graduate engineers, as many already do. GPA was found to be significantly related to OCBO and Exhibiting Eagerness and Enthusiasm. OCBO includes behaviors such as having above average attendance, conserving and protecting organizational property and not engaging in excessive socializing or surfing the internet while at work - desirable behaviors among any recruits. To this end, organizations would do well to screen candidates on the basis of GPA and attempt to hire otherwise qualified candidates with high GPAs. The recommendation was made to the organization in which this study was conducted to add a blank on its employment application for GPA and train its human resources personnel to evaluate GPA in light of its relation to OCBO and Eagerness and Enthusiasm.

Lastly, with respect to LEVEL of education, organizations would be wise to give attention to this academic background characteristic when recruiting recent college graduate engineers. LEVEL of education was found to be positively related to OCB such that as employees attain a higher degree, they tend to display higher levels of OCB. The contributions of OCBs ultimately improve the effectiveness and efficiency of the organization and are often recognized as important and valuable by organization leaders (Organ, 1988a, Orr et al., 1989; MacKenzie et al., 1991; Werner, 1994; Motowidlo & Van Scotter, 1994; Borman et al., 1995). Thus, where OCB is a desired behavior, organizations in the high-tech industry would do well to recruit recent graduates with master's degrees and doctorates.

LEVEL of education was also significantly correlated with Exhibiting Eagerness and Enthusiasm, as mentioned. This finding supports the popular perception that earning a graduate degree is a sign of success and that this type of educational achievement does transfer directly to the job, at least in terms of eagerness and enthusiasm (Wooldredge, 1979; Pascarella, 1975; Herbert, 1977). It may be that educational achievement is often partially a result of motivation (or eagerness and enthusiasm). Exhibiting Eagerness and Enthusiasm was defined by items dealing with an employee's motivation, initiative and confidence to learn and try new things - desirable behaviors among all recruits. In light of this finding, organizations may consider increasing their recruitment of advanced degree engineers.

Conclusion

The purpose of this study was to determine if organizations can rely on academic background characteristics to predict job performance, organizational citizenship behavior and organization-specific success criteria among recent college graduate engineers. The answer to this research question is yes, to some degree. Organizations can look to LEVEL of education and GPA to predict OCB and eagerness among recent college graduate engineers. In order to maximize the potential OCB and eagerness among its recent college graduate recruits, the organization should focus its recruiting efforts on hiring candidates with advanced degrees and high GPAs. Although, caution should be exercised in interpreting these findings given the little variability in GPA. It must be acknowledged that hiring employees with advanced degrees is not appropriate for all engineering positions. Organizations often recruit recent college graduate engineers to fill much-needed entry-level engineering positions and an advanced degree may make the candidate overqualified. But where the position could support and challenge a recent college graduate engineer with a master's or doctorate, the organization would do well to fill it with such a candidate. But regardless of the candidate's level of education, the organization should attempt whenever possible to hire engineers with higher GPAs. This type of recruitment strategy should maximize the potential OCB and job success to be realized among recent college graduate engineers.

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Appendix A

Survey

The following items include behaviors that have been identified as valid predictors of success.

Using the scale below, please indicate your level of agreement or disagreement with each of the following statements by circling the appropriate number next to the statement. If you do not have enough information to answer the item, circle 0 (Can Not Assess).

0	1	2	3	4	5	6
Can Not Assess	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree

My employee. . .

OCB Scale

OCBI Subscale

0	1	2	3	4	5	6	helps others who have heavy workloads.
0	1	2	3	4	5	6	assists me with my work without being asked.
0	1	2	3	4	5	6	gives advance notice when unable to come to work.
0	1	2	3	4	5	6	takes time to listen to co-workers' problems and worries.
0	1	2	3	4	5	6	takes on menial tasks without complaining.
0	1	2	3	4	5	6	passes along information to co-workers.

OCBO Subscale

0	1	2	3	4	5	6	adheres to informal rules devised to maintain order.
0	1	2	3	4	5	6	does not spend a great deal of time socializing while at work.
0	1	2	3	4	5	6	does not spend a great deal of time surfing the internet at work.
0	1	2	3	4	5	6	has an above average attendance record.

-----	-----	-----	-----	-----	-----	
0	1	2	3	4	5	6
Can Not Assess	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree

My employee. . .

0 1 2 3 4 5 6 conserves and protects organizational property.

Success Scale

Efficient and Focused on Job (EFFICFOC) Subscale

0 1 2 3 4 5 6 stays focused on his or her work.

0 1 2 3 4 5 6 figures out how to overcome obstacles on his/her own.

0 1 2 3 4 5 6 demonstrates efficiency in his/her work.

0 1 2 3 4 5 6 demonstrates the potential to be an effective manager in the future.

0 1 2 3 4 5 6 handles conflicting demands and priorities well.

0 1 2 3 4 5 6 communicates well.

Exhibits Eagerness and Enthusiasm (EAGENTHU) Subscale

0 1 2 3 4 5 6 is not afraid "to get his/her hands dirty" on the job.

0 1 2 3 4 5 6 displays excitement and enthusiasm about his/her job.

0 1 2 3 4 5 6 assumes accountability for his or her work and commitments.

0 1 2 3 4 5 6 shows initiative to complete tasks without being asked.

0 1 2 3 4 5 6 demonstrates eagerness to learn.

0 1 2 3 4 5 6 displays confidence in his/her abilities.

0 1 2 3 4 5 6 demonstrates eagerness to try new things.

Takes Direction Well (TAKESDIR) Subscale

0 1 2 3 4 5 6 will assume a subordinate role when appropriate.

0 1 2 3 4 5 6 is a good listener.

-----	-----	-----	-----	-----	-----
0	1	2	3	4	5
Can Not Assess	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree
					Strongly Agree

My employee. . .

0 1 2 3 4 5 6 takes direction well.

0 1 2 3 4 5 6 demonstrates flexibility.

Using the 5-point scale below, please rate this employee on the following dimensions by circling the appropriate response.

-----	-----	-----	-----	
1	2	3	4	5
Fails to Meet Requirements	Meets Some Requirements	Meets Requirements	Exceeds Requirements	Far Exceeds Requirements

1 2 3 4 5 **Job Knowledge** - *employee's progress in learning the technical aspects required to perform the job*

1 2 3 4 5 **Quality of Work**

1 2 3 4 5 **Quantity of Work (Output)**

1 2 3 4 5 **Working Relationships** - *employee's progress in developing healthy and productive working relationships with fellow employees*

1 2 3 4 5 **Company Procedures** - *employee's progress in learning and adapting to Company policies and procedures and compliance with Company regulations, such as absenteeism, adherence to safety standards, etc.*

1 2 3 4 5 **Customer Orientation** - *employee's understanding and demonstration that customer success is integral to the success of the Company*

1 2 3 4 5 **Team Orientation** - *employee's commitment to work in a team environment and to support team roles and team goals.*

1 2 3 4 5 **Overall Performance**

The following is a series of questions about this employee's educational background:

Please read each question and mark or write the appropriate response.

1.) I have supervised this employee for (check below):

☐ 0 - 6 months ☐ 6 months to 1 year ☐ 1 - 2 years ☐ 2 - 3 years
☐ Over 5 years

2.) Do you know where this employee attended college? ☐ Yes ☐ No

If 'Yes', what is the name of the school? _____

3.) Do you know this employee's highest level of education? ☐ Yes ☐ No

If 'Yes', check below the highest degree earned by this employee.

☐ Bachelors ☐ Masters ☐ Ph.D

4.) Do you know this employee's GPA? ☐ Yes ☐ No

If 'Yes', check below the employee's GPA.

☐ 1.50 - 1.99 ☐ 2.00 - 2.49 ☐ 2.50 - 2.99 ☐ 3.00 - 3.49 ☐ 3.50 - 4.00

5.) Do you know what this employee's major was? ☐ Yes ☐ No

If 'Yes', what was the major? _____

6.) Did you appraise this employee's performance in the last focal review period
(January 1998 for exempt employees and November 1997 for non-exempts)?

☐ Yes ☐ No

Thank you for your help!

Appendix B

Mean Responses for Items in OCB Scales

Item	<u>M</u>	<u>SD</u>	<u>N</u>
OCBI Scale			
Helps others who have heavy workloads	5.18	0.81	251
Assists me with my work without being asked	4.49	1.05	244
Gives advance notice when unable to come to work	5.13	0.84	236
Takes time to listen to co-workers' problems and	4.85	0.77	228
Takes on menial tasks without complaining	4.94	0.85	258
Passes along information to co-workers	4.98	0.76	248
Total OCBI Scale	4.98	0.54	194
OCBO Scale			
Adheres to informal rules designed to maintain order	5.01	0.74	251
Does not spend a great deal of time socializing at work	4.84	0.84	256
Does not spend a great deal of time surfing the internet	5.02	0.89	235
Has an above average attendance record	5.16	0.88	251
Conserves and protects organizational property	4.99	0.74	241
Total OCBO Scale	5.01	0.60	206
Total OCB scale	5.02	0.48	173

Appendix C

Mean Responses for Items in SUCCEss Scales

Item	<u>M</u>	<u>SD</u>	<u>N</u>
Efficient and Focused on Job Scale (EFFICFOC)			
Stays focused on work	5.07	0.88	262
Figures out how to overcome obstacles on own	4.72	1.01	260
Demonstrates efficiency in work	4.86	0.96	256
Demonstrates potential to be an effective manager	4.42	1.15	233
Handles conflicting demands and priorities well	4.64	0.85	250
Communicates well	4.82	0.89	262
Total EFFICFOC Scale Mean	4.73	0.78	222
Exhibits Eagerness and Enthusiasm Scale (EAGENTHU)			
Is not afraid "to get hands dirty" on the job	5.38	0.84	258
Displays excitement and enthusiasm about job	5.06	0.88	260
Assumes accountability for work and commitments	5.15	0.83	260
Shows initiative to complete tasks without being asked	4.79	0.99	258
Demonstrates eagerness to learn	5.36	0.81	261
Displays confidence in abilities	4.95	0.86	260
Demonstrates eagerness to try new things	5.17	0.79	258
Total EAGENTHU Scale Mean	5.15	0.62	247
Takes Direction Well (TAKESDIR)			
Will assume a subordinate role when appropriate	4.95	0.72	252
Is a good listener	4.97	0.77	259
Takes direction well	5.05	0.72	259
Demonstrates Flexibility	5.01	0.80	261
Total TAKESDIR Scale Mean	4.99	0.64	244
Total SUCCEss Scale Mean	4.97	0.61	204

Appendix D

The Gourman Report

Criteria Used in Evaluating Quality of Institutions

The Gourman Report (1996) is an objective evaluation based upon internal assessments from educators and administrators at the schools themselves. Gourman requests appraisals from individuals within the schools who are chosen based upon “their academic qualifications, their published works and their interest in improving the quality of higher education” (Gourman, 1996, p. 2). These individuals are allowed to evaluate only their own programs and not those of other institutions (Gourman, 1996). Over 90% of Gourman’s request for appraisals are answered (Gourman, 1996). The Gourman Report is also based upon external records such as “funding for public universities as authorized by legislative bodies, required filings by schools to meet standards of nondiscrimination, and material provided by the institutions (and independently verified) about faculty makeup and experience, fields of study offered, and physical plant” (Gourman, 1996, p. 2). Lastly, the Gourman Report is based upon input from individuals, associations and agencies who make projections of how successful graduates of certain schools and disciplines will be in the “real world.” The methods employed by these parties are proprietary but according to Gourman, their findings are consistently validated through experience (Gourman, 1996).

Appendix D (Continued)

The following are taken into consideration in the evaluation of each educational program and institution. It should be noted that, because different disciplines vary in their educational methodology, the significance given each criterion will vary from the rating of one discipline to the next; however, The Gourman Report's evaluation is consistent for all schools listed within each field of study.

1. Auspices, control and organization of the institution;
2. Total educational programs offered and degrees conferred (with additional attention to "subfields" available to students within a particular discipline);
3. Age (experience level) of the institution and of the individual discipline or program and division;
4. Faculty, including qualifications, experience, intellectual interests, attainments, and professional productivity (including research);
5. Students, including quality of scholastic work and records of graduates both in graduate study and in practice;
6. Basis of and requirements for admission of students (overall and by individual discipline);
7. Number of students enrolled (overall and for each discipline);
8. Curriculum and curricular content of the program or discipline and division;
9. Standards of quality of instruction (including teaching loads);

Appendix D (Continued)

10. Quality of administration, including attitudes and policy toward teaching, research and scholarly production in each discipline, and administration research;
11. Quality and availability of non-departmental areas such as counseling and career placement services;
12. Quality of physical plant devoted to undergraduate, graduate and professional levels;
13. Finances, including budgets, investments, expenditures and sources of income for both public and private institutions;
14. Library, including number of volumes, appropriateness of materials to individual disciplines, and accessibility of materials.
15. Computer facility sufficient to support current research activities for both faculty and students;
16. Sufficient funding for research equipment and infrastructure;
17. Number of teaching and research assistantships;
18. Academic-athletic balance.

Because The Gourman Report assigns a single numeric rating to each institution assessed, it offers the most convenient comparison of institutions on quality. The Gourman Report gives each college or university appraised a 3-digit numerical rating on a scale as follows: 0.00 "Not Sufficient"; 2.01 - 2.49 "Marginal"; 2.51 - 2.99 "Adequate"; 3.01 - 3.59 "Acceptable"; 3.61 - 3.99 "Good"; 4.01 - 4.49 "Strong"; 4.51 - 4.99 "Very Strong." The quality ratings for all participants (N=267) ranged from a minimum of 0.00

Appendix D (Continued)

to a maximum of 4.93 with an average quality rating of 3.88 which falls in the “Good” category of Gourman’s scale. Examining the mean quality ratings by level of degree yields an average quality rating for bachelor’s degrees ($n = 120$) of 3.70 or “Good”. The average college quality ratings for master’s degrees and Ph.D.’s were slightly higher at 3.98 “Good” and 4.13 “Strong,” respectively. The progressively higher ratings in quality with higher degree attainment can be explained by examining the distribution of quality ratings among the 3 levels of degrees. The mode for the distribution of college quality ratings of bachelor’s degrees was 3.27 or “acceptable.” In examining the distributions of college quality ratings among master’s degrees and doctorates the modes were 4.89 and 4.80 (“Very Strong”), respectively. The impact of the higher modes in the smaller samples for the master’s ($n = 91$) and doctorate’s ($n = 56$) accounts for the higher average quality ratings among the participants with graduate degrees. Thus, it would appear that the company recruited a higher proportion of its graduate-level engineers from the higher quality institutions in comparison with its employees with bachelor’s degrees, where the proportion of engineers recruited from the lower ranked schools was larger.

Appendix E

Manager Awareness of Participants' Academic Background

The final section of the survey included items assessing the manager's awareness of their new graduate employee's educational background and the length of time they had supervised the employee. Overall, the managers were relatively new to supervising their employees. One hundred sixty-four (61%) of the participants had been supervised by their manager for less than 6 months, 75 (28%) for 6 months to 1 year, 13 (4.9%) for greater than 1 but less than 2 years, and 9 (3.4%) for greater than 2 but less than 3 years. Length of management supervision was missing for 6 (2.2%) of the participants.

Manager Awareness of College Attended

When asked if they knew the college attended by their employee, managers answered "yes" for 195 (73%) participants. If managers answered "yes" they were asked for the name of the school in the next question. Their answers were checked with the schools on record for the participants to verify accuracy of the managers' reported awareness of college attended. For the 192 ($N = 267$) participants for whom this item was completed, managers listed the correct school for 174 (91%) participants while for 18 (9.4%) they listed the incorrect school. Thus, for the majority of the participants (73%) managers were aware of the college attended. When managers thought they knew the school attended by their employees, they were largely correct.

Appendix E (Continued)

Manager Awareness of Level of Education

Managers were asked if they knew the highest level of education attained by their employee. Of the 246 participants ($N = 267$) for which this item was completed, for 239 (97%) the managers indicated that they knew the highest degree earned by their employee. If managers responded that they knew the highest degree of their employee they were asked to circle the highest degree (bachelor's, master's, Ph.D.) in the next question. Managers' responses were verified against the highest degree on record for the employee. Managers circled the correct highest degree earned for 238 (94%) of 252 participants for whom this item was completed. Thus, overall, the managers were largely aware of the highest level of education attained by their employees.

Manager Awareness of GPA

Finally, managers were asked if they knew the GPA of their employees. Of the three academic background characteristics in this study, managers were least aware of their employees' GPAs. Managers responded that they knew the employee's GPA for only 49 (18%) ($N = 267$) participants. Managers responded that they did not know the GPA for 203 (76%) of the participants and this item was missing for 15 (6%) participants. The high percentage of missing GPA is likely due to the fact that GPA is not requested on the employment application. Had GPA been requested on the employment application, managers would likely have been more aware of their employees' academic performance. Due to the fact that GPA of record was only

Appendix E (Continued)

available for 125 (47%) participants, the accuracy of the managers' reported GPAs for participants was not verified.

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Appendix F

TO: Shawn Beatty
93 Kennedy Ave., #1
Campbell, CA 95008

FROM: Serena W. Stanford *Serena W. Stanford*
AAVP, Graduate Studies & Research

DATE: November 28, 1997

The Human Subjects-Institutional Review Board has approved
your request to use human subjects in the study entitled:

"Academic Background Characteristics and Prediction
of Organizational Citizenship Behavior and Job
Success"

This approval is contingent upon the subjects participating in
your research project being appropriately protected from risk.
This includes the protection of the anonymity of the subjects'
identity when they participate in your research project, and
with regard to any and all data that may be collected from the
subjects. The Board's approval includes continued monitoring
of your research by the Board to assure that the subjects are
being adequately and properly protected from such risks. If at
any time a subject becomes injured or complains of injury, you
must notify Serena Stanford, Ph.D., immediately. Injury
includes but is not limited to bodily harm, psychological
trauma and release of potentially damaging personal
information.

Please also be advised that all subjects need to be fully
informed and aware that their participation in your research
project is voluntary, and that he or she may withdraw from the
project at any time. Further, a subject's participation, refusal to
participate, or withdrawal will not affect any services the
subject is receiving or will receive at the institution in which
the research is being conducted.

If you have any questions, please contact me at
(408) 924-2480.

The California State University:
Chancellor's Office
Bakersfield, Chico, Dominguez Hills,
Fresno, Fullerton, Hayward, Humboldt,
Long Beach, Los Angeles, Maritime Academy,
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IMAGE EVALUATION TEST TARGET (QA-3)

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