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Lander University

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Editor
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# CONTENTS

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# MEASUREMENT INVARIANCE OF TEN CONSTRUCTS OF PRE-MATRICULATION FRESHMAN ATTITUDES TO COLLEGE STUDENT ATTRITION

**Ronald M. Rivas, Canisius College**
**Paul L. Sauer, Canisius College**
**Joseph G. Glynn, Canisius College**
**Thomas E. Miller, University of South Florida**

## ABSTRACT

*This study evaluated the measurement equivalence/invariance (ME/I) of a ten-construct factorial measurement model of college student attrition based on self-reported attitudes of entering college freshmen. Establishing metric invariance is the first step towards validation of constructs relevant for an early warning system to prevent college student attrition. The study uses a survey administered annually from 1995 to 1999. This allowed students from the last cohort either to graduate or to drop out by 2004. It discusses ten constructs that resemble the Cabrera, Nora, and Castañeda (1993) model of first-second year of college student persistence. The Cabrera et al. (1993) model claims that college persistence is affected by external factors or student background variables, and endogenous factors such as academic integration, social integration, institutional commitment, goal commitment, academic performance, and intent to persist. We included additional background measures of high-school attitudes towards academics. We also introduced measures of social integration, political interests and concern-for-the-disadvantaged because these were suitable to the type of college from which we drew our sample. Results of the measurement invariance tests revealed full metric invariance and validity for seven of the ten constructs of our model. We discuss implications for future research.*

## INTRODUCTION

What pre-matriculation attitudes could be used to build a consistent early warning system to prevent college dropout? That is, what constructs measured with pre-matriculation surveys could anticipate college student attrition with the same degree of measurement equivalence from year to year? A main stream of the college retention literature focuses on validation of predictive models of potential dropout students using first-to-second year college students surveys Astin, 1975; Bean,

1982; Cabrera, Castañeda, Nora, & Hengstler, 1992; Cabrera, Nora, & Castañeda, 1993; Tinto, 1975). Recent research emphasizes the evaluation of pre-matriculation surveys to establish early warning systems aiming to detect potential dropout students (Beck & Davidson, 2001; Porter & Umbach, 2006). This study contributes to the latter research stream by assessing the measurement invariance of constructs used in an early warning system of college dropouts.

Evidence of a highly predictive model of student attrition has been presented in previous research (Glynn, Sauer & Miller, 2003). We used the Glynn et al. (2003) measurement instrument that included items taken from the Cooperative Institutional Research Program (CIRP) Survey plus items from in-house survey instruments utilized internally in the past. Recent published research has provided preliminary indications that the factor structure is highly consistent over time having established evidence configural invariance(Glynn, Sauer, & Miller, 2005), yet no formal statistical tests were used to evaluate the metric or scalar invariance of the factor structure.

The purpose of this study is directed toward the first-step in the model estimation process, namely, to conduct statistical tests of measurement equivalence/invariance (ME/I) of the factor structure to verify invariance across attrition cohorts and over time. The rationale for determining time invariance is that the constructs used in the model must consistently measure the same latent characteristic in order for the construct to have validity as a measure of what it purports to represent. The rationale for the cohort invariance is to provide a basis for testing mean differences of constructs across attrition cohorts.

We begin by reviewing the retention model literature, as this is the basis for incorporating the constructs that are included in any valid model of student retention. We next review the literature on measurement invariance then proceed to a discussion of recent findings in the literature regarding the application of our freshman survey data to empirical application of a model of student retention. This is followed by application of structural equations analysis designed to test ME/I. It is important to note that this invariance evaluation is exploratory in nature and does not include the theoretically derived and empirically tested structural relationship between the constructs. We conclude with a discussion of our results.

**Theoretical Background**

The received view on student retention highlights the contributions of there models: the Student Attrition Model (SAM) (Bean, 1982), the Student Integration Model (SIM) (Tinto, 1975) and Astin's Theory of Involvement (Astin, 1975). Tinto (1975) argues the probability of student attrition decreases with student integration into the social activities and academic life of a college or university. Attrition is a direct function of the fit between the student and the institution academic and social life.

Tinto's model captures the compatibility between a student's motivation, drive and academic ability (academic performance) and the academic characteristics (academic integration) and social

characteristics of the college or university (social integration). Bean (1982) proposed an alternative comprehensive model (SAM) that included external factors. External factors include attitude constructs that affect intent both directly such as finances (financial attitude) and indirectly such as the influence of parents and friends mediated by institutional fits (encouragement from friends and family).

Efforts to integrate the SIM and SAM models demonstrated that the two models are (Cabrera et al., 1992; Cabrera et al., 1993). Cabrera et al. (1993) expanded the model of college attrition showing that external or background variables were stronger and more complex than had been portrayed and confirmed in empirical tests of the SAM model alone.

While the development and refinement of the SAM and SIM models has taken a descriptive approach and at times a normative one and thus contributed much to our understanding of the attrition process and its antecedents, there is, nevertheless, a need to be able to predict which students might be most prone to premature departure from the university based upon data collected prior to and during matriculation. While such a predictive model is the ultimate goal of our efforts, in this study we attempted to establish some of the measurement properties leading to a structural equation model of attrition. As such we will next compare the indicator variables and constructs in our model with those of the comprehensive model of Cabrera et al. (1993).

**Pre-matriculation Freshman Attitudes towards college persistence**

Our constructs follow closely those in Cabrera et al 1993 model and have been used in previous research (Glynn et al., 2005). The Cabrera et al. (1993) model supports the inclusion of constructs measuring external variables such as financial attitudes, and endogenous variables, such as social integration academic integration goal commitment, institutional commitment, and intent to persist. Our model includes external factors that affect student attrition directly, such as "financial attitudes," and other complex background constructs. We included in our model three such constructs that measure high school attitudes towards study: 1) "bad academic attitudes," 2) "good study habits," and 3) "teacher relationships." In addition, we measured "academic integration," "social integration," "institutional commitment," "goal UN-commitment," and "UN-intent to persist," (perceived probability of academic failure), where "UN-" indicates a lack of the construct, such as uncommitted to a goal or lack of intent to persist. We included two constructs related to social integration, "concern for the disadvantaged" and "political interest." These constructs measure important aspects of student social integration in a sectarian private college. We did not include "academic performance" because the surveyed students had no college experience at the time of the survey.

Perception of cost resembles "financial attitude," which is an important factor in choosing a college, and may play a role in decisions to withdraw. "Moral/religious attitudes" signal the student institutional commitment to the mission of our sectarian private school. At a sectarian

college, "concern for the disadvantaged" is a means to participate in extracurricular activities and for social integration. "Political interests" may serve as the catalyst for social integration. Both could result in extracurricular activities that contribute to social integration, an important factor in student retention (Cabrera et al., 1993; Tinto, 1993).

While there have been excellent empirical tests of these models that help to qualify the results according to characteristics such as type of institution, there has not been an effort made to statistically assess the temporal invariance of the measurement and structural parameters that constitute the construct relationships. Such invariance is essential if the model is to have sufficient validity to be applied in a normative way from school year to school year. We next proceed to review the literature review on measurement invariance.

**Measurement Invariance**

Tests for measurement equivalence/invariance (ME/I) are rarely performed in the assessment of measurement models. Measurement invariance is the equality or equivalence of estimated parameters of a model when applied to data across different population groups (Meade & Lautenschlager, 2004). Meade and Lautenschlager (2004) describe measurement invariance as "operations yielding measures of the same attribute under different conditions" (p. 61). In our study the "condition" across which we wish to assess invariance is caused by the passage of time. Our goal is to statistically apply metric invariance tests to determine if the indicated constructs based on observed variables for students matriculating in the year 1995 will be the same as for freshmen matriculating in years 1996, 1997, 1998, and 1999. In other words, we test whether our constructs are consistent across the years, that is, whether or not our constructs are measuring factors of attrition from year to year with the same degree of equivalence across years.

First, before any model can be applied to predict the behavior of different groups, the invariance of constructs must first be established (Vandenberg and Lance 2000). Second, the validity of any prediction is challenged if the constructs are inconsistent over time because of cultural changes that have occurred in our society (Thornburgh, 2006). It is therefore crucial to establish time invariance. The relevant ME/I procedures tests are designed to statistically test if factor loadings are invariant across years and across groups (metric invariance) (Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000). We are concerned with establishing longitudinal or time invariance across freshman cohorts from 1995 to 1999.

Most of the recent literature on measurement equivalence/invariance has focused on factor analytic models. Hierarchies for testing invariance have been proposed (Steenkamp & Baumgartner, 1998; Vandenberg, 2002; Vandenberg & Lance, 2000). Their hierarchy begins with a test for equivalence of covariance structures for all variables in the model. The second test is of configural invariance. Previous research had established configural invariance of the ten constructs used in this study (Glynn et al., 2005). Hence, we begin by evaluating metric invariance, which requires that

the values of the factor loading be statistically equal. This can be tested using confirmatory factor analysis (CFA) in which the parameters of the factor loadings are constrained to be equal across groups and the same manifest indicators are specified to load on the same factors across cohorts (Arbuckle & Wothke, 1999).

## METHOD

### Data

We used a set of item from our college freshman attitude and opinion survey (FAOS). This survey is administered annually to incoming freshman students prior to the beginning of classes. A subset of the college's FAOS survey has been employed as indicators of no more than twelve factors that are used in the predictive model of Glynn et al. (2003). We took ten factors to assess the measurement invariance of constructs comparable to the extent possible to those found in the Cabrera et al. (1993) model.

### Variables

Although we are not replicating the full structural equations model of Cabrera et al. (1993), we are using a set of constructs that resembles it in an attempt to evaluate their measurement invariance. Because we are using the Cabrera et al. (1993) model as our basis for naming the constructs in the model we test, we classified the constructs as either "external factors" or "endogenous factors" as these authors did.

#### External factors

As measures of external factors we included "financial attitudes" and three of constructs that measure high school attitudes towards study: 1) bad academic attitudes, 2) good study habits, and 3) teacher relationships.

#### Endogenous factors

We measured "academic integration," "social integration," "institutional commitment," "goal UN-commitment," and "(UN)-intent to persist." We included two constructs related to social integration, "concern for the disadvantaged" and "political interest". We did not include "academic performance" measured as GPA as in Cabrera et al (1993) because it had only one measurement variable (GPA). Single-item constructs introduce instability in the estimation of Amos 6.0. We did not include the construct "persistence," for similar reasons.

## Sample

Our samples were drawn from a U.S. Northeast sectarian undergraduate liberal arts college. The samples are taken from the incoming freshman population during admission processing. Our samples consist of about 95% of the freshman entry population for every year. In this study we use the samples of freshman students from 1995 to 1999 with the year of matriculation defining the cohort for that year. Using the cohorts from 1995 to 1999 ensures that all the students had either graduated or dropped out at least five years after the last cohort was admitted. In addition, it contributes to the external validity of this study by comparing our constructs with those used by Glynn et al. (2003) with college data from 2000 to 2003.

## Multiple Group Data Analysis

Amos 6.0 was used to perform a multi-group (multi-cohort) confirmatory factor analysis (CFA) as the basis for testing metric invariance and establishing measurement properties of reliability and validity. We constrained the factor loadings in CFA to be equal across the freshman cohorts from 1995 to 1999 to test for metric invariance. A significance level in the chi –square difference statistic greater than 0.05 indicates full metric invariance (Arbuckle, 2003). Other measures of fit are recommended to verify that the metric-invariant model does indeed fit well (Shook, Ketchen-Jr., Hult, & Kacmar, 2004). In our study these fit measures include: the Comparative Fit Index (CFI), the Incremental Fit Index (IFI), the Normed Fit Index (NFI), and the Tucker Lewis Index (TLI). These indices had to be larger than or equal to 0.95 for fit to be considered to be good. We also used RMSEA, with a goodness-of-fit acceptance level < 0.06 (Hu & Bentler, 1999).

# RESULTS

Results in Table 1 provide CFA tests for full metric invariance for ten constructs from yearly samples of freshman from 1995 to 1999. The factor structure passed the test of full metric invariance. Table 2 shows chi-square differences that indicate our model had full metric invariance (Chi-square difference = 19.5, p = 0.30), indicating that the values of the factor loadings were not significantly different over the five years of data for all ten constructs. Furthermore, the CFI, IFI and RMSEA fit indices indicate good fit for the full metric invariance model (CFI = 0.95, IFI = 0.95, RMSEA = 0.03). CFI, IFI and RMSEA have been found to be more robust than NFI and TLI (Shook et al., 2004) which is why we have chosen to use them as our indicators of goodness-of-fit.

**Table 1: Measurement Invariance Hierarchical tests: Time invariance of pooling years sequentially**

| | df | $\chi^2$ diff [a] | p | NFI [b] | TLI [b] | IFI [b] | CFI [b] | RMSEA [b] |
|---|---|---|---|---|---|---|---|---|
| 1995 versus 1996 | 17 | 16.4 | 0.50 | 0.89 | 0.93 | 0.94 | 0.94 | 0.03 |
| 1995-1996 versus 1997 | 17 | 18.4 | 0.36 | 0.91 | 0.93 | 0.94 | 0.94 | 0.03 |
| 1995-1997 versus 1998 | 17 | 17.3 | 0.44 | 0.92 | 0.93 | 0.95 | 0.95 | 0.03 |
| 1995-1998 versus 1999 | 17 | 19.5 | 0.30 | 0.93 | 0.93 | 0.95 | 0.95 | 0.03 |

[a] $\chi$2 differences with p>0.05 indicates that the groups compared have the same factor loadings (full metric invariance).

[b] Good fit is indicated by NFI, TLI, IFI, and CFI > 0.95 and RMSEA <0.06.

Table 2 shows the tests for reliability, convergence validity and discriminant validity for our revised model. We report the value of composite reliability (Fornell & Larcker, 1981) as our basis for establishing reliability because composite reliability (CR) has been shown in the context of formative structural equation models to be more robust than the more conventional measure of reliability, Cronbach's Alpha, reported in most research. Using 0.7 as the minimum CR value to establish reliability, we see in the first column of Table 2 that four of the ten latent constructs failed to reach the 0.7 level; though two were close -- "concern for the disadvantaged" (CR = 0.68) and "bad academic attitude" (CR = 0.67) -- two other were farther from the goal: "good study habits (CR = 0.59) and "teacher relationships" (CR = 0.58).

For convergence validity, the average extracted variance (AVE) of the latent construct should be greater than 0.5 (Fornell & Larcker, 1981). A latent construct has discriminant validity if the construct's AVE is larger than any of its squared correlation with other constructs (Fornell & Larcker, 1981). The second column of values in Table 2 labeled AVE lists the diagonal elements of the variance-covariance matrix displayed to the right in columns BA through UP. AVE values indicate that convergent validity is established for all but the first three constructs, namely, "bad academic attitudes" (AVE = 0.41), "good study habits" (AVE = 0.33), and "teacher relationships" (AVE = 0.41). These same three constructs also failed to pass the criterion for reliability. For discriminant validity, the off-diagonal elements of the variance-covariance matrix should be less than the diagonal elements (AVE) shown in bold. Discriminant validity is established for all ten latent constructs in the model.

**Table 2: Reliability, Convergent Validity, and Discriminant Validity- Pooled sample 1995-1999**

| | CR | AVE | BA | GH | TR | FA | IC | GC | AI | PI | CD | UP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bad Academic Attitudes | 0.67 | 0.41 | 0.41 | | | | | | | | | |
| Good Study Habits | 0.59 | 0.33 | 0.00 | 0.33 | | | | | | | | |
| Teacher Relation-ships | 0.58 | 0.41 | 0.08 | 0.28 | 0.41 | | | | | | | |
| Financial Attitudes | 0.77 | 0.53 | 0.00 | 0.02 | 0.02 | 0.53 | | | | | | |
| Institutional Commit-ment | 0.77 | 0.63 | 0.02 | 0.07 | 0.06 | 0.01 | 0.63 | | | | | |
| Goal Commit-ment | 0.87 | 0.78 | 0.02 | 0.00 | 0.02 | 0.00 | 0.00 | 0.78 | | | | |
| Academic Integration | 0.84 | 0.52 | 0.04 | 0.13 | 0.18 | 0.08 | 0.13 | 0.03 | 0.52 | | | |
| Social Integration I (Enjoy Politics) | 0.76 | 0.52 | 0.01 | 0.04 | 0.05 | 0.00 | 0.08 | 0.00 | 0.06 | 0.52 | | |
| Social Integration II (Concern for Dis-advantaged) | 0.68 | 0.52 | 0.00 | 0.14 | 0.14 | 0.03 | 0.11 | 0.00 | 0.20 | 0.21 | 0.52 | |
| UN-Intent to Persist | 0.79 | 0.65 | 0.24 | 0.01 | 0.10 | 0.01 | 0.00 | 0.07 | 0.06 | 0.00 | 0.02 | 0.81 |

Note 1: The shaded numbers on the diagonal are the Average Extracted Variance. Off diagonal elements are the square values of correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements. For good reliability CR > 0.7. For convergence validity AVE > 0.50. See Fornell and Larcker (1981).

Abbreviations: Composite Reliability (CR), Average Extracted Variance (AVE), Bad Academic Attitudes (BA), Good Study Habits (GH), Teacher Relationships (TR), Financial Attitude (FA), Institutional Commitment (IC), Goal UN-Commitment (GC), Academic Integration (AI), Political Interest (PI), Concern for Disadvantaged (CD), UN-Intent to Persist (UP).

Any indicator variable that has a standardized factor loadings (SFL) less than 0.7 is considered to be weakly correlated with other indicators of the same latent construct and hence may not be suitable for the scale (Bentler, 1992; Byrne, 2001). To determine which indicator variables have weak correlations with other indicator variables defining the same latent construct, we examine the SFLs shown in Table 3.

**Table3: Standardized Factor Loadings of the Pooled sample 1995-1999**

| Constructs and items Description | Item Name | Estimate |
|---|---|---|
| *Bad Academic Attitudes* | | |
| Had difficulty concentrating on assignments | TUFCONC | 0.66 |
| Made careless mistakes on tests | CARELESS | 0.57 |
| Turned assignments late | WASLATE | 0.55 |
| *Good Study Habits* | | |
| Did extra-credit assignments | XCRED | 0.54 |
| Studied with friends | FRNDHLP | 0.52 |
| Saw teachers for help after class | AFTCLAS | 0.70 |
| *Teacher Relationships* | | |
| Had excellent teacher in class | TOPTCHR | 0.59 |
| I had very good relationships with most of my high school teachers | HSRELAT | 0.59 |
| *Financial Attitudes* | | |
| Tuition, room, and expenses | TUITION | 0.74 |
| Quality of service in financial aid program | FINSERV | 0.63 |
| Expected cost to you and your family | EXPCOST | 0.87 |
| *Institutional Commitment* | | |
| Religious tradition | RELTRAD | 0.80 |
| Jesuit academic tradition | JESUIT | 0.88 |
| *Academic Integration* | | |
| Quality of faculty | FACQUAL | 0.72 |
| Small class size | CLASSIZE | 0.47 |
| Individual attention from faculty and administration | INDATTN | 0.69 |

| Table3: Standardized Factor Loadings of the Pooled sample 1995-1999 | | |
|---|---|---|
| Constructs and items Description | Item Name | Estimate |
| Specific academic programs | ACADPROG | 0.62 |
| Teaching reputation | TEACHREP | 0.78 |
| *Social Integration I (Enjoy Politics)* | | |
| I enjoy discussing political issues | POLITICS | 0.66 |
| Influencing the political structure ** | POLIT | 0.72 |
| Keeping up to date with political affairs ** | POLAFF | 0.88 |
| *Social Integration II (Concern for Disadvantaged)* | | |
| Helping to promote racial understanding ** | RACUNDER | 0.65 |
| Helping people who are in need * | NEEDY | 0.74 |
| *Goal UN-Commitment* | | |
| Change major field of study * | CHGMAJ | 0.90 |
| Change career plans * | CHGPLAN | 0.90 |
| *UN-Intent to Persist* | | |
| Fail one or more courses ** | FAILING | 0.77 |
| Drop out temporarily * | DROPOUT | 0.53 |
| Some of the items on the college's Attrition Survey instrument were borrowed directly from the CIRP Values instrument – these items are signified with **. Items denoted by a single * are very close to items on the CIRP instrument – only minor changes in wording were made on these items. | | |

All indicators of the first three constructs listed in Table 3 -- "bad academic attitudes," "good study habits," and "teacher relationships" -- fail to exceed the 0.7 criterion. These three constructs also failed to satisfy both the reliability and convergent validity criteria. Other indicator variables failing to meet the 0.7 criterion include "quality of services in financial aid program" (SFL = 0.63) loading on the "financial attitude" construct; "small class size" (SFL = 0.47), "individual attention from faculty and administration" (SFL = 0.69), and " specific academic programs" (SFL = 0.62) loading on the "academic integration" construct; "I enjoy discussing political issues" (SFL = 0.66) loading on the "social integration I -- enjoy politics" construct; "helping to promote racial understanding" (SFL = 0.65) loading on the "social integration II – concern for the disadvantaged" construct; and "drop out temporarily" (SFL = 0.59) loading on the "Un-intent to persist" construct.

## DISCUSSION

We started this study with the purpose of assessing the full metric measurement invariance of ten factors useful to establish an early warning system of college dropouts. The results support largely the full metric invariance of the ten constructs. However, we found that a distinction should be made between reflective and formative latent variables before these constructs could be consistently applied to an early warning system (Jarvis, MacKenzie, & Podsakoff, 2003). We found that seven of these constructs could be modeled as reflective constructs, that is, they have items that are similar and correlated manifestations of the underlying latent variable. On the other hand, three constructs are suitable to be modeled as formative latent variables, that is, items loading on these construct represent distinct and different aspects forming or "causing" the latent variable.

Full metric invariance allows the comparison of scores of survey items across years. Full metric invariance provides statistical evidence that the items are measuring the same underlying latent variable over time. In the context of a structural equation model such as Cabrera et al. (1993), this is important in establishing the basis for intervention and counseling of potential dropouts. It also assists in determining if there are changes in the characteristics of students admitted to academic programs over time. For example, the college used as a basis for this study has been interested in evolving into a college serving a larger geographic region than merely a local one. There is also pressure from accrediting agencies for colleges to become more diverse in terms of both student and faculty composition. Hence, it is crucial to assess consistency of measurement across time before elaborating a predictive early warning system of college dropouts.

The poor performance in invariance and measurement property tests of the first three constructs -- "bad academic habits," "good study habits," and "teacher relationships" -- likely means that these three constructs should be treated being identified as formative rather than reflective latent variables (Jarvis et al., 2003). This can be seen if one examines the first construct, "bad academic attitudes." Indicators of reflective latent variables share a common variance, and are similar aspects of the latent construct, that is, if any one of the items is removed, the meaning of the construct remains the same. However, a close examination suggests that items loading on "bad academics habits" represent different aspects of the construct. For example, "turning assignments in late" is a different behavior than "making careless mistakes on tests." In fact, the more students combine both behaviors, the more likely their academic attitude was worse than if they only enact either one of these behaviors. Hence, removing any one of these two items would restrict the meaning of the construct because it would omit an important element of the spectrum of "bad academics habits." A similar comparison can be made for the constructs, "good study habits" and "teacher relationships."

The other items with weak standardized factor loadings (SFL) were more likely the result of an item in the indicator set not having a close enough relationship with the underlying construct rather than the set requiring formative modeling. This can be seen from the perspective of simple

face validity. How would an incoming freshman, for example, be expected to equate "small class size" with "quality of the faculty" in assessing the likelihood of academic integration? Except for "small class size" and "dropout temporarily," the other indicators failing to meet the 0.7 criterion all had SFLs in the 0.6 to 0.7 range with most at or above 0.65. Because the 0.7 criterion is somewhat arbitrary, deviation from 0.7 in the 0.65 to 0.69 range should not be considered to be strong enough to warrant deletion of that indicator variable from the measurement model.

Future research needs to address other measurement issues such as scalar invariance and to test for this and metric invariance in the context of a full structural equation model that includes both exogenous and endogenous constructs based on theory such as that proposed by Cabrera et al. (1993). In extending this work, the first three constructs should be reconfigured as formative rather than reflective indicators with a technique such as partial least squares (PLS) applied to estimate the parameters of the resultant mixed formative-reflective model. Such work should lead to a highly valid and reliable test of all structural relationships between latent constructs in the context of attrition theory, thereby establishing true differences in latent constructs as well as the nomological validity of the attrition model.

## CONCLUSION

This study provided tests of measurement invariance both across time for five years of annual surveys of matriculating freshman at a private sectarian college in the Northeast. The results show that our factorial measurement instrument had full metric invariance from 1995 to 1999. It should be noted that the practice of pooling years of survey data to generate the factor structure prior to estimating the choice model is justified if temporal invariance is established as it was. Invariance, however, should be established before pooling proceeds. Metric invariance establishes the fact that students rate items in the same way from year to year.

Future research should examine other cohorts to test for measurement invariance, including: invariance between attrition groups: dropouts, stopouts and persistors; invariance between students in business, arts and sciences and education; and, invariance between students in freshman, sophomore, junior and senior years.

## REFERENCES

Arbuckle, J. L. (2003). *Amos 5.0 Update to the Amos User's Guide* Chicago, IL: SmallWaters Corporation.

Arbuckle, J. L., & Wothke, W. (1999). *AMOS 4.0 User's Guide*. Chicago, IL: Small Waters Corporation.

Astin, A. W. (1975). *Preventing students from dropping out*. San Francisco: Jossey-Bass.

Bean, J. P. (1982). Student Attrition, Intentions, and Confidence: Interactions Effects in a Path Model. *Research in Higher Education, 17*, 291-319.

Beck, H. P., & Davidson, W. D. (2001). Establishing an early warning system: Predicting low grades in college students from survey of academic orientations scores. *Research in Higher Education, 42*(6), 709-723.

Bentler, P. M. (1992). On the fit of models to covariances and methodology to the Bulletin *Psychological Bulletin, 112*, 400-404.

Byrne, B. M. (2001). Chapter 7, Application 5: Testing for an Invariant Factorial Structure of a Measuring Instrument (First-Order Confirmatory Factor Analysis Model). In *Structural Equation Modeling with AMOS. Basic Concepts, Applications, and Programming* (pp. 173-200). Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc.

Cabrera, A. F., Castañeda, M. B., Nora, A., & Hengstler, D. (1992). The Convergence between Two Theories of College Persistence. *Journal of Higher Education, 63*(2), 143-164.

Cabrera, A. F., Nora, A., & Castañeda, M. B. (1993). College Persistence: Structural Equations Modeling Test of an Integrated Model of Student Retention. *Journal of Higher Education, 64*(2), 123-138.

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research, 18*(February), 39-50.

Glynn, J. G., Sauer, P. L., & Miller, T. E. (2003). Signaling student retention with prematriculation data. *NASPA Journal, 41*(1), 41-67.

Glynn, J. G., Sauer, P. L., & Miller, T. E. (2005). Configural invariance of a model of student attrition. *Journal of College Student Retention: Research, Theory and Practice 7*(3), 263-281.

Hu, L.-T., & Bentler, P. M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. *Structural Equations Modeling, 6*(1), 1-55.

Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A Critical Review of Constructs Indicators and Measurement Model Misspecification in Marketing and Consumer Research. *Journal of Consumer Research, 30*(September), 199-218.

Meade, A. W., & Lautenschlager, G. J. (2004). A monte-carlo study of confirmatory factor analytic tests of measurement equivalence/invariance. *Structural Equation Modeling, 11*(1), 60-72.

Porter, S. R., & Umbach, P. D. (2006). College major choice: An analysis of person-environment fit. *Research in Higher Education, 47*(4), 429-449.

Shook, C. L., Ketchen-Jr., D. J., Hult, G. T. L., & Kacmar, K. M. (2004). An Assessment of the Use of Structural Equation Modeling in Strategic Management Research. *Strategic Management Journal, 25*, 397-404.

Steenkamp, J. E. M., & Baumgartner, H. (1998). Assessing measurement invariance in cross-national consumer research. *Journal of Marketing Research, 25*(1), 78-90.

Thornburgh, N. (2006). Dropout Nation. *Time, 167*(16), 30-40.

Tinto, V. (1975). Dropout from Higher Education: A Theoretical Synthesis of Recent Research. *Review of Educational Research, 45,* 89-125.

Tinto, V. (1993). *Leaving College: Rethinking the Causes and Cures of Student Attrition*: The University of Chicago Press.

Vandenberg, R. J. (2002). Toward a further understanding of and improvement in measurement invariance methods and procedures. *Organizational Research Methods, 5*(2), 139-158.

Vandenberg, R. J., & Lance, C. E. (2000). A Review and Synthesis of the Measurement Invariance Literature: Suggestions, Practices, and Recommendations for Organizational Research. *Organizational Research Methods, 3*(1), 4-69.

# AN EMPIRICAL EXAMINATION OF THE PHENOMENON OF GRADE INFLATION IN HIGHER EDUCATION: A FOCUS OF GRADE DIVERGENCE BETWEEN BUSINESS AND OTHER FIELDS OF STUDY

**S. Keith Lowe, Jacksonville State University**
**Patricia C. Borstorff, Jacksonville State University**
**Robert J. Landry III, Jacksonville State University**

## ABSTRACT

*This study examined the level of grade inflation experienced by college graduate cohorts between two time periods: 1993 and 2000. Research emphasis was centered upon grade inflation of graduates in business and compared to eleven other academic fields of study. The data for this study originated from the Baccalaureate and Beyond Longitudinal Study (B&B) series conducted by the National Center for Educational Statistics. Through independent sample t-tests, the results showed significant grade inflation in the GPA of college graduates had occurred in the interim between these two time periods. Specifically, it was found that cumulative and within major GPAs had increased across all twelve fields of study at means of 0.23 and 0.21 grade points, respectively. One-way analysis of variance (ANOVA) procedures also indicated that while grade inflation did occur within each of the twelve academic fields of study chosen for this study, some fields experienced a disproportionate rate of grade inflation in relation to the other fields. Post-hoc tests revealed that graduates from the business field experienced grade inflation that was significantly different than several other fields of study. Notably, the grade inflation level within major GPA from business graduates was higher than graduates in engineering, life sciences, mathematics, and physical sciences but less than education and professional fields. The level of grade inflation within cumulative GPA of business graduates was found to be less than graduates in health, life sciences, mathematics, and physical sciences but greater than graduates in professional fields of study.*

## INTRODUCTION

Academic achievement as a research topic is prevalent within the existing literature on higher education in the United States. The most common measurement of academic achievement is provided through the assignment of some form of grading or marking system (Basinger, 1997; Betts, 1995). Colleges and universities almost universally assess student academic achievement

through an administrative policy whereby faculty members assign a letter or numerical grade for individual courses to students (Grove & Wasserman, 2004; Iyasere, 1984). Administrators in turn utilize the grades assigned by faculty members and convert them to a scale commonly referred to as a quality point or grade point average (GPA) to create a measure of academic success (Murray & Wren, 2003; Riley, Checca, Singer, & Worthington, 1994).

According to Agnew (1995) and Caulkins, Larkey, and Wei (1996), GPA is the dominant measure of student quality in all levels of education within the United States, specifically institutions of higher education. The most common scale of GPA is administered upon the four-point scale, with a "perfect" GPA being defined by a 4.0. Final GPAs are a key component in shaping college graduates' educational and career paths through several methods, including acceptance into graduate and professional institutions, academic scholarships, financial aid, and desirable employment in the corporate world (Caulkins, Larkey, & Wei, 1996; Freeman, 1999; Pope & Ma, 2004; Wright & Palmer, 1994). Because excellent grades are an outcome sought by most students in higher education, the pressure to both earn these grades by students and to provide them by faculty has become immense (Birk, 2000; Goldman, Schmidt, Hewitt, & Fisher, 1974). While the importance of GPA has been exacerbated in recent years, Mannello (1964) exemplifed the importance college students place upon grades over four decades ago by noting that "students have a neurotic fixation on grades" (p. 328). The trend whereby the overall grades of college graduates has continued to increase at a swift rate is often referred to as grade inflation.

One of the aspects of grade inflation that has received less attention and dedicated research is that grade inflation has not occurred unilaterally across various academic disciplines and individual colleges within postsecondary institutions (Becker, 1997; Shea, 1994). This difference in overall student GPAs has shown grades to increase at an uneven rate across various academic disciplines, an occurrence that has been referred to by Freeman (1999) as grade divergence. Specifically, grades in business and natural sciences tend to be lower and less affected by grade inflation than grades in other fields such as education, humanities, and the pre-professional fields such as law or medicine (Becker, 1997; Shea, 1994). It is from the divergence point-of-view proposed by Freeman (1999) concerning the differences between fields of study in grade inflation this study is focused. Specifically, the area of business is highlighted and its interrelationship to the eleven other fields chosen for this study.

## LITERATURE REVIEW

Data on college student grading suggest that undergraduate GPAs have been inflating over the past three decades across all types of postsecondary institutions (Geisinger, 1980; Wilson, 1999). This increase is illustrated by Levine and Cureton's (1998) research of GPAs reported by undergraduate institutions in three different years: 1969, 1976, and 1993. The percentages of the grade of A and C have effectively reversed themselves. In 1969, seven percent of all undergraduate

students received grades of A-minus or higher. By 1993, this proportion had risen to 26 percent. In contrast, grades of C or lower decreased from 25 percent in 1969 to nine percent on 1993.

Grade inflation is the focus of a considerable body of literature analyzing several hypothesized contributing factors to its existence (Dickson, 1984; Feldman, 1976; Kolevzon, 1981; McKenzie & Staaf, 1974; Moore & Trahan, 1998; Share, 1997). While not an inclusive list, the most cited factors leading to grade inflation include: student retention (which leads to increased funding dollars in most states), changing student demographics, student evaluations, and the evolving role of faculty priority toward research activities. Also prevalent within the literature are suggested outcomes that arise from the presence of grade inflation (Sabot & Wakeman-Linn, 1991; Shea, 1994) and suggested solutions and remedies to curtail its occurrence (Felton & Koper, 2005; Johnson, 1997; Martinson, 2004; Nagle, 1998; O'Connor, 1979; Scott, 1988; White, 1997; Zangenehzadeh, 1988).

The introduction of the term "grade inflation" owes its roots to the era of the early 1960s when college grades began to rise at a time when monetary pricing for consumer goods and services were also rising at a swift rate (Kamber & Biggs, 2004). Select researchers suggest that the term of inflation was assigned to the grading of students out of convenience due to the perceived association with the deteriorating buying power of the United States dollar and that terms such as "grade devaluation", "grade leniency," or "grade compression" would have been more fitting terms (Kamber & Biggs, 2004; Kuh & Hu, 1999; Landrum, 1999). Yale University actually refers to the phenomenon of grade inflation within many of its publications under a synonymous term: "upward grade homogenization" (Wilson, 1999).

A thorough review of the relevant literature revealed that there are several definitions that have been offered for grade inflation (McSpirit, Kopacz, Jones, & Chapman, 2000). McKenzie and Staaf (1974) defined grade inflation as a continual increase in the awarding of the grades of A and B by the faculty with a corresponding decrease in the awarding of the grades of D and F, as indicated above. Burwen (1971) defined grade inflation as the increase in student grade point averages (GPAs) and Juola (1974) described it as the rise in grade points awarded. In a candid approach, Mullen (1995) defined grade inflation as "when a grade is viewed as being less rigorous than it ought to be" (p. 5).

Although these aforementioned definitions offered for grade inflation are certainly relevant, more robust definitions include the components of student aptitude and achievement (Scanlan & Care, 2004; Wissler, 1975). Carney, Isakson, and Ellsworth (1978) suggested that grade inflation exists when there is an increase in overall student GPAs without a noted increase in standardized college entrance exams such as the American College Test (ACT), Scholastic Aptitude Test (SAT), or other student aptitude scores. Goldman (1985) stated that grade inflation is defined as an upward shift in the GPA of students without a corresponding increase in student achievement. Zirkel (1999) defined grade inflation as "a rise in academic grades not accompanied by a commensurate increase in academic achievement" (p. 247). Grove and Wasserman (2004), along with Hadley and Vitale

(1985), added a time component to the definition, stating that grade inflation is an upward shift in the GPA of college students over a period of time without a corresponding increase in student or academic ability.

## METHODOLOGY

The data utilized for this study was obtained from the Baccalaureate and Beyond Longitudinal Study (B&B) series conducted by the National Center for Educational Statistics (NCES), a department of the U.S. Department of Education. The B&B series was a nationally representative sample consisting of more than 10,000 college graduates from approximately 648 institutions of higher education. Specifically, two time periods (1993 and 2000/01) were selected to serve as the populations for this study, representing two unique cohorts of college graduates. This data originated from two restricted data sets that contained the individual survey data. In order to acquire access to these restricted data sets for B&B:93 and B&B:2000/01, the authors successfully completed the application process for a license from the U.S. Department of Education that regulates the data's usage and ensures confidentiality. While the summary data and related reports of all B&B studies are available to the general public through print and an internet-based data analysis system (DAS), this public use data does not contain individual survey data that was essential to the analyses that were conducted within this study.

### Research Population and Sample

The respondent population for the B&B:93 study consisted of all students who attended postsecondary institutions in the United States and Puerto Rico between July 1, 1992 and June 30, 1993 and received a baccalaureate degree during this time period. The number of undergraduate students enrolled during this study period and successfully receiving a baccalaureate degree was approximately 1.2 million. Within this population, 10,028 were selected by NCES for the sample group (Wine et al, 2005). Similarly, the respondent population for this B&B:2000/01 study consisted of all students who attended postsecondary institutions in the United States and Puerto Rico between July 1, 1999, and June 30, 2000 and also received or were expected to receive a baccalaureate degree during this time period. The number of undergraduate students enrolled during this study period and successfully receiving a baccalaureate degree was approximately 1.3 million. Within this population, 10,030 were selected by NCES for the sample group (Charleston et al, 2003).

### Data Collection

Variable selection from the B&B data sets was performed using software and a related tool provided by the NCES. This software, an electronic codebook (ECB), allowed the researchers to

choose the necessary variables and related data and use Statistical Package for Social Sciences (SPSS) coding to conduct the appropriate statistical analyses. Variables chosen from each B&B data set included cumulative GPA and within major GPA for each college graduate participating in the survey. Also, two new variables were created by this study's authors to measure the level of grade inflation for cumulative and within major GPA using these existing variables from B&B.

## RESEARCH FINDINGS AND ANALYSES

The results of this study are presented in three parts. First, a set of chi-square analyses were conducted to control for any significant differences in the demographic characteristics and distribution of the twelve major fields of study between the two B&B time periods. Second, two separate independent samples *t*-tests were conducted for cumulative and major GPA scores to confirm the existence of grade inflation between the two B&B time periods. Finally, one way analysis of variance (ANOVA) procedures were conducted among the twelve fields of study to display any significant differences in grade inflation that occurred from 1993 to 2000.

### Differences in Samples

Changing demographic characteristics of college graduates have been cited as a contributing factor for an increase in GPA over time. For this reason, the following four variables were tested for significant variations across the two time periods chosen for this study: gender, age, race, and the highest educational level of the graduate's parents. A chi square analysis revealed none of the four student characteristic variables experienced significant changes between the B&B:93 and B&B:2000/01 studies. Therefore, a change in graduate's demographic characteristics between time periods can be excluded as an explanatory variable for the level of grade inflation. Results of this analysis are displayed in Table 1.

Following the definition of grade inflation offered by Hadley and Vitale (1985), along with Grove and Wasserman (2004), it was necessary to test for increasing academic achievement between 1993 and 2000. A significant increase would suggest that an increase in college graduate's academic ability could be used to explain the increase in student GPA while a nonsignificant test would rule out increased academic ability as an explanatory variable for grade inflation. A variable from B&B for standardized college entrance examination scores was used as a proxy for academic ability. This variable was a combined variable generated from the college entrance scores from American College Testing (ACT) and the Scholastic Aptitude Test (SAT). Testing with chi square revealed that no significant changes occurred in academic achievement that might explain grade inflation between periods. Results of this analysis are displayed in Table 2.

**Table 1: Frequency, Percentage Distribution, and Statistical Significance of Student Characteristic Data From Respondents to the 1993 and 200/01 B&B Studies**

| | 1993 | | 2000/01 | | |
|---|---|---|---|---|---|
| Category | *N* | *%* | *N* | % | Significance |
| Gender | | | | | |
| Male | 4,340 | 43.3 | 3,844 | 38.4 | $p = 0.67$ |
| Female | 5,682 | 56.7 | 6,178 | 61.6 | |
| Age | | | | | |
| 21 years or less | 2,601 | 26.0 | 2,654 | 26.5 | $p = 0.61$ |
| 22 years | 2,635 | 26.3 | 2,507 | 25.0 | |
| 23 to 25 years | 2,419 | 24.1 | 2,425 | 24.2 | |
| Over 25 years | 2,367 | 23.6 | 2,436 | 24.3 | |
| Race | | | | | |
| Caucasian | 9,221 | 92.0 | 9,227 | 92.1 | $p = 0.74$ |
| Non-Caucasian | 801 | 8.0 | 795 | 7.9 | |
| Highest Educational Level of Parents | | | | | |
| High school diploma or less | 3,632 | 36.2 | 3,142 | 31.4 | $p = 0.22$ |
| Associate degree | 1,532 | 15.3 | 2,044 | 20.4 | |
| Baccalaureate degree | 2,481 | 24.8 | 2,315 | 23.1 | |
| Master's degree | 1,492 | 14.9 | 1,611 | 16.1 | |
| Doctorate degree | 885 | 8.8 | 910 | 9.0 | |

**Table 2: Frequency, Percentage Distribution, and Statistical Significance of Academic Achievement Data From Respondents to the 1993 and 200/01 B&B Studies**

| | 1993 | | 2000/01 | | |
|---|---|---|---|---|---|
| Category | *N* | *%* | *N* | *%* | *Significance* |
| Combined ACT/SAT Scores | | | | | |
| No exam taken | 2,716 | 27.1 | 2,742 | 27.4 | $p = 0.14$ |
| Below 1,000 | 2,541 | 25.4 | 2,536 | 25.3 | |
| 1,000-1,200 | 2,945 | 29.3 | 2,940 | 29.3 | |
| Above 1,200 | 1,820 | 18.2 | 1,804 | 18.0 | |

Finally, a chi-square analysis was used to determine if the proportion of fields of study of graduates from the B&B:2000/01 cohort differed from B&B:93 graduates. No significant difference was found which would indicate that the twelve fields of study are evenly distributed by year of graduation. This even distribution effectively eliminated the changing of the percentage of majors in any specific field as a valid explanatory variable for grade inflation. Results of this analysis are displayed in Table 3.

**Table 3: Frequency and Percentage Distribution of Academic Field of Study Data from Respondents to the 1993 & 2000/01 B&B Studies**

| | 1993 | | 2000 | | |
|---|---|---|---|---|---|
| Field of Study | *N* | % | *N* | % | Significance |
| Business | 1,451 | 14.5 | 1,185 | 11.8 | |
| Computer Science | 251 | 2.5 | 347 | 3.5 | |
| Education | 1,579 | 15.8 | 1,369 | 13.7 | |
| Engineering | 676 | 6.8 | 508 | 5.1 | |
| Health | 759 | 7.6 | 1,103 | 11.0 | |
| Humanities | 1,288 | 12.9 | 1,398 | 13.9 | |
| Life Sciences | 814 | 8.1 | 832 | 8.3 | $p = 0.81$ |
| Mathematics | 183 | 1.8 | 115 | 1.1 | |
| Physical Sciences | 182 | 1.8 | 172 | 1.7 | |
| Professional | 941 | 9.4 | 911 | 9.1 | |
| Social Sciences | 1,638 | 16.3 | 1,854 | 18.5 | |
| Technology | 260 | 2.6 | 228 | 2.3 | |

## Testing of Grade Inflation Between Time Periods

To assess the grade inflation that occurred between study periods, two separate independent samples *t*-test procedures were conducted, one that tested cumulative GPA and one that tested the major GPA earned by college graduates participating in the study. Conducting separate tests for cumulative and major GPA was necessary to display any trends within GPA that might occur between a graduate's overall coursework and only coursework within his or her academic field of study.

**Testing of Grade Inflation – Cumulative GPA**

An independent-samples *t*-test was conducted to compare the mean cumulative GPAs earned from college graduates sampled by the 1993 B&B study and college graduates sampled by the 2000/01 B&B study. The *t*-test was found to be significant, $t\ (20{,}042) = 37.36$, $p < .01$. College graduates from the 2000/01 B&B study ($M = 3.20$, $SD = 0.47$) on the average achieved a higher cumulative GPA than those college graduates surveyed for the 1993 B&B study ($M = 2.97$, $SD = 0.40$). The 95% confidence intervals were 3.19 and 3.21 for the 2000 college graduates; intervals for 1993 college graduates were 2.97 and 2.99. A summary of the results are presented in Table 4.

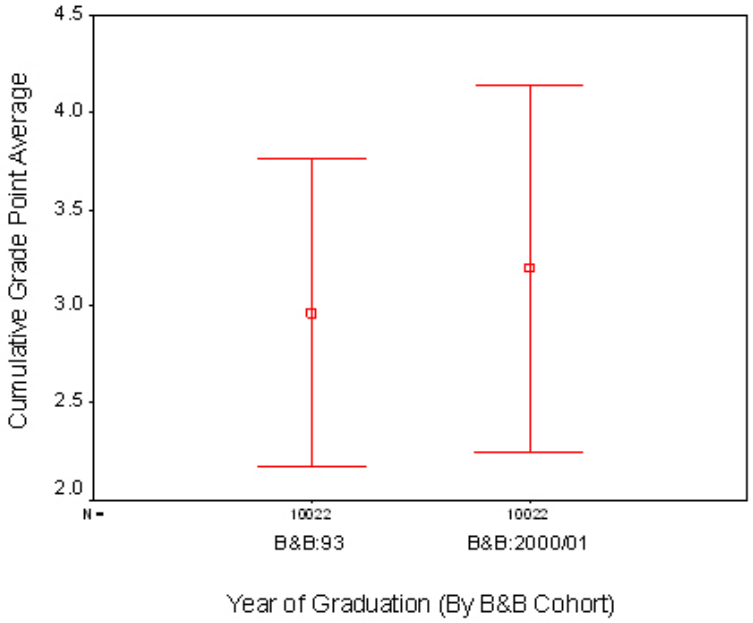
**Table 4: Means and Standard Deviations for t-test of Cumulative GPA of College Graduates Participating in B&B:93 and B&B:2000/01 Studies**

| Year of B&B Study | *M* | *SD* |
|---|---|---|
| 1993 | 2.97 | 0.40 |
| 2000/01 | 3.20 | 0.47 |

Due to the significance of the *t* value, effect size was computed. The eta square ($\eta^2$) index was computed to illustrate the proportion of the variance of the test variable (cumulative GPA) that is a function of the grouping variable (year of B&B Study). An $\eta^2$ value of .065 indicated that 6.5% of the variance of major GPA was explained by whether the student received his or her college degree in 1993 or 2000. While the measurement of $\eta^2$ is dependent upon the area of investigation, Green and Salkind (2000) indicated that this size index is interpreted as a medium effect size. Figure 1 displays the graphical distributions of means and standard deviations represented by error bars for cumulative GPA for the two B&B time periods.

The level of grade inflation that occurred in the approximately seven-year elapsed time period between the administration of the B&B:93 and the B&B:2000/01 was measured as the difference between cumulative GPA scores earned by college graduates of each respective time period. The difference of 0.23 grade points within cumulative GPA was found to represent significant grade inflation.

**Figure 1: Error bars for cumulative grade point average and year of graduation**




## Testing of Grade Inflation – Major GPA

An independent-samples *t*-test was conducted to compare the mean, major GPAs earned from college graduates sampled by the 1993 and 2000/01 B&B Studies. The test was significant, $t$ (20,042) = 32.68, $p < .01$. College graduates from the 2000/01 B&B study ($M$ = 3.33, $SD$ = 0.47) on the average achieved a higher within-major GPA than those college graduates surveyed for the 1993 B&B study ($M$ = 3.12, $SD$ = 0.42). The 95% confidence intervals were 3.32 and 3.34 for the 2000 college graduates; the intervals for 1993 graduates were 3.11 and 3.13. A summary of the results are presented in Table 5.

**Table 5: Means and Standard Deviations for t-test of Major GPA of College Graduates Participating in B&B:93 and B&B:2000/01Studies**

| Year of B&B Study | *M* | *SD* |
|---|---|---|
| 1993 | 3.12 | 0.42 |
| 2000/01 | 3.33 | 0.47 |

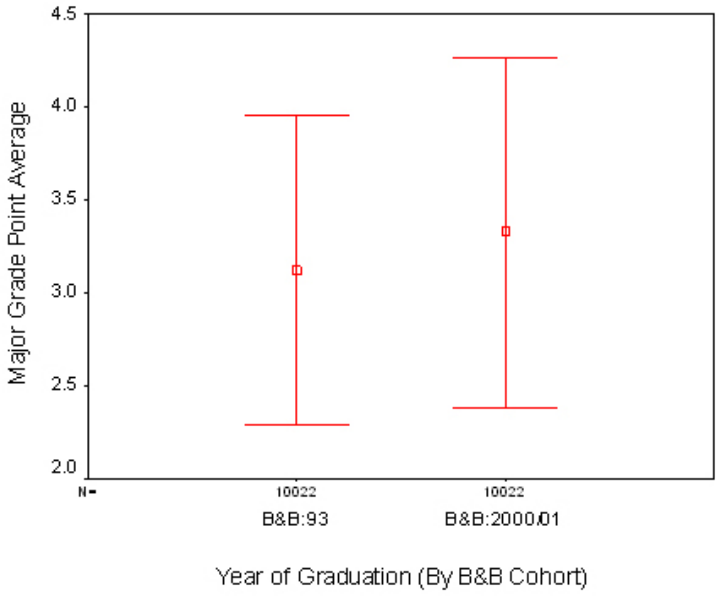
Because the *t* value in this case was significant, it was appropriate to discuss effect size (Dewberry, 2004). For a significant difference in means, the appropriate measure of effect size is

represented as *d*. To obtain *d*, the difference in the two means was divided by the pooled standard deviation. In this case, $d = 0.47$, representing a medium effect size (Cohen, 1988).

The eta square ($\eta^2$) index was computed to illustrate the proportion of the variance of the test variable (major GPA) that is a function of the grouping variable (year of B&B Study). An $\eta^2$ value of .051 indicated that 5.1% of the variance of major GPA was explained by whether the student received his or her college degree in 1993 or 2000. While the measurement of $\eta^2$ is dependent upon the area of investigation, Green and Salkind (2000) indicate that this size index is interpreted as a medium effect size. Figure 2 displays the graphical distributions of means and standard deviations by error bars for major GPA for the two B&B time periods.

The level of grade inflation that occurred in the approximately seven-year elapsed time period between the administration of the B&B:93 and the B&B:2000/01 was measured as the difference between major GPA scores earned by college graduates of each respective time period. The difference of 0.21 grade points within major GPA was found to represent significant grade inflation.

**Figure 2: Error bars for major grade point average and year of graduation**




## Testing of Grade Divergence Among Fields of Study

To adequately assess the level grade inflation that occurred among fields of study, two separate ANOVA procedures were conducted, one that tested cumulative GPA and one that tested the major GPA earned by college graduates participating in the study. As indicated earlier, conducting separate tests for cumulative and major GPA was necessary to display any trends within

GPA that might occur between a graduate's overall coursework and only coursework within his or her academic field of study.

**Analysis of Grade Divergence – Cumulative GPA**

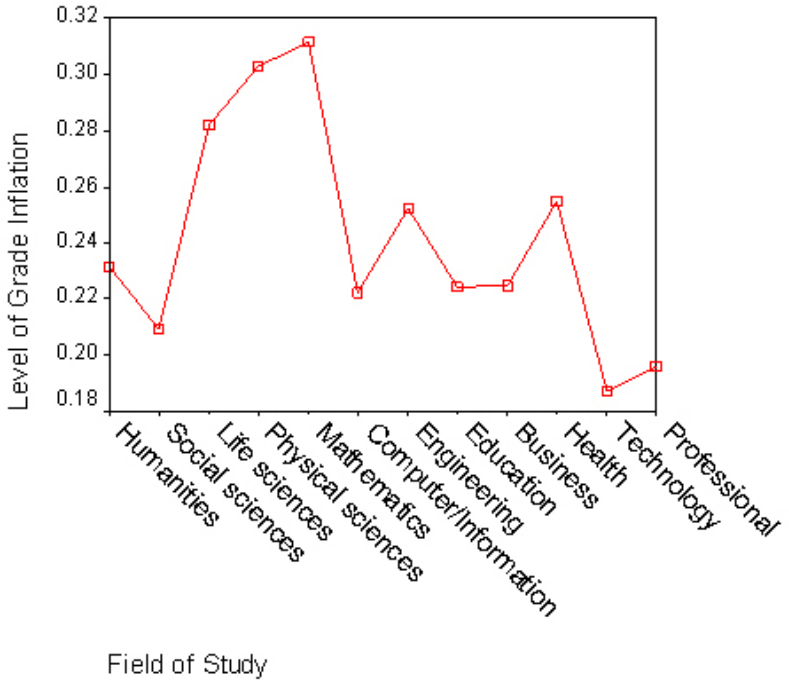
A one-way analysis of variance (ANOVA) was conducted to compare the mean levels of grade inflation within the cumulative GPA among the twelve academic major fields collected for this study. The ANOVA showed that there is a significant difference of grade inflation within cumulative GPA across twelve academic majors $F(11, 10010) = 25.263$, $p < .01$.

Within the twelve fields of study selected for this analysis, mathematics ($M = 0.31$) and physical sciences ($M = 0.30$) experienced the greatest level of grade inflation within the cumulative GPA of college graduates. Following, in order of descending order of grade inflation experienced, were health ($M = 0.26$), engineering ($M = 0.25$), humanities ($M = 0.23$), business ($M = 0.22$), computer/information systems ($M = 0.22$), education ($M = 0.22$), and social sciences ($M = 0.21$). The lowest level of grade inflation was experienced by graduates in professional ($M = 0.20$) and technological ($M = 0.19$) fields of study. Descriptive statistics (means and standard deviations) for each field of study are presented in Table 6. Additionally, a graphical plot of the means by academic field of study is presented in Figure 3.

**Table 6: Frequencies, Means, and Standard Deviations of Grade Inflation Within Cumulative Grade Point Average of Respondents to the B&B:2000/01 Study**

| Major Field of Study | N | *M* | *SD* |
|---|---|---|---|
| Business | 1,185 | 0.22 | 0.19 |
| Computer/Information Systems | 347 | 0.22 | 0.19 |
| Education | 1,369 | 0.22 | 0.17 |
| Engineering | 508 | 0.25 | 0.18 |
| Health | 1,103 | 0.26 | 0.17 |
| Humanities | 1,398 | 0.23 | 0.20 |
| Life Sciences | 832 | 0.28 | 0.18 |
| Mathematics | 115 | 0.31 | 0.16 |
| Physical Sciences | 172 | 0.30 | 0.20 |
| Professional | 911 | 0.20 | 0.18 |
| Social Sciences | 1,854 | 0.21 | 0.19 |
| Technology | 228 | 0.19 | 0.20 |

**Figure 3: Means plot for grade inflation of cumulative GPA by academic field of study**




Because the samples from the 1993 and the 2000/01 B&B Studies are drawn from populations with heterogeneous variances, Dunnett's T3 follow-up tests were used to examine the differences among cumulative GPAs in specific pairs of academic fields of study (Dewberry, 2004). Thirty-four statistically significant pairwise differences were found between major fields of study. Because the focus of this study's analysis was primarily on the comparison of the business fields of study to the other eleven fields, only the five significant combinations of cumulative GPA from business are presented in Table 7.

**Table 7: Statistically Significant Combinations Between Business and Other Fields of Study – Grade Inflation of Cumulative GPA**

| Significant Combinations | Significance Level |
|---|---|
| Business & Health | $p < .01$ |
| Business & Life Sciences | $p < .01$ |
| Business & Mathematics | $p < .01$ |
| Business & Physical Sciences | $p < .01$ |
| Business & Professional | $p < .05$ |

**Analysis of Grade Divergence – Major GPA**

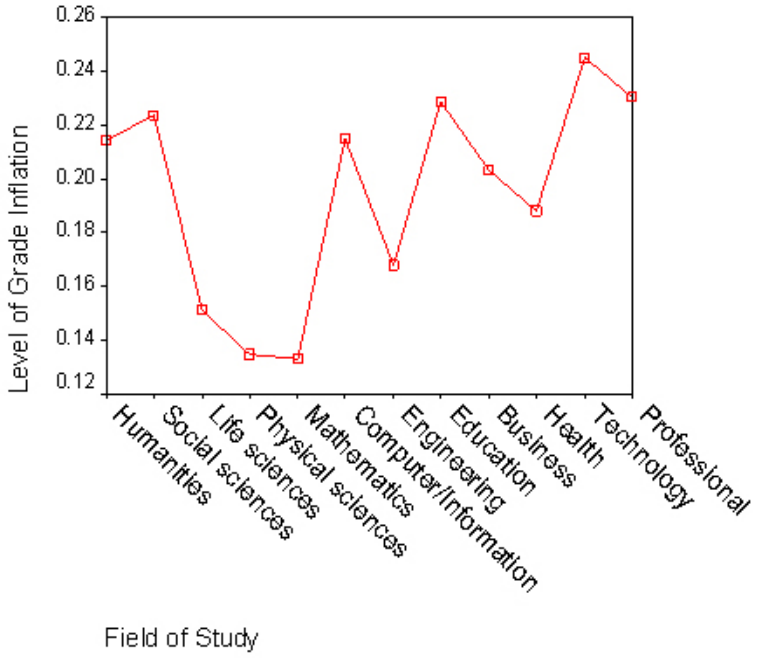
A one-way analysis of variance (ANOVA) was conducted to compare the mean levels of grade inflation among the twelve academic major fields of study collected for this study. The ANOVA showed that there is a significant difference among the level of grade inflation within major GPA across twelve academic fields of study $F(11,10010) = 20.929$, $p < .01$.

Within the twelve fields of study selected for this analysis, technology ($M = 0.25$), education ($M = 0.23$), and professional ($M = 0.23$) experienced the greatest level of grade inflation within the major GPA of college graduates. Following, in order of descending order of grade inflation experienced, were social sciences ($M = 0.22$), computer/information systems ($M = 0.21$), humanities ($M = 0.21$), business ($M = 0.20$), health ($M = 0.19$), and life sciences ($M = 0.15$). The lowest level of grade inflation was experienced by graduates in physical sciences ($M = 0.14$) and mathematics ($M = 0.13$) fields of study. Descriptive statistics (mean and standard deviation) for each field of study are presented in Table 8. Also, a graphical plot of the grade inflation means by academic field of study is presented in Figure 4.

**Table 8: Frequencies, Means, and Standard Deviations of Grade Inflation Within Major Grade Point Average of Respondents to the B&B:2000/01 Study**

| Major Field of Study | N | *M* | *SD* |
|---|---|---|---|
| Business | 1,185 | 0.20 | 0.19 |
| Computer/Information Systems | 347 | 0.21 | 0.18 |
| Education | 1,369 | 0.23 | 0.17 |
| Engineering | 508 | 0.17 | 0.17 |
| Health | 1,103 | 0.19 | 0.17 |
| Humanities | 1,398 | 0.21 | 0.19 |
| Life Sciences | 832 | 0.15 | 0.19 |
| Mathematics | 115 | 0.13 | 0.17 |
| Physical Sciences | 172 | 0.14 | 0.21 |
| Professional | 911 | 0.23 | 0.18 |
| Social Sciences | 1,854 | 0.22 | 0.19 |
| Technology | 228 | 0.25 | 0.20 |

**Figure 4: Means plot for grade inflation of major GPA by academic field of study**




Because the samples from the 1993 and the 2000/01 B&B Studies were drawn from populations with heterogeneous variances, Dunnett's T3 follow-up tests were used to examine the differences among major GPAs in specific pairs of academic fields of study (Dewberry, 2004). Thirty-six statistically significant pairwise differences were found between major fields of study. Because the focus of this study's analysis was primarily on the comparison of the business fields of study to the other eleven fields, only the six pairwise differences in major GPA from business are presented in Table 10.

**Table 10: Statistically Significant Combinations Between Business and Other Fields of Study– Grade Inflation of Major GPA**

| Significant Combinations | Significance Level |
|---|---|
| Business & Education | $p < .01$ |
| Business & Engineering | $p < .01$ |
| Business & Life Sciences | $p < .01$ |
| Business & Mathematics | $p < .01$ |
| Business & Physical Science | $p < .01$ |
| Business & Professional | $p < .05$ |

## FUTURE RESEARCH

Future statistical analyses should be conducted on data collected for individual majors of recent college graduates. For this study, grade point averages were presented for twelve academic fields of study and not individual majors. Data collection for the 2000/01 Baccalaureate and Beyond Longitudinal study was classified for 99 individual majors but research scope limitations did not allow each to be presented in this study. A future researcher could use individual major data to obtain a more detailed analysis within the twelve general fields of study. For example, a researcher interested specifically in business disciplines could conduct analyses for individual majors such as management, marketing, finance, and economics for a more detailed analysis of grade inflation within major fields.

While not included within the limitations of this research study, NCES collected a variable for the B&B Studies that provides the Carnegie classification of the institution conferring an undergraduate degree. A future study using this Carnegie variable would provide a more detailed analysis of how grade inflation varies by classification and institution type. For example, there is interest in how higher education institutions classified as research intensive would compare with regional, comprehensive institutions.

## CONCLUSION

While certainly not a new topic in higher education, grade inflation continues to pervade the editorial and scholarly literature. Many authors have relegated their opinions toward this topic to the simple acknowledgement that it indeed exists and no further analysis is necessary. However, authors like Freeman (1999) point out that the study of grade divergence across various academic disciplines is a recent research perspective of grade inflation. Generally speaking, how do specific fields of study such as business rank in comparison to other fields?

Based on our study, we concluded that the GPA of college graduates increased significantly from the college graduate cohort participating in the B&B:93 Longitudinal Study to the B&B:2000/01 cohort. More specifically, cumulative and major GPA increased 0.23 and 0.21 grade points, respectively, over the interim between these two data collection periods. Controlling for changing demographic characteristics of these graduates and the distribution of field of study, these increases can be viewed as grade inflation.

The results of cumulative grade inflation experienced between the 1993 and 2000/01 B&B Longitudinal Studies were similar to those reported by Kolevzon (1981), Mullen (1995), and somewhat less than Juola (1977). Kolevzon's study analyzed 20 academic departments within a single institution of higher education over a period of seven years between 1969 and 1976. The amount of grade inflation during the period of this study was 0.30, or somewhat less than one-third of a full grade point. Mullen's six-year study yielded a grade inflation of 0.19 grade points from

1987 to 1992. Additionally, Juola (1977) discovered a somewhat higher level of grade inflation in a study of 134 colleges. This level of grade inflation was found to be 0.40 grade points.

The results of grade inflation of major GPA experienced between the 1993 and 2000/01 B&B Studies were similar to those reported by Kuh and Hu (1999). This nationwide study of college graduates was conducted over a ten-year period from 1985 to 1995 and resulted in grade inflation in the major GPA of 0.27 grade points, or somewhat more than one-fourth of a full grade point over the study period.

The findings of this study lend validity to the theory of grade compression offered by Kamber and Biggs (2004). Under the grade compression assumption, grades can only rise to a certain level and cannot inflate perpetually because the highest GPA remains a 4.0. This is in contrast to currency inflation, which theoretically contains no ceiling and can rise infinitely. Summerville, Ridley, and Maris (1990) state that fields of study such as business, mathematics, and physical sciences are considered "low grading" departments and experience little or no grade inflation while fields of study such as education or humanities are considered "high grading" fields of study. While the time period of this current research study (1993-2000) are different from the one by Summerville, Ridley, and Maris (1990), the field of business and mathematics experienced higher levels of grade inflation than other traditional "high grading" fields. It is quite possible that grade inflation in fields such as education are leveling off while fields such as business are playing "catch-up."

While this examination of grade inflation and its subset of grade divergence does not offer a panacea, the trends that emerged were intriguing. This study will hopefully serve as a guide to stimulate future interest and further research in the increase of college graduate's educational achievement, specifically within the business disciplines.

## REFERENCES

Agnew, E. (1995). Rigorous grading standards does not raise standards: It only lowers grades. *Assessing Writing, 2*(1), 91-103.

Basinger, D. (1997). Fighting grade inflation: A misguided effort? *College Teaching, 45*(3), 88-91.

Becker, W. E. (1997, September). Teaching economics to undergraduates. *Journal of Economic Literature, 35*, 1347-73.

Betts, J. R. (1995). Does school quality matter? Evidence from the National Longitudinal Survey of Youth. *Review of Economics and Statistics, 77*(2), 231-50.

Birk, L. (2000). Grade inflation: What's really behind all those A's? *Harvard Education Letter, 16*(1), 3-5.

Burwen, L. S. (1971). *National grading survey.* San Francisco: San Francisco State University, Office of Institutional Research.

Carney, P., Isakson, R. L., & Ellsworth, R. (1978). An exploration of grade inflation and some related factors in higher education. *College and University*, *53*(2), 217-230.

Caulkins, J. P., Larkey, P. D., & Wei, J. (1996). *Adjusting GPA to reflect course difficulty* (1996-4). Pittsburgh, PA: Carnegie Mellon University, The Heinz School of Public Policy and Management.

Charleston, S., Riccobono, J., Mosquin, P., & Link, M. (2003). *Baccalaureate and beyond longitudinal study*: *2000/2001 methodology report*, NCES 2003-156. U.S. Department of Education, National Center for Education Statistics: Washington, DC.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. New Jersey: Lawrence Erlbaum Associates.

Cross, L. H. & Frary, R. B. (1993). College grading. *College Teaching*, *41*(4), 143-49.

Dewberry, C. (2004). *Statistical methods for organizational research: Theory and practice*. New York: Routledge.

Dickson, V. A. (1984). An economic model of faculty grading practices. *Journal of Economic Education*, *6*, 197-203.

Elbow, P. H. (1969). More accurate evaluation of student performance. *The Journal of Higher Education*, *40*(3), 219-30.

Feldman, K. A. (1976). Grades and college students, evaluations of their courses and teachers. *Research in Higher Education*, *4*, 69-111.

Felton, J. & Koper, P. T. (2005). Real GPA and nominal GPA: A simple adjustment that compensates for grade inflation. *Assessment and Evaluation in Higher Education*, *30*(6), 561-69.

Freeman, D. G. (1999). Grade divergence as a market outcome. *Journal of Economic Education*, *30*(4), 344-51.

Geisinger, K. (1980). Who are giving all those A's? *Journal of Teacher Education*, *31*(2), 11-15.

Goldman, R. D. & Hewitt, B. N. (1975). Adaptation level as an explnation for differential standards in college grading. *Journal of Educational Measurement*, *12*(3), 149-61.

Goldman, R. D., Schmidt, D. E., Hewitt, B. N., & Fisher, R. (1974). Grading practices in different major fields. *American Educational Research Journal*, *11*(4), 343-57.

Green, S. B. & Salkind, N. J. (2000). *Using SPSS for windows and macintosh: Analyzing and understanding data*. New Jersey: Pearson Education.

Grove, W. A. & Wasserman, T. (2004). The life-cycle pattern of collegiate GPA: Longitudinal cohort analysis and grade inflation. *Journal of Economic Education*, *35*(2), 162-74.

Haagen, C. H. (1964). The origins of a grade. *The Journal of Higher Education*, *35*(2), 89-91.

Hadley, M. & Vitale, P. (1985). Evaluating student achievement. (ERIC Document Reproduction Service No. ED 285 878)

Haskell, R. E. (1997). Academic freedom, promotion, reappointment, tenure and the administrative use of student evaluation of faculty (SEF): Analysis and implications of views from the court in relation to academic freedom, standards, and quality instruction. *Education Policy Analysis Archives, 5*(21).

Iyasere, M. (1984). Setting standards in multiple-section courses. *Improving College and University Teaching, 32,* 173-79.

Johnson, V. E. (1997). An alternative to traditional GPA for evaluating student performance. *Statistical Science, 12*(4), 251-69.

Juola, A. E. (1974). *Grade inflation (1960-1973), a preliminary report.* East Lansing: Michigan State University, Office of Education Services.

Kamber, R. & Biggs, M. (2004). Grade inflation: Metaphor and reality. *Journal of Education, 184*(1), 31-38.

Kolevzon, M. S. (1981). Grade inflation in higher education: A comparative study. *Research in Higher Education, 15*(3), 195-212.

Kuh, G. & Hu, S. (1999). Unraveling the complexity of the increase in college grades from the mid-1980s to the mid-1990s, *Educational Evaluation and Policy Analysis, 21*(3), 297-320.

Landrum, R. E. (1999). Student expectations of grade inflation. *Journal of Research and Development in Education, 32*(2), 124-128.

Levine, A. & Cureton, J. S. (1998). *When hope and fear collide: A portrait of today's college student.* San Francisco: Jossey-Bass.

Mannello, G. (1964). College teaching without grades: Are conventional marking practices a deterrent to learning? *The Journal of Higher Education, 35*(6), 328-34.

McKenzie, R. B. & Staaf, R. J. (1974). *An economic theory of learning: Student sovereignty and academic freedom.* Blacksburg, VA: University Publications.

McSpirit, S., Kopacz, P., Jones, K., & Chapman, A. (2000, Winter). Faculty opinion grade inflation: Contradictions about its cause. *College & University Journal,* 19-25.

Moore, M. & Trahan, R. (1998). Tenure status and grading practices. *Sociological Perspectives, 41*(4), 775-82.

Mortenson, T. G. (1997, February). Georgia's HOPE scholarship program: Good intentions, strong funding, bad design. *Postsecondary Education Opportunity Newsletter, 56.*

Mullen, R. (1995). AIR 1995 Annual Forum Paper. (ERIC Document Reproduction Service No. ED 386 970)

Murray, C. & Wren, C. T. (2003). Cognitive, academic, and attitudinal predictors of the grade point averages of college students with learning disabilities. *Journal of Learning Disabilities, 36*(5), 407-15.

Nagle, B. (1998). A proposal for dealing with grade inflation: The relative performance index. *Journal of Education for Business, 74*(1), 40-43.

O'Connor, D. (1979). A solution to grade inflation. *Educational Record, 60*(2), 295-300.

Pope, N. & Ma, Y. (2004). Grade-risk: An insurable event in the classroom. *Risk Management and Insurance Review, 7*(2), 189-95.

Riley, H. J., Checca, R. C., Singer, T. S., & Worthington, D. F. (1994). *Grades and grading practices: Results of the 1992 AACRAO study*. American Association of Collegiate Registrars and Admission Officers, Annapolis Junction, MD: AACRAO Distribution Center.

Sabot, R. & Wakemann-Linn, J. (1991). Grade inflation and course choice. *Journal of Economic Perspectives, 5*(1), 159-70.

Scanlan, J. M. & Care, W. D. (2004). Grade inflation: Should we be concerned? *Journal of Nursing Education, 43*(10), 475-78.

Scott, R. C. (1988). A comment on "Grade Inflation: A Way Out." *Journal of Economic Education, 19*(3), 227-29.

Share, C. E. (1997). Implications of considering students as consumers. *College Teaching, 45*(4), 122-23.

Shea, C. (1994). Grade inflation's consequences. *Chronicle of Higher Education, 40*(18), A45-6.

White, R. A. (1997). An alternative to traditional GPA for evaluating student performance: Achievement index. *Statistical Science, 12*(4), 273-74.

Wilson, B. P. (1999). The phenomenon of grade inflation in higher education. *National Forum, 79*(4), 38-41.

Wine, J. S., Cominole, M.B., Wheeless, S., Dudley, K., & Franklin, J. (2005). *1993/03 baccalaureate and beyond longitudinal study methodology report* (NCES 2006-166). U.S. Department of Education, Washington, DC: National Center for Education Statistics.

Wissler, E. J. (1975). An A is an A is an F, or is it? *Engineering Education, 66*(3), 232-37.

Wright, R. E. & Palmer, J. C. (1994). GMAT scores and undergraduate GPAs as predictors of performance in graduate business programs. *Journal of Education for Business, 69*(6), 344-49.

Zangenehzadeh, H. (1988). Grade inflation: A way out. *Journal of Economic Education, 19*(3), 217-26.

Zirkel, P.A. (1999). Grade inflation: A leadership opportunity for schools of education? *Teachers College Record, 101*(2), 247-60.

# PERSONALITY TYPE AS A DETERMINANT OF STUDENT SUCCESS IN INTRODUCTORY GENERAL BUSINESS COURSES

**Timothy O. Bisping, University of Central Arkansas**
**Hilde Patron, University of West Georgia**

## ABSTRACT

*Knowledge regarding the determinants of student success in introductory general business courses is crucial from a pedagogical perspective. Although the role of personality type as a determinant of student success has been studied in several business disciplines, its role in introductory general business student success is not well understood. Here we examine the relevance of personality type in an introductory general business course designed to incorporate information from various business disciplines. We find that personality type is indeed a significant factor in determining student success. Interestingly, we find that unlike various other disciplines, intuitive students appear to be at a relative advantage when compared to their sensing counterparts.*

## INTRODUCTION

Modern development of effective teaching pedagogy draws from a wide variety of sources designed to provide educators with information crucial to ensuring student mastery of course content. Yet, in general business education, the significance of some of these resources is not clearly understood. For instance, personality type has long been a focal point for discussion of teaching techniques in certain academic disciplines, and at various levels of education, though little is known of the role of personality type in determining the performance of students in general business courses in higher education. While research has been conducted regarding the role of personality type in determining student performance in business fields such as economics, accounting, and finance, little, if anything, has been done in general business. The role of personality type in student performance in general business courses is a unique issue and is quite different from those examined in past work. That is, in order to succeed in a general business course, students must understand and successfully incorporate knowledge from various business disciplines. This ability represents a unique skill set crucial to success in such a course, and in business in general. A better understanding of the determinants of student success in such a course is especially important at the introductory level, as it is often one of the first courses taken by business students within the college of business. Here we hope to rectify the shortcomings in the literature by examining the role of

personality type, as measured by the Myers-Briggs Type Indicator, in an introductory general business course designed specifically to incorporate information from numerous business disciplines.

## THE MYERS-BRIGGS TYPE INDICATOR

The Myers-Briggs Type Indicator (MBTI) test is a widely used psychometric tool designed to measure personality traits of an individual. The use of this test as a catalyst for pedagogical improvement has become commonplace in educational settings. This is especially true in the context of examining the relationship between personality type and student performance. Here we provide a brief summary of the MBTI and what it is designed to measure. Literature on the MBTI is extensive, and the interested reader is referred to Myers, McCaulley, Quennk, and Hammer (1998), Myers (1998), Wheeler (2001), and Borg and Shapiro (1996), for a more detailed discussion of the MBTI.

The MBTI is based upon the work of psychiatrist Carl Jung, and is designed to classify the personality type of individuals according to four dimensions. These dimensions are: 1) Introvert (I) vs. Extrovert (E), 2) Intuitive (N) vs. Sensing (S), 3) Thinking (T) vs. Feeling (F), and 4) Judging (J) vs. Perceiving (P). Once an individual has been classified according to each of these dimensions, the resulting four letter combination reveals his/her personality type (ISTJ for example). Further, various two letter combinations are associated with an individual's temperament and learning style. An intuitive explanation of these aspects of personality type is provided by Myers (1998), which serves as the basis for the following discussion.

The first dimension measured by the MBTI concerns the introvert vs. extrovert personality trait. According to Myers, this dimension deals with where people prefer to "focus their attention" and "get their energy." Introverts "focus on their own inner world of ideas and experiences," whereas extroverts "focus on the outer world of people and activity." Sensing vs. intuitive is the second dimension tested by the MBTI. This dimension deals with how people "take in information." Sensing individuals "like to take in information that is real and tangible", whereas intuitive individuals "take in information by seeing the big picture". The third dimension presented by Myers is thinking vs. feeling. According to Myers, this aspect of the MBTI deals with how people make decisions. Those categorized as thinkers "look at the logical consequences of a choice or action" when making decisions. Feelers, on the other hand, "like to consider what is important to them and others involved" when making decisions. Finally, judging vs. perceiving is the fourth personality trait measured by the MBTI. Judging vs. perceiving deals with how people "deal with the outer world." Judging individuals "like to live in a planned, orderly way", whereas perceiving individuals prefer to "live in a flexible, spontaneous way."

Taken together, the four dimensions determine an individual's personality type. Perhaps more importantly for the matter at hand (and in the literature) are various other combinations of

personality traits which yield temperaments and learning types. The learning types identified by Myers are ST, SF, NF, and NT. STs learn best by "hands on experience." SFs also learn best by hands-on activities, but prefer to do so with others. NFs learn best by "imagining, creating with others, and writing", and NTs learn best by "categorizing, analyzing, and applying logic." The temperaments derived from the MBTI are also discussed frequently in the literature and include NF (Idealists), NT (Rationals), SP (Artisans), and SJ (Guardians).

## RELATED LITERATURE

While we know of no studies directly related to ours, several studies have examined the role of personality type in various business disciplines. Some of these studies are discussed in the following paragraphs.

In the field of economics, past literature by Ziegert (1996) and Borg and Shapiro (2000) has shown that economic education is not immune to the impact of personality. Each of these two studies finds that academic performance in introductory economics courses depends in part on the personality type/temperament of a student. For example, Ziegert finds that students of type S and T score significantly better in introductory microeconomics, while Borg and Shapiro find that Is perform better that Es in introductory courses in macroeconomics as measured by course grade. Taking the aforementioned temperaments into account, both Ziegert and Borg and Shapiro find that students with NF temperaments earn significantly lower grades than their SJ counterparts, but that SPs have no statistically significant difference in grade earned when compared to students with the SJ temperament. In a later study, Borg and Stranahan (2002) find that personality type has a similar impact on student performance in upper level economics classes. Specifically, they find that Is out perform Es, and that SJs perform significantly better than SPs.

Other personality type studies involving business courses have been undertaken in the field of accounting. Nourayi and Cherry (1993) examine the relationship between certain personality traits and the performance of accounting majors in various accounting classes. The authors employ one-way ANOVA to test for this relationship and find that it is significant for the S-N dimension, but not for any other. Oswick and Barber (1998) perform an analysis based exclusively on students in introductory accounting courses. They find no relationship between personality type and performance. A similar study was conducted by Lawrence and Taylor (2000). They examine the relationship between student performance and personality type in intermediate accounting courses, with a special emphasis on the relevance of grading procedures. Their work differs from other studies cited here as it does not use the MBTI to measure personality type. Rather Lawrence and Taylor utilize the Kiersey Temperament Sorter (KTS) which measures the same personality traits measured by the MBTI. Unfortunately, the KTS has had relatively little analysis performed on its statistical properties when compared to that performed on the MBTI. Even so, Lawrence and Taylor's results imply that personality type may play a role in determining student performance in

undergraduate accounting. Specifically, judging students perform better than perceiving students, and NT temperaments perform at a lower level than other temperaments. Wheeler (2001) provides a review of past studies in this area and points to the limited, contradictory results in the literature, pointing to the need for future work in the area.

Filbeck and Smith (1996) further expand upon the research base regarding the role of personality type in undergraduate business courses by considering the impact of personality type on student performance in Corporate Finance. In their study they primarily consider the significance of the relationship between personality type, exam type (ie: multiple choice vs. open-ended, theoretical vs. quantitative) and student performance. While they find a significant relationship between exam type, personality type, and student performance, they find no significant correlation between personality type and overall performance in the course.

The major shortcoming in the literature is the lack of studies examining the relevance of personality in the performance of students in a general business course designed to incorporate components of various business disciplines. While studies have been done within various disciplines: 1) they do not examine students' ability to incorporate information from various disciplines; a seemingly crucial management skill, and 2) methodologies vary widely across studies, making any attempt to glean information for use in a comparison of past work, difficult at best. Here we correct this deficiency in the literature by performing an experiment in a general business course designed to cover a broad range of information from most business disciplines, culminating in the formation of a business plan intended to incorporate relevant information from these business disciplines.

## HYPOTHESIS

Given the lack of past research in the area, developing a hypothesis supported by the results of past work is not a particularly viable option. However, a reasonably consistent result found in studies in business disciplines is that SJs tend to perform relatively well, especially when compared to those with intuitive tendencies. There is also some support for the finding that Is outperform Es and that Ss outperform Ns. These conclusions are tentative at best, however, as not only does method vary widely among these studies, but so too does course content. We have no prior expectations regarding the relative advantage of Is when compared to Es in the context of an introductory general business course. We do, however, anticipate that our result regarding Ss vs. Ns may differ from that found in past studies. While our hypothesis is admittedly speculative, we have the following a priori expectations:

*Hypothesis:* *Students with N as part of their type will not be at a significant disadvantage in an introductory general business course.*

Specifically, we anticipate that the apparent general academic advantages of the S personality trait may be matched, if not surpassed, by the ability of the intuitive individual to incorporate information from many areas in order to form a superior understanding of the "big picture."

## DATA AND RESEARCH DESIGN

The data were collected in two sections of an Introduction to Business course in the Winter of 2004 at a mid-size public university. Introduction to Business is a one-quarter, required foundation course for all business majors and is designed to incorporate information from all business disciplines, culminating in the development of a business plan. In the class, the students are introduced to decision-making and entrepreneurial activities in the world economy. Both course sections had identical structure, including textbook, form of evaluation, syllabi, and instructor. Students in the course were graded based upon their performance on four exams, class participation, and a business plan which was completed in groups. Student performance in the course is the dependent variable in this study. For our purposes, this measure is constructed using a combination of the measures used by the instructor to evaluate course performance. Thus, the data from the course itself provides a logical and convenient measure of course performance, and eliminates the need for any additional testing. We further discuss the nature of this variable in our results section of the study.

During the first full week of class, prior to the administration of any examinations by the instructor and prior to the assignment of any grades in the course, the students were given the MBTI self-scorable test. Students were seated in the same room, but separate from each other. During the class period in which the test was administered, one of the co-authors gave the students a tutorial, instructing them on how to approach taking the exam in order to ensure accurate results. This instruction was in accordance with the standard procedures stated in the Myers-Briggs guidelines. Students were then asked to complete the exam according to these instructions. After the students had finished answering the questions, one of the co-authors gave instructions aloud on how to score the test, and how each student could determine their personality type. Each student's type was determined and recorded by the student, the results of which were double-checked by the co-authors. A discussion of the results ensued in order to help students better understand their results, and the students walked away with a small pamphlet with information about the different personality types. In total, the administration and scoring of the test took approximately 45 to 60 minutes.

TABLE 1

Variable Definitions

| | |
|---|---|
| I | Dummy variable = 1 if Introvert, 0 otherwise |
| S | Dummy variable = 1 if Sensing , 0 otherwise |
| T | Dummy variable = 1 if Thinking, 0 otherwise |
| J | Dummy variable = 1 if Judging, 0 otherwise |
| NF | Dummy variable = 1 if NF, 0 otherwise |
| SF | Dummy variable = 1 if SF, 0 otherwise |
| ST | Dummy variable = 1 if ST, 0 otherwise |
| SP | Dummy variable = 1 if SP, 0 otherwise |
| SJ | Dummy variable = 1 if SJ, 0 otherwise |
| AC | ACT composite score. |
| GPA | Cumulative College GPA |
| TRANSFER | Dummy Variable = 1 if has transfer hour credits, 0 otherwise |
| AGE | Student Age |
| CURHOURS | Hours in which currently enrolled |
| TOTHOURS | Total hours earned prior to course enrollment |
| NONWHITE | Dummy variable = 1 if student race = nonwhite |
| MALE | Dummy variable = 1 if student gender = male |
| SECTION | Dummy variable = 1 for first course section |
| TYPEMATCH | Dummy variable = 1 if student type matches instructor type |
| TEMPMATCH | Dummy variable = 1 if student temperament matches instructor's |
| FINALTEST | Student's score on the final exam |
| TEST | Student's test average for the course |
| PARTICIPATION | Student's score for participation |
| BPLAN | Group's score on the business plan |

Students were also asked to sign a consent form granting access to the use of their academic records. The analytical data set was created by merging the MBTI scores with student records. Definitions of the variables used in the analysis are provided in Table 1. Combined enrollment in the two course sections equaled 162 students, 138 of which agreed to participate in the study. Of these, 32 records were missing certain elements of the predictor data (primarily high school GPA). To avoid the loss of valuable data, we decided to use college GPA instead of high school GPA, which reduced the number with missing elements to nine. Finally, three of the 129 students dropped the course, leaving 126 for analysis. For our analysis, we combine this information with the course performance data discussed in the previous paragraph. Sample statistics are provided in Table 2.

TABLE 2
Descriptive Statisites

| | Mean | Median | Maximum | Minimum | Std. Dev. | Sum | Observations |
|---|---|---|---|---|---|---|---|
| E | 0.63 | 1 | 1 | 0 | 0.49 | 79.00 | 126 |
| I | 0.37 | 0 | 1 | 0 | 0.49 | 47.00 | 126 |
| S | 0.62 | 1 | 1 | 0 | 0.49 | 78.00 | 126 |
| N | 0.38 | 0 | 1 | 0 | 0.49 | 48.00 | 126 |
| F | 0.68 | 1 | 1 | 0 | 0.47 | 86.00 | 126 |
| T | 0.32 | 0 | 1 | 0 | 0.47 | 40.00 | 126 |
| J | 0.45 | 0 | 1 | 0 | 0.50 | 57.00 | 126 |
| P | 0.55 | 1 | 1 | 0 | 0.50 | 69.00 | 126 |
| ENFJ | 0.08 | 0 | 1 | 0 | 0.27 | 10.00 | 126 |
| ENFP | 0.16 | 0 | 1 | 0 | 0.37 | 20.00 | 126 |
| ENTJ | 0.01 | 0 | 1 | 0 | 0.09 | 1.00 | 126 |
| ENTP | 0.03 | 0 | 1 | 0 | 0.18 | 4.00 | 126 |
| ESFJ | 0.12 | 0 | 1 | 0 | 0.33 | 15.00 | 126 |
| ESFP | 0.12 | 0 | 1 | 0 | 0.33 | 15.00 | 126 |
| ESTJ | 0.06 | 0 | 1 | 0 | 0.23 | 7.00 | 126 |
| ESTP | 0.06 | 0 | 1 | 0 | 0.23 | 7.00 | 126 |
| INFJ | 0.02 | 0 | 1 | 0 | 0.15 | 3.00 | 126 |
| INFP | 0.06 | 0 | 1 | 0 | 0.23 | 7.00 | 126 |
| INTJ | 0.02 | 0 | 1 | 0 | 0.15 | 3.00 | 126 |
| INTP | 0.00 | 0 | 0 | 0 | 0.00 | 0.00 | 126 |
| ISFJ | 0.05 | 0 | 1 | 0 | 0.21 | 6.00 | 126 |
| ISFP | 0.08 | 0 | 1 | 0 | 0.27 | 10.00 | 126 |
| ISTJ | 0.10 | 0 | 1 | 0 | 0.29 | 12.00 | 126 |
| ISTP | 0.05 | 0 | 1 | 0 | 0.21 | 6.00 | 126 |
| NT | 0.06 | 0 | 1 | 0 | 0.24 | 8.00 | 126 |
| NF | 0.32 | 0 | 1 | 0 | 0.47 | 40.00 | 126 |
| SJ | 0.32 | 0 | 1 | 0 | 0.47 | 40.00 | 126 |
| SP | 0.30 | 0 | 1 | 0 | 0.46 | 38.00 | 126 |
| ST | 0.25 | 0 | 1 | 0 | 0.44 | 32.00 | 126 |
| SF | 0.37 | 0 | 1 | 0 | 0.48 | 46.00 | 126 |
| MALE | 0.53 | 1 | 1 | 0 | 0.50 | 67.00 | 126 |
| NONWHITE | 0.32 | 0 | 1 | 0 | 0.47 | 40.00 | 126 |
| SECTION | 0.39 | 0 | 1 | 0 | 0.49 | 49.00 | 126 |
| TEMPMATCH | 0.32 | 0 | 1 | 0 | 0.47 | 40.00 | 126 |
| TYPEMATCH | 0.08 | 0 | 1 | 0 | 0.27 | 10.00 | 126 |
| TRANSFER | 0.08 | 0 | 1 | 0 | 0.27 | 10.00 | 126 |
| ACT | 21.89 | 21.00 | 32.00 | 15.00 | 3.94 | 2758.00 | 126 |
| AGE | 18.91 | 18.77 | 24.17 | 17.30 | 0.80 | 2382.55 | 126 |
| CURHOURS | 11.05 | 11.00 | 14.00 | 6.00 | 1.22 | 1392.00 | 126 |
| FINAL | 81.93 | 84.00 | 98.00 | 44.00 | 11.63 | 9832.00 | 126 |
| GPA | 3.09 | 3.18 | 4.00 | 1.00 | 0.63 | 388.87 | 126 |
| PARTICIPATION | 80.04 | 83.00 | 100.00 | 20.00 | 11.57 | 10085.00 | 126 |
| TEST | 81.23 | 83.33 | 98.00 | 48.00 | 9.85 | 10234.67 | 126 |
| TOTHOURS | 18.01 | 12.00 | 155.00 | 4.00 | 19.67 | 2269.00 | 126 |

The data collected is based upon essentially the same research design as that of Ziegert (2000) where the education production function is stated as follows:

Test Performance = *f*(student ability, demographic characteristics, personality traits) (1)

In this study we consider three alternative measures of test performance: the students exam average (TEST), the student score on the final exam (FINAL), and the student's score in a business plan (BPLAN). Explanatory variables chosen closely follow the literature and are designed to control for various student attributes. Measures of student ability include ACT and GPA. Relevant demographic characteristics include: 1) TRANSFER, which is designed to account for potential differences between transfer students and those who have been at the same institution for their entire academic experience 2) AGE, which is designed to account for the impact of differing levels of maturity among students 3) CURHOURS, which reflects upon the time demands of the students due to their current schedule 4) TOTHOURS, which accounts for knowledge gained from past experience 5) NONWHITE, which controls for potential differences by race 6) MALE, which accounts for potential differences by gender 6) PARTICIPATION, which accounts for benefits gained from student involvement in the class 7) SECTION, which controls for any differences between the two course sections, and 8) TYPEMATCH, which is designed to account for any potential benefits to students who share the same personality type as the instructor. Personality traits considered include learning types, temperaments, and the individual personality dimensions.

To study the impact of personality traits on exam performance, we use ordinary least squares (OLS) regression analysis to formally test our hypothesis. Specifically, we aim to test whether Ns tend to perform significantly worse that Ss when controlling for other factors impacting student performance. We therefore estimate Equation 1 by adopting a linear functional form, as follows,

$$\begin{aligned}\text{Test Performance} = \alpha_1 + \alpha_2\text{ACT} + \alpha_3\text{GPA} + \alpha_4\text{TRANSFER} + \alpha_5\text{AGE} + \alpha_6\text{CURHOURS} \\ + \alpha_7\text{TOTHOURS} + \alpha_8\text{NONWHITE} + \alpha_9\text{MALE} + \alpha_{10}\text{SECTION} \\ + \alpha_{11}\text{PARTICIPATION} + \alpha_{12}\text{TYPEMATCH} \\ + \alpha_{13}\text{PERSONALITY TRAITS} + \epsilon \qquad (2)\end{aligned}$$

where $\alpha$'s are the parameters to be estimated, and $\varepsilon$ denotes the error term. Finally, to study the impact of personality traits on the success in writing the business plan, we calculate simple correlation coefficients. The results of this analysis are presented in the following section.

## RESULTS

Of primary concern is the extent to which personality traits impact the ability of students to master course content. Given the structure of the course, our analysis is comprised of two

components. First, to determine the extent to which personality traits influence the ability of students to learn and retain course content, we consider the impact of such traits on the exam performance of students. Here we consider both the exam average, and the score on the final comprehensive exam. Second, we consider the role of personality type as a determinant of student performance in the completion of a business plan in a group setting.

In Tables 3 through 5 we present the OLS regression estimates regarding the role of personality traits in student performance. Tables 6 and 7 present information regarding the role of personality type in the successful completion of a business plan. See Table 3 at the end of the text.

TABLE 3
OLS Results for Learning Types

| Dependent Variable: TEST<br>Method: Least Squares<br>Included observations: 126<br><br>Equation 3 Estimates | | | | | Dependent Variable: FINALTEST<br>Method: Least Squares<br>Included observations: 120<br>White Heteroskedasticity-Consistent Standard Errors & Covariance<br><br>Equation 4 Estimates | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| Constant | 47.586310 | 25.812700 | 1.843523 | 0.067900 | Constant | 84.313830 | 39.921720 | 2.111979 | 0.037100 |
| NF | -2.661143 | 2.683386 | -0.991711 | 0.323500 | NF | -5.467007 | 3.187363 | -1.715213 | 0.089300 |
| SF | -4.461343 | 2.630119 | -1.696252 | 0.092600 | SF | -8.334566 | 3.329999 | -2.502874 | 0.013900 |
| ST | -3.338556 | 2.701196 | -1.235955 | 0.219100 | ST | -3.919526 | 3.676503 | -1.066102 | 0.288800 |
| ACT | 1.066435 | 0.199524 | 5.344906 | 0.000000 | ACT | 0.935810 | 0.342775 | 2.730099 | 0.007400 |
| GPA | 4.300060 | 1.211276 | 3.550025 | 0.000600 | GPA | 3.772427 | 2.075228 | 1.817838 | 0.071900 |
| TRANSFER | 2.893608 | 2.282932 | 1.267496 | 0.207600 | TRANSFER | 0.388948 | 2.168666 | 0.179349 | 0.858000 |
| AGE | -0.537315 | 1.254607 | -0.428274 | 0.669300 | AGE | -1.908272 | 1.839684 | -1.037282 | 0.302000 |
| CURHOURS | -0.452704 | 0.537654 | -0.841999 | 0.401600 | CURHOURS | -0.510623 | 0.674831 | -0.756668 | 0.450900 |
| TOTHOURS | 0.057237 | 0.051364 | 1.114343 | 0.267500 | TOTHOURS | 0.143215 | 0.073128 | 1.958412 | 0.052800 |
| NONWHITE | -4.016667 | 1.493176 | -2.690015 | 0.008200 | NONWHITE | -7.245987 | 2.692596 | -2.691079 | 0.008300 |
| MALE | 1.316728 | 1.366897 | 0.963297 | 0.337500 | MALE | -0.192794 | 1.695239 | -0.113727 | 0.909700 |
| PARTICIPATION | 0.178470 | 0.055684 | 3.205065 | 0.001800 | PARTICIPATION | 0.149062 | 0.092339 | 1.614287 | 0.109500 |
| SECTION | 1.693759 | 1.321741 | 1.281460 | 0.202700 | SECTION | 3.021333 | 1.930094 | 1.565381 | 0.120500 |
| TYPEMATCH | -1.495899 | 2.515909 | -0.594576 | 0.553300 | TYPEMATCH | -2.234579 | 2.124664 | -1.051733 | 0.295300 |
| R-squared | 0.594676 | Mean dependent var | | 81.227510 | R-squared | 0.499579 | Mean dependent var | | 81.933330 |
| Adjusted R-squared | 0.543554 | S.D. dependent var | | 9.851308 | Adjusted R-squared | 0.432856 | S.D. dependent var | | 11.629960 |
| S.E. of regression | 6.65562 | Akaike info criterion | | 6.740144 | S.E. of regression | 8.758405 | Akaike info criterion | | 7.294373 |
| Sum squared resid | 4916.998 | Schwarz criterion | | 7.077797 | Sum squared resid | 8054.515 | Schwarz criterion | | 7.642810 |
| Log likelihood | -409.6291 | F-statistic | | 11.632500 | Log likelihood | -422.6624 | F-statistic | | 7.487371 |
| Durbin-Watson stat | 2.103718 | Prob(F-statistic) | | 0.000000 | Durbin-Watson stat | 2.048016 | Prob(F-statistic) | | 0.000000 |

Table 3 contains the results associated with student learning type. With this analysis we study how types NF, SF, and ST score on tests relative to NT types. Table 3 therefore presents the estimation of Equations 3 and 4,

$$\begin{aligned} TEST = \quad & \alpha_1 + \alpha_2 ACT + \alpha_3 GPA + \alpha_4 TRANSFER + \alpha_5 AGE + \alpha_6 CURHOURS + \\ & \alpha_7 TOTHOURS + \alpha_8 NONWHITE + \alpha_9 MALE + \alpha_{10} SECTION + \\ & \alpha_{11} PARTICIPATION + \alpha_{12} TYPEMATCH + \alpha_{13} NF + \alpha_{14} SF + \alpha_{15} ST \\ & + \varepsilon \end{aligned} \tag{3}$$

$$\text{FINAL TEST} = \alpha_1 + \alpha_2\text{ACT} + \alpha_3\text{GPA} + \alpha_4\text{TRANSFER} + \alpha_5\text{AGE} + \alpha_6\text{CURHOURS} + \alpha_7\text{TOTHOURS} + \alpha_8\text{NONWHITE} + \alpha_9\text{MALE} + \alpha_{10}\text{SECTION} + \alpha_{11}\text{PARTICIPATION} + \alpha_{12}\text{TYPEMATCH} + \alpha_{13}\text{NF} + \alpha_{14}\text{SF} + a_{15}\text{ST} + \epsilon \quad (4)$$

The results in Table 3 demonstrate that the learning type of a student does in fact influence student performance. Specifically, the SF type performs significantly worse than NTs by more than four points on the test average. While the coefficient magnitudes of the other learning types are substantial and negative, they fail to reach statistical significance in this model. In general, this supports our hypothesis stating that, when we control for other explanatory factors, Ns should not be at a disadvantage. In fact, our results provide some support for the notion that Ns maybe at an advantage in a general business course. Further, results for the model concerned with the score on the comprehensive final are presented in Table 3. We believe that the score on the comprehensive final may contain additional information on the student's ability to retain information, as opposed to simply understanding it. The results of this model are similar to the model on test average; however, in this model, the NF coefficient also achieves significance, and is negative.

TABLE 4
OLS Results for Temperaments

| Dependent Variable: TEST<br>Method: Least Squares<br>Included observations: 126<br><br>Equation 5 Estimates | | | | | Dependent Variable: FINALTEST<br>Method: Least Squares<br>Included observations: 120<br>White Heteroskedasticity-Consistent Standard Errors & Covariance<br><br>Equation 6 Estimates | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| Constant | 47.151010 | 26.003360 | 1.813266 | 0.072500 | Constant | 76.058580 | 38.926380 | 1.953908 | 0.053400 |
| NF | -2.605552 | 2.689922 | -0.968635 | 0.334800 | NF | -5.232989 | 3.232061 | -1.619087 | 0.108400 |
| SP | -4.150408 | 2.624995 | -1.581110 | 0.116700 | SP | -7.635211 | 3.560798 | -2.144242 | 0.034300 |
| SJ | -3.707996 | 2.759621 | -1.343661 | 0.181800 | SJ | -4.923151 | 3.301277 | -1.491287 | 0.138900 |
| ACT | 1.075944 | 0.203158 | 5.296096 | 0.000000 | ACT | 0.999013 | 0.333791 | 2.992924 | 0.003400 |
| GPA | 4.279700 | 1.217263 | 3.515837 | 0.000600 | GPA | 3.510022 | 2.012244 | 1.744332 | 0.084000 |
| TRANSFER | 2.755057 | 2.308983 | 1.193191 | 0.235300 | TRANSFER | -0.673057 | 2.312752 | -0.291020 | 0.771600 |
| AGE | -0.533369 | 1.260611 | -0.423103 | 0.673000 | AGE | -1.607171 | 1.796434 | -0.894645 | 0.373000 |
| CURHOURS | -0.425984 | 0.543811 | -0.783330 | 0.435100 | CURHOURS | -0.363514 | 0.693238 | -0.524371 | 0.601100 |
| TOTHOURS | 0.058045 | 0.052961 | 1.096000 | 0.275500 | TOTHOURS | 0.130578 | 0.072444 | 1.802457 | 0.074300 |
| NONWHITE | -3.962024 | 1.517449 | -2.610976 | 0.010300 | NONWHITE | -6.940135 | 2.579253 | -2.690754 | 0.008300 |
| MALE | 1.486263 | 1.372683 | 1.082743 | 0.281300 | MALE | 0.429911 | 1.714672 | 0.250725 | 0.802500 |
| PARTICIPATION | 0.175263 | 0.056217 | 3.117593 | 0.002300 | PARTICIPATION | 0.147694 | 0.091648 | 1.611537 | 0.110100 |
| SECTION | 1.682456 | 1.324366 | 1.270386 | 0.206600 | SECTION | 3.033633 | 1.950565 | 1.555259 | 0.122900 |
| TYPEMATCH | -1.435143 | 2.523798 | -0.568644 | 0.570700 | TYPEMATCH | -1.953565 | 2.132769 | -0.915976 | 0.361800 |
| R-squared | 0.593071 | Mean dependent var | | 81.227510 | R-squared | 0.486390 | Mean dependent var | | 81.933330 |
| Adjusted R-squared | 0.541746 | S.D. dependent var | | 9.851308 | Adjusted R-squared | 0.417909 | S.D. dependent var | | 11.629960 |
| S.E. of regression | 6.668789 | Akaike info criterion | | 6.744097 | S.E. of regression | 8.873070 | Akaike info criterion | | 7.320387 |
| Sum squared resid | 4936.475000 | Schwarz criterion | | 7.081750 | Sum squared resid | 8266.793000 | Schwarz criterion | | 7.668824 |
| Log likelihood | -409.878100 | F-statistic | | 11.555330 | Log likelihood | -424.223200 | F-statistic | | 7.102518 |
| Durbin-Watson stat | 2.107349 | Prob(F-statistic) | | 0.000000 | Durbin-Watson stat | 2.010756 | Prob(F-statistic) | | 0.000000 |

Table 4 includes the results for the role of student temperaments (NF, SP and SJ relative to NT) in determining student performance. More particularly, Table 4 presents the estimation of Equations (5) and (6),

$$TEST = \alpha_1 + \alpha_2 ACT + \alpha_3 GPA + \alpha_4 TRANSFER + \alpha_5 AGE + \alpha_6 CURHOURS + \alpha_7 TOTHOURS + \alpha_8 NONWHITE + \alpha_9 MALE + \alpha_{10} SECTION + \alpha_{11} PARTICIPATION + \alpha_{12} TYPEMATCH + \alpha_{13} NF + \alpha_{14} SP + \alpha_{15} SJ + \epsilon \quad (5)$$

$$FINAL\ TEST = \alpha_1 + \alpha_2 ACT + \alpha_3 GPA + \alpha_4 TRANSFER + \alpha_5 AGE + \alpha_6 CURHOURS + \alpha_7 TOTHOURS + \alpha_8 NONWHITE + \alpha_9 MALE + \alpha_{10} SECTION + \alpha_{11} PARTICIPATION + \alpha_{12} TYPEMATCH + \alpha_{13} NF + \alpha_{14} SP + \alpha_{15} SJ + \epsilon \quad (6)$$

As can be seen in Table 4, we find that when we control for other explanatory factors through the use of an OLS regression, in terms of average test score, there is only weak evidence to support the notion that temperament plays a role in student performance. Specifically we find that the SP coefficient is significant only at the .117 level, though it is negative. Additional support for this relationship is found in Table 4 where the results are presented for the regression concerned with the student's score on the comprehensive final exam. Here, SPs perform significantly worse than NTs, though no other temperament is found to be significant. While all other coefficients are substantial, and negative, they could only be considered weakly significant at best, with the NF coefficient significant at the .108 level, and the SJ coefficient significant at the .139 level. Overall, these results generally support the hypothesis that students with N as part of their type should not be at a disadvantage in an introductory general business course.

TABLE 5
OLS Results for Dimensions

| Dependent Variable: TEST<br>Method: Least Squares<br>Included observations: 126<br><br>Equation 7 Estimates | | | | | Dependent Variable: FINALTEST<br>Method: Least Squares<br>Included observations: 120<br>White Heteroskedasticity-Consistent Standard Errors & Covariance<br><br>Equation 8 Estimates | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | | Coefficient | Std. Error | t-Statistic | Prob. |
| Constant | 43.148970 | 26.020860 | 1.658245 | 0.100100 | Constant | 72.362080 | 40.078270 | 1.805519 | 0.073900 |
| I | 0.209931 | 1.345134 | 0.156067 | 0.876300 | I | -0.340442 | 1.961297 | -0.173580 | 0.862500 |
| S | -2.404101 | 1.437968 | -1.671874 | 0.097400 | S | -3.782928 | 1.883819 | -2.008116 | 0.047200 |
| T | 1.236629 | 1.419748 | 0.871020 | 0.385600 | T | 4.020457 | 2.296376 | 1.750783 | 0.082900 |
| J | 1.153692 | 1.501077 | 0.768576 | 0.443800 | J | 3.224795 | 2.097671 | 1.537322 | 0.127300 |
| ACT | 1.097874 | 0.205193 | 5.350441 | 0.000000 | ACT | 1.040023 | 0.339749 | 3.061152 | 0.002800 |
| GPA | 4.209746 | 1.220047 | 3.450479 | 0.000800 | GPA | 3.543224 | 2.060370 | 1.719703 | 0.088500 |
| TRANSFER | 2.661069 | 2.299805 | 1.157085 | 0.249700 | TRANSFER | -0.288946 | 2.180095 | -0.132538 | 0.894800 |
| AGE | -0.452795 | 1.263633 | -0.358328 | 0.720800 | AGE | -1.629110 | 1.833992 | -0.888286 | 0.376400 |
| CURHOURS | -0.404424 | 0.539004 | -0.750317 | 0.454700 | CURHOURS | -0.486357 | 0.673355 | -0.722288 | 0.471700 |
| TOTHOURS | 0.045746 | 0.053238 | 0.859274 | 0.392100 | TOTHOURS | 0.112115 | 0.071362 | 1.571077 | 0.119200 |
| NONWHITE | -3.842942 | 1.528291 | -2.514536 | 0.013400 | NONWHITE | -6.647952 | 2.608244 | -2.548823 | 0.012300 |
| MALE | 1.493163 | 1.391023 | 1.073429 | 0.285400 | MALE | 0.310510 | 1.771710 | 0.175260 | 0.861200 |
| PARTICIPATION | 0.169042 | 0.057325 | 2.948860 | 0.003900 | PARTICIPATION | 0.138659 | 0.092692 | 1.495904 | 0.137700 |
| SECTION | 1.647658 | 1.328138 | 1.240577 | 0.217400 | SECTION | 2.934413 | 1.890817 | 1.551928 | 0.123700 |
| TYPEMATCH | -2.512984 | 2.775053 | -0.905562 | 0.367100 | TYPEMATCH | -4.930671 | 2.781449 | -1.772699 | 0.079200 |
| R-squared | 0.596130 | Mean dependent var | | 81.227510 | R-squared | 0.511188 | Mean dependent var | | 81.933330 |
| Adjusted R-squared | 0.541056 | S.D. dependent var | | 9.851308 | Adjusted R-squared | 0.440686 | S.D. dependent var | | 11.629960 |
| S.E. of regression | 6.673805 | Akaike info criterion | | 6.752424 | S.E. of regression | 8.697734 | Akaike info criterion | | 7.287568 |
| Sum squared resid | 4899.364000 | Schwarz criterion | | 7.112587 | Sum squared resid | 7867.661000 | Schwarz criterion | | 7.659234 |
| Log likelihood | -409.402700 | F-statistic | | 10.824310 | Log likelihood | -421.254100 | F-statistic | | 7.250709 |
| Durbin-Watson stat | 2.096715 | Prob(F-statistic) | | 0.000000 | Durbin-Watson stat | 2.043475 | Prob(F-statistic) | | 0.000000 |

Table 5 presents the estimations pertaining to Equations (7) and (8), which correspond to the impact of the individual dimensions (T vs. E, S vs. N, T vs. F, and J vs. P) on exam performance.

$$\begin{aligned}TEST = {} & \alpha_1 + \alpha_2 ACT + \alpha_3 GPA + \alpha_4 TRANSFER + \alpha_5 AGE + \alpha_6 CURHOURS \\ & + \alpha_7 TOTHOURS + \alpha_8 NONWHITE + \alpha_9 MALE + \alpha_{10} SECTION \\ & + \alpha_{11} PARTICIPATION + a_{12} TYPEMATCH + \alpha_{13} I + \alpha_{14} S + \alpha_{15} T \\ & + \alpha_{16} J + \varepsilon \end{aligned} \quad (7)$$

$$\begin{aligned}FINAL\ TEST = {} & \alpha_1 + \alpha_2 ACT + \alpha_3 GPA + \alpha_4 TRANSFER + \alpha_5 AGE + \alpha_6 CURHOURS \\ & + \alpha_7 TOTHOURS + \alpha_8 NONWHITE + \alpha_9 MALE + \alpha_{10} SECTION \\ & + \alpha_{11} PARTICIPATION + \alpha_{12} TYPEMATCH + \alpha_{13} I + \alpha_{14} S + \alpha_{15} T \\ & + \alpha_{16} J + \varepsilon \end{aligned} \quad (8)$$

The only significant result regarding the role of personality in determining the student test average found here is that Ss tend to perform significantly worse than Ns. This result is quite relevant given that it directly supports our hypothesis, in that Ns appear to perform better than Ss in introductory general business. This result is also supported by a model using the final test score as the dependent variable, which also suggests that Ts outperform Fs on the comprehensive final exam.

TABLE 6
Business Plan Group Statistics

| GROUP | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 | Group 6 | Group 7 | Group 8 | Group 9 | Group 10 | Group 11 | Group 12 | Group 13 | Group 14 | Group 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Members | 5 | 6 | 4 | 5 | 4 | 6 | 4 | 5 | 4 | 4 | 4 | 2 | 4 | 3 | 3 |
| NT | 20.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 50.00% | 25.00% | 0.00% | 0.00% |
| NF | 40.00% | 33.30% | 50.00% | 40.00% | 0.00% | 16.70% | 25.00% | 60.00% | 25.00% | 25.00% | 0.00% | 0.00% | 25.00% | 33.30% | 33.30% |
| SF | 40.00% | 16.70% | 50.00% | 60.00% | 25.00% | 33.30% | 50.00% | 0.00% | 50.00% | 75.00% | 75.00% | 50.00% | 0.00% | 0.00% | 0.00% |
| ST | 0.00% | 50.00% | 0.00% | 0.00% | 75.00% | 50.00% | 25.00% | 40.00% | 25.00% | 0.00% | 25.00% | 0.00% | 50.00% | 66.70% | 66.70% |
| SP | 0.00% | 16.70% | 0.00% | 40.00% | 50.00% | 50.00% | 50.00% | 0.00% | 50.00% | 50.00% | 50.00% | 50.00% | 25.00% | 0.00% | 66.70% |
| SJ | 40.00% | 50.00% | 50.00% | 20.00% | 50.00% | 33.30% | 25.00% | 40.00% | 25.00% | 25.00% | 50.00% | 0.00% | 25.00% | 66.70% | 0.00% |
| I | 20.00% | 16.70% | 25.00% | 60.00% | 75.00% | 33.30% | 50.00% | 20.00% | 75.00% | 0.00% | 25.00% | 100.00% | 50.00% | 66.70% | 33.30% |
| S | 40.00% | 66.70% | 50.00% | 60.00% | 100.00% | 83.30% | 75.00% | 40.00% | 75.00% | 75.00% | 100.00% | 50.00% | 50.00% | 66.70% | 66.70% |
| T | 20.00% | 50.00% | 0.00% | 0.00% | 75.00% | 50.00% | 25.00% | 40.00% | 25.00% | 0.00% | 25.00% | 50.00% | 75.00% | 66.70% | 66.70% |
| J | 60.00% | 83.30% | 50.00% | 40.00% | 50.00% | 33.30% | 25.00% | 40.00% | 50.00% | 50.00% | 50.00% | 50.00% | 50.00% | 100.00% | 0.00% |
| TEMPMATCH | 40.00% | 33.30% | 50.00% | 40.00% | 0.00% | 16.70% | 25.00% | 60.00% | 25.00% | 25.00% | 0.00% | 0.00% | 25.00% | 33.30% | 33.30% |
| Mean ACT | 22.00 | 23.67 | 25.75 | 25.20 | 21.00 | 19.67 | 20.25 | 22.60 | 19.00 | 17.75 | 17.75 | 20.50 | 19.25 | 24.00 | 20.67 |
| Mean GPA | 3.24 | 3.39 | 3.81 | 3.38 | 2.96 | 2.92 | 3.33 | 2.93 | 3.36 | 3.06 | 2.31 | 2.82 | 3.06 | 3.07 | 2.93 |
| Mean Age | 18.59 | 18.68 | 18.58 | 19.11 | 20.04 | 19.58 | 18.52 | 19.12 | 18.63 | 18.66 | 19.20 | 18.29 | 18.52 | 19.47 | 18.86 |
| Mean CURHOURS | 11.00 | 10.33 | 11.25 | 11.40 | 10.00 | 11.33 | 11.25 | 10.80 | 11.75 | 10.25 | 10.50 | 11.50 | 11.50 | 12.67 | 10.67 |
| Mean TOTHOURS | 11.80 | 11.83 | 18.75 | 18.60 | 48.75 | 27.00 | 10.00 | 23.00 | 10.50 | 15.25 | 17.75 | 10.50 | 8.50 | 38.00 | 11.00 |
| NONWHITE | 0.00% | 0.00% | 0.00% | 0.00% | 50.00% | 66.70% | 100.00% | 0.00% | 100.00% | 75.00% | 100.00% | 100.00% | 100.00% | 33.30% | 0.00% |
| MALE | 40.00% | 16.70% | 0.00% | 80.00% | 75.00% | 50.00% | 0.00% | 60.00% | 50.00% | 50.00% | 75.00% | 50.00% | 0.00% | 100.00% | 66.70% |
| TRANSFER | 0.00% | 16.70% | 25.00% | 0.00% | 25.00% | 0.00% | 0.00% | 20.00% | 0.00% | 25.00% | 25.00% | 0.00% | 0.00% | 33.30% | 0.00% |
| BPLAN | 80 | 82 | 81 | 78 | 80 | 80 | 83 | 90 | 78 | 70 | 80 | 85 | 78 | 88 | 80 |

Notes: "Members" refers to the number of students in the group. "SF" refers to the percentage of students in the group with SF type. Other variables are defined analogously

Table 6 includes sample statistics for the business plan groups whereas Table 7 presents an analysis of the data. Data analysis is limited here by the fact that the work was completed in groups ranging in size from two to six students, and therefore the scores received by individuals were based on those assigned to his/her respective group as a whole. Further, though there were a total of 33 groups, the fact that not all students participated in the study left us with complete data for only 15 groups. Our analysis here is based on the data for these 15 groups.

**Table 7: Analysis of Business Plan Data**

| | Correlation Coefficient between BPLAN and | t-test | |
|---|---|---|---|
| SF | -0.54 | -2.30 | * |
| NF | 0.24 | 0.89 | |
| NT | 0.12 | 0.45 | |
| ST | 0.31 | 1.16 | |
| SP | -0.47 | -1.92 | ** |
| SJ | 0.27 | 1.02 | |
| Is | 0.28 | 1.06 | |
| Ss | -0.32 | -1.21 | |
| Ts | 0.38 | 1.49 | |
| Js | 0.22 | 0.81 | |
| TEMPMATCHs | 0.24 | 0.89 | |
| Mean ACT score | 0.44 | 1.79 | ** |
| Mean GPA | -0.09 | -0.32 | |
| Mean AGE | 0.15 | 0.54 | |
| Mean CURHOURS | 0.37 | 1.45 | |
| Mean TOTHOURS | 0.25 | 0.93 | |
| NONWHITEs | -0.24 | -0.90 | |
| MALEs | 0.15 | 0.55 | |
| TRANSFERs | 0.15 | 0.55 | |
| MEMBERS | -0.12 | -0.44 | |

* Significant at the 5% level

** Significant at the 10% level

The t-test is a two tailed test. The null hypothesis is that the correlation coefficient ($\rho$) is zero. The alternative hypothesis is that it is different from zero. The t-statistic is given by

$$t_{N-2} = \rho\sqrt{\frac{N-2}{1-\rho^2}}, \text{ where N=15.}$$

Given the small number of observations, we cannot perform multiple regression analysis. Instead, in Table 7 we present the correlation coefficient and related t-tests for the relation between the average value of each variable and the group score on the finished business plan. Personality type variables examined are expressed as the percentage of the group comprised of the particular type. Significant relationships found here are reasonably consistent with earlier results. Specifically, we find the correlation coefficient between the percentage of the group that is made up of SFs and the score on the business plan to be significant and equal to -.54. Further, the same relationship is significant for SPs and is equal to -.47. Aside from these two variables, only the mean ACT score for the group is significantly correlated with performance on the business plan, with a correlation coefficient of .44. Hence, we find further support for the notion that SFs and SPs are at a relative disadvantage in various aspects of an introductory general business course.

Given the nature of our hypothesis, the focus of the literature, and the somewhat sparse representation of some personality types, we omit results pertaining to each of the 16 personality types.

## PEDAGOGICAL RECOMMENDATIONS

The results of our study differ substantially from those found in past research regarding the role of personality type in student performance. This adds a new dimension to be considered by business instructors when fine-tuning their pedagogy. For instance, past work may imply that, in many courses, students with S as part of their type would tend to outperform their N counterparts. In such courses it may, therefore, be prudent for instructors to pay special attention to the learning needs of Ns when presenting the course material. For example they may wish to put special emphasis on "the big picture" and be sure to emphasize how topics fit into the overall scheme of things. However, our results suggest that this approach may not be appropriate in introductory general business courses. Our results point to the fact that it is not Ns who are at a relative disadvantage in such courses, but rather Ss. This suggests a pedagogical approach quite different from many other courses, and one that may be fairly unique to an introductory business course. In introductory general business courses, instructors may wish to be certain to provide ample "hands-on" experience for students, incorporate ample tangible facts into their examples, and emphasize practical applications of course material. These practices may be especially helpful for those with S as part of their personality type, as they are more likely to struggle with the nature of the course. These results are crucial in that they emphasize that the role of personality type is not the same in every course, and instructors, when considering their teaching methods, need to be aware of the relationship between personality type and student performance in each particular course that they teach. Ideally, of course, prior knowledge regarding the personality type of each student would be available to each instructor. However, even without this information, instructors of introductory general business courses can prepare course materials equipped with the knowledge that personality

does indeed play a role in student performance, and that role may be different from many other courses.

## CONCLUSION

We perform a study designed to examine to role of personality type, as measured by the Myers-Briggs Type Indicator test, in determining the performance of students in an introductory general business course. To our knowledge, this study is the first of its kind in this discipline. While other research has focused on the role of personality type in various business-related fields, the results seem counterintuitive when applied to a course in general business which integrates knowledge from several business disciplines. We hypothesize that students with the intuitive personality characteristic will be more inclined to succeed in such a course than is the case in other business fields. We find strong evidence of this in our analysis of the individual personality traits, where intuitive individuals perform significantly better than sensing individuals on course exams. Further, in terms of learning types and temperaments, students with NT as part of their type are found to perform significantly better than others, especially when compared to those with S as part of their learning type or temperament. We also find that personality type impacts the performance of students working in groups to develop a business plan, where SFs and SPs tend to perform significantly worse. These results point to the fact that those traits contributing to the success of a general business student, who is required to incorporate information from various business fields, may be different from those of students in other business fields.

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## REFERENCES

Borg, M. O. & Shapiro S. L. (1996). Personality type and student performance in principles of economics. *Journal of Economic Education, 27* (1), 3-25.

Borg, M.O. & Stranahan, H.A. (2002). Personality type and student performance in upper-level economics courses: The importance of race and gender. *Journal of Economic Education, 33*(1), 3-14.

Filbeck, G. & Smith, L.L. (1996). Learning styles, teaching strategies, and predictors of success for students in corporate finance. *Financial Practice and Education, 6*(1)1, 74-85.

Lawrence, R. & Taylor, L.W. (2000). Student personality type versus grading procedure in intermediate accounting courses. *Journal of Education for Business, 76* (1), 28-35.

Myers, I. (1998). *Introduction to type* (6th ed.), Consulting Psychologists Press, Inc.

Myers, I., McCaulley, M., Quennk, N. & Hammer, A. (1998). *MBTI manual: A guide to the development and use of the Myers-Briggs type indicator* (3rd ed.), Consulting Psychologists Press, Inc.

Nourayi, M. M. & Cherry, A.A. (1993). Accounting students' performance and personality types. *Journal of Education for Business, 69* (2), 111-115.

Oswick, C. & Barber, P. (1998). Personality type and performance in an introductory level accounting course: A research note. *Accounting Education, 7* (3), 249-254.

Wheeler, P. (2001). The Myers-Briggs type indicator and applications to accounting education research. *Issues in Accounting Education, 16* (1), 125-148.

Ziegert, A. L. (2000). The role of personality temperment and student learning in principles of economics: Further evidence. *Journal of Economic Education 31* (4), 307-322.

# ASSESSING PREREQUISITES AS A MEASURE OF SUCCESS IN A PRINCIPLES OF FINANCE COURSE

**Alan Blaylock, Murray State University**
**Stephen K. Lacewell, Murray State University**

## ABSTRACT

*This paper seeks to determine if student success in courses that serve as prerequisites to the principles of finance course is carried over to success in the actual finance course. Also, additional variables, such as the gender of the student, the number of background courses taken, and the time since the courses were taken are analyzed to determine if they have a direct impact on final grades. The quantity of prerequisite courses and their timing are found to significantly influence student performance in the introductory finance course. This shows that adequate and timely exposure to prerequisite subjects are helpful in learning finance.*

## INTRODUCTION

Most principles classes of all disciplines have few, if any, formal prerequisite class requirements. The principles of finance class is usually the exception requiring prerequisites in both economics and accounting and often a math or statistics course. Since the principles of finance is by nature a very quantitative course, it would seem that a student's success in the prerequisite classes should carry over to the finance course.

Making this topic more interesting are the ever-changing requirements necessary for colleges of business to attain AACSB accreditation. Even a casual glance through the latest AACSB Eligibility Procedures and Standards for Business Accreditation (2003) reveals an increased emphasis on standards related to the assurance of learning. Thus, the design of courses used as prerequisites for the basic finance course as well as the design of finance curriculums in general have taken on an increased level of importance.

This paper seeks to determine if student success in courses that serve as prerequisites to the principles of finance course is carried over to success in the actual finance course. Also, additional variables, such as the gender of the student, the number of background courses taken, and the time since the courses were taken are analyzed to determine if they have a direct impact on final grades.

## LITERATURE REVIEW

A study of the factors that determine performance in business related courses is not necessarily groundbreaking research. The area of economics, for example, includes papers by Schuhmann, McGoldrick, and Burrus (2005), Laband and Piette (1995), Anderson, Benjamin, and Fuss (1994), Bosshardt and Watts (1990), and Borg, Mason, and Shapiro (1989). Studies that examine factors related to performance in accounting classes include Gracia and Jenkins (2003), Drennan and Rohde (2002), Murphy and Stanga (1994), Graves, Nelson, and Deines (1993). Other studies related to student preparedness and student performance include one on business communications (Marcal and Roberts, 2000) and a study concerning performance on the Educational Testing Service Major Field Exam in Business (Bagamery, Lasik, and Nixon, 2005). However, the very few studies performed on the area of finance have mostly focused on self-reported qualitative factors such as student effort and test anxiety. Papers that study the quantitative relationship between student success in a principles of finance course and student success in the prerequisites needed for this class are very few. Only one paper by Didia and Hasnat (1998) touches on this subject. They found that a student's cumulative GPA has a statistically significant positive impact on success in the finance course. They also noted that a student's prior performance in accounting, economics, and math tended to carry over to success in finance. This study adds other variables not considered in the Didia and Hasnat study that may foretell success or failure in the basic finance course.

## DATA AND METHODOLOGY

This study uses academic transcript data for students enrolled in six sections of the introductory finance course in the fall 2004 and spring 2005 semesters. All sections were taught by the same instructor so faculty influence is not an issue. Student performance is measured by the semester average for each student and is obtained from the instructor. All other information is obtained from student transcripts. One hundred forty out of 189 observations are usable.

Didia and Hasnat (1998) explain the grade received in a principles of finance class as a function of maturity, background, aptitude, effort, and faculty contribution. They find all of these factors significantly influence student performance in the principles of finance course. Our study concentrates on the background component in detail. Didia and Hasnat use GPAs of prerequisite courses to measure student background. Specifically, they use the average GPA for the first two accounting courses, the average GPA for the first two economics courses (micro and macro), and the highest GPA of all math courses taken. Our present study expands on these variables. Essentially, our study includes the number and timing of prerequisites taken in addition to their GPAs.

The principles of finance course usually requires prerequisites courses in the areas of math, accounting, and economics. Our measures of student background relate to not only the academic performance as measured by grades, but also the quantity, and timing of these prerequisites courses. Similar to Didia and Hasnat, academic performance in prerequisite courses is measured by the average GPA for all accounting courses taken, the average GPA for all economics courses taken, and the average GPA for all math courses taken at the College Algebra level and above. Using only the GPAs in the math classes at or above the College Algebra level reduces any grade inflation from developmental math courses. To explain further, new students in the university that are determined to be weak in the area of math are enrolled in developmental math courses to prepare them for College Algebra. The weaker the student the more developmental math courses that are taken. High grades in developmental math courses are obviously not on par with high grades in College Algebra and above. A student may have many high developmental math grades but only mediocre algebra and calculus grades. Using all math grades to include the developmental math grades would not provide an accurate measure of a student's math background. However, as indicated below, a dummy variable measures if a developmental math course has been taken.

In addition to academic performance in the perquisite courses, the quantity of those prerequisite courses are also included as a measure of student background. Some students may have more exposure to these prerequisite areas than others which may lead to a better finance grade. For instance, students that have taken more than the first two accounting or economics courses, regardless of grade, may have a better grasp of these principle areas such that their performance in finance is enhanced. To incorporate this information, variables are added that use the number of math, accounting, and economics courses for which the student has taken. Also, although the GPAs of any developmental math courses are not included in the academic performance variables mentioned previously, a variable is included to indicate if any developmental math courses were ever taken.

A student's ability to harness prerequisites knowledge may be limited by the length of time since the prerequisites class was taken. Thus, the timing of prerequisite courses should be included in addition to the academic performance and quantity of prerequisite courses taken. Variables related to the timing of the prerequisites simply indicate the number of semesters since the last prerequisites course in each of the areas (math, accounting, and economics) was taken. A similar variable is used by Austin and Gustafson (2006).

As in Didia and Hasnat, we use cumulative GPA at the time of enrolling in the principles of finance course not only as a measure of student aptitude but also as a means of controlling the other GPA-related independent variables. Variables are also included to indicate gender and transfer status, and in addition to Didia and Hasnat, variables are included to indicate if the student is a finance, accounting, or economics major.

Although not usually a formal prerequisite, the area of statistics may also be useful in the finance class, especially when studying measures of risk such as variance and beta. Since statistics

is not a formal prerequisite for the principles of finance course, the majority of students had not taken any statistics courses (only 71 out of 189). Using variables related to grades and timing of a student's statistics course severely limits the sample size. A variable that measures the quantity of statistics courses taken, however, would use the full sample size. Therefore, the variable measuring the quantity of statistics courses taken is used with the full sample, and the variables measuring the GPA and timing of a student's statistics course is used with the reduced sample. This results in 69 usable observations.

Two models are used. The first limits the measurements of statistics background to only the number of statistics courses taken while the second adds variables that measure the grades and timing of statistics courses. The first model is

$$GRADE = C + GENDER + TRANSFER + DEVMATH + ACC\_MAJOR + ECON\_MAJOR + FIN\_MAJOR + MATH\_AGE + MATH\_GPA + MATH\_Q + ECON\_AGE + ECON\_GPA + ECON\_Q + ACC\_AGE + ACC\_GPA + ACC\_Q + STATS\_Q + GPA \quad \textit{Equation (1)}$$

The second model is

$$GRADE = C + GENDER + TRANSFER + DEVMATH + ACC\_MAJOR + ECON\_MAJOR + FIN\_MAJOR + MATH\_AGE + MATH\_GPA + MATH\_Q + ECON\_AGE + ECON\_GPA + ECON\_Q + ACC\_AGE + ACC\_GPA + ACC\_Q + STATS\_AGE + STATS\_GPA + STATS\_Q + GPA \quad \textit{Equation (2)}$$

Where C is a constant; GENDER is a dummy variable that equals 1 if the student is male and 0 if the student is female; TRANSFER is a dummy variable that equals 1 if the student is a transfer student; DEVMATH is a dummy variable that equals 1 if the student has taken any developmental math course; ACC_MAJOR, ECON_MAJOR, and FIN_MAJOR are dummy variables that each equal 1 if the student is an accounting major, economics major, or finance major, respectively, and 0 otherwise; MATH_AGE, ECON_AGE, ACC_AGE, and STATS_AGE equal the number of semesters since, respectively, a math, economics, accounting, or statistics course was taken, MATH_GPA, ECON_GPA, ACC_GPA, and STATS_GPA equal the average GPA for the student's math, economics, accounting, and statistics courses, respectively, MATH_Q, ECON_Q, ACC_Q, AND STATS_Q equal the number of, respectively, math, economics, accounting, and statistics courses were taken, and GPA equals the cumulative GPA. Descriptive statistics for each of the variables are presented in Table 1.

| Table 1: Descriptive Statistics | | |
|---|---|---|
| Variable | Mean | Standard Deviation |
| Semester average for the course (GRADE) | 75.30 | 19.11 |
| Number of males (GENDER) | 35 | -- |
| Number of accounting majors (ACC_MAJOR) | 11 | -- |
| Number of economics majors (ECON_MAJOR) | 1 | -- |
| Number of finance majors (FIN_MAJOR) | 8 | -- |
| Number of transfer students (TRANSFER) | 42 | -- |
| Number of students that have taken developmental math (DEVMATH) | 19 | -- |
| Average GPA for all math courses taken (at the college algebra level and above) | | |
| (MATH_GPA) | 2.70 | 0.91 |
| Number of semesters since a math course was taken (MATH_AGE) | 7.19 | 6.58 |
| Number of math courses taken (at the college algebra level and above) | | |
| (MATH_Q) | 2.10 | 0.69 |
| Average GPA for all economics courses taken (ECON_GPA) | 2.65 | 0.83 |
| Number of semesters since an economics course was taken (ECON_AGE) | 3.83 | 5.80 |
| Number of economics courses taken (ECON_Q) | 2.45 | 0.58 |
| Average GPA for all accounting courses taken (ACC_GPA) | 2.79 | 0.76 |
| Number of semesters since an accounting course was taken (ACC_AGE) | 4.00 | 6.20 |
| Number of accounting courses taken (ACC_Q) | 2.04 | 0.67 |
| Average GPA for all statistics courses taken (STATS_GPA) | 2.66 | 1.12 |
| Number of semesters since a statistics course was taken (STATS_AGE) | 3.14 | 5.30 |
| Number of statistics courses taken (STATS_Q) | 1.36 | 0.51 |
| Cumulative GPA (GPA) | 2.80 | 0.60 |

## RESULTS

The possible dependence between the prerequisite GPAs with each other as well as the cumulative GPA may result in multicollinearity. A rule of thumb suggested by Griffiths, Hill, and Judge (1993, page 435) is that multicollinearity may be a problem given a correlation coefficient greater than 0.8 or 0.9. Hair, Anderson, Tatham, and Black (1995, page 127) suggest harmful collinearity with correlations coefficients above 0.9. Hair, et. al. and Myers (1990, page 369) suggest multicollinearity may be problem with Variance Inflation Factors (VIFs) greater than 10.

**Table 2: Correlation Coefficients Between the Variables**

| | GENDER | ACC_MAJOR | ECON_MAJOR | FIN_MAJOR | TRANSFER | DEVMATH | |
|---|---|---|---|---|---|---|---|
| GENDER | 1.0000 | | | | | | |
| ACC_MAJOR | -0.1984 | 1.0000 | | | | | |
| ECON_MAJOR | -0.0086 | -0.0588 | 1.0000 | | | | |
| FIN_MAJOR | 0.0117 | -0.0443 | -0.0491 | 1.0000 | | | |
| TRANSFER | -0.0064 | 0.0621 | -0.0359 | 0.0913 | 1.0000 | | |
| DEVMATH | -0.0910 | -0.1150 | -0.0695 | 0.0943 | -0.0861 | 1.0000 | |
| MATH_GPA | -0.0550 | 0.2770 | 0.1268 | 0.1326 | 0.0120 | -0.2928 | |
| MATH_AGE | -0.0320 | 0.1846 | -0.0499 | -0.0677 | -0.1018 | -0.1465 | |
| MATH_Q | -0.0961 | 0.0243 | 0.0646 | 0.0402 | 0.1040 | 0.1136 | |
| ECON_GPA | 0.0445 | 0.2358 | 0.1807 | -0.0546 | -0.0070 | -0.2123 | |
| ECON_AGE | -0.0413 | 0.1368 | -0.0068 | -0.0327 | -0.1509 | -0.0755 | |
| ECON_Q | -0.0914 | -0.1045 | 0.0437 | -0.1864 | -0.0017 | 0.0338 | |
| ACC_GPA | -0.1091 | 0.3181 | -0.0233 | 0.1094 | 0.1711 | -0.1600 | |
| ACC_AGE | -0.0034 | 0.0246 | 0.0046 | -0.1116 | -0.0607 | -0.0470 | |
| ACC_Q | -0.2072 | 0.3794 | 0.0902 | -0.0807 | 0.1582 | -0.0360 | |
| STATS_GPA | 0.0382 | 0.1611 | -0.0264 | -0.0961 | -0.1078 | -0.0540 | |
| STATS_AGE | -0.2218 | 0.1683 | 0.0369 | 0.1103 | -0.0436 | -0.3967 | |
| STATS_Q | -0.1389 | -0.0594 | -0.0292 | -0.0990 | -0.0334 | 0.0215 | |
| GPA | -0.1047 | 0.2809 | 0.1094 | 0.0623 | -0.0266 | -0.2365 | |
| | MATH_GPA | MATH_AGE | MATH_Q | ECON_GPA | ECON_AGE | ECON_Q | |
| MATH_GPA | 1.0000 | | | | | | |
| MATH_AGE | 0.0644 | 1.0000 | | | | | |
| MATH_Q | 0.0638 | -0.1307 | 1.0000 | | | | |
| ECON_GPA | 0.4565 | 0.0528 | 0.0578 | 1.0000 | | | |
| ECON_AGE | 0.0239 | 0.5423 | -0.1123 | 0.0697 | 1.0000 | | |
| ECON_Q | -0.0897 | 0.1863 | 0.0471 | -0.1501 | -0.0692 | 1.0000 | |
| ACC_GPA | 0.3757 | 0.2189 | -0.0632 | 0.4650 | 0.1359 | -0.0530 | |
| ACC_AGE | 0.0765 | 0.3281 | 0.0130 | 0.1792 | 0.6117 | 0.0716 | |
| ACC_Q | 0.0186 | 0.0524 | -0.0763 | 0.0125 | 0.0817 | 0.0266 | |
| STATS_GPA | 0.1593 | 0.7091 | -0.0766 | 0.2219 | 0.7937 | 0.0739 | |
| STATS_AGE | 0.4968 | 0.1558 | -0.0088 | 0.5531 | 0.0120 | -0.0456 | |
| STATS_Q | -0.0559 | 0.0018 | 0.0834 | -0.1269 | -0.0034 | 0.2178 | |
| GPA | 0.6261 | 0.0504 | -0.0493 | 0.6694 | 0.0156 | -0.0507 | |
| | ACC_GPA | ACC_AGE | ACC_Q | STATS_GPA | STATS_AGE | STATS_Q | GPA |
| ACC_GPA | 1.0000 | | | | | | |
| ACC_AGE | 0.0835 | 1.0000 | | | | | |
| ACC_Q | 0.1415 | -0.0702 | 1.0000 | | | | |
| STATS_GPA | 0.1289 | 0.8469 | -0.0801 | 1.0000 | | | |
| STATS_AGE | 0.4927 | 0.0273 | -0.0290 | 0.1217 | 1.0000 | | |
| STATS_Q | -0.0379 | 0.1306 | 0.0594 | -0.1817 | -0.0565 | 1.0000 | |
| GPA | 0.5949 | 0.0773 | 0.0511 | 0.2096 | 0.7397 | -0.1196 | 1.0000 |

The correlation matrix in Table 2 indicates relatively higher correlations are associated with the ages of the prerequisites courses. STATS_GPA has notable high correlations with MATH_AGE and ECON_AGE, and the high correlation of 0.85 with ACC_AGE indicates a possible problem with multicollinearity. GPA also has a relatively high correlation with STATS_AGE. Notice that this potential problem only impacts those variables in Equation 2. Table 3 reports Variance Inflation Factors (VIFs) for each non-binary variable. The correlations of the variables and their VIFs in Equation 1 (designated as Equation 1A) do not indicate any potential problem with multicollinearity. For Equation 2 (designated as Equation 2A), the correlations involving STATS_GPA may pose a problem. Although none of the VIFs break the threshold noted above, a few are dangerously high and should warrant concern during model selection. Table 3 also reports VIFs for reduced models to be discussed shortly.

**Table 3: Variance Inflation Factors**

| | Equation 1A | Equation 1B | Equation 2A | Equation 2B |
|---|---|---|---|---|
| MATH GPA | 1.85 | -- | 2.31 | -- |
| MATH AGE | 1.69 | 1.15 | 2.49 | -- |
| MATH_Q | 1.14 | 1.04 | 1.39 | -- |
| ECON GPA | 2.18 | -- | 3.14 | 2.24 |
| ECON AGE | 2.33 | -- | 6.38 | -- |
| ECON_Q | 1.28 | -- | 1.19 | -- |
| ACC GPA | 1.91 | -- | 2.21 | -- |
| ACC AGE | 1.86 | 1.13 | 9.36 | -- |
| ACC_Q | 1.33 | -- | 1.64 | -- |
| STATS GPA | -- | -- | 2.92 | 2.21 |
| STATS AGE | -- | -- | 5.63 | -- |
| STATS_Q | 1.15 | -- | 1.41 | -- |
| GPA | 3.08 | 1.02 | 6.01 | 3.44 |

Another concern is the large number of variables in each equation compared to the sample size. A stepwise regression could be performed, but Greene (1997, page 401) notes the possible faulty inference procedures associated with it. All of these variables are included due to the possible relationships with student performance in the principles of finance course. However, the inclusion of so many variables may cloud the results so that the marginal variable contributes little if any explanatory power. The solution should hold to the theoretic necessity of variable inclusion and at the same time use the mechanical nature of the stepwise regression process. The Akaike Information

Criterion (AIC) and the Schwartz Criterion are used to arrive at a more parsimonious model. All combinations of variables are included in the equation to find the best AIC and Schwartz Criterion statistic.

The OLS coefficients from the two models are given in Table 4. In Equation 1 (designated as Equation 1A) three variables are significant, two of which, MATH_Q and ACC_AGE, are unique to this study. MATH_Q indicates that a student's final semester average in principles of finance increases by about 3 percentage points for each math class taken. ACC_AGE indicates that the semester average decreases by about 1 percentage point for every semester since the student has taken an accounting class. Not surprisingly, GPA contributes largely to the student's semester average.

**Table 4: OLS Results**
The dependent variable is the final grade received in the course. The t-values are presented in parentheses.

| Independent Variables | Equation 1A | Equation 1B† | Equation 1C | Equation 1D | Equation 2A | Equation 2B† |
|---|---|---|---|---|---|---|
| C | 13.862<br>(1.3347) | 15.9436*<br>(1.7586) | 9.0852<br>(0.4895) | 23.8951<br>(1.5160) | 10.7505<br>(0.6045) | 26.5305***<br>(3.0950) |
| GENDER | -4.4924<br>(1.6307) | -5.5130**<br>(2.2936) | -4.1738<br>(1.0235) | -5.7301<br>(1.3584) | -0.7080<br>(0.1779) | -- |
| ACC_MAJOR | 2.7105<br>(0.6932) | -- | 2.1220<br>(0.3321) | -1.8873<br>(0.3423) | 5.6129<br>(0.9479) | -- |
| ECON_MAJOR | 1.0356<br>(0.0915) | -- | 2.0602<br>(0.1204) | -7.2943<br>(0.4203) | 0.0836<br>(0.0053) | -- |
| FIN_MAJOR | 0.2096<br>(0.0533) | -- | 5.7957<br>(0.8758) | -4.7791<br>(0.8352) | 1.6759<br>(0.2689) | -- |
| TRANSFER | -1.2258<br>(0.4220) | -- | 1.9768<br>(0.4737) | -7.1869<br>(1.5441) | 3.0257<br>(0.7880) | -- |
| DEVMATH | 3.2186<br>(0.9977) | -- | 1.9786<br>(0.4022) | 3.9482<br>(0.7928) | 6.2120<br>(1.3209) | -- |
| MATH_GPA | 1.0504<br>(0.5317) | -- | -0.9445<br>(0.3065) | 1.7770<br>(0.5557) | -0.8033<br>(0.2842) | -- |
| MATH_AGE | 0.2475<br>(1.3831) | 0.3145***<br>(3.2456) | 0.3426<br>(0.8571) | 0.2538<br>(1.1079) | 0.1464<br>(0.3609) | -- |
| MATH_Q | 3.1775*<br>(1.8646) | 3.3122*<br>(1.9153) | 3.6710<br>(1.2019) | 4.7826*<br>(1.9669) | 1.5646<br>(0.5409) | -- |
| ECON_GPA | -2.2232<br>(0.9857) | -- | -3.4389<br>(0.8724) | -0.8174<br>(0.2664) | -4.1864<br>(1.1572) | -5.8182<br>(1.6241) |
| ECON_AGE | 0.2413<br>(0.7846) | -- | 0.2322<br>(0.2904) | 0.1630<br>(0.4324) | 0.4881<br>(0.6626) | -- |
| ECON_Q | -1.2427<br>(0.5260) | -- | 1.2719<br>(0.3697) | -3.6313<br>(0.8931) | 1.4322<br>(0.4517) | -- |

**Table 4: OLS Results**
The dependent variable is the final grade received in the course. The t-values are presented in parentheses.

| Independent Variables | Equation 1A | Equation 1B† | Equation 1C | Equation 1D | Equation 2A | Equation 2B† |
|---|---|---|---|---|---|---|
| ACC_GPA | 1.9838 (0.8386) | -- | -0.3720 (0.1052) | 2.8819 (0.7616) | -1.9040 (0.5758) | -- |
| ACC_AGE | -1.0226*** (2.7338) | -0.8208* (1.7632) | -0.7533 (0.9605) | -2.8835*** (2.9794) | -0.3391 (0.4060) | -- |
| ACC_Q | -2.7260 (1.2705) | -- | -2.7057 (0.7732) | -0.4594 (0.1397) | -1.4706 (0.4568) | -- |
| STATS_GPA | -- | -- | -- | -- | 9.0958*** (3.5219) | 8.5344*** (3.4837) |
| STATS_AGE | -- | -- | -- | -- | -0.5006 (0.6608) | -- |
| STATS_Q | 2.6683 (1.4965) | -- | -- | -- | 3.1820 (0.8150) | -- |
| GPA | 20.0260*** (5.4172) | 19.6745*** (8.5420) | 25.9684*** (3.9331) | 18.2497*** (3.3605) | 16.3821** (2.3821) | 14.8288*** (2.8214) |
| Adjusted $R^2$ | 0.4101 | 0.4276 | 0.3627 | 0.5623 | 0.4673 | 0.5424 |
| F | 6.6851 | 21.7686 | 3.4191 | 4.1448 | 4.1397 | 27.8687 |
| N | 140 | 140 | 69 | 69 | 69 | 69 |
| Akaiki Information Criterion | 8.3855 | 8.2778 | 8.4976 | 8.5387 | 8.3459 | 8.0127 |
| Scwartz Criterion | 8.7637 | 8.4039 | 9.0480 | 9.0891 | 8.9934 | 8.1422 |

† indicates that White's corrected standard errors were used due to the detection of heteroskedasticity.
*** Significance at the 0.01 level.
** Significance at the 0.05 level.
* Significance at the 0.10 level.

The model of best fit as determined by the AIC and Schwartz Criterion is designated as Equation 1B. This equation also has the second highest adjusted R squared of all the possible models. MATH_Q, ACC-AGE, and GPA are all still statistically significant, although the significance of ACC_AGE is reduced. GENDER and MATH_AGE become significant in this model. A puzzling finding is the positive coefficient for MATH_AGE. This shows that student performance improves the longer the amount of time has elapsed since the last math class was taken. A possible explanation could be that students with better math ability complete math requirements early in their academic career, resulting in a longer period since the last math class was taken, while those with poorer math ability would have only recently completed a high level math course.

Equation 2 (designated as Equation 2A) adds STATS_AGE and STATS_GPA to the model with a cost of a reduced sample size. GPA still remains the largest significant contributor to student

scores, but MATH_Q and ACC_AGE lose their significance. This could be a result of the reduced sample size, the inclusion of the two additional variables, or both. Notice that the new variable, STATS_GPA, is positively significant. STATS_Q was not significant in Equation 1A. This may show that a proficient statistics knowledge and not just an exposure to a statistics background is important to a student's performance.

A concern for Equation 2 was the possible problem with multicollinearity. Since the "age" variables evidenced the potential problem, these variables (MATH_AGE, ECON_AGE, ACC_AGE, and STATS_AGE) were all removed from the model. Although not reported here, all remaining variables kept their signs, and STATS_GPA and GPA retained their levels of significance. For this model, GPA was found to have a VIF of 5.88 with the second highest VIF of 3.03 associated with ECON_GPA.

The model of best fit for Equation 2 as determined by the AIC and Schwartz Criterion is designated as Equation 2B. This equation also has the highest adjusted R squared of all the possible models. STATS_GPA and GPA retain their levels of significance. Interestingly, the model fits the data better with ECON_GPA. Another puzzling finding is its negative coefficient. The authors can offer no reasonable explanation for this phenomenon. Notice that the VIFs reported in Table 3 indicate no evidence of multicollinearity.

An observation may be made concerning the sign change in several variables from Equation 1A to Equation 2A. For instance, ACC_GPA is positive in Equation 1A, yet negative in Equation 2A. This is because Equation 2A uses a different sample than Equation 1A. To fully appreciate the different characteristics of the sample of students who have not taken statistics and the sample of students who have, Equation 1A is run using both sub-samples. These new equations are designated as Equation 1C and 1D. STATS_Q is omitted from these regressions since STATS_Q would equal zero for all observations for the sub-sample of students who have not taken a statistics course. Although not reported here, STATS_Q was included when using the sub-sample of students having a statistics course, and the findings are similar to those that are reported in Table 4.

Equation 1C uses the sub-sample of students who have taken a statistics course. Notice that the coefficients have the same sign as those in Equation 2A. This is because both equations use the same sample. Notice also that this model does not fit the data quit as well as Equation 2A as indicated by the AIC, Schwartz Criterion, and adjusted R squared. Adding the STATS_GPA variable as in Equation 2A improves the model for this sample. Equation 1D uses the sub-sample of students who have not taken a statistics course. The variables that are significant here are also those that are significant in Equation 1A. Reviewing Equations 1C and 1D together with Equations 1A and 2A indicates that for those students who have taken a statistics course, better performance in the statistics course relates to better performance in the introductory finance course; for those students who have not taken a statistics course, more math courses and the more recent the last accounting course was taken results in better performance in the introductory finance course.

## CONCLUSION

As in Didia and Hasnat (1998) cumulative GPA has been found to contribute significantly to a student's performance in the principles of finance class. This research identifies the quantity of math classes taken, the age of a student's last accounting class, and the GPA in a student's statistics classes as additional determinates of performance. Of course, different instructors teach in different ways, and what contributes to one instructor's students may not contribute to another's. However, instructors and program developers need to be aware that a student's performance in the principles of finance course may be a function of such factors as the timing and quantity of certain prerequisite courses, and not only the GPA in those courses.

## REFERENCES

AACSB International, "Eligibility procedures and standards for business accreditation," *AACSB International Business Accreditation Seminar (New Standards),* November 2003, 156-239.

Anderson, Gordon, Dwayne Benjamin, and Melvyn A Fuss(1994). The Determinants of Success in University Introductory Economics Courses. *Journal of Economic Education,* 25 (2), 99-119.

Austin, M. Adrian and Leland Gustafson (2006). Impact of course length on student learning. *Journal of Economics and Finance Education* 5 (1), 26-37.

Bagamery, D. Bruce, John J. Lasik, and Don R. Nixon (2005). Determinants of success on the ETS business major field exam for students in an undergraduate multisite regional university business program. *Journal of Education for Business,* September/October, 55-63.

Borg, O. Mary, Paul M. Mason, and Stephen L. Shapiro (1989). The case of effort variables in student performance. *Journal of Economic Education,* 20 (3), 308-313.

Bosshardt, William and Michael Watts (1990). Instructor effects and their determinants in precollege economic education. *Journal of Economic Education,* 21 (3), 265-276.

Didia, Dal and Babnan Hasnat (1998). The determinants of performance in finance courses. *Financial Practice and Education,* 8 (1), 102-107.

Drennan, L.G. and F.H. Rohde (2002). Determinants of performance in advanced undergraduate management accounting: an empirical investigation. *Accounting and Finance,* 42, 27-40.

Gracia, Louis and Ellis Jenkins (2003). A quantitative exploration of student performance on an undergraduate accounting programme of study. *Accounting Education,* 12 (1), 15-35.

Graves, O. Finley, Irva Tom Nelson, and Dan S. Deines (1993) Accounting student characteristics: results of the 1992 Federation of Schools of Accountancy (FSA) Survey. *Journal of Accounting Education,* 11 (2), 221-225.

Greene, William H. (1997). *Econometric analysis (Third Edition)*. Prentice Hall.

Griffiths, William E., R. Carter Hill, and George G. Judge (1993). L*earning and practicing econometrics*., John Wiley & Sons, Inc.

Hair, Joseph F. Jr., Rolph E. Anderson, Ronald L. Tatham, and William C. Black (1995). *Multivariate analysis (Fourth Edition).* Prentice Hall.

Laband, N. David and Michael J. Piette (1995). Does who teaches principles of economics matter. *Papers and Proceedings of the American Economic Association*, 85 (2), 335-338.

Murphy, P. Daniel and Keith G. Stanga (1994). The effects of frequent testing in an income tax course: an experiment. *Journal of Accounting Education*, 12 (1), 27-41.

Marcal, Leah and William W. Roberts (2000). Computer literacy requirements and student performance in business communications. *Journal of Education for Business*, May/June, 253-257.

Myers, Raymond H. (1990). *Classical and modern regression with applications (Second Edition)*. Duxbury Press.

Schuhmann, W. Peter, Kim Marie McGoldrick, and Robert T. Burris (2005). Student quantitative literacy: importance, measurement, and correlation with economic literacy. *American Economist*, 49 (1), 49-65.

# IMPROVING PERFORMANCE THROUGH THE BALDRIGE ORGANIZATIONAL PROFILE: AN APPLICATION IN BUSINESS EDUCATION

**Ramachandran Natarajan, Tennessee Technological University**
**Bonita Barger, Tennessee Technological University**

## ABSTRACT

*In recent years, business education has come under attack. CEOs, recent graduates, and business school faculty themselves are complaining that the Academy is not preparing students to deal with the complex, unquantifiable aspects of leading and managing organizations. The relevance of the business curriculum is being questioned. At the same time, in the last couple of decades, a number for formal systems and frameworks for improving organizational performance have been developed and deployed. These include the ISO series of standards for quality and environmental standards, principles of lean production, Six Sigma and the criteria framework of the quality awards. Of these, the use of quality award frameworks is of particular interest because it is motivated by the organization's desire to improve performance on a voluntary basis, unlike other systems which are often mandated by customers. In this paper, we discuss the use of a specific aspect (the Organizational Profile) of a quality award, i.e., the Malcolm Baldrige National Quality Award of the U.S.A. in a specific context, i.e., in business education. The paper highlights an innovative instructional approach in which business students develop organizational diagnostic and consulting skills through the application of the Baldrige Organizational Profile (OP) as a performance improvement tool. It demonstrates how students translate the OP and apply it to a real life organization. It describes the process and the outcomes in terms of learning and benefits for both the students and their client organizations.*

Key words: Performance Improvement; Baldrige Award; Baldrige Organizational Profile; Critique of Business Education; Relevance of Business Curriculum; Organizational Learning; Interventions for Performance Improvements

## INTRODUCTION

In the last couple of decades, a number of formal systems and frameworks for improving organizational performance have been developed and deployed. These include the ISO series of standards for quality and environmental standards, principles of lean production, Six Sigma and the

criteria framework of the quality awards (Evans & Lindsay, 2005). Of these, the use of quality award frameworks is of particular interest because it is motivated by the organization's desire to improve performance on a voluntary basis, unlike other systems which are often mandated by customers. In this paper, we discuss the use of a specific aspect (the Organizational Profile) of a quality award, i.e., the Malcolm Baldrige National Quality Award of the U.S.A. in a specific context, i.e., in business education.

The paper is organized by sections. The first section addresses the contemporary issues in business education and curriculum and then presents the context for the application of the Organizational Profile. The following section provides a historical perspective on the Baldrige Award and the Organizational Profile. Then, the application of the Profile is illustrated and elaborated. The last section highlights the benefits, transferability issues, and the conclusion.

## CURRENT ISSUES IN BUSINESS EDUCATION

In recent years, business education and curriculum has come under attack in many countries (Bennis & O'Toole, 2005; Ramachander, 2005; *Economist* 2004A; *Business Week*, 2005). These criticisms have originated not only from the employers and students but also from the deans and business faculty themselves (Bennis & O'Toole, 2005). One of the main charges—in fact not all that recent—leveled against the business education is that it is not preparing the graduates to deal with complex, unquantifiable aspects of leading and managing organizations. One of the ways business schools traditionally have addressed this problem is by including case studies in the coursework. This case study approach, popularized by the Harvard Business School, does not satisfy critics like Professor Mintzberg, a leading and vocal critic of the business programs. According to him, "You don't get trained in the capacity for managing in an MBA program. You think you do, but . . . a lot of people end up grabbing for techniques. Where it goes wrong is in the case-study method: give me 20 pages and an evening to think about it and I'll give you the decision tomorrow morning. It trains people to provide the most superficial response to problems... getting the data in a nice, neat, packaged form and then making decisions on that basis. It encourages managers to be disconnected from the people they are managing" (Ramachander, 2005). In his book, *Managers Not MBAs*, he says MBA programs often ignore that management is a craft which requires more than just the ability to analyze data (Mintzberg, 2004). According to Stanford Graduate School of Business faculty member Jeffrey Pfeffer, MBA education does not equip graduates to respond effectively to the rapid changes taking place in the global economy (Pfeffer and Fong, 2002).

In a recent article that has generated a lot of discussion, business school academics, Bennis and O'Toole (Bennis & O'Toole, 2005) argue that the model used for business education is inappropriate and is not rooted in the requirements of the profession. It mimics the hard disciplines of natural and physical sciences and emphasizes quantitative and analytical skills. The faculty have very little experience in actual business practice. The research knowledge they generate using the

methodology of hard sciences is often divorced from reality and irrelevant to what goes on in business. They recommend switching to the professional model in medicine and law, where the teachers also practice what they teach.

But such sweeping changes are unlikely to take place any time soon. The American Assembly of Collegiate Schools of Business (AACSB) International, the accrediting agency for U.S. business schools and professional organization for management education, has taken note of the increasing chorus of critics and the gloomy forecasts about the future of the industry's main product, the MBA degree. But John Fernandes, president and CEO of AACSB International, remains optimistic that the glory days of MBA are still ahead (AACSB International, 2005). This optimism is based on the growth in demand for business education. Business degrees rose from 14% of all undergraduate degrees in 1971 to 21% in 2001, and MBAs from 11% to 25% of all master's degrees (Friga, Bettis, & Sullivan, 2003). And globally, business education is expanding rapidly in places where it did not exist just 25 years ago. For instance, China now has at least 21 MBA programs run with American partners, and another 40 or so are run by Chinese universities alone. In Russia and central and eastern Europe, more than 1,000 new business schools sprang up during the 1990s (*Economist,* 2004a). The composition of this demand is also changing. Because of the advent of online programs offered by many business schools, the enrollment in part-time MBA programs is increasing. For instance, University of Phoenix, which pioneered the online degrees in the U.S., enrolls about 7,000 part-time MBA students compared to about 4,000 full-time ones (*Economist*, 2004a). Mr. Fernandes wants MBA program providers to keep their programs current. According to him, "The MBA still is the most popular, most flexible, and most successful degree in the world. Our job is to keep it that way. After all, we are providing our graduates with the 'liberal arts of life,' and a guarantee of the tools needed for life-long success," (AACSB International, 2005). All this does sounds more like a call for fine-tuning than for making sweeping changes.

Other solutions stop short of the fundamental changes called for by Bennis and O'Toole. One such solution it is to incorporate more real world experience into the business curriculum (Ramachander, 2005). The objective is to create more opportunities for students to link theories and concepts to the work experience. The application of Baldrige Organization Profile described in this paper belongs to this genre of solutions for reforming business curriculum.

It serves another purpose as well. It can meet the needs of growing demand for business consultants. The profession of business consulting seems to be recession-proof, complementing the tumultuous and rapidly changing technology environments in business. It has grown exponentially over the years. "In 2000, over 140,000 consultants sold over $70 billion of advice"(Careers-in-Business, 2005). In the U.S., top consulting firms such as Bain, McKinsey, and Mercer Management Consulting often target top MBA schools such as Harvard, Wharton, Stanford, and Sloan. "Ten percent of the 1993 Harvard graduating class went to work for McKinsey" (Careers-in-Business, 2005). While large firms continue to contract consultants for projects such as sales force automation and foreign business development, smaller entrepreneurial firms seek their services in

value management, information technology implementation, health care, education, market research, and project management.

Seventy-three AACSB International, The Association to Advance Collegiate Schools of Business colleges offering MBA programs ranging from 30-33 hours were benchmarked to determine if courses were offered in consulting/research and internships. Thirteen programs offered both consulting/research and internships. Thus, while the market demand continues to grow for consulting/research, only 17% of these programs addressed this demand by offering courses.

## THE BALDRIGE AWARD AND ORGANIZATIONAL PROFILE

### The Baldrige Award

In the 1980s, there was great concern about the loss of competitiveness of U.S. industries in the global market place. The noteworthy successes of the Japanese companies were becoming evident. While the issue had many dimensions, one aspect in particular—quality—received a lot of attention. The gap in quality of products made by U.S. companies in comparison to the Japanese was viewed with alarm. There was growing recognition that concerted action was needed to close the gap. A National Quality Award was suggested as one of the mechanisms for this purpose. The legislation for the National Quality Award passed in August 1987, as the Malcolm Baldrige National Quality Award (MBNQA), named after the Secretary of Commerce who had been a strong supporter of the award but had recently died in tragic horse riding accident.

> "A national quality award program of this kind in the United States would serve, among others, the purpose of helping to improve quality and productivity by:
>
> (a) helping to stimulate American companies to improve quality and productivity for the pride of recognition while obtaining a competitive edge through increased profits;
> (b) recognizing the achievements of those companies that improve the quality of their goods and services and providing an example to others;
> (c) establishing guidelines and criteria that can be used by business, industrial, governmental, and other organizations in evaluating their own quality improvement efforts; and
> (d) providing specific guidance for other American organizations that wish to learn how to manage for high quality by making available detailed information on how winning organizations were able to change their cultures and achieve eminence" (National Institute of Standards, 2005).

The award criteria are the basis for organizational self-assessments, for making awards, and for giving feedback to applicants. Over the years, the Baldrige criteria have evolved from its initial emphasis on the quality dimension of organizational performance to becoming a model for overall performance excellence (Evans & Lindsay, 2005). The Baldrige Award has played a significant role in helping U.S. organizations improve their performance and competitiveness. (Junkins 1994; Blodgett, 1999; DeBaylo, 1999; Shergold & Reed, 1996). By spawning a number of state quality awards in over 40 states of the U.S., most of which are based on the Baldrige Criteria, MBNQA has been able to extend the deployment of the criteria to a much wider base of organizations (Bobrowski & Bantham, 1994). It has served as a benchmark for many other national quality awards. Many textbooks have used the award criteria and the cases based on the award winning organizations as teaching tools (Evans & Lindsay, 2005). Business students learn through these texts and case studies how these role model organizations have benefited from the application of the Baldrige criteria. However, typically, they do not learn how to apply the Baldrige framework to real organizational contexts for performance improvements. This paper describes an innovative approach in which students learn by applying a particular element of the Baldrige criteria, i.e., the Organizational Profile (OP), to a real life organization. It describes the process and the outcomes in terms of learning and benefits for both the students and their client organizations.

**Baldrige Organizational Profile: Purpose and Function**

The applicants for the Baldrige award have to provide a description of their organization and what is important to that organization in terms of key factors such as its customers, products and/or services, competition, employees, supplier and partnering relationships, its regulatory and legal environment, and organizational directions. Until 2000, this information was to be organized under the following subheadings: Basic description of the organization; Customer/student/patient and stakeholder requirements; Relationship to other organizations; Competitive situation; and Organizational directions. In the year 2001, the required information to be provided by the applicant was made more specific and explicit by a series of questions that the applicant has to respond to. These questions constitute the Organizational Profile (OP). The term Profile here refers to more than just the facts about the organization, such as the number of employees. The Organizational Profile is a snapshot of the organization, the key influences on how it operates, and the key challenges it faces. The first section, Organizational Description, addresses the organization's business environment and its key relationships with customers, suppliers, and other partners. The second section, Organizational Challenges, calls for a description of the organization's competitive environment, the key strategic challenges, and the system for performance improvement. The questions that apply to the performance excellence criteria for the business sector are given in Appendix 1A. The questions for the education and health care sector are similar but tailored to those sectors (National Institute of Standards, 2005). A simpler version of the Organizational Profile

questionnaire (for the business, education, and the healthcare sectors) called E-Baldrige Organizational Profile is available at the Baldrige website. An organization can complete it online and receive a comparison with other organizations that have also completed it. The version for the business sector is given in Appendix 1B.

The importance of the Organizational Profile to the Baldrige award process lies in the following:

- It is the most appropriate starting point for self-assessment and for writing an application;
- It helps in identifying potential gaps in key information and focusing on key performance requirements and business results;
- It is used by the Examiners and Judges in application review, including the site visit, to understand the organization and what the organization considers important; and
- It also may be used by itself for an initial self-assessment. If the organization identifies topics for which conflicting, little, or no information is available, it is possible that the Organizational Profile can serve as the complete assessment, and the organizations can use these topics for action planning (National Institute of Standards, 2005).

The last point is the most relevant as far as its use in business education is concerned. It is used as a tool for organizational diagnosis, gap identification, and action planning.

## APPLICATION OF THE BALDRIGE ORGANIZATIONAL PROFILE

The purpose of this section is to describe the integration of business/market research, consulting, self-managed work teams, and the application of the Baldrige Organizational Profile (see Appendices 1A & 1B) in an MBA level course for the purpose of developing organizational diagnostic and consulting skills. Peter Block (2000) states, "One of the things that has always haunted me is truly knowing whether we are making a difference (adding value by consulting)" (Block, 2000, p. xix). The MBA curriculum at XXX University attempts to make a difference by preparing students to be business leaders. In doing so, the program required students to take an exit class called Business Research. The main objective of the course was for students to do applied and actionable research in the role of consultants for local businesses. The secondary objective was to contribute to regional business development. The course was designed to develop business research, reporting, and entrepreneurial consulting skills through the integration of learning from prior MBA courses and application to a "live" and "real time" entrepreneurial client system.

**Profile Content and Structure**

Business research begins with the gathering of information, which serves as the basis for intellectual capital and managerial decisions. An important foundation for this capital and these decisions is information and data turned into relevant and applied knowledge. The purpose of business and market research is to provide this valid, reliable, and accurate information to serve as a basis for entry, diagnosis, and managerial decisions in the consulting relationship.

As part of their role in a simulated consulting organization, MBA students identify their core competencies (i.e. web page creation, inventory control, accounting, marketing, etc.). They become subject matter experts in a chosen area (i.e., entry and contracts, project management, diagnosis, and data collection, dealing with resistance, and report writing) (Block, 2000). They scout, identify, and contract with a local firm that needs their services. In the role of external consultants, students have some influence with the firm's managers but no direct power to make changes or implement programs.

As members of a simulated consulting firm, students: *choose* a project management team; *locate* an entrepreneurial organization that has a problem; *create* a memo of understanding outlining scope of work, terms of service), confidential information, etc. (see Appendix 2); *analyze* the organization using the Baldrige Organizational Profile (see Appendix 1A); *create* a project management plan; *generate* $5,000 of simulated revenue for the consulting organization; *benchmark* (Camp, 1989) 3-4 sources; *do the research and develop recommendations; present* their findings to the class and the client; and *post* the project on a portfolio website as evidence of their work to support on-going employment searches.

As external consultants, the MBA students develop a strong vested interest in the client organization's success and a pride in their work. As part of the simulated consulting culture, their reputation and future success depend on "helping the client" solve the problem. They create simulated budgets of "what their work is worth" in the geographic marketplace. Each student is required to generate $4,500-$5,000 worth of simulated project revenue for the class consulting firm. The organizations are not charged a fee, but over $700,000 of "free service" has been generated by these student consulting contracts. Student teams are self-managed with the authority to terminate dysfunctional team members. A three-phase disciplinary action policy allows a terminated team member "due process" to appeal such a termination (see Appendix 3). The worth of the final deliverables is determined by a 360-degree performance appraisal system comprised of peers, the client, self, and the instructor. The final deliverables become part of a student-created electronic portfolio used to seek employment in their final semester of the MBA program. Frequently, follow-up is provided by the university's Small Business Development Center.

The Baldrige Organizational Profile (OP) has become the instrument of choice for the organizational analysis in the consulting relationship. Prior to the selection of the OP, a theoretical framework highlighting human resource management, organizational structure, and culture was

used. While theoretically sound, the model was complex and not "student friendly." Students were given many categories and a list of questions. They randomly chose questions, interviewed managers, and reported the responses in the final paper. The framework was "just another assignment" given by the instructor. It was completed to meet the requirements of the course. It did not add value beyond the class assignment. On the other hand, the OP has to be completed by every Baldrige award applicant and has already proved its worth to the practitioners and companies. It provided the structure and ease of application, and served as an educational tool for both the student and the organization. In addition, a standard language for analysis and report writing was created using the Baldrige Glossary of Key Terms (National Institute of Standards, 2005).

To increase theawareness of the Baldrige Organizational Profile and the issues involved in its application as a diagnostic and learning tool for organizational performance improvement, a CD-ROM was created to guide any instructor who wishes to use OP and serve as a means of introducing the OP into classroom lecture. The CD-ROM has 5 video lecturettes. Each lecturette is designed to provide a unique perspective of the Baldrige Organizational Profile to organizational performance improvement. Perspective #1: The educator's perspective on incorporating the OP and Terminology. Perspective #2: A Baldrige Examiner's historical perspective on Baldrige and the Organizational Profile. Perspective #3: A student consultant interviewing a client—An application of the Organizational Profile. Perspective #4: The student and business client's perspective on using the Profile for performance improvement. Perspective #5: A State Quality Award Program Director's perspective on value added to organizations. The CD-ROM is available from the authors upon request.

**The Benefits**

Students learn and apply an organizational analysis process. Contextual learning occurs. The logic is one *of theory-practice-practice informed by theory* (Kolb & Fry, 1975). Multiple models and theories and relationships are presented in the Academy. However, these concepts remain "empty," are "skeletons" or just buzz words for students until they have a context to "hang" them on. As one typical student stated: "By helping the company develop its Organizational Profile, we were also able to help our client recognize some Opportunities for Improvement (OFIs). The OFIs were only identified when we asked him the questions pertaining to the Organizational Profile." What students learn in functional silos in various courses in the MBA program has to be integrated as they address the various areas of OP. They learn systems thinking by developing a holistic perspective on the organization. An important benefit students derive is developing the ability to synthesize the disparate facts about the organization into knowledge for performance improvement. On a related note, according to scholars like Mintzberg, synthesis, not analysis, "is the very essence of management" (Economist, 2004b).

As student consultants, they translate the OP and become teachers to local business managers. Translating the OP category areas into "client-comprehensible questions" to decode the organization in order to make improvement interventions is a major challenge. While business research in action involves the creation of intellectual capital and applied knowledge for managerial decisions—"head work"—it also involves the use of "heart work." Students leave the "classroom" and enter the "boardroom." A "human moment" is created bringing emotional and intellectual attention to real business problems. The students feel the impact of resistance and struggle with change management issues. The clients feel the impact of improved business processes. During the final feedback meeting, one client clearly and emotionally stated this impact: "I've just received a large contract (over several million dollars). I do not have a college education and never thought I needed one. You have showed me why an education is important" (Client, 2001). For the student, the outcome is increased confidence and pride in delivering a series of products that will go beyond receiving a "grade" from the instructor. They themselves have become the teacher—often to successful business leaders.

**Transferability**

While the application of the OP presented here is at the graduate level, student teams in undergraduate courses have successfully used it to analyze an organization. It has been used in Human Resource Management and International Management classes at the undergraduate level. Undergraduate students used OP to analyze the chosen organization using secondary research sources (annual plans, organization websites, etc.) but students did not act in the role of consultants.

We administered a survey at the end of Fall semester of 2006 assessing student reactions to the application of the OP used in both undergraduate and graduate courses to analyze organizations. The survey is given in Appendix 4. The survey results are given in Tables 1 and 2 respectively for assessments by MBA and undergraduate students. Their thoughts on other aspects of OP are given in Appendix 5. The majority of the both MBA and Undergraduates thought that the Profile was significant in every aspect (giving a rating of 4 or 5 on a 1-5 scale). However, for 12 out of the 16 items in the survey, in terms of overall weighted rating percentages, the undergraduates rated the Profile as not as important, not as relevant to business practice, as less complete, etc. This is not as unexpected as it may seem. MBA students have more experience (whether it be in school or with previous work) than undergraduates and would probably know whether the Profile applies to the business world or not. According to Dr. Curt Reimann (2005), the first director of the Baldrige Award, "OP factors chosen could set the bounds for student's assessment, taking into account their current level of business education."

A side by side comparison with another approach for organizational analysis for the same set of students was not possible because only one approach can be used at a time in the course. But it must be mentioned that the earlier approach was discontinued because it was more theoretical,

more complex, and less user friendly than the OP. Clearly OP was more effective and an improvement over the earlier approach.

For undergraduate courses and those not familiar with the Baldrige Organizational Profile, we recommend instructors use the simplified online version of the instrument (See Appendix 1B). Several basic prerequisites are recommended for using the OP: (1) an understanding of business terminology; (2) the ability to establish a relationship; (3) the ability to interview and ask pertinent questions, develop, and lead a "conversation with a purpose" (Bingham & Moore, 1959); and (4) the ability to synthesize/integrate information into a coherent report.

The OP is a publicly available (on the Internet) tool easily accessible worldwide. Therefore, the content and the process underlying this interdisciplinary innovation lends itself to global transferability in national and international business education. Dr Reimann (2005) states "that the OP thinking could be used as a basis for designing a variety of capstone experiences." It is suited for use in courses such as business policy, small business consulting, and entrepreneurship courses, where there is an experiential component, or case study methodology. The authors also envision it being relevant in management and executive development programs, workshops on performance improvements, and organizational analysis for practitioners, venture capitalists, and small businesses.

## CONCLUSION

In summary, students' learning is enhanced as a result of transferring theory into practice, becoming subject matter experts to clients, creating visible performance improvement processes that are quantifiable in real monetary terms, and gaining confidence in their skills and ability to replicate the process in other business settings. The financially driven business entrepreneurial consulting simulation with the application of the OP is a win-win situation for all. The *student* benefits by presenting actual deliverables to prospective employers. "Being turned loose to do the caliber of work most definitely gave me the kind of real-world experience I wanted," stated one student. "The work is not easy. It is work!" One student reflected, "Business research turned out to be more difficult than the syllabus indicated, but the project built confidence that will carry over into our futures." *Local businesses* benefit by improving their business processes and performance. The *university* benefits by graduating competent and confident business professionals. The *general business community* benefits by gaining access to free professional services.

## REFERENCES

AACSB International (2005 June) *eNEWSLINE* 4(6). Retrieved August 16, 2005 from http://www.aacsb.edu/publications/enewsline/archive_print/.

B schools for the 21st century (2006, April) *Business Week*, Editorial, 112.

Bennis, W. G. & J. O'Toole (2005, May). How business schools lost their way, *Harvard Business Review Online Edition*.

Bingham, W. V. D. & B. V. Moore (1959). *How to Interview* (4th ed.) New York: Harper and Row.

Block, P. (2000). *Flawless consulting: A guide to getting your expertise used.* San Diego, CA: Jossey-Bass/Pfeiffer & Co.

Blodgett, N. (1999). Service organizations increasingly adopt Baldrige model. *Quality Progress,* (December), 74-78.

Bobrowski, P. M., & J. H. Bantham (1994). State quality initiatives: mini Baldrige to Baldrige plus. *National Productivity Review, 13*(3) (Summer), 423-438.

Business schools: But can you teach it? *Economist* (2004, May 20).

Camp, R. C. (1989*). Benchmarking.* Milwaukee, WI: ASQ Quality Press.

Careers-in-Business. Consulting: facts and trends. Retrieved August 16, 2005 from http://www.careers-in-business.com/consulting/mcfacts.htm.

Client (2001, September 27). [Personal Interview]. *Organizational Profile.* Anytown, USA.

DeBaylo, P. W. (1999). Ten reasons why Baldrige model works. *The Journal for Quality and Participation,* (January/February), 1-4.

Evans, J. R.& W. M. Lindsay (2005). *The management and control of quality* (Chapter 3). Mason: OH: Thomson South-Western.

Friga, P., R. Bettis, & R. Sullivan (2003). Changes in graduate management education and new business school strategies for the 21st century. *Academy of Management Learning and Education, 2,* (3).

Junkins, J. R. (1994). Insights of a Baldrige award winner. *Quality Progress,* 27(3), 57-58.

Kolb, D. A. & R. Fry (1975). Toward an applied theory of experiential learning In C. Cooper (ed.) *Theories of group process.* London: John Wiley.

Management education: No more boring analysis? *Economist* (2004, May 13).

Mintzberg, H. (2004). *Managers not MBAs: A hard look at the soft practice of managing and management development* San Francisco, CA: Berrett-Koehler.

National Institute of Standards. *Organizational Profile*. In 2005 Criteria for Performance Excellence. Retrieved August 16, 2005 from http://www.quality.nist.gov/Criteria.htm.

Pfeffer, J. & C.T. Fong (2002). The end of business schools? Less success than meets the eye. *Academy of Management Learning and Education.* 1(1), 78-95.

Ramachander, S. (2005, May 15). Making global managers. *The Hindu* magazine section. Retrieved August 16, 2005 from http://www.hindu.com/thehindu/mag/2005/05/15/index.htm.

Reimann, C. (2005). In an interview by one of the authors.

Shergold, K. & D. M. Reed (1996). Striving for excellence: how self-assessment using business excellence model can result in step improvements in all areas of business activities. *TQM Magazine, 8* (6), 48-52.

## APPENDIX 1A
## BALDRIGE ORGANIZATIONAL PROFILE

Please note that the Baldrige Organizational Profile itself is evolving from year to year. The users should decide which year's OP is appropriate for their use. The OP for 2005 Business Criteria is given below. http://www.quality.nist.gov/PDF_files/2005_Business_Criteria.pdf

P.1 Organizational Description

Describe your organization's business environment and your KEY relationships with CUSTOMERS, suppliers, PARTNERS, and STAKEHOLDERS.

Within your response, include answers to the following questions:

a. Organizational Environment

(1) What are your organization's main products and services? What are the delivery mechanisms used to provide your products and services to your CUSTOMERS?

(2) What is your organizational culture? What are your stated PURPOSE, VISION, MISSION, and VALUES?

(3) What is your employee profile? What are your categories and types of employees? What are their educational LEVELS? What are your organization's workforce and job DIVERSITY, organized bargaining units, use of contract employees, and special health and safety requirements?

(4) What are your major technologies, equipment, and facilities?

(5) What is the regulatory environment under which your organization operates? What are the applicable occupational health and safety regulations; accreditation, certification, or registration requirements; relevant industry standards; and environmental, financial, and product regulations?

b. Organizational Relationships

(1) What are your organizational structure and GOVERNANCE system? What are the reporting relationships among your GOVERNANCE board, SENIOR LEADERS, and parent organization, as appropriate?

(2) What are your KEY CUSTOMER and STAKEHOLDER groups and market SEGMENTS, as appropriate? What are their KEY requirements and expectations for your products, services, and operations? What are the differences in these requirements and expectations among CUSTOMER and STAKEHOLDER groups and market SEGMENTS?

(3) What role do suppliers and distributors play in your VALUE CREATION and KEY support PROCESSES? What role, if any, do they play in your organizational INNOVATION

PROCESSES? What are your most important types of suppliers and distributors? What are your most important supply chain requirements?

(4) What are your KEY supplier and CUSTOMER partnering relationships and communication mechanisms?

P.2 Organizational Challenges

Describe your organization's competitive environment, your KEY STRATEGIC CHALLENGES, and your system for PERFORMANCE improvement.

Within your response, include answers to the following questions:

a. Competitive Environment

(1) What is your competitive position? What is your relative size and growth in your industry or markets served? What are the numbers and types of competitors for your organization?

(2) What are the principal factors that determine your success relative to your competitors? What are any KEY changes taking place that affect your competitive situation?

(3) What are your KEY available sources of comparative and competitive data from within your industry?

What are your KEY available sources of comparative data for analogous PROCESSES outside your industry?

What limitations, if any, are there in your ability to obtain these data?

b. Strategic Challenges

What are your KEY business, operational, and human resource STRATEGIC CHALLENGES?

What are your KEY STRATEGIC CHALLENGES associated with organizational SUSTAINABILITY?

c. PERFORMANCE Improvement System

HOW do you maintain an overall organizational focus on PERFORMANCE improvement, including organizational LEARNING?

HOW do you achieve systematic evaluation and improvement of key processes.

FOR DEFINITIONS OF KEY TERMS (IN CAPS), see the Glossary of Key Terms on pages 60–66 of the Business Criteria pdf document.

## APPENDIX 1B
## BALDRIGE ORGANIZATIONAL PROFILE ON LINE VERSION

E-Baldrige Organizational Profile is available at the Baldrige website

Check column 1 to indicate questions that would be *easy* for your organization to provide an answer on which there is widespread agreement and consensus.

Check column 2 to indicate questions for which data are not readily available, but your organization *could* produce data to provide a consensus response to address this question.

Check column 3 to indicate questions that would be *difficult* or impossible to answer and/or reach agreement and consensus on at this time.

| | | | 1 Easy to answer | 2 Could answer | 3 Difficult to answer |
|---|---|---|---|---|---|
| P.1 | Organizational Description | | | | |
| | Organizational Environment | | | | |
| | 1.a | What are your organization's main products and services? | | | |
| | 1.b | What are the delivery mechanisms used to provide your products and services to your customers? | | | |
| | 2. | What is your organizational culture? What are your stated purpose, vision, mission, and values? | | | |
| | 3. | What is your employee profile? What are their educational levels? What are your organization's workforce and job diversity, organized bargaining units, use of contract employees, and special health and safety requirements? | | | |
| | 4. | What are your major technologies, equipment, and facilities? | | | |
| | 5. | What is the regulatory environment under which your organization operates? What are the applicable occupational health and safety regulations; accreditation, certification, or registration requirements; relevant industry standards; and environmental, financial, and product regulations? | | | |
| | Organizational Relationships | | | | |
| | 1.a | What is your organizational structure and governance system? | | | |
| | 1.b | What are the reporting relationships among your governance board, senior leaders, and parent organization, as appropriate? | | | |
| | 2.a | What are your key customer and stakeholder groups and market segments, as appropriate? | | | |
| | 2.b | What are their key requirements and expectations for your products, services, and operations? What are the differences in these requirements and expectations among customer and stakeholder groups and market segments? | | | |
| | 3.a | What role do suppliers and distributors play in your value creation and key support processes? What role, if any, do they play in your organizational innovation processes? | | | |
| | 3.b | What are your most important types of suppliers and distributors? | | | |
| | 3.c | What are your most important supply chain requirements? | | | |
| | 3.d | How do you achieve systematic evaluation and improvement of key processes? | | | |

| | | 1 Easy to answer | 2 Could answer | 3 Difficult to answer |
|---|---|---|---|---|
| P.2 Organizational Challenges | | | | |
| Competitive Environment | | | | |
| 1.a | What is your competitive position? | | | |
| 1.b | What is your relative size and growth in your industry or markets served? | | | |
| 1.c | What are the numbers and types of competitors for your organization? | | | |
| 2.a | What are the principal factors that determine your success relative to your competitors? | | | |
| 2.b | What are any key changes taking place that affect your competitive situation? | | | |
| Strategic Challenges | | | | |
| 1. | What are your key business, operational, and human resource strategic challenges? | | | |
| 2. | What are your key strategic challenges associated with organizational sustainability? | | | |
| Performance Improvement System | | | | |
| 1. | What are your key strategic challenges associated with organizational sustainability? | | | |
| 2. | How do you achieve systematic evaluation and improvement of key processes? | | | |

**APPENDIX 2**
**MEMORANDUM OF UNDERSTANDING**

THIS MEMORANDUM OF UNDERSTANDING ("MOU") is made and entered into this ____ day of __, 20_ (the "Effective Date") by and between [insert name and address of company sponsor] ("Sponsor"), and the undersigned students of XXX University ("Students").

Whereas, Sponsor desires to provide Students with a practical business consulting project suitable for their use as a project in the Business School course [insert course title], course number MBA XXX at XXX University, and make subsequent use of the results of the project, and;

Whereas, Students desire to undertake this problem as their consulting project for this course.

Now therefore, the parties wish to enter this MOU as follows: 1. Project Description [Insert a succinct description of the project and its objectives.] 2. Support to be provided by Sponsor [Insert a description of support to be provided by the Sponsor, e.g. information, technical or other mentoring, financial resources, materials, etc., if any.] 3. Intended Project Deliverables [Insert a description of what the students intend to deliver to the Sponsor as a result

of the Project.] 4. No Warranty. The parties agree that this project is an educational exercise, the results of which are in no way guaranteed or warranted. In particular, no representation or guarantee is made regarding the accuracy, completeness, or utility of the results of this project.

5. Confidentiality

Students agree to hold in confidence all materials, documents, and information disclosed to them in writing or other tangible form pursuant to this MOU (collectively, "Confidential Information"). Confidential Information shall be identified as such by Sponsor at the time it is delivered to Students. Confidential Information may not be disclosed to classmates not party to this agreement or any other third parties without prior written consent of Sponsor, with the exception that Confidential Information may be disclosed to the course instructor without additional consent beyond this MOU. By his or her signature below, the course instructor indicates his or her agreement to not disclose or use any such Confidential Information which may be disclosed to him or her. The obligations of confidentiality and limited use, however, shall not apply to information that Students or the course instructor can establish:

A. is in the public domain at the time of disclosure or development;
B. is published or otherwise becomes part of the public domain after disclosure or development through no fault of Students;
C. was in possession of Students at the time of disclosure or development and was not acquired from the Sponsor under an obligation of confidence; and
D. is independently developed by the Students without use of or reliance on any Confidential Information.

This obligation to not disclose Confidential Information shall terminate three years following conclusion of the academic term in which this project is completed.

IN WITNESS WHEREOF, the parties have executed this MOU as of the date first set forth above.

Sponsor Signature; Printed name
Student's Signature; Printed name

By the signature below, the course instructor indicates his or her agreement not to disclose or use any Confidential Information disclosed to him or her during the course of this project, and also indicates the he or she has reviewed this project and accepts it for use in this course.

Course Instructor Signature; Printed name

## APPENDIX 3
## DISCIPLINARY ACTION POLICY

The following process and guidelines are discussed in face-to-face with signed agreements to assist in managing a fair and equitable process if the team is confronted with a dysfunctional member.

The group members discuss the issue (i.e. non-attendance at meetings of a member, etc.)
The group members discuss how to handle the situation.

If disciplinary action is decided upon by the group, the group members inform the team member by providing an oral reminder (via phone) that serves as the initial formal phase of the process to identify to the member what problems the group is having. This reminder is designed to correct the problem (i.e., not attending virtual meetings, not contributing a task on time, etc.)

If the oral reminder is unsuccessful and the group decides that a more formalized version is needed, the group drafts a written reminder of what the problem is and what corrective actions the group expects. Furthermore, specific timetables, actions, and consequences for failing to comply are included.

If the written reminder is unsuccessful and the group chooses to terminate the team member from the group, they are required to submit to the member a written summary outlining the problems, actions taken to date, and their final recommendation-termination. Termination means that the terminated member will not receive a grade for the group work.

If the terminated member wishes to appeal, he/she must do so to the instructor in writing within 7 days of receiving the termination document from the group. A copy of the written appeal must be submitted by the terminated member to each group member as well as the instructor. Upon receipt of the written appeal to the team members, the team members are to provide the instructor with a copy of the Written Reminder and the chronology of the disciplinary action taken.

The instructor will review both documents (appeal and the written reminder), interview team members, and make a final decision.

## APPENDIX 4
## ASSESSMENT OF USAGE OF THE BALDRIGE ORGANIZATIONAL PROFILE

Your feedback is valued. Take about 2 minutes to reflect on your team experience of analyzing a company using the Baldrige Organizational Profile.

Before you learned about the organizational profile, how did you analyze a company, your competition, suppliers, etc.?

_____

The Core Ideas of the Organizational Profile (Organizational Description and Organizational Challenges) are:

| | | | | | | |
|---|---|---|---|---|---|---|
| Unoriginal | 1 | 2 | 3 | 4 | 5 | Original |
| Trivial | 1 | 2 | 3 | 4 | 5 | Important |
| Dull | 1 | 2 | 3 | 4 | 5 | Provocative |
| Incomplete | 1 | 2 | 3 | 4 | 5 | Complete |

The Format and Design of Organizational Characteristics are:

| | | | | | | |
|---|---|---|---|---|---|---|
| Rambling | 1 | 2 | 3 | 4 | | Clear |
| Not easy to use | 1 | 2 | 3 | 4 | 5 | Easy to use |
| Not relevant to Business practice | 1 | 2 | 3 | 4 | 5 | Relevant to business practice |
| Not important | 1 | 2 | 3 | 4 | 5 | Important |

The Content of the Organizational Characteristics:

| | | | | | | |
|---|---|---|---|---|---|---|
| Not relevant to business practice | 1 | 2 | 3 | 4 | 5 | Relevant to business practice |
| Not important | 1 | 2 | 3 | 4 | 5 | Important |

The Organizational Profile's contribution to learning and education:

| | | | | | | |
|---|---|---|---|---|---|---|
| Not important | 1 | 2 | 3 | 4 | 5 | Important |
| Unclear | 1 | 2 | 3 | 4 | 5 | Clear |

The Organizational Profile's use in my work when analyzing competitors, suppliers, etc. has:

| | | | | | | |
|---|---|---|---|---|---|---|
| No application | 1 | 2 | 3 | 4 | 5 | Application |
| Not important | 1 | 2 | 3 | 4 | 5 | Important |

The Organizational Profile's use in my class work when analyzing cases:

| | | | | | | |
|---|---|---|---|---|---|---|
| No application | 1 | 2 | 3 | 4 | 5 | Application |
| Not important | 1 | 2 | 3 | 4 | 5 | Important |

Your thoughts on any other aspect of OP: _____

**Table 1: Assessment of OP by MBA Students**

| | 1 | 2 | 3 | 4 | 5 | | Weighted Percentage* |
|---|---|---|---|---|---|---|---|
| Core Ideas of Organizational Profile | | | | | | | |
| Unoriginal | | | 3 | 3 | 1 | Original | 67.86% |
| Trivial | | | 1 | 3 | 3 | Important | 82.14% |
| Dull | | | 4 | 1 | 2 | Provocative | 67.86% |
| Incomplete | | | | 3 | 4 | Complete | 89.29% |
| Format and Design of Organizational Characteristics | | | | | | | |
| Rambling | | | 1 | 4 | 2 | Clear | 78.57% |
| Not easy to use | | | 1 | 2 | 4 | Easy to use | 85.71% |
| Not relevant to business practice | | | | 2 | 5 | Relevant to business practice | 92.86% |
| Not important | | | | 4 | 3 | Important | 85.71% |
| Organizational Characteristics | | | | | | | |
| Ignores Theory | | | 1 | 4 | 2 | Extends Theory | 78.57% |
| Ignores Practice | | | 2 | 4 | 1 | Extends Practice | 71.43% |
| Organizational Profile's contribution to education and learning | | | | | | | |
| Not important | | | 2 | 2 | 3 | Important | 78.57% |
| Unclear | | | 2 | 2 | 3 | Clear | 78.57% |

| Table 1: Assessment of OP by MBA Students | | | | | | | |
|---|---|---|---|---|---|---|---|
| Organizational Profile's use in my work when analyzing competitors, suppliers, etc. has: | | | | | | | |
| No application | | 1 | | 3 | 3 | Application | 78.57% |
| Not important | | | | 3 | 4 | Important | 89.29% |
| Organizational Profile's use in my class work when analyzing cases: | | | | | | | |
| No application | | 1 | | 4 | 2 | Application | 75.00% |
| Not important | | | 1 | 4 | 2 | Important | 78.57% |
| * The weighted percentage is calculated in the following way: We will use the "Unoriginal" and "Original" ratings under the "Core Ideas of Organizational Profile" as an example. If a person assigned a rating of '1' then they thought that the Core Ideas were not original at all (0%). If assigned a '5', they thought it was completely original (100%). A '2' is 25% original, a '3' 50% original, and a '4' 75% original. So, after applying these weights MBA students thought the Core Ideas were 67.86% original. | | | | | | | |

| Table 2: Assessment of OP by Undergrads | | | | | | | |
|---|---|---|---|---|---|---|---|
| Core Ideas of Organizational Profile | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | | Weighted Percentage* |
| Unoriginal | | | 9 | 15 | 8 | Original | 74.22% |
| Trivial | | | 4 | 16 | 12 | Important | 81.25% |
| Dull | 1 | 3 | 11 | 13 | 5 | Provocative | 63.64% |
| Incomplete | | 1 | 3 | 12 | 15 | Complete | 83.06% |
| Format and Design of Organizational Characteristics | | | | | | | |
| Rambling | 1 | 3 | 5 | 11 | 13 | Clear | 74.24% |
| Not easy to use | 1 | 1 | 8 | 14 | 9 | Easy to use | 71.97% |
| Not relevant to business practice | | 1 | 2 | 12 | 18 | Relevant to business practice | 85.61% |
| Not important | | 2 | 2 | 12 | 17 | Important | 83.33% |
| Organizational Characteristics | | | | | | | |
| Ignores Theory | | 1 | 7 | 15 | 9 | Extends Theory | 75.00% |
| Ignores Practice | | 2 | 7 | 14 | 8 | Extends Practice | 72.58% |
| Organizational Profile's contribution to education and learning | | | | | | | |
| Not important | | | 4 | 19 | 10 | Important | 79.55% |
| Unclear | | 2 | 8 | 14 | 9 | Clear | 72.73% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Organizational Profile's use in my work when analyzing competitors, suppliers, etc. has: | | | | | | | |
| No application | | | 5 | 19 | 9 | Application | 78.03% |
| Not important | | 1 | 5 | 17 | 10 | Important | 77.27% |
| Organizational Profile's use in my class work when analyzing cases: | | | | | | | |
| No application | | 1 | 6 | 14 | 12 | Application | 78.03% |
| Not important | | 3 | 7 | 12 | 11 | Important | 73.48% |

* The weighted percentage is calculated in the following way: We will use the "Unoriginal" and "Original" ratings under the "Core Ideas of Organizational Profile" as an example. If a person assigned a rating of '1' then they thought that the Core Ideas were not original at all (0%). If assigned a '5', they thought it was completely original (100%). A '2' is 25% original, a '3' 50% original, and a '4' 75% original. So, after applying these weights the Undergrads thought the Core Ideas were 74.22% original.

**APPENDIX 5**
**THOUGHTS ON OP**

The thoughts on other aspects of OP are given below

MBA Thoughts:

- I am still not comfortable with using the OP because I don't really have a lot of experience with it, and because most teachers still ask for a SWOT analysis.
- This has been a good tool that provides a quick snapshot to allow you to ensure your thoughts and research are on track.

Undergrad Thoughts:

- Redundancy is a major issue. Not in the criteria but in the answers to some of the questions.
- I truly enjoyed the facts and important information that the OP provided. I also like its easy to use website. For me, it was very effective for two of my courses.
- Could better defined and organized.
- It's OK.
- I feel it provides a good basis for analyzing company processes and effectiveness.

# USE OF HUMOR AS A PEDAGOGICAL TOOL FOR ACCOUNTING EDUCATION

**Jane B. Romal, State University of New York College at Brockport**


## ABSTRACT

*This article focuses on the use of humor to increase the effectiveness of teaching accounting by conducting a meta-analysis on the use of humor by business executives and professors in other fields. Exclusively for this study, the meta-analysis quantitatively synthesizes the results of similar studies that meet predetermined criteria on a variable of interest, the effectiveness of humor, by summarizing their common statistic, called their effect size. Results support the hypothesis that humor is more effective today than it was in the early eighties. No articles were found on the use of humor in the accounting classroom, but the results of this meta-analysis affirm that accounting professors may benefit as well. This article then goes on to provide strategies and illustrations related to the use of humor that may enable interested accounting teachers to develop humor consistent with their personal styles and the needs of their students.*


## INTRODUCTION

In 1998, the AICPA's Vision Project developed a set of core competencies that students entering the accounting field should master (AICPA, 1998). Accounting professors rely on teaching technical skills students need for success in their careers, and most of the core competencies stress this technical knowledge. However, three competencies — communication, leadership, and personal interaction — relate to the "soft skills" one needs to progress to upper management, whether in a CPA firm or other business entity. The question then arises: How can educators help our accounting students master these "soft skills?"

Mastery of these three competencies may be facilitated by the use of humor in the classroom. Prior studies in other fields indicate that successful executives, leaders, and managers use positive humor to motivate employees and to improve their performance (Sala, 2003; Decker & Rotondo, 2001). As future executives in the accounting profession, accounting students might profit from the professorial use of humor because it exposes them to a positive role model (Bush & Dong, 2003), and because it fosters learning by increasing teacher effectiveness (Murray, 1983).

Differing opinions on the use of humor abound. Anecdotally, the chair of an accounting department learned that one professor, who had just completed teaching Intermediate Accounting II for the first time, was poorly evaluated because the students found his otherwise excellent lectures

and class discussions "boring." When asked why he didn't use his fine sense of humor, the professor claimed it was "unprofessional." Other educators have commented that using humor is "risky," "politically incorrect," and "inappropriate." These comments contradict the more commonly held belief that "Everyone knows it's better to use humor." Also, at a conference of accounting educators and practitioners who participated in a demonstration of the Chocolate Factory (See Appendix), some commented, "Why don't instructors at CPE sessions use humor? Those sessions are so long and boring." This perceived difference in opinions demands empirical research.

As a first attempt, this study conducted a meta-analysis on studies related to the use of humor by business executives and educators in other fields that meet predetermined criteria (Wolf, 1986). A discussion of the implication of these results includes strategies for those who want to use humor in the accounting classroom and additional hints for those who already do so. A summary, limitations, and the further research needed to clarify this issue conclude the paper.

## LITERATURE REVIEW

Numerous studies provide evidence of increased effectiveness from the use of humor in classrooms or applied settings, where effectiveness is defined as success that is evidenced by increased ratings, motivation, achievement, or performance. Effectiveness can be experienced by either the person using humor or the one on the receiving end of the humor. Executives and leaders who use more humor experience greater success (Harris & Barnes, 2006; Sala, 2003 and Decker & Rotondo, 2001). Humor increases achievement and learning (Wanzer & Frymeir, 1999; Berk & Nanda, 1998; d'Apollonia, 1997; Gorham & Christophel, 1990), while teachers who used more humor received higher student ratings (Murray, 1983).

Humor may increase the presenter's effectiveness by building rapport between the presenter and the listener. Humor helps the presenter draw the listeners' attention to the material to make it more salient. Evidence from studies of memory and decision-making (e.g. Kahneman & Tversky, 1974) shows that certain experiences, like the use of humor, increase the amount of material retained. Students or employees who are exposed to humor in the classroom or workplace may be more likely to remember what they've heard, simply because their awareness has been heightened. In other words, humor helps make the material stand out, reduces tension, and keeps the students alert and focused.

In the business world, research has demonstrated that executives who incorporate humor into their leadership styles are more effective than those who do not (Collinson, 2002; Sala, 2000). Sala's research suggests that positive humor, in contrast to sarcasm or other negative humor, helps communicate potentially unpleasant information (such as budgets) without evoking adversarial reactions and further eases personal interactions by showing a constructive regard for individuals and Romero and Cruthirds (2006) agree. Decker and Rotondo (2001) demonstrated a significant correlation between the leader's use of positive humor and better outcomes. In a study of military

leadership, “[w]arm humorous conduct” increased leadership effectiveness of good leaders even after controlling for leadership ratings (Priest & Swain, 2002). Moreover, a review of major literature in this area concludes that humor may create an agreeable environment that contributes to enhanced employee performance (Clouse & Spurgeon, 1995). That well-documented body of research confirms the need for the appropriate use of humor in those assuming leadership roles.

In the college classroom, similar studies provide evidence that students learn more effectively when the instructor uses humor. According to Edwards and Gibboney (1992, p.8-9), "People who laugh are...seen as warmer, more confident, and more accepting." Moreover, "[i]nstructors who can laugh at themselves teach the lesson of not taking oneself too seriously. Instructors who enjoy the cleverness of a student enhance the student's self-image.” In addition, instructors who welcome appropriate laughter can build a feeling of unity among the students and the teacher (Harris, 1989). Harris concluded that class interchanges characterized by frequent laughter produce a "safe classroom" in which students feel able to try new things. Lucy (2002) agrees that humor enhances interpersonal relationships.

Of course, the teacher must make appropriate use of humor in the classroom. Humor that simply ridicules a student subverts its effectiveness, as does humor that merely attempts to make the instructor seem bumbling and incompetent (Imel, 1994). Studies show that humor may be most effective when it is "appropriate to the situation, personable and original, and when it contains something of the personality of the instructor or the student” (Edwards & Gibboney, 1992, p. 9).

Also, humor may improve retention and learning. A study of undergraduate students at California State University at Dominguez Hills found that a teacher’s use of humor in the classroom facilitated students’ retention of information, especially when the jokes or anecdotes used directly related to the lesson at hand (Desberg, 1981). One study affirmed that students taking statistics, a “dread” course, from teachers who used humor scored higher on the final exam than those students whose teachers did not incorporate humor into the lessons (Ziv, 1988).

Today’s students have changed appreciably from previous generations and view humor differently. Studies demonstrate that today’s students have shorter attention spans (Snell, 2000) and are more accustomed to elaborate visual effects that shrink attention spans (Hoskins, 2004). The belief of many publishers is that these students require more stimulation in learning—for example, textbooks with more pictures and less content. This suggests that entertainment, and more specifically, humor, may have increased in importance in focusing attention on the material during accounting classes.

Recent studies indicate that use of humor is, in general, more highly correlated to effectiveness in teachers (Lucy, 2002; Kher, et al., 1999; Babad et al., 1999; Fortson & Brown, 1998; Cravens, 1996; Chrisophel & Gorham, 1995) than in earlier studies (Ziv, 1988, Murray, 1983; Bryant, et al., 1980). The following meta-analysis of relevant studies tests this apparent difference in correlations in an effort to determine whether the difference is statistically significant.

## A META-ANALYSIS OF RELEVANT LITERATURE

Meta-analysis is a quantitative review of the literature, which was first introduced almost 70 years ago (Fisher, 1938), but is used today in a wide variety of fields to form a synopsis of previous research. In this article, a meta-analysis of prior empirical studies was conducted to study the effectiveness of the use of humor by executives and educators. In an effort to ensure reliable results, articles that meet predetermined inclusion criteria were evaluated with respect to their experimental design, purpose, population, and statistics, as well as whether they covered a sufficiently broad spectrum of databases (Wolf, 1986).

After the studies were identified, they were examined for experimental rigor and relevance to the research hypotheses by two judges (See format in Cooper & Hedges, 1994, p.107). Of the seventy-two retrieved articles, thirty-one were empirical studies, including two unpublished in ERIC and five dissertations. In the empirical articles, appropriate humor had a positive impact on the outcomes and thus would not affect the results of the meta-analysis negatively. None of the studies considered the effect of race in any way, and many did not include a breakdown of participants by gender. There were no empirical, refereed studies that specifically focused on accounting.

To be included in the meta-analysis, the studies had to have a dependent variable that referred to "humor" and was clearly operationalized and measured (Beal, et al., 2003). In addition, results had to rely on outcome measures such as increased student ratings of teacher effectiveness that were also clearly operationalized and empirically analyzed.

The statistical results are referred to as "effect sizes" meaning the strength of the relationship between two variables. As defined by Cohen (1988, p.9-10), "effect size" is "the degree to which the phenomenon is present in the population, or the degree to which the null hypothesis is false." In meta-analysis, many statistics can be used to define relationships between two variables, so that effect size is a broad term that encompasses correlation r, d, z scores, etc. The reported statistic representing effect size in each article had to be easily converted to "r." Correlation r refers to the coefficient of correlation that is used as a measure of the relationship between two interval-scaled or ratio-scaled variables and is frequently referred to as Pearson's r or as the Pearson product-moment correlation coefficient. It ranges from -1 to +1, where the extremes indicate perfect correlation (Rosenthal, 1991).

The eight articles in the meta-analysis met the predetermined criteria for experimental rigor, fit the definitions of humor and effectiveness, and had usable effect sizes. These included five studies related to classroom use of humor: whereas three studies examined executives' use of humor. There was restricted sampling within individual studies, but across the studies there was a broad base of 1,332 participants in a wide variety of domains (Rosenthal, 1991). Rosenthal (1991) limits some recommended statistics for sample sizes of "at least 4" studies, but he has no limit on others, implying that eight is a sufficient number of studies for many statistics in a meta-analysis (See also Loo, 2002; Feingold, 1992). The synopsis of each study ultimately included in the meta-analysis

(Table 1) confirms that each tests the use of humor to determine if humor influences the effectiveness of the user through a positive outcome. Using only one result from each study eliminated the problem of non-independence that could contribute to "over-weighted" conclusions; this also guaranteed the independence of the samples and of the statistics. Every attempt was made to avoid comparing or aggregating studies of highly dissimilar measuring techniques, operationalized variables, and participants.

**Table 1: Synopsis of Articles for the Meta-Analysis**

| | |
|---|---|
| 1) | Bryant et al. (1980) studied the correlation between humor use and the "perceived effectiveness" of teachers. Students "naïve" to the purpose of the study were selected from 70 random courses, viewed one taped lecture, then completed an evaluation on several aspects of the lecture they received. Overall use of humor was positively correlated to perceived teaching effectiveness. This study employed a random sample of students in courses that were "equivalent to all courses on most facets." Factor analysis and correlation results were supplied. |
| 2) | Decker and Rotondo (2001) surveyed a random sample of alumni from a large Mid-Atlantic university on their opinions of their managers. Results showed a highly significant relationship between executive use of positive humor and perceived manager effectiveness. Their study reported results of a regression analysis on the responses (36% response rate). |
| 3) | Murray (1983, p. 142) concluded in his study that highly rated teachers used significantly more humor than those who did not use humor and indicated that humor was one way of "communicating enthusiasm for the subject and thereby eliciting and maintaining student attention to lecture material." This quasi-experimental study presented a table of univariate F. |
| 4) | Rizzo et al. (1999) hypothesized that when an employee perceives a manager as humor-oriented (HO), the manager is also perceived as more effective. Their survey of individuals in the workforce asked participants to complete four measures including the Humor Orientation scale (Booth-Butterfield and Booth-Butterfield, 1991) and related humor strategy questions. They reported a significant correlation between the humor orientation of managers and manager's effectiveness. |
| 5) | Sala (2000) compared executives' humorous utterances during taped, pre-employment interviews with executive effectiveness ratings and bonus awards a year later. He found significant correlations in both cases, but the more conservative was used in this meta-analysis. The interviews from this field study were coded for empirical analysis. |
| 6) | Stuart and Rosenfeld (1994) examine the relationship between use of humor and classroom climate, where "classroom climate" is defined as either a supportive communicative environment or a defensive one. "*Humorful* teachers" (p. 91) were significantly more likely to provide a supportive communicative environment. Their study of a random cross-section of college students employed MDA. |
| 7) | Wanzer and Frymier (1999) examined the relationship between student perceptions of high humor orientation (HO) in college teachers with perceptions of their learning in college communication classes. Their quasi-experimental study used as the HO instrument a 17-item self-report measure developed and validated by earlier work of Booth-Butterfield and Booth-Butterfield (1991). Their results show that the high HO teacher was positively correlated to learning. |
| 8) | Ziv (1988) used an experimental group of 67 students and a similarly sized control group, who were randomly assigned from two classes of introductory psychology. Students were taught statistics in one semester of lectures either using humor or not using humor. "One significant main effect was found. Those hearing the humorous lectures did significantly better on the final exam, clearly demonstrating the contribution of the teachers' use of humor to student learning." (p.12). ANOVA results were reported. |

In this meta-analysis, the "file drawer problem" was addressed by using Rosenthal's (1991) formula for fail-safe N. Although some authors advocate restricting meta-analyses to published works (e.g., Chalmers et al., 1987), there remains the nagging doubt that there are other unpublished or unretrieved studies that might affect the results. Called the "file drawer problem," the problem arises from the realization that not all studies of a given topic are published or that only statistically significant results are presented in those that are published.

Extensive statistical tests are required for meta-analysis. These are displayed at the bottom of each table. Special attention to the homogeneity of effect sizes and significance levels allows the interpretation that the studies are testing the same outcome variable. When effect sizes differ (i.e., the null hypothesis of equal effect sizes is rejected), a moderating variable, such as time, can often explain the heterogeneity. Consequently, if heterogeneity is indicated, study results will be tested to determine whether the correlations increase over time and to contrast results of the early studies and the later studies. (Further details are available from the author.)

## RESULTS OF THE META-ANALYSIS

The "file drawer" problem was addressed first. In an extreme case, if the assumption is made that if 5% of studies are published, then 95% may be unpublished or may demonstrate no experimental effect. Using Rosenthal's (1991) formulas, the fail safe N for this study is 992 which means that 992 studies must be missed in the search to render the results unreliable; Further Rosenthal (1991) suggests that a calculation greater than 50 ($N > 5K + 10$, where K is the eight studies in this study) indicates a robust finding with regard to unpublished studies. Thus the results are not compromised by undiscovered or unpublished research.

The initial meta-analysis (Table 2), based on Fisher's $z_r$, results in a mean correlation of 0.46 between use of humor and perceived effectiveness. Although there may be a relationship, the relationship may not be reliable unless the variation in the effect sizes is minimal. To explore this variation, the null hypothesis of equal effect size (known as homogeneity) was tested and was rejected (See Table 4, which displays the results of this test of homogeneity as well as further tests.). This rejection of homogeneity indicates that the studies do not have a common effect size, which requires further investigation.

The z score based on d was computed to determine whether there was a linear change from the early studies to those conducted later (Rosenthal and Rubin, 1982a, p. 71). The computed z score of 5.5322 is statistically significant ($p<0.001$) supporting the idea that the correlations are not stable over time (Table 3).

**Table 2: Meta-Analysis Inputs**

| Article | Sample Size | Statistic Published | Result of Conversion to r^ | Fisher's $z_r$ [c] |
|---|---|---|---|---|
| Bryant (1980) | 70 | r = 0.31 * | 0.31 | 0.321 |
| Decker (2001) | 359 | r = 0.465 *** | 0.465 | 0.504 |
| Murray (1983) | 57 | F(1/56) = 5.40* | 0.297 | 0.299 |
| Rizzo (1999) | 136 | r = 0.67*** | 0.67 | 0.811 |
| Sala (2003) | 40 | r = 0.68* | 0.68 | 0.829 |
| Stuart (1994) | 195 | chi-square = 95.14 ** | 0.698 | 0.963 |
| Wanzer (1999) | 314 | r = 0.47*** | 0.47 | 0.511 |
| Ziv (1988) | 161 | F(1/160) = 5.39* | 0.18 | 0.811 |
| Total/Means | 1,332 | | $\overline{r}$ = 0.46 [d] | $\overline{z}_r$ = 0.492 |

^ Converted to r using formulas in a. and b. below.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

a. r = (F/(F + df (error)) ½ (To convert F to r)

b. r = (chi-square /2) ½ ; (To convert chi-square to r)

c. $z_r$ = ½ ln [(1 + r)/(1 – r)] (To compute $z_r$ from r's)

d. $\overline{r}$ is found from $\overline{z}_r$ in a table of Fisher's $z_r$ ( e.g. Kanji, 1999, p. 167)

The literature review implies that the year the studies were conducted may be an underlying reason for the heterogeneity, which may be between groups rather than within groups. Time then is a moderating variable that is sometimes referred to as a grouping variable. In this instance, earlier studies may have significantly lower effect sizes than later studies. Visual inspection of the correlations depicted in the graph of correlations below supports this idea as there is a gap of six years between the early studies with low correlations and the later studies that have a higher correlation between the use of humor and effectiveness (Figure 1).

**Table 3: Change Over Time – Computed**

| Article, by Year of Publication | Sample Size | Statistic Published | Result of Conversion to r^ | Result of Conversion to d[c] |
|---|---|---|---|---|
| Bryant (1980) | 70 | r = 0.31 * | 0.31 | 0.6521 |
| Murray (1983) | 57 | F(1/56) = 5.40* | 0.297 | 0.6060 |
| Ziv (1988) | 161 | F(1/160) = 5.39* | 0.18 | 0.3660 |
| Stuart (1994) | 195 | chi-square = 95.14 ** | 0.698 | 1.9495 |
| Rizzo (1999) | 136 | r = 0.67*** | 0.67 | 1.0851 |
| Wanzer (1999) | 314 | r = 0.47*** | 0.47 | 1.0645 |

**Table 3: Change Over Time – Computed**

| Article, by Year of Publication | Sample Size | Statistic Published | Result of Conversion to r^ | Result of Conversion to d[c] |
|---|---|---|---|---|
| Sala (2000) | 40 | r = 0.68* | 0.68 | 1.8549 |
| Decker (2001) | 359 | r = 0.465 *** | 0.465 | 1.0505 |
| Total/Means | 1,332 | 5.5322*** | | |

^ Converted to r using formulas in a. and b. below

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

a. r = (F/(F + df (error)) ½

b. r = ( chi-square /2) ½

c. $d_i = 2r_i / (1 - r_i^{2})^{½}$ , i = 1,…,8

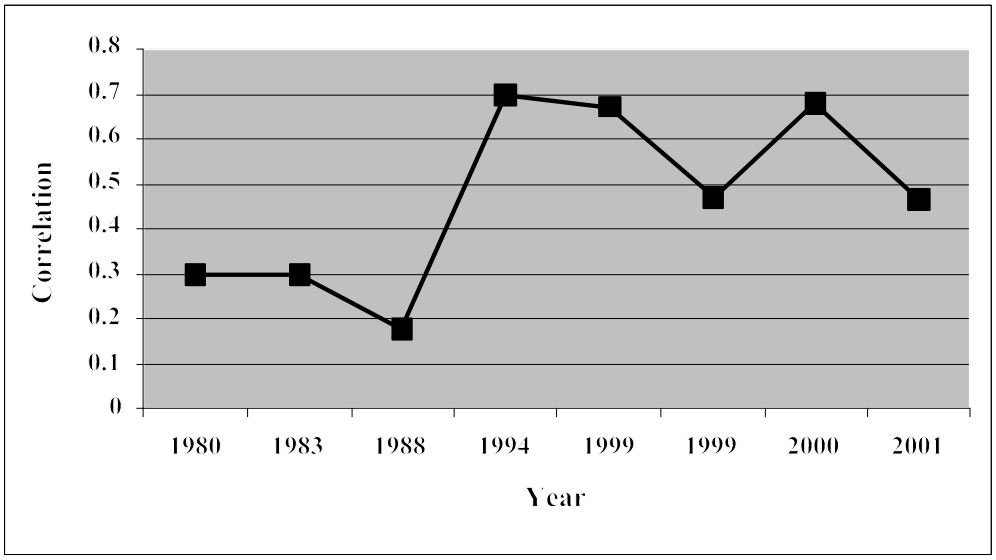
d. z score = $\text{Sum}(\underline{\text{lambda}_i d_i})$ , i = 1,…,8

$[\text{Sum}(\text{lambda}_i^2 / w_i)]^{½}$

where $\text{lambda}_i = y_i - \overline{y}$ (mean of the years of publication = 1993)

$w_i = 1/v_i$ (the reciprocal of the variance of each study)

**Figure 1: Changes in Importance of Humor over Time**




The six-year gap between early studies and more the recent studies indicated a natural partition into two subgroups based on time. Subgroup I contained three studies conducted in 1980, 1983, and 1988. Subgroup II was restricted to those from 1994, 1999, 2000, and 2001. The significance levels and effect sizes indicate that Subgroup I is a homogeneous group. However, this

was not true for Subgroup II even though the results are in the indicated direction and may simply indicate that the effect sizes of some studies were larger than others (Feingold, 1992, p. 130). The studies conducted later had a mean correlation of 0.62 compared to 0.24 for the earlier studies. These correlations differ significantly (chi-square = 415.86, p<0.000, df =1) (Table 4). That is, most of the heterogeneity in the effect sizes found in the eight studies is due to the time the study was completed.

**Table 4: Summary of Heterogeneity—Between-Groups and Within-Groups [a]**

| Source | Statistic | Degrees of Freedom |
|---|---|---|
| Between Groups | $Q_{BET}$ [b] = 415.86*** | 1 |
| Within group | | |
| Within group I. 1980 to 1988 | $Q_{W1}$ = 1.20 | 2 |
| Within group II. 1994 to 2001 | $Q_{W2}$ = 26.39*** | 4 |
| Total within groups | 27.596 | |
| Overall | 443.45 | 7 |

*** $p < .000$

a. All Q's are distributed as chi-square. (For formulas see Cooper & Hedges, 1994, p. 286-290.)

b. Significance indicates rejection of the null hypothesis of homogeneity, that is the between-group effect over the time period, 1980 to 2001, is statistically significant.
The within group heterogeneity of group II is due the variability in the effect sizes. This summary table style is taken from Cooper and Hedges, 1994, p. 268.

How much difference these results make in effectiveness can be easily understood by constructing a binomial effect size display (BESD) (Rosenthal & Rubin, 1982b). For the entire group of studies, an explained variance of 21 % (.2116) translates to a gain in effectiveness of 46 (Table 5). Put another way, out of 100 participants, using humor would result in 46 participants performing better. This is a size effect of 46. Similarly for the studies in the group of studies completed in 1988 or earlier (Subgroup I), out of 100 participants, using humor would result in 24 doing better; and for studies in the later group of studies completed in 1994 or later (Subgroup II), 62 doing better.

## HUMOR IN THE ACCOUNTING CLASSROOM

Granting that clarity, organization, and knowledge are crucial in teaching, the implication of the results of the meta-analysis is that the accounting teacher may well find that humor will add spark to lectures and other classroom activities. After all, "Lecturing isn't necessarily communication." (Wulff & Wulff, 2004, p.93). The accounting teacher already knows what is

important in the discipline; the students do not, but humor may focus their attention on important concepts and procedures.

**Table 5: Estimated Changes in Effectiveness, Corresponding to $r^2$ of the Entire Group and Each Subgroup: Binomial Effect Size Display (BESD)**

| | | | Use of Humor [b] | | |
|---|---|---|---|---|---|
| | r = | $r^2$ = | No or Low | Frequent or High | Difference in effectiveness |
| Overall | 0.46 | 0.2116 | 27 | 73 | 46 |
| Subgroup I- 1980s | 0.24 | 0.0576 | 38 | 62 | 24 |
| Subgroup II – 1994-2001[a] | 0.62 | 0.3844 | 19 | 81 | 62 |

a. This correlation results from a group of significantly heterogeneous effect sizes (Table 4).
b. Rosenthal and Rubin (1982b) suggest a range of (0.50 +/- r/2)*100.

Hence, the accounting teacher would do well to consider strategies (Table 6) for the use of humor before proceeding. Diligent effort is required because using humor as a teaching technique takes time and practice, but can help students relax and reduce anxiety over difficult concepts. Everyone doesn't have the ability to convey important information effectively and thus succeed more than others (Sala, 2003). Fortunately, "…humor is just one more set of skills that can be learned (Speath, 2001, p. 60)."

Students perceive humor differently depending upon their own learning styles, personalities, and backgrounds. What works in a heterogeneous class of beginning accounting students may not be as effective in a class of all accounting majors. Material relevant to the subject at hand and the students' lives may garner more interest.

Teachers are public speakers, so in line with the strategies above, Smithson (1992, p. 451) suggests "(a) going gradually, (b) researching one good bit of humor, (c) reworking that piece to personal satisfaction, (d) rehearsing delivery of the piece, and then (e) telling it often." The Chocolate Factory, described in the sample lecture in the Appendix, serves as an example of this technique. The original concept was taken from an acquaintance's use of it in a social setting and subsequently was adapted to process costing in a traditional factory of the 1930s, then reworked, rehearsed, and told every semester in Cost Accounting.

Any on-line bookseller or Internet search engine will list several books on using humor in public speaking and interested professors might examine a few to determine which best suits their personal style and the needs of their students. For example, Smithson (1992), who is quoted above, reviewed four of these. Other books specifically address the use of humor in public speaking or the classroom (E. g., Berk, 2003; Berk 2002; Slan, 1998).

Once appropriate strategies have been determined, the discerning accounting teacher could explore the many different types of humor that are possible (Table 7). Abundant sources of humor are available on the Internet; for example, searching Google with "jokes accounting" resulted in over one hundred fifty thousand sources! This part of the process should result in humor that suits the teacher and the students, but requires careful thought and planning, so that the teacher is comfortable with the selections and sensitive to students' reactions in the first few attempts.

| **Table 6: Strategies for the Effective Use of Humor in the Accounting Class** | |
|---|---|
| 1. | Relevant to the material being presented; e.g., using examples from practice for topics like auditing cash. |
| 2. | Relevant to students' lives; e.g., using students' names in a humorous fictitious story to illustrate a merger problem. |
| 3. | Positive--not negative, derisive, aggressive, hostile, or critical. None of the tendentious types of humor such as sarcasm directed at an individual or group are wise, although some professors thrive on these. In contrast, gentle, joking sarcasm about the truth of some general comment in the text or at the end of a problem is appropriate. Adapted from Berk (1996, p. 80) |
| | "How many of you think inventory is overstated?" NO RESPONSE: "How many of you think inventory is overstated?" NO RESPONSE: "How many of you don't care?" NO RESPONSE: "How many of you want to go back to bed? |
| 4. | Understandable to students; i.e., humor that is "above their heads" or beyond their experience is simply confusing. |
| | An instructor might want to impress on students that plagiarism is not acceptable by saying, "The resourceful and brilliant Oscar Wilde, struck by a witty remark of Whistler's, exclaimed, "I wish I'd said that!" "Never mind, Oscar," came the quick reply, "You will." (Braude, 1965, p.63). Students may not understand either Whistler or Wilde and may conclude erroneously that concerns about plagiarism are out-dated. |
| 5. | Complementary to the personal style of the professor; e.g., the teacher might consider friends' and colleagues' impressions of what the teacher says or does that comes across as funny to them. Don't fake it! |
| 6. | Complementary to the student's learning style; i.e., extensive literature on student learning illustrates the differences between student and professorial learning styles, although Takeuchi (2004) contends that students' learning style may not be as important as coming across as a caring human being. Any teacher faces a "tough audience" partly because differing learning styles, personalities, and backgrounds are present in the students. |
| 7. | Varied in the types of humor used; i.e., humor is meant to enrich the presentation of course material not increase boredom by too much repetition. (See #9.) |
| 8. | Not anxiety-producing for students; e.g., before or during tests or students' presentations. Contrary to this axiom, Berk (1996) has success using humor on tests. |
| 9. | *Sparingly* employed. Overkill is not effective. Cartoons were scattered throughout a talk on SOX as if the speaker had no humor and was simply trying to break the boredom. (Harris, 1989; Edwards & Gibboney 1992) |

| Table 7: Definitions and Examples of Constructive Humor in Accounting: | | |
|---|---|---|
| 1. | Apparel: | *Any item of clothing that increases humor.* For example, hats, pins, tee shirts, and ties related to the financial statements de jour. |
| 2. | Anecdotes: | *Short account of an interesting or amusing event, often biographical.* |
| | | A CPA concluded that the only way to count the inventory of chickens at a "free range" chicken ranch in Texas required hiring a helicopter to take aerial photographs of the chickens and then counting the white spots in the pictures. He never dreamed that the pilot would get too close to the chickens and draw them into the whirling blades, causing chicken parts and blood to be spewed everywhere—destroying the inventory! |
| 3. | Funny Stories: | *Constructed humorous narratives or tales could be nonsense (relies on the absurd or unusual).* E. g. "The Fable of the Chocolate Queen," (Appendix). |
| 4. | Humorous Comments: | *Repartee, Wry Remarks, One-liners, Questions*. These can be developed from non-humorous sentences and ideas. |
| | | a. A CPA commented, "One-half of my clients contact me because they aren't in trouble with the IRS, and the other half because they are." Is considered humorous compared to "Half of my clients aren't in trouble with the IRS." (Schmidt, 1994) |
| | | b. Out of date or very current slang used *very* sparingly—"You're all cool with this?" This works best when students already "know" the professor. |
| 5. | Jokes: | *Relatively short prose buildups followed by a punch line.* A repertoire of good ones will eventually lead to spontaneous telling at appropriate times. The teller must be sensitive to the students' responses (Cohen, 1996). The following are admittedly old stand-bys, but thousands were found on Google using the words: jokes accounting. |
| | | a. In trying to explain the broadened horizons needed by accountants today and/or to start a discussion on the criticisms of historical cost, the following could be told to illustrate the justification for the new competencies. |
| | | Two men are up in a hot air balloon. The dense fog prevents them from seeing where they are, where they have been, and where they are going. Suddenly, through an opening in the fog, they spot a man on the ground and yell, "Where are we?" The man yells back, "You are in a hot air balloon." "Must be an accountant," states one of the men, "What he said was factually true but absolutely worthless." |
| | | b. When encountering difficulties remembering debits and credits the following might reduce tension: |
| | | Every day when a bookkeeper arrives at work he opens a tightly locked drawer, looks inside, closes and locks the drawer and starts to work. All his coworkers are curious but wait until he retires. After 40 years they quickly open the drawer and find a piece of paper with the words, "Debits on the left, Credits on the right." (This is most effective when told as a "shaggy dog" story.) |
| 6. | Puns: | *Similar words or phrases with more than one meaning used simultaneously to play on multiple meanings.* These are usually considered the lowest form of humor – "groaners" –and may be a type worth avoiding or using subtly so that only certain students who enjoy this type catch on and the class isn't even aware of their use. Students who like these will pay close attention. Tatum (1999) finds these invaluable in teaching English, but they could be just as effective in accounting. The next two riddles use puns for accounting. |

| Table 7: Definitions and Examples of Constructive Humor in Accounting: | | |
|---|---|---|
| 7. | Riddles: | *Informative questions with a humorous punch line as an answer*. (Pepicello, 1987) |
| | | a.. "What industry has many material errors?" (The Garment Industry) |
| | | b. "What is the slowest moving inventory?" (Molasses, snails?) |
| 8. | Skits and/or Role-playing: | *A short dramatization using students in the roles, usually humorous, but with a point*. For example, to illustrate how statistics plays a part in cost behavior and responsibility accounting related to manufacturing, the following skit from a Deming management seminar (Walton, 1987) could be used: |
| | | Deming played the role of a manager in a "factory" that was supposed to produce red beads. Workers (students) dipped an implement into a box of beads to extract 25. Since 20% of the beads were blue, it was statistically rare that someone would get all red beads. Deming yelled and carried on after each attempt, blaming the worker. Having one student write the results of several "production runs" on the board, students easily draw the conclusion that the machinery is defective and that responsibility lies with whomever buys the equipment, not with the workers. (To do this, expeditiously, use teams of three students: each with a specific role: Student #1dips into a box of beads (20% blue, the rest red) using a flat potato masher that has about 25 holes, Student #2 counts the blue beads, Student #3 records the count, assuming the rest are red (red = 25-blue, even if that is not perfectly accurate.). The professor or another student can play Donald Trump's role, when after three trials, all the beads aren't red, and yell, "You're fired." Then, another team has a chance. Or the best student in one group could be promoted to the supervisor's position for the next round. |
| 9. | Student Humor: | *Spontaneous student remarks and comments in the classroom, or in written work that they read in class later*. Students will voluntarily contribute to class humor once they realize the instructor likes and welcomes humor. |
| | | To teach tax, Crumbley and Smith (2000) engage students in writing mysteries and/or comedies in which accountants play the major role and the solution is based on a tax or accounting principle they have encountered. The better ones are read in class. |
| 10. | Visual Aids: | C*artoons, Videos*. Cartoons are a persuasive medium to enhance liking for the subject (Lyttle, 2001; Ginman & von Ungern-Sternberg, 2003), as are videos. |
| | | a. Cartoons: Dilbert and The Far Side are favorite sources. Additionally, the slightly outdated "Accounting: The Lighter Side 1992 " (Coffman & Jensen, 1992 and earlier) provides cartoons from Accountancy, The CPA Journal, the Harvard Business Review, The New Yorker, and the Wall Street Journal, which are still good sources of relevant cartoons. |
| | | b. Videos: The book, "The Simpsons and Philosophy" (Irwin et al. eds., 2001) includes several suggestions of television episodes that relate to ethics such as "Realty Bites," in which Marge is selling real estate and cannot follow the company's unethical policies. An abbreviated version of an episode could be used to initiate discussion of ethics in accounting. |

Ideas for using humor may be gleaned from a variety of sources. Accounting education workshops and sessions, such as those found at AAA national and regional meetings and the Colloquium on Change in Accounting Education are a good start. The Georgia State Master Teachers' conference provides a critique on a teacher's delivery as well as other suggestions for the

accounting professor. If an instructor needs practice, Toastmasters International or being video-taped by the college teaching and learning center would help.

These endeavors will expand the teacher's efficacy. The message here is not to go out and get a joke book or search the Internet for a joke and then mumble about one's inability to tell jokes. The point is to "enhance curriculum content" through judicious use of humor (Cohen, 1996, p.4) by establishing a learning friendly environment in which students are comfortable with the many challenges in accounting.

## CONCLUSIONS

The publication practices for empirical work always under represent studies that don't demonstrate statistically significant findings. Although eight articles that met predetermined criteria are sufficient for a meta-analysis, did reflect responses of 1,332 participants, and were sufficient to investigate time as a moderating variable, they were not sufficient to investigate additional moderating variables. After all, the goal of meta-analysis is to bring together the results within a particular area of interest and to update the current status of that research, and that is only possible when sufficient prior research has been completed and reported.

Investigating the effects of moderating variables on teaching with humor would be a natural extension of this work. Examining the risk of using humor to increase effectiveness could either support or contradict those who view humor as risky. A meta-analysis of major criteria found in student teaching evaluations could also prove invaluable. A survey of accounting educators to determine their use of humor and perceived effectiveness would greatly enhance knowledge in the area. Additional research could focus on any differences in the effectiveness of the use of humor between male and female instructors or among instructors of different races. On the practical side, evaluating the abundant sources of humor for use in accounting classes and publishing this analysis would also help those with a desire to increase humor in their classes. Because of the lack of research into the specific topic of the use of humor in the accounting classroom, individuals may wish to conduct new research specifically targeting this issue.

This meta-analysis of articles on the use of humor by executives and teachers in other fields supports the view that students' retention and assimilation of course material is increased by the use of humor, and further that humor is more important today than it was in the 1980s. Accounting professors who already recognize the value of humor in the classroom may be persuaded to find additional ways to introduce humor. Those who do not use humor may be encouraged by the results of this quantitative literature review of prior research to try humor and may reap the benefits of changed attitudes and better outcomes from their teaching.

The results point to an increasing need to use humor to achieve effectiveness in the classroom. College teachers and executives who use humor frequently today may have students and employees who perform better. From this meta-analysis, the conclusion can be drawn that 1)

appropriately used humor is likely to enhance effectiveness in the accounting classroom and 2) the value of humor in these settings is greater today than it was in 1988 or before. Using humor as an aid to effective teaching in accounting may help students develop a broader spectrum of skills needed for success in the accounting professions.

## REFERENCES


AICPA. (1998). The CPA Vision Project 2011 and Beyond, *Journal of Accountancy* 186(6):3-48.

Babad, E., J.M. Darley, & H. Kaplowitz (1999). Developmental aspects in students' course selection. *Journal of Educational Psychology* 91(1): 157-168.

Beal, D.J., R. R. Cohen, M. J. Burke, & C. L. McLendon (2003). Cohesion and performance in groups: A meta-analytic clarification of construct relations. *Journal of Applied Psychology* 88(6): 989-1004.

Berk, R. A. (2002).Humor as an instructional defibrillator: evidence-based techniques in teaching and assessment. Sterling, Virginia. Stylus.

Berk, R.A. (2003). Professors are from mars, students are from snickers: how to write and deliver humor in the classroom and in professional presentations. Sterling, Virginia. Stylus.

Berk, R.A. (1996). Student rating of 10 strategies for using humor in college teaching. *Journal on Excellence in College Teaching* 7(3): 71-92.

Berk, R.A. & J. P. Nanda (1998). Effects of jocular instructional methods on attitudes, anxiety, and achievement in statistics courses. *International Journal of Humor Research* 11(4): 383-409.

Booth-Butterfield, M. & S. Booth-Butterfield (1991). Individual differences in the communication of humorous messages. *Southern Communication Journal* 56: 32-40.

Braude, J.M. (1965). *Complete Speaker's and Toastmaster's Library*. Englewood, NJ: Prentice-Hall, Inc.

Bryant, J., P. W. Comisky, J. S. Crane, & D. Zillmann (1980). Relationship between college teachers' use of humor in the classroom and students' evaluations of their teachers. *Journal of Educational Psychology* 72(4): 511-519.

Bush, K. & Q. Dong (2003). Beyond parents and peers: The role of important non-parental adults (VIPs) in adolescent development in China and the US. *Psychology in the Schools* 40(1):35-49.

Chalmers, T., J. Berrier, P. Hewitt, J. Berlin, D. Reitman, R. Naglingam, & H. Sacks (1987). Meta-analysis of clinical trials as a scientific discipline. I. Control of bias and comparison with large co-operative trials. *Statistics in Medicine* 6: 733-744.

Christophel, D.M. & J. Gorham (1995). A test-retest analysis of students' motivation, teacher immediacy, and perceived sources of motivation and demotivation in college classes. *Communication Education* 44(4): 292-306.

Clouse, R.W. & K. L. Spurgeon (1995). Corporate analysis of humor. *Psychology: A Journal of Human Behavior* 32(3-4): 1-24.

Coffman, E.N. & D. L. Jensen (1992). *Accounting: The Lighter Side 1992. Transparency Masters and Lecture Aids*. New York: McGraw-Hill/Random House.

Cohen, J.B. (1996). Laughing in the classroom. *English Leadership Quarterly* 18(3): 2-4.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences (2nd. ed.).* Hillsdale, NJ: Erlbaum.

Collinson, D.L. (2002). Managing humor. *The Journal of Management Studies* 39(3): 269-288.

Cooper, H. & L. V. Hedges (Editors) (1994). *The Handbook of Research Synthesis*. New York: Russell Sage Foundation.

Cravens, T.F. (1996). Students' Perceptions of the Characteristics of Teaching Excellence. ERIC. ED393478.

Crumbley, D.L. & L. M. Smith (2000). Using short stories to teach critical thinking and communication skills to tax students. *Accounting Education* 9(3): 291-296.

d'Apollonia, S. (1997). The dimensionality and validity of students' ratings of instruction: two meta-analyses. *Dissertation Abstracts International.* 59(02-A). 0463.

Decker, W.H. & D. M. Rotondo (2001). Relationships among gender, type of humor, and perceived leader effectiveness. *Journal of Managerial Issues* 13(4): 450-465.

Desberg, P. (1981). The effect of humor on retention of lecture material. ERIC-CA ED223118.

Edwards, C. & E. Gibboney (1992). The power of humor in the college classroom. ERIC-CA ED346535.

Feingold, A. (1992). Gender differences in mate selection preferences: A test of the parental investment model. *Psychological Bulletin* 112(1): 125-139.

Fisher, R.A. (1938). *Statistical Methods for Research Workers*. 7th Edition. London: Oliver and Boyd.

Fortson, S.B. & W. E. Brown (1998). Best and worst university instructors: the opinions of graduate students. *College Student Journal* 32(4): 572-576.

Ginman, M.S. & S. von Ungern-Sternberg (2003). Cartoons as information. *Journal of Information Science* 29(9): 69-78.

Gorham, J. &. D.M. Christophel (1990). The relationship of teachers' use of humor in the classroom to immediacy and student learning. *Communication Education* 39: 46-62.

Harris, J. (1989). When jokes are not funny. *Social Education* 1: 270 -280.

Harris, J. & B. K. Barnes (2006). Leadership storytelling. *Industrial & Commercial Training* 38(6/7): 350-353.

Hoskins, A. (2004). Television and the collapse of memory. *Time and Society* 13(1): 109-128.

Imel, S. (1994). Strategies for working with adult learners. ERIC Digest No. 154, ERIC Clearinghouse and Adult, Career, and Vocational Education. BBB16032.

Irwin, W., M.R. Conard, & A. J. Skoble Editors. (2001). *The Simpsons and Philosophy, The D'oh! of Homor*. Chicago and LaSale, IL: Open Court.

Kahneman, D. & A. Tversky (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185(4157), 1124-1131.

Kanji, G. K. (1999). *100 Statistical Tests*. London: SAGE Publications.

Kehr, N., S. Molsted, & R. Donahue (1999). Using humor in the college classroom to enhance teaching effectiveness in 'dread courses.' *College Student Journal* 33(3):400-406.

Loo, R. (2002). A meta-analytic examination of Kolb's learning style preferences among business majors. *Journal of Education for Business* May/June: 252-256.

Lucy, C.A. (2002). Using humor to teach. *Analytical Chemistry* 74 (11): 342-343.

Lyttle, J. (2001). The effectiveness of humor in persuasion: The case of business ethics training. *The Journal of General Psychology* 128(21): 206-216.

Murray, H.G. (1983). Low-inference classroom teaching behaviors and student ratings of college teaching effectiveness. *Journal of Educational Psychology* 75(1): 138-149.

Pepicello, W.J. (1987). Pragmatics of humorous language. *International Journal Social Language* 65: 27-35.

Priest, R.F. & J. E. Swain (2002). Humor and its implications for leadership effectiveness. *International Journal of Humor Research* 15(2): 169-189.

Rizzo, B. J., M. B. Wanzer, & M. Booth-Butterfield (1999). Individual Differences in managers' use of humor: Subordinate perceptions of managers' humor. C*ommunication Research Reports* 16(4): 360-369.

Romero, E. J., & K. W. Cruthirds (2006). The use of humor in the Workplace. *Academy of Management Perspectives* 20(2): 58-69.

Rosenthal, R. (1991). *Meta-Analytic Procedures for Social Research*. Newbury Park, CA: Sage Publications.

Rosenthal, R. & D. B. Rubin (1982a). Further meta-analytic procedures for assessing cognitive gender differences. *Journal of Educational Psychology* 74(5): 708-712.

Rosenthal, R. & D. B. Rubin (1982b). A simple, general purpose display of magnitude of experimental effect. *Journal of Educational Psychology* 74(2): 166-169.

Sala, F. (2000). Relationship between executives' spontaneous use of humor and effective leadership. *Dissertation Abstracts International: Section B: The Sciences and Engineering.* 61(3-B). September.1683.

Sala, F. (2003). Laughing all the way to the bank. *Harvard Business Review*, 81(9), 16-18.

Schmidt, S. (1994). Effects of humor on sentence memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 20(4): 953-967.

Slan, J. (1998). *Using Stories and Humor—Grab Your Audience!* Needham Heights, MA. Allyn and Bacon Company

Smithson, S. (1992). Review of humor resources. *Communication Education*, 41(4): 452-456.

Snell, J.C. (2000). Part I: Establishing one's self in the classroom. *College Student Journal,* 34(3): 472-475.

Speath, M. (2001). Humor as a presentation tool. *Risk Management,* 48(10), 60-63.

Stuart, W.D. & L. B. Rosenfeld (1994). Student perceptions of teacher humor and classroom climate. *Communication Research Reports* 11(1): 87-97.

Takeuchi, K. J. (2004). Classroom techniques: Lecture design and delivery. Presentation at the Training Center, State University of New York at Buffalo. March 5.

Tatum. T. (1999). Cruel and Unusual PUNishment (low humor is better than no humor). *English Journal* 88(4): 62-65.

Walton, M. (1987). Deming's parable of the red beads. *Across the Board* 24: 42-8.

Wanzer, M. & A. B. Frymeir (1999). The relationship between student perceptions of instructor humor and students' reports of learning. *Communication Education* 48(January): 48-62.

Wolf, F.M. (1986). *Meta-Analysis Quantitative Methods for Research Synthesis.* Newbury, CA: Sage Publications.

Wulff, S. & D.Wulff, D. (2004). "Of course I'm communicating; I lecture every day." *Communication Education* 53(1): 92-103.

Ziv, A. (1988). Teaching and learning with humor: Experiment and replication. *Journal of Experimental Education* 57(1): 5-15.

## APPENDIX

A Case for Humor: Processing Costing in a Chocolate Factory: The Fable of the Chocolate Queen (By using appropriate pronouns and descriptions, this may easily be converted to the "Chocolate King." His wife (secretary) could come from a family partial to bird names . . . DOVE and he could be Mr… GOODBAR.)

Today you will hear the Fable of the Chocolate Queen. Sometimes words will fail me and you must help by suggesting them. (Candy bars may be tossed when students fill in the words. They will not expect the tie to candy bars, but after one or two are mentioned, their attention increases markedly. See Teaching Suggestions.)

In the 1930's the Chocolate Queen, who has large blue-gray eyes, glasses, a pointed nose, and curly light-brown hair (Description of author) runs a chocolate factory in a Pennsylvania city famous for its chocolate. The name of the city is (Pause). . . HERSHEY. This factory makes specialty items and mass produces them all year long in several departments, which makes it ideal for a process costing, Cost of Production Report. ((Rabbits, turkeys, Santas, pumpkins etc. may be produced as appropriate to the season. Write the heading on the board, overhead or prepared PowerPoint using last month as the period. A conveyor belt with rough drawings of whatever is being produced aids visualization of the process, too.) If it made rockets for travel to our nearest planet (Pause). . . MARS or to our galaxy (Pause). . . MILKY WAY, job order costing would be used, but since the company mass produces like objects it must figure the units into the cost system each month in terms of units of output. In the factory, chocolate comes in to the factory in heaps, which are sometimes called (pause). . . MOUNDS. Each mound makes 1000 rabbits. Last month the factory purchased 20 mounds, which is enough for 20,000 finished rabbits, and had 500 units in Beginning Work-in-Process Inventory, 60% complete with respect to conversion costs. (Stress that units of output are used throughout the report as the Units section is completed.)

The chocolate factory has one engineer, who is called Mr. (Pause). . . GOODBAR. The foreman, whose ancestor explored the Northwest with Lewis, is (Pause). . .CLARK. Also, remember the Japanese frequently have three engineers for every worker and US factories have the opposite, so the workers are called the (Pause). . . THREE MUSKETEERS. Unfortunately, one of the workers is a Klutz, who acts like he has grease on his hands so they call him (Pause). . . BUTTERFINGERS. Last month he spoiled 800 rabbits that had to be included in normal spoilage (Write side notes on spoilage.) These units are inspected at the end and are good enough to sell as seconds or be reworked, which means they would be considered defective units. These are counted at inspection, which occurs in the Chocolate Queen's factory at the end of the process, but it could occur anytime.

The workers' favorite day is (Pause). . . PAYDAY, but then the banks closed and the Chocolate Queen couldn't withdraw any of the large sums she had on deposit. (It was over

(Pause). . .100,000 GRAND.) One of the workers became angry (His rage made everyone think he was nuts so they referred to him as … NUTRAGIOUS). He threw a wrench in the molds, ruining 200 at the halfway mark. These are considered abnormal spoilage, because of the unexpected nature of the cause, and thus are recorded as scrap. They are melted down and reused or sold as-is. Also there are 4000 units in Ending Work-in-Process Inventory 30 % complete with respect to conversion costs. (Complete the Units at End of Period section, backing into the number of units transferred out.)

No individualism is allowed, nor are any suggestions or ideas from the workers considered valuable. Even though the Klutz is tolerated, because he is the engineer's brother, the factory is run very strictly. Still, sort of undercover, the jolly fat worker, called (Pause). . . CHUNKY, causes laughter, which has to be kept quiet, more like (Pause). . . SNICKERS.

Because costs are a major concern to the Chocolate Queen, the costs in the process and unit costs are watched closely. Last month beginning inventory carried direct material costs of $5000 and conversion costs of $1000. Costs added during this period for direct material and conversion are $210,250 and $36,840 respectively. (Complete Costs at End and Unit Cost sections.) If unit costs are reasonable, the Chocolate Queen treats the employees to a trip to Philadelphia to attend a baseball game in which the Phillies play the Yankees and thus the workers can see their favorite star (Pause). . . BABY RUTH.

Every cent is watched carefully, especially when the Costs at End of Period section of the report is completed. (Complete the report.) However, as one good short story writer (Pause). . . O'HENRY, has made us expect, a good story must have a surprise ending, that is a (Pause). . .TWIXT. The engineer wasn't called MR GOODBAR for nothing. The Chocolate Queen called him 'Honey' on their trips to New York City, because she knew she could always get a (Pause). . .BIT OF HONEY! They usually went to Saks(Pause). . .5th AVENUE and to hear the New York Philharmonic play a (Pause). . .SYMPHONY. THE END

## SUMMARY OF THE CASE

The fable reinforces and/or introduces many concepts of process costing including normal and abnormal spoilage and materials introduced in terms of output and could be adapted to a form similar to the text used in the course. Comparing it to a modern factory helps illustrate major changes that have occurred in the past 30 years. Although the work you do should be the play you love, many students have difficulty perceiving this in professors and need a more overt example without wasting class time.

## STUDENT COMMENTS

Students receive this case very well and there have never been any adverse comments afterward when they may write anonymous opinions. In that aspect of the debriefing process students have written: "What a great idea to hear the entire class laughing, especially during cost accounting and there was even educational value to the madness, applying this to process-costing."…"I like the candy bar example because it was a real company and not as boring as the examples in the book."… "Encouraged people to participate"… "Cut the tension" … "I think this will help me remember the concept of spoilage better." … "Helps concentrate during such a long class."

Some were not interested in receiving candy bars, so dollars and fruit were tried as substitutes, but frankly did not work as well. Consequently, either fruit or dollars are offered in exchange afterward, but the students are told after the first candy bar is tossed that exchange is possible. There have not been any adverse comments, even anonymously.

In comparing the results of a key learning outcome related to abnormal costing and the cost of production report from a day class that heard this with the results in a night class that did not, the day class did better (81% to 74%) on a test question and exhibited a better understanding of abnormal costing on homework as well, but there are too many other variables to conclude that the difference is statistically significant.

## TEACHING SUGGESTIONS

1. Pass out blank forms for students to fill in, especially if they are not overly familiar with process costing. If you use an overhead or PowerPoint slide, this should be blank also, ready for you to complete.
2. Draw a conveyor belt indicating the heaps of chocolate coming in, the location of beginning and ending inventories, started and completed units, and inspection points.
3. Use whatever chocolate item would be appropriate to the season, e.g. pumpkins, turkeys Santas, hearts, rabbits, flags, as the specialty item produced in the factory and draw some on the conveyor belt.
4. Keep the fable flowing by supplying the name of the candy bar and moving on if the students have difficulty recalling a name. (E.g., students frequently miss O'Henry.)
5. Toss candy bars for added interest and fun.
6. Follow the format for the Cost of Production Report found in whatever text is used in the class for consistency.
7. Discuss the following, if time permits:
   a. Scrap, waste, defects, rework – definitions and journal entries.

b. Compare and contrast the “traditional” factory depicted here with a modern factory with respect to:
    i. Worker responsibility.
    ii Attitudes toward spoilage (defects).
    iii. Quality.
    iv. Automation.
    v. Inventories.

8. Debrief by asking questions orally or written anonymously:
    a. Ask some who/what/when/where/why questions.
    b. Examples:
        i. What happened?
        ii. Why did it happen?
        iii. What worked well?
        iv. What didn't work well?
        v. How could you work to CHANGE what happened?
        vi. Explain the lessons that one can learn from this exercise.
        vii. Connect the dots... what does all this have to do with the theory that we discussed in this class?

## SOLUTION TO COST OF PRODUCTION REPORT AND JOURNAL ENTRIES FOR SPOILAGE

Chocolate Queen's Factory
Cost of Production Report--Weighted Average—Department M
For the Month Ending_____

| | Totals: | Direct Material | Conversion Costs |
|---|---|---|---|
| **Units in Process:** | | | |
| WIP Beginning | 500 | | |
| Started during current | 20,000 | | |
| Total Units in Process | 20,500 | | |
| | | | |
| **Units at End of Period:** | | **Equivalent Units** | |
| Good Units Completed (Transferred) | 15,500 | 15,500 | 15,500 |
| Normal spoilage | 800 | 800 | 800 |
| Abnormal spoilage | 200 | 200 | 100 |
| Ending WIP | 4,000 | 4,000 | 1200 |
| Total Units at End: | 20,500 | 20,500 | 17,600 |
| | | | |
| **Costs In the Process:** | | | |
| WIP Beginning | $ 6,000 | $ 5,000 | $ 1,000 |
| Added this period | 247,090 | 210,250 | 36,840 |
| Total to Account for: | $ 253,090 | $215,250 | $ 37,840 |
| | | | |
| **Unit Costs:** | $12.65 | $10.50 | $2.15 |
| | | (Divide costs by total equivalent units for DM and CC.) | |

| | | | |
|---|---|---|---|
| **Costs at End of Period:** | | | |
| Completed and Transferred out: | | | |
| Costs before Normal Spoilage | | $196,075 | (15,500 units x unit cost of $12.65) |
| Normal Spoilage | | 10,120 | (800 units x unit cost of $12.65) |
| Total costs of Good Units | | $206,195 | |
| Abnormal Spoilage | | | |
| DM | $ 2,100 | | (200 units x $10.50) |
| CC | 215 | 2,315 | (100 units x $2.15) |
| Total costs of Units T-O | | $208,510 | |
| Ending WIP | | | |
| DM | $42,000 | | (4,000 units x $10.50) |
| CC | 2,580 | 44,580 | (1,200 units x $2.15) |
| Total Costs at End of Period: | | $ 253,090 | |

Journal Entries from final section:

| | | | |
|---|---|---|---|
| Finished Goods | $206,195 | Loss due to Abnormal Spoilage | $2,315 |
| WIP | $206,195 | WIP | $2,315 |
| To record transfer of 15,500 units of finished goods to warehouse at a unit cost of $13.30290/unit | | To record abnormal damage during process as miscellaneous income (loss) account. | |

## BLANK FORM FOR COST OF PRODUCTION REPORT

Chocolate Queen's Factory
**Cost of Production Report--Weighted Average**
**For the Month Ending _____**

| | **Totals:** | **Direct Material** | **Conversion Costs** |
|---|---|---|---|
| **Units in Process:** | | | |
| WIP Beginning | _____ | | |
| Started during current | _____ | | |
| Total Units in Process | _____ | | |
| **Units at End of Period:** | | | |
| Completed and T-O | _____ | _____ | _____ |
| Normal spoilage | _____ | _____ | _____ |
| Abnormal spoilage | _____ | _____ | _____ |
| Ending WIP | _____ | _____ | _____ |
| Total Units at End: | _____ | _____ | _____ |
| **Costs in the Process:** | | | |
| WIP Beginning | _____ | _____ | _____ |
| Added this period | _____ | _____ | _____ |
| Total to Account for: | _____ | _____ | _____ |
| **Unit Costs:** | _____ | _____ | _____ |
| (Divide costs by units) | | | |
| **Costs at End of Period:** | | | |
| Completed and T-O: | | | |
| Costs before NS | _____ | | |
| Normal Spoilage | | | |
| DM _____ | | (_____) | |
| CC _____ | | | (_____) |
| Total Costs of Units T-O: | _____ | | |
| Abnormal Spoilage | _____ | | |
| DM _____ | | (_____) | |
| CC _____ | | | (_____) |
| Ending WIP: | | | |
| DM _____ | | (_____) | |
| CC _____ | | | (_____) |
| Total Costs at End of Period: | _____ | | |

# THE EFFECTIVE USE OF SIMULATIONS IN BUSINESS COURSES

**L. Jeff Seaton, Murray State University**
**Michael Boyd, Western Carolina University**

## ABSTRACT

*Since the beginning of business education history, heated discussions have occurred and several lines have been drawn in the sand relating to the most effective methodology for the teaching of business courses. One of the most prominent methodological arguments is between the academicians who profess that simulations are the best thing that has appeared in the educational environment since the chalkboard and those academicians who with equal vitality, profess that simulations are a useless teaching tool that will quickly follow pet rocks, mood rings, and lava lamps down the path to a proverbial "fad grave."*

*As individuals who teach in a business area that is highly charged with the divergent "Simulation - No Simulation" argument (i.e., strategic management), the current authors felt it necessary to research the reasoning why individuals choose to use or not to use simulations in business courses.*

## COURSE DESIGN AS A MEANS TO FACILITATE LEARNING

While delivery of material is an important component of teaching, course design can be a much more important component of learning. To be successful as a facilitator of learning, a teacher must be competent in both material delivery and course structure (Fink, 2005). Whetten (2007) acknowledge that 30 years of teaching experience has taught him that the most important component of the facilitation of learning lies in the choice of reading material, assignments, activities and learning objectives and not in the personal delivery of those materials.

Diamond (1998) suggests that when attempting to teach, an educator should make a determination as to what would best facilitate the learning process for the individuals in which you wish to teach. A business course should be designed, not with the needs and preferences of the professor in mind, but instead, focused on the needs and preferences of the students. Therefore, it appears to the present authors that the educator should use a type of "contingency approach" when choosing teaching methodology. The educator should evaluate the situation (i.e. course and student)

and use the methodology most effective for that particular situation. In the field of strategic management we refer to this type of reasoning as creating a "strategic fit".

Bloom's (1956) taxonomy of educational objectives suggests that there are different stages of learning. An individual's learning cycle will mature through the following stages: comprehension, application, analysis, synthesis, and finally, evaluation. The earlier stages (i.e. comprehension and application) consist of acquiring and applying basic knowledge while the final stages (i.e. analysis, synthesis, and evaluation) consist of a higher level of critical thinking skills.

Bloom's(1956) taxonomy applied to the academic environment seems to suggest that students are entering the early stages of the taxonomy of learning during their principle or core courses and then should mature into the latter stages of the taxonomy when moving into their more advanced courses. The problem with this application of theory is that most professors develop a type of pedagogical structure early in their careers, including methodologies, and use that structure in each class they teach. We refer to this as a "teaching style". This process totally ignores the stages of learning referred to in Bloom's taxonomy.

## DEVELOPING OF TEACHING METHODOLOGIES

The current authors uncovered a very interesting phenomena during the research of why individuals use or don't use particular methodologies as part of their course presentation. The phenomena seemed to point to the realization that often professors may have strong feelings about the use or non use of new methodologies based, not on the new methodology's effectiveness as a teaching tool, but instead in the resulting time and effort it would take to research and implement a new methodological change.

Researchers who study the change process in organizations, have consistently suggested that people will resist change (c.f., Hannan & Freeman, 1984; Peach, Mukherjee, & Hornyak, 2007; Piderit, 2000). Often people will not consider new ideas or activities simply because they are quite comfortable with the old way of doing things and don't want to disturb the status quo. From this paradigm came the old adages: "That is the way I have always done it" or "If it ain't broke don't fix it." Nowhere is this paradigm more salient than in the academic environment.

It has been suggested that professors develop a style of teaching early in their careers and often, they don't deviate far from that style (Greenberg, et.al, 2007; Whetten, 2007). The researchers state that this lack of style change is a result of the professors managing their priorities.

Greenberg, et. al. (2007) and others (c.f., Bennis & O'Toole, 2005; Billimoria, 2000) reported that doctoral candidates learn early in their careers that success as a business professor means they must develop discipline-specific knowledge and hone their skills as researchers. This research focus coupled with incentive structures that promote research excellence means that many

business professors will devote most of their time to becoming better researchers at the expense of time to develop better teaching skills.

Billimoria (2000) supported this argument by stating that once management professors enter into their academic positions and become involved in the responsibilities of that position, they rarely engage in any type of activity that focuses on making them better educators. One can't help but think about Steven Kerr's (1975) seminal article "The Folly of Rewarding A While Hoping for B".

Whetten (2007) makes the problem even more complex by suggesting that even when business professors put forth an effort to change their style and become a better educator, they focus on teaching and not learning. There is a disturbing myth that being a well polished instructor automatically translates into a quality learning environment for your students. Whetten (2007) gave evidence of this paradigm by suggesting that when we attempt to create high quality classes we ask the following questions:

*What do I want to teach?*
*How can I best cover the designated course material?*
*How can I deliver the material in a quality way?*

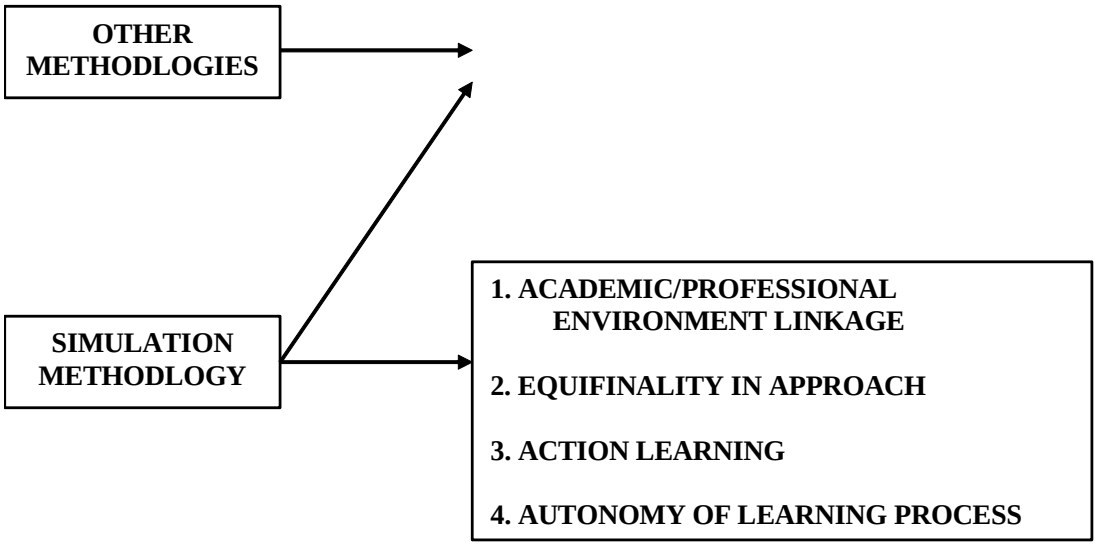
The focus on teaching and not learning is disturbing when we acknowledge the fact that the Association to Advance Collegiate Schools of Business (AACSB), the premier accrediting agency that most of our collegiate business programs are governed by, has charged the business school programs with the responsibility of closing the gap between what the students are learning within the educational environment and the knowledge they will need in their professional careers.

Business schools lack excellence not because of ineffective teaching, but because of misalignment of what they intend to teach, what is actually being taught and what they assess as having been taught (Cohen, 1987). The AACSB has given a major responsibility to educators. This responsibility is going to be a true challenge if educators don't understand the learning process and can't find ways of improving those processes within our classrooms.

## USING SIMULATION METHODOLOGIES

When choosing the methodology that creates the best "strategic fit" for the course and the students in that course, an educator should consider the particular learning objectives associated with that particular methodology. Simulations offer some very valuable learning opportunities which are equally present in other methodologies. Simulations also offer some learning objectives that are unique to this type of methodology. Figure 1 presents the commonality of valuable learning opportunities between other methodologies and simulation methodology and also presents learning objectives unique only to the simulation methodology.

**Figure 1. Methodology Learning Objectives**




## AUTHENTICITY OF ASSIGNMENT

As shown in Figure 1, both simulation and other methodologies can place the assignment in an authentic perspective. Using cases from actual companies or industry specific reading assignments, for example, the students can see behaviors, activities, and strategies represented in real companies and industries outside of the academic environment.

### Critical Thinking Requirements

Critical thinking techniques can be required in several types of methodologies. Case analysis, problem solving exercises, as well as simulations require students to engage in critical thinking. The experiences and lessons learned from these types of activities contribute to what Bloom (1956) referred to as part of a higher learning objective.

### Integration of Functional Areas

As students move through their educational experience, they become focused on their particular functional area. Marketing students for example, focus most of their time and efforts

honing their knowledge and skills in the area of marketing of products or services. While knowledge in a specific area is very important for individuals who make the transition from the academic to the professional environment, equally important is the individual's conceptual or holistic skills. Lainema and Lainema (2007) suggested that today's business organizations need business graduates who have knowledge and skill in the integration of business functions for a strategic purpose. Methodologies such as cross-functional case analysis, discussions which require functional integrated reasoning, reading assignments which cross functional boundaries, or simulations can all stress the importance of functional integration in business processes.

**Learning of Team Dynamics**

Another very important skill essential to students entering their professional environments is the ability to work effectively and efficiently as a member of a diverse work team. Methodologies which require that students be grouped together into work teams allows students to experience the forming, storming, norming, and performing stages of team development referred to by Tuckman (1965) in his early work with small work team dynamics. Several types of methodologies including simulation methodology can be structured into a group project, giving the students the opportunity to have the group experience.

While the above learning objectives can be accomplished using several different types of methodologies, the present authors suggest that there are some learning objectives that are unique to the simulation type of methodology (See Figure 1). These four learning objectives are: 1) Academic/professional environment linkage; 2) Equifinality in approach; 3) Action learning; and 4) Autonomy of learning processes.

**Academic/Professional Environment Linkage**

One of the primary problem areas for training organizations is the disconnection between the learning environment and the actual environment where the learned performance will take place (Lainema & Lainema, 2007). While case analysis, company or industry specific readings, and other pedagogical methodologies can bring some authenticity to the course, these methodologies do a poor job of actually linking the academic environment to the professorial environment in which these learned behaviors will someday take place.

Doyle and Brown (2000) describes classrooms that lack simulation methodologies as an artificial context of learning which does not reproduce the characteristics of a working situation. It has been suggested that this type of business school context can prepare a student in "analytical" skills but does not adequately prepare students in behavioral knowledge and behavioral skills (Rynes, et. al., 2003; Trocchia, et. al., 2007). Trocchi, et.al., (2007) goes even further to suggest that

this type of context can cause students to graduate from business schools with a more narrow perspective of how to handle business situations than they had going into their academic experience.

While they are not perfect in their ability to link the academic environment to the professional environment, simulations have been shown to be more realistic than alternative learning methods (Nel, et al., 1996; Doyle & Brown, 2000). These authors suggest that through simulations, the learner is directly in touch with the realities being studied. Keeton and Tate (1978) suggest that simulations involve a direct encounter with the studied phenomenon rather than merely thinking about it.

After evaluation of many types of training methods, the fields of aviation and medical training has concluded that simulation based training has a substantial and positive impact on the quality of training and future performance of individuals (Tichon, 2007; Von Lubitz & Levine, 2005). A major part of the success of these simulations has been the simulation's ability to bring the environmental context into the equation. The simulations create a "micro world" which greatly resembles the environment an individual will encounter in their work position (Senge and Fulmer, 1993).

One essential attribute of this created training environment is stress. Performing under the same stressful operating conditions that will be encountered in the real work environment is essential to quality training (Zakay & Wooler, 1984; Tichon, 2007).

Another attribute of simulations that is lost in other methodologies such as case analysis is the focus of the assignment as a process and not a product. When a case analysis is conducted, the student will use evaluation and analytical skills to make a determination of the situation and often make recommendations to future actions needed. The product produced by the student is then evaluated by the assignment instructor and feedback is given, essentially ending the assignment.

Simulations most often consist of multiple periods or rounds where analysis is conducted, decisions made, actions implemented and then the consequences are reviewed. This continuous cycle is process focused rather than product focused as seen in other methodologies. Having students run a simulated company over a number of decision periods helps students develop a strategic (i.e. holistic and long term) planning focus, much like the focus needed in today's businesses (Doyle & Brown, 2000; Thompson & Stappenbeck, 1995).

**Equifinality in Approach**

One problem in many learning domains is oversimplification due to looking at a concept from just one perspective (Lainema & Lainema, 2007). While the business world is very complex in both situations and strategy alternatives, teaching methodologies such as case analysis, most often suggest that the students work to find the "optimal strategy" for a given situation. In these methodologies, the course's professor or case author often unconsciously expect the students to view

the problem situation from their own perspective and therefore, the optimal solution becomes the optimal solution bounded by the rationality of the professor or the case author.

The ever-increasing environmental dynamism of the business environment outside the world of academia has made flexibility a necessity (Heifetz & Laurie, 1997; Lainema & Lainema, 2007; Zeleny, 1989). Simulations alleviate a lot of oversimplification by offering an equifinality approach to problem solving or strategy formulation. The simulations have usually been designed, produced, tested and continuously improved by a team of individuals. This team approach brings different perspectives, skills, abilities, and knowledge into the course and prevents the overshadowing effect of one person's perspective. The simulation method allows for different perspectives and solution alternatives while putting emphasis upon active application of knowledge or skills to a practical problem (Kolb, 1984; Lainema & Lainema, 2007). This type of application process is what Bloom (1956) referred to as a higher objective of learning and serves the students much more in the real world than does the knowledge the student gains from simply searching for the professor's opinion of the "optimal solution."

**Action Learning**

Simulations provide quick feedback and allow students to see the consequences of their decisions (Fripp, 1993). Yourstone, et.al., (2008) suggests that the entire dynamic of the classroom changes when the student is given immediate feedback (Yourstone, et. al., 2008).

Simulations, different from other methodologies, are "reciprocal in nature", meaning that past decision results are both an end of a process and the beginning of future actions. The purpose of simulations is to have users revisit past actions and commit to changing those past actions in an attempt to create positive future outcomes (Vega, 2007). In this way, assessments of past decisions stimulate further learning, this is referred to as "action learning" (Walvoord & Anderson, 1998; Whetten, 2007).

Action learning is a dialectical process where lessons are derived from and continuously modified through experience (Kolb, 1984). Students who operate a company through several time periods using a simulation, can see how their decisions relate to and/or constrain future decisions (Doyle & Brown, 2000).

Simulation methodology is focused on the process of student learning and not on the students' individual decisions. Washbush and Gosen (1998) discovered that players who made bad decisions and performed poorly at the beginning of the simulation, became very skilled and knowledgeable of successful business practices as they conscientiously played the game and worked to correct their earlier bad decisions. This would not be a possible outcome for teaching methodologies that did not allow the student to work through their decision errors.

Business organizations have placed a strong emphasis on individuals who are sensitive to strategic indicators and impulses and possess the agility and creativity to quickly adjust to the many

changes that occur within today's extremely dynamic and hyper-turbulent business environment. This is the exact type of skills and knowledge that are consistent with the learning objectives of the simulation methodology.

**Autonomy of Learning Process**

Whetten (2007) suggests that sometimes educators harm the student learning process more than they facilitate the process. This is partly the result of the old educational paradigm that assumes that the quality of the learning experience depends on the ability of the educator to teach the course material. With this paradigm in mind, the educators practice the mechanics of teaching the course materials. Whetten (2007) compares this logical inference to a golfer who has a bad swing. The golfer continues to practice his bad swing in order to become a better golfer but instead he just becomes better at making a bad swing. To be a better golfer he must change his swing and then, and only then, will his practice produce a better golfer.

Educators can take note of the golfer with the bad swing. No matter how much the educators improve or practice on their teaching style, without good pedagogical methodologies, the student learning will not improve.

Making the learning process more autonomous is one way of improving the learning experience. Researchers have suggested that more student involvement in the learning process leads to a higher order learning (c.f., McKeachie, 1990; Whetten, 2007; Yourstone, et. al., 2008). The more autonomy our students have to uncover and manage the learning process in their courses, the more likely they are to master the course material and internalize the lessons learned (Whetten, 2007).

Simulation methodology totally changes the roles of the actors in the learning process. The learners are now given a very high degree of autonomy (Brown, 2001; Hannafin, 1984). The students are now in control of their self-directed learning experience and the instructors act solely as facilitators for that learning process (Nonaka, 1994).

Once again the learning objectives of the simulation methodology, autonomy in this case, are objectives that are essential in today's business environment. Thus, what is learned in the academic environment can be linked to the future activities of the student in the professional environment.

## SIMULATIONS AS A STAND ALONE METHODOLOGY

As this paper has pointed out, there are a lot of teaching objectives that are unique to the simulation methodology. To say however, that simulations can stand alone as the sole pedagogical methodology in the student's learning process is as incorrect as saying simulations are not useful

in the learning process. While a lot of the simulations used today in business courses are very effective in helping the student transition from the academic environment to the professional environment, a realistic evaluation of these simulations will conclude that no simulation is 100% complete in preparing the student. Using the simulation as a stand-alone methodology will deny the student important information which may be available though other methodologies.

As stated earlier in the paper, simulations are a good practice in critical thinking techniques. However, some courses, especially core courses where the students are first learning the terminology and theories associated with that subject matter, require a different type of learning objective. Bloom's (1956) taxonomy of learning objectives refers to this as the early stages of learning. He states at this point, the learning objective should be comprehension and simple application. Whetten (2007) states that students can't apply something they don't understand, therefore, the educator should find means in which to help the student comprehend the subject matter as soon as possible so they can begin the critical thinking part of the learning process. In this instance, simulations could possibly be used as part of the simple application learning objective referred to by Bloom, but, a caveat must be given in relying too heavily on simulations at this stage of the student learning process. Most application of knowledge at this early stage of learning requires careful guidance by the instructor. This is in stark contrast to the autonomous nature of simulations. Applying Boom's taxonomy, instructors should seek a strategic fit between the course design and their students' stage of learning. This design may or may not include simulation methodology.

Another caveat given to instructors is to remember that all simulations are not the same. Educators should examine the content of each simulation carefully. Even though simulations have improved dramatically, there are usually still some missing elements. One of the most common elements missing from simulations is ethical training.

While many MBA instructors use simulations as part of their teaching methodology, only 22% of MBA students polled stated that their business school was adequately preparing them ethically for the professional environment (Trocchia, et.al., 2007). One only has to go as far as the local newspaper or morning news to understand the paramount importance of ethically preparing students to operate in the business environment. If the simulation is lacking in an ethical perspective, the instructor must supplement the simulation with adequate methodology that eliminates this void. Some simulations that were examined by the current authors lack any type of global perspective. The companies that the students strategically managed in the simulation were domestic companies that only competed against other domestic companies. While these simulations still have the teaching objectives suggested earlier in the paper, they were definitely weakened by the lack of a global perspective that is so prevalent in today's business environment (c.f., Tempel & Walgenbach, 2007; Adekola & Sergi, 2007). These simulations needed support from methodologies that supplied the global element that was so obviously void from these simulations.

Finally, the linking of the academic environment to the professional environment is almost always lacking in the hands on experience of the actual implementation of a strategy, idea, or theory.

In academic courses as well in academic research, the transferring of knowledge is intangible. In different types of methodology the students make decisions and design strategies however, in reality the implementation of those changes and strategies involve more people than simply the members of a project work team. The strategist or change agents must use "change leadership" in order to get the members of the organization to "buy into" a new change or strategy otherwise the change will not happen (French & Bell, 1990). Even when using simulations where the linkage between the academic and professional environments is strong, this implementation element is missing.

While other methodologies (e.g., specific reading assignments, video documentaries, cooperative programs) are not perfect in teaching the needs and requirements for implementation of organizational change, they can be used to supplement the void within the simulation only methodology.

## CONCLUSION

While the arguments associated with pedagogical methodology will probably continue to the end of time, this paper has offered some insight into using simulations in the teaching of business courses.

Diamond (1998) suggests that when attempting to teach, an educator should make a determination as to what would best facilitate the learning process for the individuals in which you wish to teach. Bloom's (1956) taxonomy suggests that individuals are at different levels of learning maturity. Educators can successfully facilitate the learning experience if they use this theoretical foundation as a means to understand the needs of the students in which they wish to teach.

Obviously, simulations are not the panacea that will change every business course taught into the perfect learning environment. If business courses, however, are designed with the primary focus of strategically fitting the course methodology with the needs of the student learners, simulations can be a very important part of the learning process.

## REFERENCES

Bennis, W. G., & O'Toole, J. (2005). How business schools lost their way. *Harvard Business Review*, 98-104

Billimoria, D. (2000a). A new scholarship of teaching and learning: An agenda for management education scholarship. *Journal of Management Education*, 24(6), 704-707

Billimoria, D. (2000b). Teachers as learners: Whither our own development? *Journal of Management Education*, 24(3), 302-303

Bloom B.S. (1956). *Taxonomy of educational objectives: The classification of educational goals.* London: Longmans, Green and Company.

Brown, F. W., (2001). Using a business simulation to teach applied skills-the benefits and the challenges of using student teams from multiple countries, *Journal of European Industrial Training* 24(6), 330-336.

Cohen, S. A. (1987). Instructional alignment: Searching for a magic bullet. *Educational Researcher*, 16, 16-20.

Diamond, R. M. (1998). *Designing and assessing courses and curricula: A practical guide*. San Francisco: Jossey-Bass.

Doyle, D. & Brown, F. (2000). Using a business simulation to teach applied skills: The benefits and the challenges of using student teams from multiple countries. *Journal of European Industrial Training*, 24(6). 330-336.

Driskell, J.E. & Johnston, J.H. (1998). Stress exposure training. In Cannon-Bowers, J.A., Salas, E., (eds.) *Making decisions under stress: Implications for individual and team training.* Washington, DC: American Psychological Association, 191-217.

Eyler, J., & Giles, D. E. (1999). *Where's the learning in service learning?* San Francisco: Jossey- Bass

Fink, D. (2005). *Creating significant learning experiences.* San Francisco: Jossey-Bass.

Fripp, J. (1993). *Learning through simulations*, McGraw-Hill, London

Greenberg, D., Clair, J. & Maclean, T. (2007). Enacting the role of management professor: Lessons from athena, prometheus, and asclepius. *Academy of Management Learning & Education*, 6(4), 439-457.

Hannafin, M.J. (1984). Guidelines for using locus of instructional control in the design of computer-assisted instruction. *Journal of Instructional Development*, 7, 6-10.

Hannan, M. & Freeman, J. (1984). Structural inertia and organizational change. *American Sociological Review*, 49(2), 149-164.

Heifetz, R.A. & Laurie, D.L. (1997). The work of leadership. *Harvard Business Review*, 75(1), 124-134.

Keeton, M. & Tate, P. (1978). *What, Why, How,* San Francisco, CA: Jossey-Bass..

Kerr, S. (1975). On the folly of rewarding A whole hoping for B. *Academy of Management Journal*, 18, 769-783.

Kolb, D. A., (1984). *Experimental learning: Experience as the source of learning and development,* Englewood Cliffs, NJ: Prentice- Hall.

Lainema, T. & Lainema, K. (2007). Advancing acquisition of business know-how: Critical learning elements. *Journal of Research on Technology in Education*, 40(2), 183-198.

McKeachie, W. (1990). Research on college teaching: The historical background. *Journal of Educational Psychology*, 82, 189-200.

Nel, D., Pitt. L., Berthon, P. & Prendergast, G. (1996). Social decision schemes and group processes: some impacts on decision making making, *Journal of Managerial Psychology*, 11(6), 4-18.

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1), 14-37.

Peach, B., Mukherjee, A., & Hornyak, M. (2007). Assessing critical thinking: A college's journey and lessons learned, *Journal of Education for Business*, July/August, 313-320.

Piderit, S.K. (2000). Rethinking resistance and recognizing ambivalence: A multidimensional view of attitudes toward an organizational change. *Academy of Management Review*, 25, 783-794.

Rynes, S. L., Trank, C. Q., Lawson, A. M., & Ilies, R. (2003). Behavior coursework in business education: Growing evidence of a legitimacy crisis. *Academy of Management Learning and Education*, 2, 269-283

Senge, P. & Fulmer, R. (1993). Simulations, systems thinking and anticipatory learning, *Journal of Management Development*, 12 (6), 21-33.

Thompson A. & Stappenbeck, G. (1995). *The Business Strategy Game*, Chicago, IL: Irwin..

Tichon, J. (2007). Training cognitive skills in virtual reality: Measuring performance. *CyberPsychology & Behavior*, 10(2), 286-289.

Tuckman, B.W. (1965). Developmental sequences in small groups, *Psychological Bulletin*, 63, 384-399.

Vega, G. (2007). Teaching business ethics through service learning metaprojects. *Journal of Management Education*, 31(5), 647-678.

Von Lubitz, D.K & Levine, H. (2005). Distributed, multiplatform high fidelity human patient simulation environment: A global-range simulation-based medical learning and training network. *International Journal of Healthcare Technology Management*, 6(4/5/6). 500-528.

Walvoord, B. E., & Anderson, V. J. (1998). *Effective grading: A tool for learning and assessment.* San Francisco: Jossey-Bass.

Washbush, J.B. & Gosen, J. (1998). Total enterprise simulation performance and participant learning, *Journal of Workplace Learning*, 10(6/7).

Whetten, D. (2007). Principles of effective course design: What I wish I had known about learning-centered teaching 30 years ago. *Journal of Management Education*, 31(3), 339-357.

Yourstone, S., Kraye, H. & Albaum, G. (2008). Classroom questioning with immediate electronic response: Do clickers improve learning? *Decision Sciences Journal of Innovative Education.* 6(1). 75-88.

Zakay, D. & Wooler, S. (1984). Time pressure, training and decision effectiveness. *Ergonomics*, 27, 273-284