

JOURNAL OF BUSINESS AND EDUCATIONAL LEADERSHIP

Volume 8, Number 1

ISSN 2152-8411

FALL 2018

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**A REFEREED PUBLICATION OF THE AMERICAN SOCIETY
OF BUSINESS AND BEHAVIORAL SCIENCES**

JOURNAL OF BUSINESS AND EDUCATIONAL LEADERSHIP

P.O. Box 502147, San Diego, CA 92150-2147: Tel 909-648-2120

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ISSN: 2152-8411

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The Journal of Business and Educational Leadership is a publication of the American Society of Business and Behavioral Sciences (ASBBS). Papers published in the Journal went through a blind review process prior to acceptance for publication. The editors wish to thank anonymous referees for their contributions.

The national annual meeting of ASBBS is held in Las Vegas in March of each year and the international meeting is held in June of each year. Visit www.asbbs.org for information regarding ASBBS.

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THE APLIA MATH ASSESSMENT SCORES AND INTRODUCTORY ECONOMICS COURSES: AN ANALYSIS

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Abstract

Mathematical concepts are integrated throughout most undergraduate courses within the economics major. In fact, it is the language of economics. This is true even at the principles level, where students are often expected to use tools such as graphical analysis extensively. This paper investigates the relationship between mathematical ability and academic performance in an introductory economics course. We measure student competency in mathematics using the online course management system, Aplia, which was acquired by Cengage Learning in 2007. The mathematics tutorial and exercises within Aplia assess students' knowledge of graphs, slope, area and units, numeric calculations, and equations. Our paper examines the correlation between students' Aplia math assessment scores and their final grades in the principles of macroeconomics course. Our empirical analysis suggests that competency with basic mathematical concepts such as those captured by the mathematics tutorial and exercises within Aplia are strong predictors of academic performance in principles of macroeconomics.

Key Words: APLIA Math Assessment Scores, economics, mathematics, learning outcomes

Introduction

Mathematical concepts are integrated throughout most undergraduate courses within the economics major. In fact, it is the language of economics. This is true even at the principles level, where students are often expected to use tools such as graphical analysis extensively. As Benedict and Hoag (2012) point out, the degree to which mathematics is used in economics varies from courses which require a minimal level of mathematical comprehension to courses such as mathematical economics and econometrics which focus on applying mathematical tools to economic problems. Intermediate courses in microeconomics and macroeconomics often incorporate calculus-based problems. Additionally, mathematical concepts such as marginal change are used regularly in economics. Benedict and Hoag (2012) summarize the importance of mathematics in economics by suggesting that "Mathematics is embedded in the undergraduate

economics curriculum via relevance to economic concepts, major requirements and the existence of specific courses (pp. 334-335).”

If mathematics is the language of economics, this implies that the level of quantitative skills students possess as they begin an economics course should be a key component in their academic success. Early knowledge of mathematical concepts that need to be reviewed or learned in order to meet mathematics proficiency for a course likely benefit both the student and the professor. Students have an opportunity to remedy mathematical deficiencies at the beginning of the course before tackling the application of mathematical concepts in economic analysis as the course proceeds. Information about students’ mathematical competencies in specific areas could also be helpful to professors as they plan teaching strategies to maximize learning in economics courses.

This paper investigates the relationship between mathematical ability and academic performance in the principles of macroeconomics course. We measure student competency in mathematics using the online course management system, Aplia. Aplia offers students a digital copy of the text and the ability to complete online graded homework with feedback and tutorials. The Aplia assignments are integrated with the material in the textbook. The mathematics tutorial and exercises within Aplia assess students’ knowledge of graphs, slope, area and units, numeric calculations, and equations. We measure academic performance by the numerical grade earned in the course. Our results suggest that the Aplia math assessment is highly significant in predicting a student’s academic success in the Principles of Macroeconomics course.

Teaching Economics: Recognizing the Relationship between Economics and Mathematics

Three major surveys describing the literature on teaching economics to undergraduates have been published since economic education became a research topic in economics (Siegfried and Fels 1979; Becker 1997; Allgood et al. 2015). In a recent survey, Allgood et al. (2015) argue:

Teaching undergraduate economics differs from instruction in other subjects because it draws on content and techniques from many disciplines, such as mathematics, statistics, philosophy, psychology and history but blends them in special ways. Economic analysis also requires extensive verbal and quantitative reasoning that can be both practical and abstract. Although teaching economics is certainly not completely different from teaching other disciplines, it does have some unique qualities that can make it more challenging than other disciplines... (p. 286).

Their survey results suggest that economics faculty continue to agree that the overarching goal of the undergraduate major is to enable students to think like an economist and suggest that this approach requires “using deductive reasoning with parsimonious models to understand economic phenomena (p. 288).”

In their discussion of the economics major, Allgood et al. (2015) use the following analogy.

Both the structure of the economics discipline and the undergraduate major have been likened to a tree. The major is rooted in the introductory course or courses. A core of principles, analytical methods and quantitative skills comprise the trunk of the tree. Its branches, protruding extensively in all directions, represent subdisciplinary fields, ranging from labor economics to monetary economics. The subfields generate the problems to which the principles and quantitative approaches can be productively applied. These two characteristics – a core of theoretical and empirical knowledge, combined with opportunities to extend that knowledge to a wide variety of topics—distinguish economics from other social sciences (p. 289).

Both the structure of the undergraduate economics major and its primary goal of learning to think like an economist suggest that strong analytical skills are necessary for successfully completing an economics degree. In fact, critical thinking skills are ranked at the top of desired student learning outcomes in many departments (Myers et al. 2011; Allgood et al. 2015). Additionally, during the last 30 years, the most significant change in course requirements for the economics major has been to require econometrics. This suggests a greater emphasis on empirical training and a recognition of its importance in the workplace (Allgood et al. 2015; Bosshardt et al. 2013). The emphasis on critical thinking skills and empirical training suggest that quantitative competency will continue to be important throughout the undergraduate economics curriculum, even at the principles level.

Many studies have investigated factors that determine academic success in economics courses throughout the major. Given the focus on analytical skill and empirical training required in the discipline, it is not surprising that quantitative literacy is widely supported as being an important determinant for economic literacy in empirical studies (Benedict and Hoag 2012; Schuhmann et al. 2005; Swope and Schmitt 2006; Allgood et al. 2015). This study focuses on the correlation between quantitative literacy and academic performance in an introductory course, macroeconomics principles.

Understanding the impact of mathematical competency on economic literacy in the principles course is particularly important. As Allgood et al. (2015) and Prante (2016) argue, aside from offering courses that constitute the economics major, the economics principles courses are the most important contribution that economics departments make at most institutions. In fact, one could even argue that the principles courses are the most important courses offered for several reasons. The principles course is typically taken to begin an economics major, as an elective for a specific major or to satisfy general education requirements. In most cases, the principles course serves as the student's first introduction to economics. Academic outcomes in this course can determine whether one pursues an economics major or even an alternative major that requires economics as an elective. Finally, because only a small percentage of students in principles courses become majors, the principles course will often be the only exposure to economics in college for many students.

As previously mentioned, mathematical concepts are consistently integrated in economics courses throughout the major, beginning at the principles level. Typically, the minimum level of mathematical competency assumed for the principles courses is knowledge of basic algebra, graphing, and use of geometry to calculate areas (Prante 2016; Hoag and Benedict 2010). Ballard and Johnson (2004) use a mathematical quiz as one of their measures to assess competency. They find that the ability to answer questions that cover arithmetic, algebra and geometry are the most important skills in determining academic success in economic principles. Yet, even though the importance of quantitative skill is widely recognized, most economics departments do not have specific mathematical pre-requisites for the principles courses. In a comparison of principles courses among colleges in the 2016 edition of the Princeton Review, Prante finds that only 16% of schools require, and 2% of schools recommend, a minimum level of mathematical competency, so slightly more than 80% of schools do not have a mathematical pre-requisite for the principles of economics course. Completion of Algebra II is the most common minimum requirement and scores on the ACT, SAT or a mathematical placement exam are often used to assess competency (Prante 2016).

Quantitative skills among students entering college may vary greatly so economics instructors should not assume that students enrolled in the principles courses all possess the basic competency necessary to navigate those courses. For example, Schuhmann et al. (2005) examine the relationship between quantitative and economic literacy in the economics principles course. They administer a mathematical assessment test composed of eight multiple choice questions designed to measure both computational and interpretive skills such as computing a percentage and distinguishing differences across two graphs. They find that although students' ability to answer computational questions was stronger than their ability to answer interpretive questions, that "generally, students do not fare well on simple quantitative questions and hence do not possess an adequate working knowledge of the 'language' we often speak during our economics courses (p. 60). " Other studies have also found that some students have difficulty working with graphs and that those students perform more poorly in economics (Strober and Cook 1992; Cohn and Cohn 1994; Cohn et al. 2001, 2004).

The relationship between mathematical and economic literacy has been examined in the research on teaching and learning economics. However, determining the most appropriate measures of mathematical aptitude has proved complex. Many empirical studies use one measure of mathematical competency such as the mathematical portion of the ACT or SAT exam, college mathematical placement tests, or the performance in or the number of high school mathematical courses taken by students. Each of these measures presents some challenges. For example, the mathematical scores on the mathematical portion of college entrance exams or on college mathematical placement tests cannot distinguish between inherent ability, learning from the specific mathematical courses a student has taken, or a student's motivation (Allgood et al. 2015; Lagerlöf and Seltzer 2009). Bosshardt and Manage (2011) find that mathematics ability is more important than taking a

calculus class prior to having an economics course. Arnold and Straten (2012) find that although a student's preparatory mathematical education is the most important factor in academic success in economics, motivation is also important, and this is particularly for students with inadequate mathematical backgrounds.

Another problem that arises when comparing studies on the relationship between mathematical competency and economic literacy in principles is that the measures of mathematical competency typically used may not uniformly measure the same quantitative skills, nor may some assessment instruments be measuring the most important quantitative skills needed in a principles class. Schuhmann et al. (2005) find that basic mathematical competencies such as being able to solve a system of equations, compute a percentage, and having the ability to interpret increases and decreases on a graph are positively associated with economic literacy. Ballard and Johnson (2004) use four measures of mathematical competency in an attempt to explain performance in a microeconomics principles course; mathematics ACT scores, whether the student took calculus or was required to take remedial mathematics, and a mathematics quiz covering basic concepts which included computations and simple geometry and algebra. They find that mathematics ACT scores, having had calculus, and doing well on a mathematics quiz all contribute to a higher grade in economics. However, being required to take remedial mathematics is negatively correlated with final course grades. They conclude that competency in very basic quantitative skills is one of the most important factors in determining success in microeconomic principles, and that quantitative skills are multidimensional, making it difficult to find one measure that adequately represents mathematical competency.

Hoag and Benedict (2010) examine the mathematics skills that matter most for academic success in economics principles classes. They find that the most important skill is the abstract reasoning associated with geometry or trigonometry. They use mathematics ACT scores to represent mathematical competency and find that the mathematics ACT score and having had college mathematics or calculus is associated with higher grades in the principles course. Evans et al. (2015) also use the mathematics ACT scores as a measure of quantitative literacy. They point out that the correlation between mathematics ACT scores and performance in economics is probably stronger than the correlation between mathematics SAT scores and performance in economics. This is a consequence of the questions that comprise these tests. The geometry questions on the mathematics sub-score on the ACT account for 45% of the total questions while only 25-30% of the questions on the mathematics sub-score on the SAT are related to geometry. Their empirical results reiterate the importance of geometry scores in determining academic performance in economics.

To summarize, the link between quantitative skills and economic literacy in an economics course is complex and difficult to unravel when using a single measure of mathematical competency. This may be due both to the nature of the specific economics course and to the difference in learning goals in specific mathematics courses. Success in the principles course depends on basic mathematical competency and the ability to think critically. Both skills can be developed and

enhanced by completing specific courses in mathematics. However, various mathematics courses may emphasize these skills at different levels. Even in courses where basic mathematics is taught, the ability to reason by transferring or applying what was previously learned to more difficult problems may be enhanced (Hoag and Benedict 2010; Leader and Middleton 2004; Walter 2005; Mayer and Wittrock 1996). As Allgood et al. (2015) point out in their survey of the research in teaching economics, most studies on the importance of mathematical aptitude have shown a positive correlation between verbal, quantitative or composite SAT and ACT college entrance exams and academic performance in economic principles. Knowledge of basic mathematical concepts and inherent ability in mathematics have also been supported in empirical studies as important variables.

We measure student competency in mathematics using the online course management system, Aplia, which was acquired by Cengage Learning (2007). The mathematics tutorial and exercises within Aplia assess students' knowledge of graphs, slope, area and units, numeric calculations, and equations. Our paper examines the correlation between students' Aplia mathematics assessment scores and their final grades in the principles of economics course after controlling for differences in sections, sessions, ACT scores, gender, graduating class, major, and whether students graduated from public or private high schools. If Aplia mathematics assessment scores are useful in predicting student performance in introductory principles, then the availability of Aplia scores as the term begins could be used by both students and professors to improve academic outcomes.

Data and Methodology

The empirical analysis is based on data obtained from records of students enrolled in the Principles of Macroeconomics courses at Bellarmine University, a small Catholic liberal arts institution. As a pre-requisite to the Principles of Microeconomics course, this course is the first economics course in a two-semester introductory sequence offered by the economics department. The course is open to all students, although freshmen make up a majority of the students in some sections. Data for twelve sections of macroeconomic principles courses were collected during five semesters from the fall of 2010 to the spring of 2013. Each section was composed of fifty-minute classes which met three days per week on Monday, Wednesday and Friday. All sections were taught during the 8:00 a.m. to 1:00 p.m. time period by the same professor. Deletions in the data set for missing variables on some students resulted in a sample size of 335.

Production function models form the basis for many empirical studies on academic performance in economics. The output, academic performance in economics, is a function of inputs such as aptitude or academic background (Mallik and Shankar 2016; Anderson et al. 1994). We also base our empirical analysis on this theoretical model and hypothesize that academic performance in the Macroeconomics principles course is a function of mathematical competency, aptitude and a set of control variables.

The dependent variable, performance in the Macroeconomics principles course, is measured by the final numerical grade, calculated as a percentage of total possible

points. This is consistent with previous empirical studies in which three types of measures are typically used to assess economic knowledge; the difference between post- and pre-scores on the Test of Understanding College Economics (TUCE) exam, the total points or percentage of points accumulated in a course, and the course letter grade (Benedict and Hoag 2012).

Mathematics competency is measured by scores on the Aplia math assessment taken by students during the first week of the class and captures the students' current quantitative skills as the economics course begins. As mentioned earlier, this exercise assesses students' knowledge of graphs, slope, area and units, numeric calculations, and equations. These concepts reflect the basic mathematical tools used most often in the macro-and micro-principles courses. The questions on the Aplia math assessment are designed to capture the mathematical concepts needed for quantitative proficiency and are linked to a specific textbook in the macro- or micro- introductory courses.

We also include variables used as controls in many empirical studies of economic performance such as course section, whether the class was taken in the fall or spring semester session, composite ACT score, gender, graduating class, whether the student attended a public or a private high school and the student's intended major at the beginning of the course. We use the composite ACT score in this study. Prior studies have shown that the verbal and math ACT or SAT sub-score and the composite ACT or SAT score is positively correlated with the academic performance in introductory economics courses as measured by the *Test of Understanding of College Economics* (TUCE), course exams or course grades (Allgood et al. 2015; Becker 1997; Siegfried and Walstad 1998). Most students at this institution take the ACT although some students take the SAT and a few students take both college entrance exams. SAT scores were converted to ACT scores for students who took only the SAT. As discussed in the previous section of the paper, the composition of the math sub-test varies in the ACT and SAT. Because the ACT and SAT math sub-scores are not compatible, we use composite ACT scores, rather than math and verbal sub-scores.

Information on a student's intended major is included to capture mathematics proclivity. Hoag and Benedict (2010) include majors in economics, finance, mathematics, actuarial science or computer science to measure proclivity for economics, mathematics and technical skills. Following their lead, we construct a measure of mathematics proclivity. We do this by separating all majors at this institution into two categories, based on whether calculus or business calculus is required for the major. Mathematics proclivity is proxied by those students who have declared majors with calculus or business calculus requirements.

We use Ordinary Least Squares to estimate the following regression equation.

$$(1) \quad Y_i = \beta_0 + \beta_1 \text{APMATH}_i + \beta_2 \text{SEC}_i + \beta_3 \text{SESS}_i + \beta_4 \text{ACT}_i + \beta_5 \text{GENDER}_i + \beta_6 \text{CLASS}_i + \beta_7 \text{HS}_i + \beta_8 \text{MAJOR}_i + \varepsilon_i$$

where Y_i = the final numerical course grade in macroeconomics, determined by the percentage of total possible points

APMATH_i = the Aplia math grade, determined by the percentage of total possible points on the Aplia math assessment

SEC_i = Dummy variable for the section number, indicating the time of day that the economics class was taken, Section F (1:00 p.m. section) omitted

SESS_i = Dummy variable for the fall or spring session, fall = 1

ACT_i = numerical score on ACT college entrance exam

GENDER_i = Dummy variable for gender, male = 1

CLASS_i = Dummy variable for graduating class, junior class rank omitted

HS_i = Dummy variable for attending either a private or public high school, Private = 1

MAJOR_i = Dummy variable for math proclivity, calculus required for intended major = 1.

The model was evaluated for multicollinearity and heteroskedasticity. A model with a correction for heteroskedastic errors was estimated. The estimation produced results that were virtually identical to the original model. The signs and significance of variables were unchanged.

Empirical Results

Regression results for equation (1) are reported in Table 1.

Table 1

Regression Results

Variable	Coefficient	t-Statistic	P-value
CONSTANT	29.29	5.36	0.00 ^a
APMATH	0.21	4.59	0.00 ^a
SECA	-2.09	-0.57	0.57
SECB	-2.01	-0.60	0.55
SECC	-1.42	-0.42	0.68
SECD	-2.23	-0.83	0.41
SECE	0.11	0.04	0.96
SESSFA	0.51	0.22	0.83
ACT	1.32	8.12	0.00 ^a
GENDMALE	-1.01	-0.97	0.34
CLASSF	0.73	0.40	0.69
CLASSSO	1.48	0.77	0.44
CLASSSR	-1.71	-0.60	0.55
HSPR	1.24	1.16	0.25
MAJORCAL	-1.49	-1.37	0.17

N = 335

Adj-R² = 0.28

F = 10.42

^a = Indicates significance at the 1% level.

The results show that the Aplia math assessment score is highly significant in predicting academic success in principles of macroeconomics. A letter grade increase of 10 points on the Aplia math assignment leads to an increase in the final

course grade of 2.1 points. This result is consistent with previous studies that use mathematics tests covering basic quantitative skills to examine the impact on economic literacy and find a positive and significant relationship between basic math skills such as graphing, arithmetic and geometry and academic performance in principles of economics courses (Ballard and Johnson 2004; Schuhmann et al. 2005; Hoag and Benedict 2010; Hafer and Hafer 2002).

ACT scores are also highly significant in predicting economic literacy. A one-point increase in the ACT college examination is predicted to increase the final course grade by 1.32 points. This result is not surprising since mathematical, verbal and analytical reasoning ability all play a role in a successful academic outcome in economics. This finding is widely supported in the literature. Numerous studies have found that the verbal and math ACT or SAT sub-score and the composite ACT or SAT score is positively correlated with the academic performance in introductory economics courses as measured by the *Test of Understanding of College Economics* (TUCE), course exams or course grades (Allgood et al. 2015; Becker 1997; Siegfried and Walstad 1998). As Allgood et al. (2015) point out, the ACT and SAT entrance exam scores may capture learning from specific courses that were taken, motivation, and natural aptitude.

The remaining variables in the regression equation control for differences in the characteristics of course offerings or for differences in personal characteristics. The classes were taught by the same instructor at Bellarmine University using the same method of instruction and textbook. Class sizes were virtually identical. Additionally, all classes met three times per week on Monday, Wednesday and Friday. The dummy variables, session and section, capture differences in classes offered in the fall or spring session or at different times during the day which varied from 8 a.m. to 1 p.m. Other control variables focus on student characteristics. They include gender, class rank, graduation from a private or public high school, and math proclivity.

Our results suggest that the control variables are not important predictors of final course grades. The results for the control variables reflecting course characteristics are not surprising since the section times are spaced within a range of only 5 hours and the sections are all offered in the morning or early afternoon. Likewise, the sessions include only sessions offered in the traditional academic year, excluding summer sessions. Both variables, section and session, reflect similar course offerings.

Prior research has produced mixed results on the impact of some student characteristics on performance in economics. For example, many studies have examined the role of gender on performance. In a review of the relationship between student characteristics and behavior to performance in economics, Owen (2012) summarizes some of the literature on the effects of gender. She cites empirical results that indicate that female students perform worse than male students in introductory economics (Anderson et al. 1994) as well as other findings that suggest females perform as well as males or better than males in high school economics courses (Watts 1987; Lumsden and Scott 1987). Swope and Schmitt (2006) find no relationship between gender and academic performance in

economics. Arnold and Rowaan (2014) examine gender, motivation and math skills as factors that may be important in predicting success in introductory economics and econometrics. They find only weak evidence of a gender gap. They also find that the effects of preparatory education and motivation are stronger than the effects arising from gender. As they point out in their review of the literature, a meta-analysis undertaken by Johnson et al. (2014) suggests that “the gender effect on economics is overestimated and that the gender gap has decreased over time (p. 26).”

The impact of a student’s high school experience has also been analyzed in prior studies. A priori, students who attended private versus public high schools might be expected to perform better in college economics courses due to factors such as smaller classes and more individualized instruction. Owen (2012) also reviews some of this literature and includes a study by Grimes (1994). With the exception of Hispanic and African American students who perform better, Grimes found that students in private high schools perform worse than students in public high schools on economics tests. Although initially surprising, because students in a private high school are more likely to have had a course in economics, this result is attributed to two factors. First, instructors in public high schools typically have more academic coursework in college economics and second, public high school instructors often receive more support from economic education agencies. More recently, Mallik and Shankar (2016) find that a private versus public high school background is not significant in predicted academic performance in the principles of economics course.

In a survey of undergraduate coursework in economics, Siegfried and Walstad (2014) discuss maturity in terms of either age or year in school, as a factor that is important in a successful introductory experience in economics. Although some empirical studies, such as Siegfried and Fels (1979) have indicated that maturity is not related to economic performance, many studies have found that maturity is important (Siegfried and Walstad 1998). Siegfried and Walstad point out that younger students and first-year students have typically performed worse in economics. However, they suggest that this may be less true today as students are more likely to have taken a high school economics course, achieved advanced placement (AP) in economics, or to have taken college economics as a high school student (Walstad and Rebeck 2012). Siegfried and Walstad conclude their discussion by adding that offering economics courses only to students who are at least at the sophomore level is typically not feasible for most economics departments due to the “sequential nature of economics instruction (p. 150).” Their survey results suggest that 92 to 100% (weighted average of 97%) of first-year students are allowed to enroll in introductory economics courses.

As discussed above, we include a measure of mathematics proclivity by separating all majors at this institution into two categories, based on whether calculus or business calculus is required for the major. Mathematics proclivity is proxied by those students who have declared majors with calculus or business calculus requirements. Our results suggest that there is no significant relationship between math proclivity and performance in the principles of macroeconomics course.

These results differ from those of Hoag and Benedict (2010). They include majors in economics, finance, mathematics, actuarial science or computer science to measure proclivity for economics, mathematics and technical skills. They find that all three of these variables are positively associated with final grades in principles of microeconomics. It may be that math proclivity is more important in microeconomics than macroeconomics since microeconomics is more math intensive.

In summary, our empirical analysis suggests that competency with basic mathematical concepts such as those captured by the mathematics tutorial and exercises within Aplia, including a knowledge of graphs, slope, area and units, numeric calculations, and equations are strong predictors of academic performance in principles of macroeconomics. In addition, verbal, quantitative and reasoning skills measured by college examinations such as the ACT are also important.

Conclusions

The overriding goal of economics is to enable students to think like an economist with an approach that uses deductive reasoning and abridged models to explain a broad spectrum of economic events and behaviors. This type of cognitive development in economics suggests an important role for mathematical literacy. The benefits of mathematical training in developing economic literacy are at least twofold. First, as our results indicate, a basic knowledge of mathematical concepts is necessary to speak the “language” of economics, even at the principles level. Second, mathematical training and experience in solving mathematical problems enhance transitional ability or the ability to apply learned concepts to problems not previously encountered. In their discussion of research related to mathematics training and transferability, Hoag and Benedict (2010) review work by Leader and Middleton (2004) and Walter (2005) which suggest that practice with basic algebra or calculus leads to the ability to apply those skills to more challenging mathematical problems. They also summarize research results by Gagatsis and Shiakalli (2004), suggesting that the “idea of becoming a transitional problem-solver is directly related to mathematics education, where one becomes comfortable presenting the same information across verbal, graphical, and algebraic symbols (p.21).” Hoag and Benedict conclude that “mathematics maturity and understanding help students become better overall learners (p.21).” This is consistent with the empirical results in Schuhmann et al. (2005) where they find that improvements in basic quantitative skills enhances learning in economics and also that economic literacy promotes mathematical competency. However, even at the end of the course, their test results indicate that students do not perform well on quantitative questions.

The empirical results in this paper and in prior studies consistently find that mathematical ability is related to academic success in economics, quantitative skills vary widely among students, and students often do not do well on basic quantitative questions. Even though the importance of quantitative skill is widely recognized and quantitative courses are required for the economics major, most economics departments do not have specific mathematical pre-requisites for the

principles courses. This underscores the importance of assessing students' basic quantitative skills at the beginning of an economics course. Early knowledge of mathematical concepts that need to be reviewed or learned in order to meet mathematics proficiency for a course likely benefit both the student and the professor. Students have an opportunity to remedy mathematical deficiencies at the beginning of the course before tackling the application of mathematical concepts in economic analysis as the course proceeds. Information about students' mathematical competencies in specific areas could also be helpful to professors as they plan teaching strategies to maximize learning in economics courses. As part of the Aplia online management system, the mathematical assessment and tutorial assignment provides an easy, quick and consistent way to check for the minimum quantitative proficiency to navigate the principles course as the assignments are integrated with the material in the textbook. Quantitative skills requiring more development could be addressed in class, in review sessions or with individual students. Assessments and mastery of the most important quantitative skills for academic success in economics are particularly important in introductory economics courses, as students make decisions about whether to enroll in additional courses in economics, perhaps as an economics major, as a major in a field with economics requirements, or as an interested student taking additional economics electives.

ANNOTATED REFERENCES

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IDENTIFYING PRESCRIPTION OPIOID ABUSE IN THE MEDICAL SETTING

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ABSTRACT

This paper explores the issue of identifying prescription opioid abuse in the healthcare setting and potential strategies to address this nationwide problem. In particular, this article examines existing literature focusing on opioid abuse and possible prevention methods to address this epidemic in the U.S. Using literature reviews accompanied by interviews from healthcare professionals who shared their experiences about the problems they face in their practices, this study found that the complexity of opioid abuse requires a more universal approach and some form of intervention from the outside. One inspiration for a solution comes from the Mandatory Reporting of abuse for children implemented by many professionals in California. This paper suggests a variation of the Mandatory Reporting, adapted for opioid abuse that involves education and public involvement, harsher consequences for professionals for failure to report opioid abuse, as well as involvement from the federal government in the form of legislation.

Keywords: prescription opioids abuse, prevention, public health, healthcare setting

INTRODUCTION

Prescription opioid use has increased significantly during the past decades, and opioid abuse in the U.S. has been recognized as a significant problem. Congress approved the spending of \$60 million in 2005 from fiscal years 2006-2010 to help establish or improve prescription monitoring programs (Meyer et al., 2014). However, abuse of opioids continues to be a growing problem. From 1999 to 2013, drug overdose deaths due to opioids increased from 6% to 13.8% per 100,000 people in the US. (Centers for Disease Control and Prevention, 2013). In 2014 in the U.S., about 36 million people older than 12 years of age had used prescription opioids for non-medical reasons (Center for Behavioral Health Statistics and Quality, 2015). An increasing number of unintentional opioid overdose deaths indicates that the clinical burden associated with prescription opioid use remains a concern and the effective strategy to identify those cases in the medical setting is critical.

One of the major reasons for prescription opioid use is in chronic pain management, despite the fact that the benefits of opioids for chronic pain management are questionable (Jamison, Serrailier, & Michna, 2011). In 2014,

retail pharmacies in the U.S. dispensed 245 million prescriptions for opioid pain relievers (Volkow & McLellan, 2016). Nonmedical opioid users may receive these controlled substances from multiple physicians, a behavior known as “doctor shopping” (Hall et al., 2008), or from friends or relatives for whom opioid drugs were prescribed, a practice known as “diversion” (White et al., 2009). An important question is how to access information on potential misuse and abuse of prescription opioids and to assist prescribers (mainly primary care physicians) to balance between alleviating pain for patients while ensuring safe prescribing practices. The current study aims to address this important question by reviewing existing literature and interviewing healthcare practitioners about their experiences with prescribing patterns. Despite efforts taken by the Drug Enforcement Administration (DEA), identifying prescription opioid abuse in the medical setting remains a significant challenge for healthcare practitioners.

CURRENT STATE OF THE PROBLEM

The biggest challenge that our nation is facing in relation to the opioid crisis is how best to access information regarding the potential misuse and abuse of prescription opioids in a healthcare setting so that effective management through a controlled monitoring system can be implemented to balance pain management for patients and safe prescribing of opioids.

One of the primary means that has been used by some states to address this epidemic is the use of prescription drug monitoring programs (PDMPs). These programs gather information from physicians and pharmacies about controlled substances dispensed to patients and are considered as promising tools to help combat the prescription opioid epidemic. This automated system can be useful for prescribers, pharmacists, and law enforcement agencies. Effective prescription monitoring programs can help change physicians’ behavior by identifying patients at high risk for doctor shopping or diversion (Bao et al., 2016). This program can also help law enforcement agencies or medical licensure boards monitor aberrant prescribing practices by practitioners. Although several studies of PDMPs have noted the efficacy of these programs in reducing opioid consumption at the population level and the incidence of overdose deaths, the overall low rate of use of these programs limits their effectiveness in addressing the problem of identifying prescription opioid use in the medical setting.

DATA COLLECTION: INTERVIEWS

The research conducted in this study is based on a review of the current literature on identifying prescription opioid abuse in the healthcare setting and qualitative interviews of physicians and other healthcare workers about their experiences with this problem in their practices. Initial interviews with the physicians and other healthcare workers in California were conducted over the phone and follow-up sessions were held in person.

For the purpose of anonymity, the names of the interviewees have been changed. The healthcare workers who were interviewed were: Dr. Angelo, a solo general practice physician with 25 years of experience, Dr. Black, a physician with 45 years of general practice group experience, Ms. Andrews, with 16 years pharmacy retail experience, Mr. Lam, with sixteen years in pharmacy retail experience, Dr. Coulter, a physician with 48 years of solo practice neurology experience, Dr. Goren, an orthopedist with 41 years of group practice experience, and Dr. Wang, a pediatric dentist with 18 years of solo practice experience. The following questions were asked in the interviews:

1. Should the California Mandatory laws, rules, and regulations stay in place?
2. Should the California Mandatory laws, rules, and regulations expand its scope?
3. In your practice, what is the hierarchy of reporting any concerns of abuse?
4. Please share your thoughts regarding the reporting of abuse as it applies to prescription opioid abuse, sexual or domestic violence.

The response to question number one from all interviewees was, “Yes”. With regard to question two, Doctors Coulter, Goren, and Wang strongly suggested that the scope of the Mandatory Reporting rules should be expanded. The nature of their practices seems to be more vulnerable and they believe that rehabilitation clinics and hospitals should be more involved and take more efforts to address this critical issue. Most of these physicians expressed the opinion that individual physicians are held responsible for opioid use but coordinated efforts by other facilities involved in patient care are critical to address the problem.

Dr. Wang was particularly concerned because of the age of his patients; all are under 16 years of age. His concerns are how to protect children from this epidemic in a coordinated way through various welfare programs available within the community. Dr. Wang and some of his colleagues in pediatric dentistry are trying to convince lawmakers to expand the scope of all Mandatory Reporting to include prescription opioid abuse.

Questions three and four refer to the hierarchy of the reporting chain and reporting instances of opioid abuse, sexual and domestic violence. When reporting these abuses pharmacists, pharmacy managers, and supervisors have the obligation to report directly to the appropriate social welfare or law enforcement agency such as the police, the DEA, and the adult protective services. Pharmacy technicians must also report to the pharmacist on duty. Doctors Angelo, Black, and Goren have a designated individual who makes many of the decisions to report, but if issues involve something more complex, then those individuals will present their concerns to the group manager or the solo practitioner. Doctors Coulter and Wang, on the other hand, require that all employees contact them first. Then they make the decision to report any suspected abuse.

All the answers and the experiences shared by the interviewees led to one possible solution: Mandatory Reporting of opioid abuse and potential abuse should be implemented as this issue not only carries serious consequences but also because issues such as these are underreported.

LITERATURE REVIEW

The second part of this research paper consists of a review of the literature concerning the problem of identifying opioid abuse in the medical setting and potential solutions to this problem.

Some studies in the literature have discussed strategies for physicians to consider to identify misuse of prescription opioids. For example, Jamison et al (2011) suggested that although there is no “gold standard” method for assessment of prescription opioid misuse, several validated measures such as controlled substance agreements, urine drug screens, and motivational intervention to improve patient compliance with opioids can be used to minimize prescription opioid abuse. The authors also mentioned that there exists a great deal of controversy regarding the effectiveness of screening methods in the identification of aberrant drug-related behavior. In another study, Chou et al. (2009), found that there was a lack of effective methods for the prediction and identification of drug-related problems in patients with chronic non-cancer pain considered for opioid therapy. The authors of this study found that existing instruments such as the Addiction Behavior Checklist (ABC) and the Current Opioid Misuse Measure (COMM) used in identifying prescription opioid misuse are not effective and encouraged the use of additional screening methods in clinical settings. The authors also mentioned that cautions need to be taken when applying those instruments in the regular clinical setting due to varying effectiveness of those instruments among different patient populations as well as the question of the validity of those instruments under some circumstances.

Volkow and McLellan (2016) suggested improving opioid prescribing practices and increased training on pain management and addiction in order to reduce opioid abuse. According to the authors of this study, the urgency of patients’ needs, demonstrated effectiveness of opioids in pain management, and limited therapeutic alternatives for chronic pain have contributed to this epidemic without effective strategies to identify and minimize the risks. The authors offered three practice and policy changes to reduce abuse and improve the treatment of chronic pain: an increase in prescription and management practices backed by findings, increased medical training on pain and addiction, and increased research on pain.

Ellison et al (2016) suggested that the emergency department (ED) is an opportune clinical setting in which to identify patients at risk of opioid overdose or misuse. Using the ICD-9 (*International Classification of Diseases, Ninth Revision, Clinical Modification* [ICD-9-CM] codes) diagnosis codes, the authors established drug overdose risk categories for patients who received care at the ED during the

study period and found that this mechanism can offer a systematic means to identify cases of drug overdose and hence develop prevention strategies that may be implemented.

The role of the pharmaceutical industry also remains a concern for making these drugs available in the market. Many pharmaceutical companies paved the way for opioids to be used as a first line of treatment for chronic pain. Furthermore, the existence of online pharmacies allows patients to bypass the traditional safeguards placed by the FDA and health care providers, thereby placing consumers at risk of opioid abuse. While competition is a valuable characteristic of the American ethic, there must be a collective agreement of when the importance of competition should be rescinded to help combat abuse both current and emerging.

As this is not a single state issue but a multi-state issue, it must be addressed also by our federal government. This paper proposes that a federal law be passed to mandate reporting not just of current opioid abusers but of potential abusers as well. The proposed law should also include mandatory training in the identification of signs of current or possibly emerging abuse similar to the State of California law requiring employees to be mandatory reporters of child abuse and suspected child abuse.

PROPOSED IMPLEMENTATION PLAN

The Mandatory Reporting laws found on the websites of various healthcare institutions in the state of California confine Mandatory Reporting to physical abuse of either children or other victims of domestic violence. Furthermore, the requirement for reporting is limited to possible or actual signs of violence, but not of drug abuse. Drug abuse is listed as a cause of physical abuse, but not as an issue, in itself, that the law was made to address. In the University of California Irvine's (UCI) medical center, for example, the word drug is not even listed in the Mandatory Reporting of Abuse/Neglect in regards to patient care. However, policy implementation suggestions can be taken from the existing policy. The UCI Medical Center policy features a list of items helpful in identifying child abuse, ranging from lack of explanation for injuries to positive toxicology (University of California Irvine, 2006). The policy also indicates directions for the next steps should a possible abuse be identified, such as examining the potential victim(s) or contacting the Orange County law enforcement agency. This list for reporting physical abuse can be adapted for reporting drug abuse.

Another California institution requiring mandatory reporting is the University of Southern California (USC). USC requires this policy to be followed not just by faculty members but also those on campus such as clergy and healthcare workers (University of Southern California, 2015). USC's policy features a list of what must be reported, among them endangering of health, though there is no clear definition of what constitutes "endangering of health." One suggestion can be to adapt this particular item into mandatory reporting and have a clear definition and

examples of what constitutes endangering of health, one of them being opioid abuse.

There seems to have been some progress made to combat opioid and prescription abuse. The California Department of Justice has implemented a Controlled Substance Utilization Review and Evaluation System (CURES) mandate that requires all medical dispensers to register and submit controlled substance prescription data to the database on a weekly basis (Controlled Substance Utilization Review and Evaluation System, n.d.). This would provide a starting point. However, as Volkow and McLellan have identified, the public at large are not aware of the specific, legitimate, uses and proper administration of opioids, and often use them for health issues that do not require such treatment (2016). In addition, CURES is unlike the California Mandatory Reporting in that all professionals are not required to be part of CURES. One solution may be education and training followed by extending reporting requirements to all professionals. In order to facilitate implementation, outreach and educational programs can be offered to professionals in other fields and even the general public, if they so desire, to identify potential and current opioid abuse. This can perhaps be accomplished through the involvement of the federal government, passing legislation that seeks to solve a growing problem, and requiring community cooperation for the well-being of their fellow man.

DISCUSSION

Since the source of prescription opioid abuse begins with the physician, it is important that physicians receive education and training at all levels to ensure that they are aware of appropriate chronic pain management strategies and the warning signs of opioid abuse. Literature suggests that fewer than 40% of physicians have received any training in identifying prescription drug abuse and addiction, or drug diversion. In the U.S., the rates of prescribing OxyContin® and oxycodone had increased 556% from 1997 to 2004 (Manubay et al., 2011). Without adequate knowledge of the long-term safety and appropriate use of opioids, physicians may unknowingly contribute to prescription opioid abuse. They also need to educate patients about safety regarding the storage of prescription medications, and the negative impacts and risks of sharing these medications with family and friends. To combat this epidemic, it may not be new ideas that are needed but existing laws that need to be adapted for this purpose, to protect lives. The issue of combatting opioid abuse is a lifetime endeavor that involves multiple partners and one whose seriousness must be acknowledged. Those not in compliance should have their license suspended, fines assessed or, in serious cases where dereliction of duty resulted in disability or death, have their licenses revoked and/or face criminal charges. Medical professionals such as physicians, pharmacists, and dentists, so censured, should also have this information placed in a database, accessible to medical boards in all states, so that if the healthcare professional moves to another state to practice, this information would be readily accessible. Accessing the database would be required before the medical board could issue a license.

Originally at the beginning of this project, it was viewed simply a matter of black and white with blinders on. As the research continued and, in particular the interviews, it was apparent that the issue of identifying prescription and opioid abuse in a medical setting was both complex and complicated. Most of the healthcare professionals were adamant that because of the variety of patients that they see it is not always easy or straightforward to assess what may be an abuse of medications. Patients come from diverse socio-economic backgrounds as well as religious beliefs and gender differences. They also have different medical conditions, co-morbid conditions, and different pain tolerances. To arbitrarily make decisions as to reporting abuse, denying a patient access to prescription pain relievers, even opioids, or bringing criminal charges against a patient, it is necessary to be conscientious regarding that specific individual and his or her needs.

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LEADERSHIP IS MORE THAN RANK

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ABSTRACT

RHIP—“Rank Has Its Privileges,” is secondary to the substance of this case study—“Leadership is more than rank!” Cheryl Landry, experienced in public management, faced new challenges in the military. Conversant with sundry leadership theories, she now was convinced more than ever in value of experiential knowledge. She reflected on the suggestions she often heard from superiors that they had learned through the College of Hard Knocks. Still, she wondered what attributes are truly associated with successful leadership principles and effective managerial style. The case showcases the different styles and dynamics of leadership associated with two different positions of leadership in the Central Fire Department at her airbase, and their accompanying personalities—the assistant chief of operation and the station captain. She observed that they focused on quite different attributes that they thought were embedded in their job descriptions and associated responsibilities—one with a “hands-on” and the other with a “hands-off” policy. She analyzed the two different styles of leadership and attempted to reconcile their behavior and orientation to various mainstream leadership theories she understood. In the final analysis, she conducted a “psychological autopsy” and her assessment left her with more questions to ask than she had durable answers. The case ends with a set of thought provoking **Questions and Instructions** which are carefully crafted and encourage group dialogue and self-reflection.

Keywords: Leadership, Organizational Behavior; Discipline, Case Study Analysis, Managerial Effectiveness, Group dialogue

Recommended Courses: Military Science; Military Leadership; Cases in Management; Leadership; Public Administration; Business Management; Public Personnel Administration; and Human Resource Management

Introduction

Cheryl Landry returned to her barracks in a state of bewilderment and anxiety. She thought she understood what made organizations “tick,” but somehow her

experience during the week stood out in stark contrast to what she had experienced at work in the Central Fire Department. As she fixed a “smoothie” at her kitchen counter and added the powdered “Muscle Force” additive to the frozen blueberries, banana, and skimmed milk which she had placed in the freezer overnight, she muttered to herself in wonderment about how leadership is best learned and then practiced. She stated in slightly audible tones that “...reading textbooks might be a great way to learn about leadership, but it certainly does not compare to studying leadership by “total immersion” in real life organization.”

As she sipped the “diet cocktail” she had mixed, she reflected on how she had learned about the many theories of leadership, such as Blake and Mouton’s Managerial Grid, Rensis Likert’s System 1-to-System 4, and Leonard Fielder’s Contingency Theory—to mention just a few theories and how they vary in their relevancy to the real world and their explanatory power. She wondered how an array of divergent personalities can best be factored into a workable theory of leadership and although textbook learning provides a foundation of knowledge, it was her experience that this kind of formal learning was less meaningful than that which she acquired by working in an organization and observing what transpired between the different “players” and vicariously trying on in her mind the various things she had learned from her lengthy work experience. Indeed, while taking management courses in college, she concluded that the intricacies of human action and inaction and the complex interaction of different persons, departments and agencies were best understood through case study analysis.

A Casual Analysis of the Fire Department

In a careful and thoughtful manner, she sketched out on lined white paper the organizational ingredients that comprised the Central Fire Department at the Air Base. In her attempt to understand the organizational dynamics of the department, she noted that the fire department was made up of a highly structured hierarchy. Within the organization, she noted, there were two teams that work alternating twenty-four hour shifts, known as the A shift and the B shift. Each shift was managed by the “AC,” or Assistant Chief of Operations and the Station Captain. Below them were sundry Non-commissioned Officers, or NCO’s, and Airmen. In support of the two shifts were the military personnel that worked regular eight-hour shifts and assigned to work in areas such as fire prevention and suppression training, health, safety and ergonomics, and they were not involved in responding to emergency calls. At the apex or top of the chain of command was the Chief of the department. Her interactions and experience largely dealt with the top leadership of the B shift.

MSgt Matthew Hansen, assistant chief for the B shift, was in charge of the shift as a whole and, in her opinion, focused on conducting exercises, establishing award packages for members of the shift, and assessing emergency shift performance. The AC, she understood, was to have a “hands-off” policy as it pertained to the

“...day-to-day operations and the actual running of the shift.” Additionally, the AC served in a liaison position between upper management and the shift.

MSgt Chris Lanier, the Station Captain for the B shift, unlike the AC was instrumentally involved in the day-to-day operational affairs. In this capacity, the station captain made truck “manning” assignments, and many other duties, and determined when the shift is “down”—when firefighting personnel are allowed to stop working for the day. Hansen and Lanier also supervised the eight or more Airmen and the five or so NCO’s, although Lanier was subordinate to Hansen.

As Cheryl continued to develop the structure and style of the fire department, she had in her mind that both Hansen and Lanier were leaders only in terms of the positions and rank that they held. She chuckled to herself, saying “...if this pair were placed in a professional civilian setting, they would have been ousted a long time ago.” In short, the airmen and women followed their orders, for not to do so would have constituted insubordination; the followers respected the rank worn by their “leaders,” but they had little more than contempt for the persons themselves. She further mused, “Is there something inherently wrong when leadership status is assigned on the basis of rank?” And, she understood full well that rank in the military is partially a function of time in service—not principally based on demonstrated leadership and management skills.

An Assessment of Leadership Styles

As Cheryl, went to the second page of her lined tablet, she placed in bold capital letters the following heading: **LEADERSHIP STYLE**. As she flushed out their styles, she penned the following—although now, more than ever, she realized that she lacked the formal labels and theories that would aid in her analysis: MSgt Hansen does not treat his team members professionally, and rather than earning respect, he simply demands it. On the other hand, MSgt Lanier is seen as a “passive” doormat, and lacks the necessary skills to be an effective leader. As she engaged in performing a mental autopsy on Hansen and Lanier she itemized the following traits for Hansen:

1. He knows that he is in charge because he has the most stripes on his sleeve and therefore, commands with authority.
2. He does not consider the thoughts or opinions of others and feels that to do so would diminish his own position.
3. He combines an authoritative style with a strong task and results orientation, seeing the other members of B shift as a means to an end; personnel are simply there to get the job done and done according to his strident dictates and without his caring concern.
4. He sees things the same way as the upper management which, in turn, is pleased that tasks are done correctly the first time around and do not have

to be repeated or corrected. He ignores or belittles ideas or opinions of others that he finds objectionable or with which he is in disagreement.

5. He sets the standards or bar for performance and behavior very high, and requires all tasks be done “by the book.” Thus, the airman and NCO’s know the official and correct ways to perform their assigned tasks and duties.
6. He is a consummate micromanager, involving himself unnecessarily in all the minor details associated with shift operations and management, causing the followers to feel that he lacks confidence in their ability to do their work.
7. He equates busyness with results and effectiveness, causing some followers to quip that he has an “Obsessive Compulsive Disorder (OCD).” That is, if his coworkers are not working at something—anything—they are judged to be disinterested in their jobs or just plain lazy.

MSgt Lanier leadership traits and style were characterized by these attributes:

1. He is laid back, personable, and people-oriented, but lacks the requisite leadership skills and, therefore, is unable to make independent decisions. Although he ensures that the work and tasks are performed correctly and attempts to build relationships, he is considered to be “light weight” by his shift.
2. He defers to MSgt Hansen, is easily persuaded, and merely implements what he is told to do, becoming a “... task-oriented leader by proxy.”
3. When in his comfort zone, which rarely happens, his decision style is more democratic than autocratic— “...a democratic leader without a backbone.”
4. He is easily manipulated and intimidated by those who outrank him or by his followers. Generally, he would rather be in a position that does not require leading, is personally cognizant of his leadership deficiencies, and this is reflected in his inability to be assertive and make decisions on his own.
5. Members of his shift do not respect or value him as their leader.

When Cheryl finished her dissection of the Lanier and Hansen’s personalities and their dominant leadership traits and style, she wondered how these attributes fit within the formal theories of leadership. She enjoyed learning about the characteristics associated with situational leadership styles and felt that it would be a useful tool to use in organizational assessment and analysis. She remembered that situational leadership is adaptable to the characteristics of the followers and the environmental milieu in which the leader performs. However, as she recalled, the leader must be able to evaluate where the employees are in their development and adjust the leadership style accordingly. In this case, Hansen, because of his inflexibility and directive style, was either unable or was unwilling to modify or adapt his behavior to the situation. Accordingly, Cheryl reasoned, Hansen’s co-

workers had no other choice but to learn to deal with his directive and authoritative characteristics.

For MSgt Lanier, Cheryl felt he was capable of employing the theory of situational leadership. He attempted, unlike Hansen, to build relationships with the team or shift and was supportive of their efforts. Rather than ignore or demean ideas or suggestions coming from others, he was open to assisting airmen when they needed support and direction and, generally, he delegated authority competently in that he knew “instinctively” which tasks that could be assigned and to whom.

What had begun as little more than a “flight of ideas” after a stressful and strenuous day at the “office” had absorbed over two hours of her “leisure” time. She looked at the digital timer on the microwave and could not believe that she had just immersed herself in conducting a “windshield” analysis of the leadership characteristics displayed by her immediate superiors.

The time had quickly escaped her and she knew that the mental exercise she had just completed enabled her to size up the work environment at the station; yet she wondered, how it would help her come to terms with her deeply felt twin emotions of alienation and anxiety that she regularly felt. Her “free-time” for the evening was largely exhausted now, yet she had another hour of personal time to complete her analysis before she went to the base commissary and exchange and bought some needed groceries and household supplies.

A Psychological Autopsy

Once more, Cheryl picked up her pen and wrote in bold lettering the following headline on her tablet: **Leadership Style and Organizational Impact**. She had a conscious team of rapidly “firing” thoughts and she would not be content until she had completed this last part of this self-directed analysis. For Hansen she made the following bulleted observations:

1. He was able to assign the work and get it done correctly and on time.
2. His micromanagement style was counterproductive and his shift was not only poorly motivated, but performed at a minimalistic level, knowing that outstanding performance and attention to detail would likely, in the final analysis, be criticized rather than recognized and rewarded.
3. His shift had disdain for Hansen and morale was always at “rock bottom” level.
4. Hansen knew that the morale of his shift was low, and rather than take personal responsibility for it, attributed or blamed it on the philosophy and leadership style of upper management.

For Lanier, Cheryl wrote down a set of observations that were of mixed valences in terms of outcome:

1. His personable style enables his co-workers to approach him with ease, develop a relationship, and not fear repercussions for asking a question or for making a mistake.
2. Since Lanier is not respected by his team, his leadership effectiveness is considerably diminished to the point of ineffectiveness.
3. His tendency to “sway with the prevailing wind” coupled with a grossly underdeveloped managerial style, produces inconsistency in his leadership style and leads to unpredictable behavior—a flexible, movable “pawn” controlled by higher ranking officers.

Once Cheryl had completed her amateurish analysis, a sense of self-satisfaction pulsed through her mind. For once, Cheryl had taken the time to purposively size up her work environment and realistically come to grips with leaders that would affect her life and professional military career while on her two-year assignment in Europe.

Questions and Instructions:

1. Cheryl Landry analyzed the leadership style of Master Sergeants Lanier and Hansen and attempted to understand how their philosophy and behavior affected the group. Please attempt to perform a casual analysis of your own work environment and, especially, the leadership characteristics of your immediate supervisor. Please be specific without revealing you superior’s name.
2. Please review the abbreviated job descriptions for the assistant chief of operations and station captain presented in Exhibit 1. Do these descriptions assist you in better evaluating the leadership competencies and behavior associated with Master Sergeants Lanier and Hansen? Please explain.
3. Which of two sergeants, Hansen or Lanier, would you feel most comfortable having as a superior? Specify the pros and cons of each NCO analyzed by Cheryl.
4. Are there any identifiable traits that you would have your “idealized” leader possess? If yes, what are they and why are they important to you. Please explain.
5. Generally, what leadership characteristics would you say are “equally” applicable to the three sectors of the economy—public, nonprofit and private? Please elaborate.
6. The military is a public sector organization. Are the characteristics associated with building teams, group cohesiveness, morale, and military readiness different from what one would employ non-military

organizations whether public or not? Please explain. Would the characteristics associated with the factors mentioned above be different for para-military based organizations, such as police departments and emergency response units? Please elaborate.

Exhibit 1. Job Descriptions for Assistant Chief of Operations and Station Manager

Assistant Chief of Operations

- Supervises/manages duty schedules for 19 military/18 civilian firefighters operating 18 fire/rescue vehicles
- Oversees inspection/maintenance of facilities and equipment valued at \$10M; prepares/maintains all fitness records
- Provides initial command & control for emergency operations or until relieved by a Senior Fire Officer (SFO)
- Supports SFO on all fire suppression, rescue incidents, hazardous material operations and medical responses

Station Captain

- Supervises two to five personnel in daily inspections of safety equipment, vehicles and facility valued at \$10M
- Provides protection for 1,168 facilities and 12,000 personnel by establishing command & directing firefighting
- Performs fire suppression, confined space rescue, emergency medical care, and hazardous material team duties
- Develops pre-incident plans; performs fire safety inspections--educates base populace on fire safety awareness

Case Title: Leadership is More Than Rank

Name:

Case Log and Administrative Journal Entry

This case analysis and learning assessment may be submitted for either instructor or peer assessment

Case Analysis:

Major case concepts and theories identified:

What is the relevance of the concepts, theories, ideas and techniques presented in the case to that of public or private management?

Facts: What do we know *for sure* about the case? Please list.

Who is involved in the case (people, departments, agencies, units, etc.)? Were the problems of an intra/interagency nature? Be specific.

Are there any rules, laws, regulations or standard operating procedures identified in the case study that might limit decision-making? If so, what are they?

Are there any clues presented in the case as to the major actor's interests, needs, motivations and personalities? If so, please list them.

Learning Assessment:

What do the administrative theories present in this case mean to you as an administrator or manager?

How can this learning be put to use outside the classroom? Are there any problems you envision during the implementation phase?

Several possible courses of action were identified during the class discussion. Which action was most practical by the group? Which was deemed most feasible? Based on your personal experience, did the group reach a conclusion that was desirable, feasible, and practical? Please explain why or why not.

Did the group reach a decision that would solve the problem on a short-term or long-term basis? Please explain.

What could you have done to receive more learning value from this case?

Source: Case Log and Administrative Journal Entry reprinted with permission, Millennium HRM Press, Inc.

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Websites: The following provide comprehensive materials on selected institutions and organizations of government and provide many valuable links to topics associated with modern personnel management practices.

<http://www.usa.gov/>: A comprehensive site that can link to almost all government sites, which are easily listed as executive, legislative, and judicial branches and offices. This is the “real McCoy” of

federal government websites and is touted as the one single best source for information on the U.S. government.

<http://www.searchgov.com/>: An in-depth site for links to federal and state governmental programs and agencies.

<http://www.census.gov/>: The U.S. Census Bureau site provides information about recent census data, people, business, geography, news, and additional topics. A top notch site for demographic, social, and economic data compiled nationally, by state and locale.

<http://www.dod.mil/>: Comprehensive site for all things military, including metrics on size, base and installation locations, pay and other personnel matters.

<http://www.supremecourtus.gov/>: The official website for the U.S. Supreme Court.

<http://www.va.gov/>: The Department of Veteran Affairs website contains *information* about health, compensation, education, insurance, special services, and links to state and local sites.

http://www.uscourts.gov/outreach/resources/fedstate_lessonplan.htm: A website that aims to help an average person to understand the differences between federal, state and other special courts. It also provides links to “locate courts” in your own state and city and other judiciary websites.

<http://www.ojp.usdoj.gov/bjs>: U.S. Department of Justice’s Bureau of Justice Statistics.

GUANXI, RECIPROCITY, AND REFLECTION- APPLYING CULTURAL KEYS TO RESOLVE DIFFICULT NEGOTIATIONS

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ABSTRACT

All too often negotiations, particularly international negotiations, are stalled or fail due to cultural differences rather than conflicting substantive issues. While acknowledging and understanding cultural differences is essential, what can be learned from applying various “constructive” cultural principles is that they can provide a bridge over challenging negotiations. To accomplish this requires both reciprocity and reflection by the parties. In this article we examine how to recognize, value, and utilize key attributes of various cultures and apply them to successfully resolve difficult negotiations.

There are many negotiation benefits that can be found in “differing” cultural concepts which do not negatively impact or offend the other side. On the contrary, when thoughtfully adopted they can improve outcomes in the most difficult negotiations. In some situations, it is purely a matter of degree to which one side is asked to embrace the cultural norms of the other side. But more often, simply acknowledging and showing respect for cultural differences removes those issues from the negotiation process and allows the parties to focus on the substantive issues. In the following article we examine some of these cultural concepts, applying them to the negotiation process, and show that even the most difficult negotiation can be improved. Most importantly, we argue that taking the best of different cultures and applying them will lead to better negotiation outcomes for both parties.

Keywords: Negotiations, Reciprocity, Guanxi, Reflection

INTRODUCTION

People bring attributes of their cultural background with them to the negotiating table. Many American negotiators tend to think that they have a fairly neutral set of cultural attributes, but at the same time are quick to observe that negotiators from other countries display all sorts of deeply ingrained cultural traits. These traits lead to behaviors that can bewilder even seasoned bargainers. In this article we compare and contrast the American approach to negotiation with the Asian approach and focus on understanding and adopting selected cultural keys to aid in achieving negotiating success. The cultural keys we look to adopt would rarely, if ever, be inconsistent with a negotiation party’s personal values or ethics. These cultural concepts in fact, if adopted, in many cases support and strengthen personal values. While we argue that negotiators should adopt some of these cultural keys,

we also believe that negotiators should never adopt another culture's norms if they would offend or be contrary to the negotiator's own personal values.

The history and development of the American approach to negotiation begins with a brief period of international diplomatic activity by the founding fathers, followed by more than a century of relative isolation. During this time, the attention of the newly formed country was primarily focused on internal commercial and economic matters. (Stempel 2002). This focus on commercial, and therefore practical, forms of negotiation became deeply embedded in the American way of bargaining.

According to Stempel, the pragmatic American approach has the following identified characteristics:

- 1) optimism that almost everything is negotiable,
- 2) a tendency to focus more on the deal than the relationship
- 3) a commitment to finding "win/win" solutions to issues
- 4) an obsession with monochromatic time
- 5) a low level of negotiator-knowledge about other countries.

(Stempel 2002)

These then are the cultural keys of American negotiation. They are rooted in practical deal-making patterns of commercial, transactional negotiation practice, and they are embedded in the mind of the typical American negotiator. These American cultural keys stand in stark contrast to their Asian counterparts.

For example, in comparison to the American approach, the Chinese view the negotiation "process" itself as most important. According to Graham and Law (2003), "Chinese negotiators are more concerned with the means than the end, with the process more than the goal."

A number of cultural influences shape this Chinese perspective, a perspective similar in other Asian countries. We examine the Asian concepts of *guanxi*, *kibun*, *nunchi*, *wa*, and other unique cultural keys, and point out the benefits of applying the best from each.

GUANXI

Guanxi is arguably the most important element of doing business in China. *Guanxi* applies at the individual level, but it is also helpful at the organizational level when examining *guanxi* networks (Tsang 1998). While it is often noted as a Chinese concept it is also recognized in most Asian cultures, including Japan and Korea (Ai 2006). It is much more than simply a situation of connections through relationships. It involves trust, honesty, the concept of "face" and an obligation to do what is right between the parties. Establishing a "good" *guanxi* relationship takes time because it must be grounded in a solid personal relationship (Yang 2011). This is not done overnight or simply by one party making a single gesture such as the payment of money or a gift. While often times there are gifts, dinners, etc., involved, they are most often not given with the intent to wrongly influence, but rather to build a relationship. The true basis of *guanxi*, as noted above, cannot be based on bribery or wrongful intent. Once the personal *guanxi* relationship is built, the business *guanxi*, or *guanxi* network, is then developed through the sharing

of information and business contacts. There is often a “strategic intent to developing guanxi networks” (Reid 2006).

Guanxi is not only important in business to business relations, but in business to government, politics, and even education. Its impact has been studied extensively in all areas, however it should be noted that its’ impact is most important in business, particularly when looking at organizational performance (Luo, Huang & Wang 2012). There are different levels of guanxi, i.e. not all relationships are “equally important” (Su, Mitchell, & Sirgy 2007). While China is a hierarchical society, guanxi can apply across any relationship. It would not be uncommon for guanxi to be developed between an office manager and the CEO of a corporation. Guanxi looks beyond an individual’s title or job description.

There are some ethical concerns over the improper development and use of a relationship based on guanxi (Dunfee & Warren 2001). Clearly when one gives money or other gifts solely to create influence we can see a relationship that is not built on “good guanxi”. Also, when an individual asks another for the return of a favor and that favor may involve an unethical or even illegal act, clearly this is not the cultural norm of guanxi. In fact, guanxi has its roots in Confucianism, building harmony between individuals and in society (Gandolfi & Bekker 2008). Historically, Guanxi was based on blood relationships and relationships in the local community. These two influences are now less important as Chinese society has become more mobile, relocating across the country, and therefore establishing new guanxi relationships not built on family or local relationships.

Developing a business, and hence negotiating in the context of a business relationship, is very different in western and eastern cultures (Buttery & Wong 1999). How initial interactions between individuals are managed is essential to establishing guanxi. In many business cultures, such as Japanese, it is important to start the negotiation process with the use of an intermediary (Katz, 2008). Selecting the intermediary is extremely important not just for the introduction but also to help establish future business dealings.

In China, this intermediary, known as zhongjian ren, is essential in establishing any business negotiation. This intermediary must have a personal trusted relationship with the Chinese side, guanxi, in order to introduce an American who does not have a personal relationship. To the Chinese, using an intermediary is simply a necessity of building trust.

As noted above with regard to American negotiation traits, western business culture often looks to complete the transaction first and maybe develop a relationship later. Also, western business culture is more often focused on the short term rather than the long term Asian perspective. For example, western business culture often evaluates CEO performance on results of the last few financial quarters as opposed to eastern business culture which has a long term perspective, evaluating senior management often on performance over the past decade. Much research has been developed applying Hofstede 5th dimension of long term orientation versus short term orientation to cultures (Hofstede 2001). As Hofstede points out, Asian cultures have a long term perspective. Clearly,

understanding this long term perspective is essential to building guanxi and achieving more successful negotiations with Asian businesses.

Why is guanxi so important to the negotiation process? Guanxi has at its very foundation the well known negotiation concept of reciprocity, one of the most important elements in moving individuals to successful negotiations. Reciprocity is based on the concept that if someone acts to do something for someone else it creates the obligation that the receiving party will in the future return the favor (Gandolfi, 2008). The strength of the relationship is knowing that the other side will help you when you need help. It is not just trust but a sense of loyalty. The favor is not just expected in good situations but also in difficult situations.

KIBUN, NUNCHI & WA-HARMONY BASED NEGOTIATIONS

Kibun, nunchi, and wa are all cultural concepts with a basis in harmony, how we treat others. This harmony in Asian business culture is based on trust, respect, good faith and establishing positive relationships. The more concepts of harmony are incorporated into a negotiation the better chance to reduce conflict (Zhang 2016).

In China, this harmony in relations, is known as renji hexie. To establish this harmony between the parties can take many interactions, most of which will be social rather than business. In Asian cultures, this “non-task sounding”...i.e. the ability to evaluate the other side, may take many months or more. In contrast, American negotiators often evaluate the other side in minutes. Clearly, respecting the importance of harmony, is essential for any business negotiations in China.

Likewise, maintaining harmony is one of the most important elements in Korean business culture. Kibun is one of the keys to maintaining this harmony (Wang 2016). It includes respect for the individual, maintaining a positive state of mind, and never causing one to lose face. It also includes the personal traits of modesty and humility. Kibun is extremely important in business relationships and one must avoid conveying responses to another in a negative manner.

Nunchi is another Korean concept designed to maintain harmony. It is the ability to gauge the other side’s state of mind by listening and also understanding non-verbal and indirect cues. In western culture nunchi is part of understanding emotional intelligence. Clearly, nunchi is important in understanding the dynamics of a relationship, building guanxi, and having the ability to influence people in negotiations.

Similar to kibun and nunchi, the Japanese concept of “wa” is based on the importance of harmony within the group (Alston 1989). In Japanese business culture, “wa” emphasizes the ability to get along with others within the organization. Negotiations which turn acrimonious, particularly in “public”, would clearly violate this most important Japanese cultural concept.

These cultural concepts which promote harmony should be part of any negotiation process. These concepts, combined with the concept of guanxi, also have a basis in reciprocity, a key element of negotiations.

RECIPROCITY

According to Robert Cialdini the six principles of persuasion are reciprocity, commitment & consistency, social proof, liking, authority and scarcity (Cialdini 2006). Reciprocity, the concept that if someone has done something for another, that person will feel the obligation to “return the favor” and respond favorably, is arguably the most influential factor of persuasion. The key to establishing the obligation of reciprocity is to be the first one to act so that the other party feels obligated to reciprocate. Reciprocity influences both the negotiation and performance of the agreement.

Reciprocity applies across all cultures. According to Mislin et. al., “The norm of reciprocity shapes and constrains how people conduct social exchange in different contexts and cultures around the globe.” (Mislin, Boumgarden, Jang & Bottom 2015). What we find in guanxi, kibun, nunchi and wa is that reciprocity is an important foundational element in each.

In China, this belief in reciprocity is actually based on Confucianism’s moral axiom of treating people as you would want to be treated. In American culture we would refer to this as the “golden rule.” Regardless of the country, this foundation for reciprocity applies in every culture around the world

Recently, Cialdini has recently added a seventh principle to the powers of persuasion, unity (Cialdini 2016). This is based on the theory that we are more likely to act favorably toward people who are like “us”. This concept of sharing a common identity is present in groups where members have shared interests in work, religion or ethnic origins. Underlying this principle is the cultural concept of harmony as discussed above.

In China, the influence of Taoism on Chinese negotiations puts a significant focus on maintaining harmonious relationships. Also, Buddhism in China, with an emphasis on modesty and respect for others, fosters harmony. These religious influences flow at different levels throughout Asia and it is essential to understand their importance in order to negotiate in Asian cultures. These religions, Confucianism, Taoism and Buddhism, like most religions, emphasize the important element of reflection.

REFLECTION

Reflection should be viewed as gaining a higher perspective of what is occurring in the negotiations. A way to achieve this is often referred to as “going to the balcony”. As William Ury pointed out this can give a more focused view of the negotiations:

“Imagine you’re negotiating on a stage and part of your mind goes to a mental and emotional balcony, a place of calm, perspective, and self-control where you can stay focused on your interests, keep your eyes on the prize.”

This ability to step back and take a “global” perspective is most important in difficult negotiations. Reflection improves the understanding of what needs to be accomplished as the negotiations progress and how to achieve a successful agreement.. (Di Stefano, Gino & Pisano 2016). This is even more important when negotiating with Asian businesses. Asian business cultures compared to American businesses take a long term view of business relationships. For example, Chinese businesses view reaching an agreement as the beginning of the negotiations:

“From the Chinese perspective, the contract signing indicates the formal beginning of the partnership and with it, the commitment to the ongoing negotiation. In this context, successful foreign companies commit adequate time and resources to understanding and tending local China relationships for the long run (Neidel).”

American businesses need to fully understand the importance placed on long term relationships within Asian cultures and to strategically plan for this as they negotiate. Reflection, by “going to the balcony”, can help negotiators recognize these cultural influences. As Hague points out, “reflection is a strategic imperative” (Haque, 2010).

Reflection, in addition to improving the negotiation process and agreement, can also assist in understanding the “cultural” relationship. Is there an understanding of the other sides’ cultural norms and is there anything that could cause a cultural clash? For example, in most Asian cultures individuals will not negotiate with another party unless they have been introduced by a trusted third party intermediary.

Reflection also allows us to evaluate what often may seem like very minor gestures but may be very important to the negotiation interrelationship. For example, bowing is a business cultural norm in many Asian cultures. Bowing shows respect for the other party, clearly an element of building guanxi, kibun, nunchi, and wa in the negotiations.

Finally, reflection, particularly with regard to culture, needs to be constant throughout the negotiation process. Are there other parties that can be brought in to strengthen personal relationships (guanxi) that would help the negotiations? Can new “guanxi networks” be built based on these relationships? Reflection also provides the context to determine if the important Asian cultural norm of harmony is being maintained. Are the parties continuing to build trust and respect, key elements of “kibun”, “nunchi”, and “wa”.

CONCLUSION

By understanding and adopting various cultural keys we can improve outcomes in difficult negotiations. We have examined but a few: guanxi, kibun, nunchi and wa. What negotiations would not benefit from a better relationship between the

parties? What negotiations would not benefit from more respect and trust? And finally, what negotiations would not benefit if there was a focus on harmony between the parties?

We also examined two universal negotiation concepts which apply across all cultures, reciprocity and reflection. Reciprocity establishes the commitment to bring negotiators together. Reflection allows a continuing discernment of the negotiating parties' relationship, "guanxi". This continuing discernment provides negotiators with the vision of how to build trust, respect, and harmony throughout the negotiations. Clearly, reciprocity and reflection, applied together with the cultural keys we have discussed, can improve even the most difficult negotiations.

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THE RELATIONSHIP BETWEEN TECHNOLOGY STRESS AND LEADERSHIP STYLE: AN EMPIRICAL INVESTIGATION

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ABSTRACT: Information and communication technologies (ICTs) have invaded practically every aspect of life. This inescapable technological revolution has resulted in an exponential growth in the use of ICTs at home and at the workplace. Technology-induced anxiety, otherwise known as technostress, is a harmful phenomenon, suggested to be caused by the use of ICTs. Within organizations, technostress not only inhibits workplace productivity, reduces performance, weakens employee commitment, and decreases job satisfaction, but also increases the reported frequency of absenteeism, burnout, and job turnover. The consequences of technostress are widespread and costly and can have a severe impact not only on companies and their afflicted workforce but also to the global economy. Technostress costs United States companies more than \$300 billion per year attributable to lost productivity and increased absenteeism, workplace accidents, and employee turnover. Technostress is the cause for over 275 million lost workdays each year. Incorporating a multiple linear regression analysis, this study evaluated whether leadership style, utilizing the Full-Range Leadership theory (FRLT) and demographic factors including age, gender, education, and industry experience, influenced the observed, self-perceived level of technostress of information technology managers between the ages of 18 to 65 working in the United States. Results from the survey of 129 information technology managers concluded that a statistically significant relationship exists between transactional and laissez-faire leaders and technostress.

Key Words: Information technology, technostress, leadership style, transformational, transactional, laissez-faire

INTRODUCTION

Information and communication technologies (ICTs) have inundated nearly every nook and cranny of the global workplace and the digital revolution has permanently shaped the nature and future of many jobs and professions within the United States. Even though technology can empower organizations with greater productivity and workplace efficiency, improved communications, and enhanced mobility, significant negative consequences can result from their use for both the employer and their employees (Ayyagari, Grover, & Purvis, 2011; Petter, DeLone, & McLean, 2008). Hence, a widespread research effort is currently underway to isolate and understand the effects that ICTs have on businesses and their workers. A toxic phenomenon, termed technostress, has been discovered and is suggested to stem from exposure to and interaction with ICTs.

Technology-induced anxiety, shortened to technostress, has been described as the somatic and psychosomatic outcomes experienced by those who engage with ICTs (Brod, 1984; Chua, Chen, & Wong, 1999; Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2007; Weil & Rosen, 1997). Indications of technostress include but are not limited to: fatigue, headache, irritability, moodiness, intolerance, apprehension, sadness, despair, fear, sleeplessness, distress, depression, and loss of appetite (Arnetz & Wilholm, 1997; Brod, 1984; Chesley, 2005; Freeman, Soete, & Efendioglu, 1995; Riedl, Kindermann, Auinger, & Javor, 2012; Salanova, Llorens, & Cifre, 2013; Selwyn, 2003).

Technostress can be detrimental to the health and well-being of the afflicted (Charles, Piazza, Mogle, Sliwinski, & Alemida, 2013; Hjortskov, et al., 2004; Lee, Chang, Lin, & Cheng, 2014). Technostress not only curtails workplace productivity, inhibits performance, weakens employee commitment, and reduces job satisfaction, but also increases the reported frequency of absenteeism, burnout, and job turnover (Ayyagari, Gover, & Purvis, 2011; Chau et al., 1999; Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008).

To facilitate expanded knowledge with respect to technostress and control for its undesirable results, researchers and managers, alike, are purposefully seeking to identify the circumstances and conditions that trigger workplace technostress. A number of studies have been performed to establish if a connection exists between technostress and gender, race, age, education, industry experience, along with other socioeconomic considerations in worldwide organizational settings and in varying professions (Atanasoff & Venable, 2017; Burke, 2009; Harris, Carlson, Harris, & Carlson, 2012; Johansson & Aronsson, 1984; Krishnan, 2017; Lau, Wong, & Chan, 2001; Lim & Teo, 1999; Preston, Ivancevich, & Matteson, 1981; Tarafdar et al., 2007; Tarafdar, Pullins, & Ragu-Nathan, 2015). Previous to this study, researchers had yet to determine that self-perceived leadership style influences the prevalence of technostress (Boyer-Davis, 2014, 2015). This study evaluated the relationship between self-perceived leadership style, based on the Full-Range Leadership theory (FRLT) measured by the Multifactor Leadership Questionnaire short rater instrument (MLQ-5X), and technostress in information technology (IT) managers in various U.S. organizations (Avolio & Bass, 1991, 2002; Bass, 1985, 1990; Bass & Avolio, 1990, 1995, 2004; Boyer-Davis, 2014, 2015; Burns, 1978; Tarafdar et al., 2007).

LITERATURE REVIEW

Technostress was first described as a syndrome or disease that precludes or inhibits an end user from coping with ICTs in a positive way (Brod, 1984). Weil and Rosen (1997) later advanced the meaning to include the undesirable influence upon thoughts, perceptions, actions, or physiology, implicit or explicit to ICT use (p. 5). Originating from modern ICT use at home and at the workplace and the altered behaviors that result, technostress causes an inability to adapt with technology. Users feel compelled to stay connected, forced to take immediate action on work-related requests, and are driven to chronic multi-tasking to work faster due to the instantaneous availability of information (Agervold, 1987;

Ayyagari et al., 2011; Kinman & Jones, 2005; Korunka & Vitouch, 1999; Wellman & Hampton, 1999).

The conventional 9-to-5 workday has been permanently altered as a result of ICTs. With the invention of e-mail, smartphones, remote network access, cloud computing, document sharing, and applications, flexible work arrangements such as telecommuting, teleworking, and mobile offices have become increasingly popular. Even though flexible work arrangements have enabled more autonomy in defining working hours, this practice has blurred the lines between work and life, causing greater work overload and job stress (Beehr & Newman, 1978; Yun, Kettinger, & Lee, 2012). When work and life responsibilities collide, as initiated by ICTs in the work environment, technostress results (Butler, Aasheim, & Williams, 2007; Tarafdar et al., 2007).

A range of symptoms may be presented by technophobic ICT users, some of which are categorized as biological while others are considered more psychological in nature. Most technostress symptoms have detrimental effects on the health and well-being of the inflicted (Knani, 2013; Wang, Shu, & Tu, 2008). For example, a recent study conducted by Riedl et al. (2012) identified that ICT breakdowns can increase the production of the stress hormone cortisol. Prolonged levels of cortisol can suppress the immune system and thyroid function, increase blood pressure and abdominal fat, and impair overall cognitive performance (De Kloet, Joels, & Holsboer, 2005; McEwen, 2006; Melamed et al., 1999). Other common physical symptoms include eye strain, fatigue, gastric problems, and sleep disturbances.

From a psychological standpoint, technostress can hinder the ability to concentrate due to constant worry, fear, panic, apprehension, and depression. Sufferers may be irritable, frustrated, moody, and resistant to change. Moreover, those afflicted by computer stress may experience poor judgment and decision-making, uncertainty, avoidance, recklessness, withdrawal, and loss of appetite (Aghwotu & Owajeme, 2010). These symptoms, arising from the attempt of individuals to deal with the constantly evolving change associated with ICT use, should be anticipated given the mounting varieties of technology in the workplace.

Although the symptoms of stress are ordinarily understood to have a caustic effect on physical, mental, and emotional well-being, a conflicting result is plausible. Stress can accelerate the production of the anabolic hormones that enhance immunity, repair cells, and improve overall health (Epel, McEwen, & Ickovics, 1998). Whether destructive or constructive, technostress induces numerous biologic and psychosomatic responses, each with resulting consequences.

Technostress is estimated to cost organizations approximately \$300 billion annually (American Institute of Stress, 2007). This is a result of decreased efficiencies and work contentment, and increased burnout, health care costs, absenteeism, and turnover (Ayyagari, et al., 2011; Cooper, Dewe, & O'Driscoll, 2011; McGee, 1996; Tarafdar et al., 2007; Tennant, 2001). The investigation of the research problem not only expanded the technostress literature but also equipped organizational management with scientific evidence that, if

implemented, can potentially reduce costs to minimize some of the negative consequences associated with technostress.

Technostress intensifies the perceptions of role overload, a syndrome where employees feel as though their job is too demanding and challenging (Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2011). ICTs force workers to produce more work in less time. Similarly, technostress increases role conflict, a condition where work-life balance is upset and personal time is plagued by workplace interruptions (Tarafdar, Tu, & Ragu-Nathan, 2010; Tarafdar & Tu, 2011). Both role overload and role conflict are linked to poor managerial performance (Lazarus, 1991). Technostress is also associated with reduced job satisfaction, productivity, involvement, organizational commitment, and creativity and time spent on critical thinking (Brillhart, 2004; Hung, Chang, & Lin, 2011; Ragu-Nathan et al., 2008; Tarafdar et al., 2007, 2010, 2011).

Workers experiencing prolonged levels of technostress may become overwhelmed and experience job burnout (Shropshire & Kadlec, 2012). Job burnout results in low energy, fatigue, exhaustion, a lack of interest, or disillusionment about competence and value of work, all of which drain motivation and impede performance (Moore, 2000; Muir, 2008). Burnout reduces job satisfaction and commitment and increases employee turnover, the inability to concentrate, career change intentions, and interpersonal problems at home and at work (Simmons, 2009).

Role stress, or the problems, constraints, conflicts, or deficiencies imposed upon the performance of a function, indirectly drives a negative consequence of technostress, a reduction in job productivity (Srivastav, 2010; Tarafdar et al., 2007). In their investigation of technostress and the relationship with role stress, Tarafdar et al. (2007) determined that role stress is directly related to technostress. However, technostress is inversely related to productivity for as computer anxiety increases, output decreases.

Tarafdar et al. (2011) investigated how individual characteristics influence perceived levels of technostress. According to their research, men are more susceptible to technostress than women, despite being more inclined to use ICTs (Tarafdar et al., 2011). This study determined that women find ICTs to be more challenging to use than men and may, therefore, use ICTs less than men (Tarafdar et al., 2011). Further, they concluded that older workers experience less technostress than younger workers because their maturity has provided them with a more advanced skill set to manage stress (Tarafdar et al., 2011). Finally, employees with more tenure and education have less technostress than their peers with fewer years of experience and education due to more exposure to ICTs within the workplace, enabling one to adapt more quickly to change (Tarafdar et al., 2011).

Technostress may lead to other destructive consequences such as corrupted morale, a reduction in the quality of products and services, poor internal communications, workplace conflicts, lost market share, injured reputation, inability to fill open positions or permanent vacancies, and a decrease in shareholder profits and value (Moses, 2013). Contrastingly, some effects of stress

may be, to some degree, positive performing as a motivational stimulus (Farley & Broady-Preston, 2011; Liu, Spector, & Jex, 2005; Topper, 2007). Recent research discovered that, when employees are trained to reframe their perceptions of stress from one of pessimism to optimism, a significant improvement in work performance and wellness was experienced (Crum, Salovey, & Achor, 2013). Stressful experiences have been argued to heighten awareness, strengthen relationships, enhance mental sharpness and acuity, improve behaviors and attitudes, and impart a deepened sense of appreciation and meaning (Blackwell, Trzesniewski, & Dweck, 2007).

Leadership style denotes the conduct and attitudes demonstrated by leaders as they influence others and interact with stakeholders (Dubrin, 2004). Often, leaders demonstrate a consistent pattern of behaviors that characterize and predict their style. Leadership style sets the tone of the corporate environment and shapes the attitude and performance of the workforce. An effective leadership style is key to motivating followers to achieve desired goals.

According to the literature, leadership style can have an impact on nearly every aspect of the business (Williams, Ricciardi, & Blackbourn, 2006). Affected areas may include productivity, performance, employee morale, job satisfaction, organizational commitment, retention, turnover, customer service, errors, quality, and profitability (Bass, 1998; Lyons & Schneider, 2009; Offermann & Hellmann, 1996; Sosik & Godshalk, 2000; Yukl, 1998). Researchers have argued that leadership style can influence stress at the workplace (Lyons & Schneider, 2009; Syrek, Apostel, & Antoni, 2013). Resulting from their leadership style, leaders, themselves, may even be a leading source of stress (Lyons & Schneider, 2009).

Full-Range Leadership Theory

This study focused on the FRLT. An extension of the transformational leadership theory, FRLT consists of three leadership style behavior typologies (a) transformational, (b) transactional, and (c) laissez-faire (Avolio & Bass, 1991). The Multifactor Leadership Questionnaire (MLQ) is the most extensively utilized and validated instrument to measure full-range leadership performance (Bass & Avolio, 2004; Hunt, 1999; Kirkbride, 2006; Yukl, 1998).

Transformational leadership. Embedded in transformational leadership theory is the principle of the alignment of company interests with those of its members (Bass, 1985, 1987, 1998). Transformational leaders advance this principle through their abilities to inspire and motivate their followers beyond expectations to achieve common goals. Bass (1985, 1987, 1998) suggested that transformational leaders evoke respect, trust, and loyalty from their followers. Transformational leaders emphasize the needs of their followers, encouraging leadership skills development, and empowering participation in decision-making (Bass, 1985; Bass & Avolio, 1995, 2004; Bass & Riggio, 2006; Berger, Romeo, Guardia, Yepes, & Soria, 2012). Studies have shown that teams piloted by a transformational leader have higher levels of job performance and satisfaction as compared to those governed by other leadership styles (Bass, Avolio, & Atwater,

1996; Bass, Avolio, Jung, & Berson, 2003; Bass & Riggio, 2006; Hemsworth, Muterera, & Baregheh, 2013).

Transformational leaders are anticipatory and understand the need for constant change (Brown, 1994). They accept risk as it relates to the achievement of organizational goals. As such, transformational leaders are well-adapted to changing environments. These leaders encourage a collective team environment and challenge their followers to take ownership for their work (Bass, 1985; Bass & Riggio, 2006).

Transactional leadership. The theoretical underpinning of transactional leadership is that leaders exchange in a series of transactions with their followers. The nature of the transactions is such that leaders promote follower compliance with established policies and procedures through rewards or punishments (Bass, 1985; Burns, 1978). This leadership style ignores the social and emotional needs of followers and their power to motivate (Maslow, 1943). However, transactional leadership is an effective management approach in times of crises or when tasks are straightforward.

Both reactive and directive, transactional leaders focus on standardizing practices that promote organizational stability. These leaders are concerned that the workplace runs smoothly and efficiently on a daily basis (Bass, 1985; Burns, 1978). Transactional leaders are less inclined to accept or promote ideas, innovation, or organizational change that disrupts workflow (Eagly, Johannesen-Schmidt, & van Engen, 2003). Further, transactional leaders do not promote follower innovative or creative thinking to find new solutions to solve organizational problems.

Transactional leaders are passive and provide a well-defined chain of command. Relationships with followers are impersonal and task-oriented (Bass & Avolio, 1990; Bono & Judge, 2004; Burns, 1978; Hooper & Bono, 2012). They monitor the work of their followers to confirm that expectations are met. Transactional leaders spend little or no time attending to the needs or developing the talents and abilities of their followers.

Laissez-faire leadership. Laissez-faire leadership, delegative, passive-avoidant, or non-transactional, is the style in which leaders are typically uninvolved or abdicate their management responsibilities to their followers (Avolio & Bass, 1991; Bass, 1985; Eagly et al., 2003). These hands-off leaders provide their followers with the complete freedom to make decisions and solve workplace problems. Laissez-faire leaders provide little or no direction to their followers and commonly do not use their authority. Typically operating in crisis mode, laissez-faire leaders often neglect to communicate goals and objectives or define a plan to achieve them if established.

Laissez-faire leadership is not recommended in conditions where followers lack sufficient knowledge and experience to draw conclusions, make decisions, and complete tasks (Bass, 1985, 1987, 1988, 1990; Goodnight, 2011). This leadership style may not be appropriate in conditions where followers are incapable of working independently to manage projects, monitor deadlines, or solve problems.

Followers that are dependent on the guidance and feedback of their supervisors to perform their jobs run a much higher risk of failure if active leadership is absent.

Although laissez-faire is deemed the most inert and unproductive of all leadership styles, this approach is relevant, if not ideal, in specific environments (Antonakis, Avolio, & Sivasubramaniam, 2003; Avolio, Bass, Walumbwa, & Zhu, 2004; Avolio, Reichard, Hannah, Walumbwa, & Chan, 2009; Bass, 1998). For instance, laissez-faire leaders may be effective when followers are independent, motivated, highly skilled, and able to work with minor guidance. Even though laissez-faire leadership implies an entirely detached approach, many leaders are accessible to followers for guidance, consultation, direction, and feedback.

RESEARCH DESIGN

To bridge a research gap and enhance the understanding and identification of technostress influencers, the research question evaluated in this study was, “What effect does transformational, transactional, or laissez-faire leadership style, controlling for age, gender, education, and industry experience have on the level of technostress realized by information technology managers in the U.S.?”

The sample was randomly selected from the population, consisting of all information technology managers between the ages of 18-65 working in U.S. companies. SurveyMonkey was used to collect data via a multiple-choice Likert-scale survey combining questions from both the Multifactor Leadership Questionnaire 5X short rater form (MLQ-5X) and technostress instruments (Bass & Avolio, 1990, 1995, 2004; Cozby, 2009; Tarafdar et al., 2007). Demographic questions including gender, age, level of education, and years of experience, were built into the instrument. Those technostress questions connected with productivity were excluded from the study (Tarafdar et al., 2007).

Leadership instrument. The MLQ-5X is universally recognized as a valid, reliable measure of transformational, transactional, and passive-avoidant or laissez-faire leadership style (Antonakis et al., 2003; Avolio, Bass, & Jung, 1999; Berger et al., 2012; Kanste, Kaariainen, & Kyngas, 2009; Muenjohn & Armstrong, 2008). Total item reliability for each leadership factor scale measured by the MLQ-5X spans from a Cronbach’s alpha of .74 to .94 (Bass & Avolio, 1995, 2000, 2004).

Technostress instrument. The technostress instrument integrated into this study was based on the research conducted by Tarafdar et al. (2007). The study integrated the overall technostress construct. The inferential model of the technostress construct is composed of the technostress creator sub-constructs (Ragu-Nathan et al., 2008; Tarafdar et al., 2007). The technostress instrument has been validated with a reliability ranging between a Cronbach’s alpha of .71 and .91, with an average of .84 (Ragu-Nathan et al., 2008; Tarafdar et al., 2007). Demographics questions were added to the data collection instrument to observe the individual characteristics of the research participants (Ayyagari et al., 2011).

RESULTS

An e-mail invitation was randomly sent to 800 information technology managers working in companies across the United States. 129 surveys were

collected, yielding an overall response rate of 16.1%. In using the Cook's Distance leverage technique to screen for outliers, ten observations were removed from the analysis with Cook's D values exceeding .049 (Tabachnick & Fidell, 2013).

The majority (64.3%) of respondents were male ranging in age from 18 to 65 years old. One respondent preferred not to answer the individual characteristic question related to gender. For both male (28.9%) and female (31.1%) respondents, the most frequently observed age group was 34 to 44 years old. The next most prevalent age groups for male (25.3%) and female (24.5%) respondents were 55 to 65 and 25 to 33 years old, respectively.

Over 72% of respondents earned a bachelor's degree, the traditional standard educational requirement to secure a job in the information technology management field. Nearly 34% of respondents held an advanced degree. The highest level of education for 10.1% of respondents was a high school diploma. One respondent had not earned a high school diploma. Approximately 72% of males and 71% of females within the sample hold at least a bachelor's degree. More males (34.9%) than females (28.9%) hold advanced degrees. However, more females (28.9%) than males (27.7%) do not have a bachelor's degree.

Respondents reported a broad range of information technology management experience varying from less than 1 year to more than 20 years. A majority of respondents (28.7%) have logged between 6 to 10 years on the job while approximately 25% of respondents were fairly new to their roles. Over 45% have at least 10 years of experience with 17.1% of respondents exceeding 20 years in an IT management position. Similarly, 31.8% of respondents have been employed at their current workplace between 6 to 10 years, nearly 21% of employees are new to their companies, over 47% have at least 10 years of seniority, and 14.7% have at least 20 years of tenure. Nearly 76% of respondents were dominantly transformational leaders while 15.5% and 8.5% were primarily transactional and laissez-faire leaders, respectively. Transformational leadership was the most common style among those aged 45 to 54 (23.5%) and 55 to 65 (28.6%). Transactional leadership was prevalent among the 34 to 44 age group (40.0%). Laissez-faire leadership was the minority leadership style of all age categories. Both females (33.7%) and males (66.3%) were most commonly transformational. More males (55.0%) than females (40.0%) considered themselves a transactional leader. Similarly, more males (63.6%) than females (36.4%) were determined to be a laissez-faire leader.

Nearly 75% of transformational leaders have earned a bachelor's degree, at minimum. Of those identifying as transactional, 50% have earned a bachelor's degree. Respondents considered predominantly laissez-faire (36.4%) have earned an associate degree. Nearly 40% of respondents with 6 to 10 years of information technology management experience identify with transactional and laissez-faire leadership styles, respectively. Those with 1 to 5 years of current organizational experience were transactional (25.0%) and laissez-faire (12.5%) leaders.

Results showed a significant relationship between transactional or laissez-faire leadership styles and technostress. Those information technology managers with predominantly transactional or laissez-faire leadership styles experienced a

significant increase in their perceived level of technostress. However, information technology managers characterized as primarily transformational in terms of their leadership style did not experience a statistically significant change in their perceived level of technostress. With respect to individual characteristics, research indicated that only those information technology managers without a high school diploma had a significant relationship with perceived levels of technostress but collectively, individual characteristics were not statistically significant in predicting technostress.

Table 1
Model Summary (N = 119)

<i>R</i>	<i>R</i> ²	Adjusted <i>R</i> ²	Std. Error of the Estimate	Statistics				
				<i>F</i>	df1	df2	Sig. <i>F</i>	Durbin - Watson
.76	.58	.50	2.77	7.18	19	99	.00	2.05

Note. Dependent variable = Technostress.

The ANOVA established that the model was statistically significant, with $F(119) = 7.18$ at $p < .01$, for leadership styles and individual characteristics predicting technostress (see Table 2).

Table 2
Analysis of Variance of the Regression Model (N = 119)

	Sum of Squares	df	Mean Square	<i>F</i>	Sig.
Regression	1045.41	19	55.02	7.18	.00
Residual	758.29	99	7.66		
Total	1803.70	118			

Note. Dependent variable = Technostress.

In this study, transformational leadership was not found to be a statistical predictor of technostress in information technology managers. However, transactional and laissez-faire leadership styles were identified to statistically influence technostress within this population. Consequently, H_01 was not rejected ($\beta = -.05$, $t(119) = -.57$, $p < .57$) and H_02 ($\beta = .22$, $t(119) = 1.99$, $p < .049$) and H_03 ($\beta = .53$, $t(119) = 4.75$, $p < .00$) were rejected. Transactional ($\beta = .21$, $p < .049$) and laissez-faire ($\beta = .53$, $p < .00$) leadership styles positively predicted technostress. Therefore, as transactional and laissez-faire leadership styles become more dominant or prevalent based on the FRLT sub-constructs, more technostress is experienced.

Table 3
Multiple Regression Model Coefficient Data (N = 119)

Variables	B	SE	β	<i>t</i>	Sig.
CONSTANT	7.81	2.60		3.01	.00
T					
TFORM	-.07	.12	-.05	-.57	.57
TACT	.26	.13	.21	1.99	.049
LF	.41	.09	.53	4.75	.00
AGE	.31	.26	.10	1.18	.24
GEN	-.03	.58	.00	-.06	.95
ED	-.27	.28	-.07	-.96	.34
EXP	.04	.23	.01	.18	.86

Note. Constant (y-intercept). Overall model $R^2 = .58$, $F(19, 99) = 7.18$, $p = .001$. * $p < .05$. ** $p < .01$. *** $p < .001$.

In using multiple linear regression, individual characteristics and leadership style predicted 58% of the variance in technostress as perceived by the information technology managers evaluated as part of this study. Transactional and laissez-faire leadership style positively predicted technostress, meaning that as the leadership style becomes more dominant, the information technology manager will experience greater levels of technostress. Transformational leadership style, along with the individual characteristics of the respondents (i.e., age, gender, education, and industry experience), did not improve the predictive nature of the linear regression model.

IMPLICATIONS

This study was the first in the academic literature to conclude that a statistically significant predictive relationship exists between technostress and leadership style, and in specific, transactional and laissez-faire leadership styles in information technology managers (Boyer-Davis, 2014, 2015). Transactional leaders prefer stability, order, and efficiency and can be reluctant to introduce change into the work environment (Bass, 1998; Shin & Zhou, 2003). Laissez-faire leaders generally delegate their authority and job responsibilities to their subordinates. The ICT management field often compels managers to be more actively involved owing to the frequent transformational, fast-paced nature of the industry (Agervold, 1987; Ayyagari et al., 2011; Kinman & Jones, 2005; Korunka &

Vitouch, 1999). As supported by the literature and the results of this study, information technology managers operating in a highly variable, change-oriented occupation, self-identifying with a predominantly transactional or laissez-faire leadership style were shown to experience greater technostress.

The implications of these findings are critical to practitioners in various ways. For one, this study promotes the importance of understanding those factors that inflict technostress at the workplace. The consequences of technostress are immense. If organizational management is not currently aware of the impact that technostress has upon its staff and the company overall, this study has reinforced the value of developing approaches or systems to reduce or eliminate its effects.

Secondly, transactional and laissez-faire leaders in the information technology field may suffer from and display more of the adverse physical, mental, and emotional consequences of technostress when weighed against their transformational leader equivalents. These symptoms can have an exceedingly profound and caustic effect upon the health and well-being of the inflicted (Knani, 2013; Wang et al., 2008). As these toxic side effects intensify, so do their control over leadership success. Therefore, the effectiveness of transactional and laissez-faire managers can be more severely compromised than transformational leaders serving the same type of information technology leadership roles.

Thirdly, as feelings of technostress intensify, so do role conflict and overload (Tarafdar et al., 2011). Poor managerial performance is associated with these perceptions (Lazarus, 1991). Because transactional and laissez-faire leaders may experience more technostress than transformational leaders, they may also encounter increased role conflict and role overload. This could result in a decline in their managerial performance unless measures are taken to neutralize the effects of technostress.

Lastly, by way of this innovative breakthrough, the research study informs management that the presence of a dominant transactional or laissez-faire leadership style can increase the incidence of technostress (Boyer-Davis, 2014, 2015). This insight may prompt organizations to develop and adopt strategic techniques to prevent, manage, and reduce the influence of technostress resulting from these leadership styles. Accordingly, initiatives to counteract technostress can be tailored to align with the leadership style of the employee. The implementation of a personalized plan may be more effective in reducing technostress than a non-customized one.

LIMITATIONS

One limitation of this study was the use of a Likert-scale perception survey as the data collection tool; qualitative responses were not collected. Secondly, by design, only information technology managers were surveyed to determine if leadership style induces technostress and the leadership styles of managers working in other non-information technology professions may experience different outcomes. Thirdly, this study was limited to information technology managers employed in the United States and internationally-employed IT managers may experience technostress differently than their domestic counterparts. Finally, this

study was limited to the Full-Range Leadership perspective, integrating three specific constructs (a) transformational, (b) transactional, and (c) laissez-faire.

CONCLUSION

This research study was conducted to develop a more robust understanding of technostress and those factors that influence its catastrophic repercussions to organizations and their staff. Transactional, transformational, and laissez-faire leadership styles in conjunction with descriptive demographic statistics including gender, age, industry experience, and level of education were evaluated to ascertain their relationship with technostress. A quantitative, non-experimental research method was utilized to analyze relationships. This study was grounded in extant leadership and technostress research.

An examination of the multiple linear regression results determined that the leadership styles of information technology managers employed in the United States between the ages of 18 to 65 along with their individual characteristics explained 58% of the variance in technostress. Transformational leadership style and individual characteristics did not improve the explanatory power of the statistical model. Transformational and laissez-faire leadership styles were determined to be statistically significant in predicting technostress.

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AN ANALYSIS OF HIGHER EDUCATION FACILITY EXPANSION

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ABSTRACT

America's colleges and universities have expanded campus facilities by renovating and increasing square footage. This is in contrast to general construction activity during the same time period. This quantitative study investigates the relationship between university and college campus facility square footage per Full Time Equivalent (FTE) and university enrollments, institution endowments, and tuition and fees. Dummy variables were created for Carnegie classification and whether the college or university was private or public. Literature documents concern that these increased and upgraded facilities may become overbuilt and thus become liabilities to the institutions. Square footage data gathered over a five-year period from college and university administrators were regressed against enrollment, endowment, tuition, and fees for the same time period (2002-2007). Results show a relationship between university square footage per FTE and endowments per FTE and tuition. The relationship between enrollment and square footage per FTE indicates that total square footage increases with enrollment, however at a lower rate than enrollment. This indicates that administrators may act rationally using this empirical data as suggested in teleological theory. However, the results also show that this theory cannot explain all the increases in campus square footage. It leaves room for such theories as arms race theory and public choice theory. This study adds to the body of knowledge regarding the motivation of administrators to increase campus facility square footage and creates a predictor model for administrators to compare institutions.

Keywords: Higher Education Expansion, Arms Race, Public Choice Theory, Teleological Theory

INTRODUCTION

America's colleges and universities have expanded campus facilities by renovating and increasing square footage. Approximately \$846.2 billion in new construction was recorded at a seasonally-adjusted annual rate as of February 2010, according to the U.S. Bureau of the Census. This was down from the 2006 yearly peak of \$1.16 trillion (United States Bureau of the Census, 2010). Bucking this downward

trend in commercial and residential construction and considered by many economists as the bright spot in the construction industry, higher education construction enjoyed an increase in both the number of projects and the dollar amount per project, and was second only to health care in terms of construction and real estate development activity from 1994 to 2011 (Abramson, 2007; Baker, 2009; Haughey, 2010). This quantitative study investigates the relationship between university and college campus facility square footage per Full Time Equivalent (FTE) and university enrollments, institution endowments, and tuition and fees.

LITERATURE REVIEW

Theory This study discovered significant relationships between empirical data, such as endowments and tuition, to changes in college and university campus facility square footage. Higher education administrators acting within the framework of teleological theory would only expand college or university campuses when required to meet the goals or achieve the missions of the institution. In the teleological construct, administrators should expand campus facilities only when relying on empirical data from research based on enrollment, endowments, and tuition. Teleological theory ignores or downplays the possibility that individuals within the organization might act from alternative motives conflicting with those of the organization. The results of this study show that empirical data, such as enrollment, endowment and tuition are being considered; however, increases in campus square footage that cannot be attributed to this empirical data, also appear to take place. This is exemplified by the lower than expected R^2 results.

This study adds to the body of knowledge of college and university campus facility expansion by revealing that although a significant amount of the increase in square footage can be accounted for by careful evaluation of empirical data, other motivations may exist as well. These include the concept of the positional arms race and public choice theory. The low R^2 numbers in several models indicate that at least some of the changes in square footage is unexplained by the variables regressed. Coase (1960) demonstrated effectively that in the absence of any distorting influences, such as imperfect information or perverse incentives, a rational actor will choose the efficient outcome such as that seen in this study and in teleological theory.

Economists develop theories to explain and predict how changes in situations affect economic behavior. There are obvious risks in applying these theories to elucidate the change in square footage of campus facilities. De Alessi (1983) posits that the relationship asserted by neoclassical economic theory predicts behavior, considering idealized variables under theoretical conditions. This theoretical construct highlights the importance of considering applicable theories and alternative hypotheses that affect relationships to real world phenomena

(Milgrom & Roberts, 1992; Nagel, 1963). In the vernacular of economic theory, consideration must be given for friction, distorting influences, or externalities that might cause otherwise rational actors to make choices that deviate from theoretical expectations. Some economists refer to the actions taken that are counterproductive or inefficient as market failures (Viscusi, Vernon, & Harrington, 2000). Although not considered a formal theory, the concept known as a positional arms race may account for the distorting influences attributed to market failures.

Frank (1999) documents recent competition for students among higher education institutions, forcing these institutions into what he refers to as an “arms race” (p. 9) for the biggest and best facilities. A classic example of an arms race is the race for naval supremacy between the United Kingdom and the German empire prior to the First World War. In explaining this arms race, Massie (1991) details how both Germany and the United Kingdom expended significant amounts of their national treasure over a 20 year period to build two fleets that never met in the decisive battle naval theorists had predicted. The result of the First World War would have probably been the same if both nations refrained from engaging in the arms race. Similarly, the competition between universities appears to have characteristics of an arms race, whereby too many of the scarce educational resources available to higher education institutions are consumed in a pointless competition for status contributing to unnecessarily increased costs (Hirsch, 1976; Winston, 2000; Zemsky, Wegner, & Massy, 2005).

This competition is partially fueled by the growing importance of academic ranking. Students are increasingly concerned with the rankings published in the *U.S. News & World Report's* annual college ranking issue (Ehrenberg, 2001). A testament to this fact is that this issue is the magazine's leading seller, and university applicant pools swing sharply in response to changes and fluctuations in the rankings. Investments in facility square footage and renovation, made by America's colleges and universities to compete for the best and brightest students, may be mutually offsetting just as the arms races of competing nations to obtain the most powerful weaponry (Frank, 1999; Hirsch, 1976). In the end, gains are minimized and expenditures are substantial in paying for the added facility square footage and upgrades. Given the propensity of actors in organizations to operate contrary to the principles described in neoclassical theory and their tendency to be drawn into unproductive positional arms race in higher education, public choice theory is subsequently considered to elucidate decision-makers' motivation and pursuit of facility campus expansion.

The public choice theoretical perspective argues that many of the expenditures made to expand campus facilities are wasteful. In their seminal work, Buchanan and Tullock (1962) posited that economic theory could be used to understand government institutions, political actors, and non-profit organizations. They contend that the principle of rational maximization could be applied to

governmental and bureaucratic behaviors, however one should not expect bureaucrats to take actions that would further the mission of the organization over their own personal well-being. Analysis of self-serving behavior by administrators was further expanded by Jensen (2000), who argued that to view an organization as a rationally maximizing entity is erroneous. Organizational entities are typically composed of self-satisfying rent-seeking actors. This composition of individuals leads to a further issue, as expounded by Milgrom and Roberts (1992), who illustrate how information asymmetries make the costs of monitoring so expensive that it is economically impractical for any board or other supervisors to ever truly eliminate self-regarding behavior in organizational management.

Organizational theorists note that physical expansion and growth give the appearance of competence to those administering the growth of the organization (Kaufman, 1973; Marris, 1964; Penrose, 1959; Perrow, 1979; Whetten, 1980). Expansion also gives university administrators the opportunity to dispense favors and expend significant resources in the local community, thereby enhancing their own status. These conditions would potentially influence a self-interested administrator to be biased toward expansion, even if it were not economically preferable (Cyert & March, 1963). The result is an inefficient production of a bureau's services compounded by potentially perverse motivations in bureaucrat compensation (Downs, 1967; Mueller, 2003). Warren (1975) found that leadership in private industry is normally able to claim a share of savings and profits generated by an increase in efficiency, however, public bureaucrats' salaries are either unrelated or indirectly and perhaps inversely related to improved efficiency. Without financial incentives in place for the higher education administrator, a host of self-serving behaviors may manifest, including salary inflation, power seeking, public reputation seeking, patronage, and favor dispensation in the community (Niskanen, 1971). Public choice theory paints a clear path and incentive for the bureaucrat to maximize power and utility by increasing budgets and over expanding the campus facilities.

With their seminal work Buchanan and Tullock (1962) revolutionized political economy doctrine theory by demonstrating that economic analysis could be used to explain the behavior of government institutions, political actors, and bureaucracies. Just as Jensen (2000) opened the black box called the firm and found individual self-regarding rational actors behaving in their own self-interest, the public choice economist opens the black box called the bureaucracy and finds it filled with rational self-regarding maximizing actors. Applying this concept to higher education, Massey (2001) referred to a situation he calls resource diversion where people follow their own interests at the expense of the organization at every opportunity. Thus, in lieu of using the type of marginal-cost, marginal-benefit analysis, or empirical data, such as enrollment, endowment, and tuition described in teleological theory, the individual bureaucrat may act so as to maximize their personal utility rather than the public's benefit. In a worst-case scenario, a self-maximizing administrator in a university system could seek to gain control of a

program simply to maximize the budget and incentivize over-expansion of campus facilities.

RESEARCH METHODOLOGY

Research Variables: Enrollment, Endowments, and Tuition

Enrollment. *Measurement: Integrated Postsecondary Education Data System (IPEDS).* The U.S Department of Education fulfills a congressional mandate through the National Center for Education Statistics (NCES) to collect, analyze, and report enrollment data from America's higher education institutions. Much of these NCES data is based on findings from the Integrated Postsecondary Education Data System (IPEDS). National Participation in IPEDS is a requirement for colleges and universities that receive Title IV federal student financial aid programs, such as Pell Grants or Stafford Loans.

The proportion of higher education enrollment at four-year public and private universities declined as compared to the higher education industry as a whole. IPEDs data reveals the declining market share at not-for-profit, four-year public and private universities. Both public and private four-year not-for-profit universities lost approximately 10% in market share during the period addressed. The market share loss was tolerable, however, because it came at a time when the entire market grew significantly, from 5.9 million in 1965 to 15.9 million in 2001. Every sector grew substantially: public four-year universities by 113%, private four-year institutions by 82%, and two-year public schools by 366% (United States Government Accountability Office, 2007). Simply put, loss of market share was easier to tolerate in a rapidly growing market. The danger was that institutions losing market share while enrollment was growing might fail to recognize that the shift in students' preferences away from their institutions could be destructive to these institutions.

The Western Interstate Commission for Higher Education (WICHE) projects that the total number of high school graduates in 2022 will be roughly 1% larger than in 2009, but the overall figure masks dramatic changes in high school demographics. Caucasians, who currently attend college in higher numbers, are projected to decline by 14.6%, while Hispanics, who currently attend college in significantly low percentages, will increase by 62.5%. Enrollment in K-12 schools in the United States reached 55.3 million in 2006, and began a declining trend for the first time in 20 years. These data suggest that postsecondary enrollment will decline dramatically if historic university attendance patterns remain unchanged (National Center for Education Statistics, 2006). If higher education is unsuccessful at increasing enrollment patterns of Hispanics, as well as Caucasians and African-Americans, the years described by the commission could witness a declining market for higher education. The institutions that have market shares reduced may well see absolute declines in enrollments (Western Interstate Commission for Higher Education, 2008). Buildings and infrastructure built without consideration to the declining enrollment possibilities could become a

significant liability to American higher education. Reduction in the number of high school graduates and the demographic makeup of those graduates would be prudent considerations when expanding campus facilities.

The literature points to another complication that suggests higher education administration should go beyond looking at the numbers enrolled and look to the types of enrollment. Commercial real estate leaders are currently worried that technology might be a formidable competitor and impair its future economic viability. The concern stems from a fear that businesses operating in brick and mortar buildings would be able to utilize technology to operate virtually, or without physical places, leaving empty retail, industrial, and office space. A comparable situation may be present in higher education. The possibility exists that higher education enrollment could continue to increase, but less square footage of campus facilities could be needed to accommodate the increase. This dichotomy could be caused by the emergence of students' preference for institutions offering on-line learning (Porter, 2001).

The potential shift to on-line learning initiatives may have a substantive effect on the demand for higher education campus facilities. Ambient Insight Research (AIR) released a market forecast predicting that 25 million post-secondary students in the United States will take classes online by 2015. The predicted number of students who take classes exclusively on physical campuses will go from 14.4 million in 2010 to just 4.1 million five years later (Ambient Insight Research, 2011). While the exact numbers of students who attend classes physically on American college and university campuses may certainly be debated, the trend for a growing percentage of students using online learning in lieu of attending classes on physical campuses is nearly certain (Allen & Seaman, 2010). Although there is limited agreement among experts that online learning will strategically change the current higher education landscape, there is very little literature predicting or discussing the impact on higher education campus facilities.

Meyer (2008) suggests that the capital for the creation of the online learning curriculum could come by capitalizing on cost-efficiencies of online learning. In a concept called capital-for-capital substitution, many institutions count on online learning to use existing buildings more efficiently and save classroom space; some institutions are even eliminating the physical building altogether and saving 15% of the cost of traditional courses (Campbell, Bourne, Mosterman, Nahvi, Brodersen, & Danwant, 2004; Farmer, 1998; Meyer, 2006; Milam, 2000).

Endowment. The size of an institution's endowment is often now integral to the evaluation of the financial health of the institution by bond underwriters and stakeholders. Along with the amplified dependence on the incomes from endowments comes increased pressure on college and university administrations for higher expected performance of returns on the invested assets. Data from the NACUBO-Commonfund Study indicates that the financial performance of

endowments may have a significant relationship to the economy, and, specifically to indexes such as the S&P 500 in which at least some of these assets are invested.

Endowments of universities not only gain attention from underwriters and stakeholders but also from the U.S. Congress, industry, media, and general society as a whole. The U.S. Senate Finance Committee held hearings in 2006 and 2007 evaluating how college and universities use their 501(C)(3) status and the ability of donors to deduct gifts to educational institutions (United States Senate Committee on Finance, 2006). Industry publications and popular press such as *The Chronicle of Higher Education* and *The New York Times* discuss university endowment investments, tuition in relation to endowments, the growing wealth gap between institutions of higher education, and scrutiny over the endowment-to-expense ratio of universities. The endowment-to-expense ratio compares the endowment to an institution's actual costs and is subjective with some analysts considering more than a 2:1 ratio as evidence of an excessive endowment. Still others suggest that under certain circumstances, an endowment exceeding a ratio of 5:1 would be considered justifiable (Schneider, 2006). There is evidence suggesting that Congress may consider establishing tax-deductibility criteria based on endowment-to-expense ratios (Waldeck, 2009). No matter what ratio is utilized to justify the amount of endowment held by a university, and whether the long-term increases are from increased giving or increased market returns, it is apparent that administrators will be under increasing pressure to spend those revenues and could justify campus facility expansion projects to artificially and strategically fall into a beneficial endowment-to-expense ratio (Waldeck, 2009).

Tuition. *Current trends in higher education tuition.* Considering the importance of a college education to the success of individuals in the United States (Baum & Payea, 2005; Baum & Ma, 2007; Black & Smith, 2004; Card, 2002; Johnstone, 1999; Monks, 2000; United States Government Accountability Office, 2007) and the significance of the degreed individual to society (Colby, Ehrlich, Beaumont, & Stephens, 2003; Torney-Purta, 2002) the issue of college affordability is paramount. College affordability is a complex issue and cannot be captured by simply analyzing tuition and fee increases; however, there is a substantive value in considering trends and issues surrounding tuition. Tuition and fees constitute 67% of the total budget for full-time students enrolled in four-year private colleges and universities and 36% of the budget for in-state residential public students. Data from the period 1981 to 2012 indicates a robust increase in tuition as well as fees in all but two-year public colleges (The College Board, 2006).

In recent decades the cost of a college education continued to increase at twice the rate of general inflation (United State Department of Education, n.d.). This occurred in spite of the efforts of business professionals, scholars, and politicians who offered prescriptions to mitigate the increases (Ehrenberg, 2004; Ehrenberg, 2001). As tuition increased, federal and state financing of student funding diminished causing students to become more reliant on student loans (The

College Board, 2006) and creating concern about unmanageable debt burdens (Harrast, 2004; King & Bannon, 2002). Likewise, the federal government decreased block grant funding for higher education and emphasized programs that require repayment from the student. Because of this shift to a more student-responsible system and continuing increases in the cost of education, few students were able to pay for college without some form of financial aid. In the 2007-08 school year, over 65% of all four-year undergraduate students graduating with a bachelor's degree started their careers with education-related debt, and the average debt among graduating seniors was \$23,186 (The College Board, 2008).

THE MODEL

Six separate models were developed to consider the relationship between enrollment, endowments, and tuition to college and university facility square footage. Two regressions were performed for each model. The first regression utilized core educational square footage and the second regression in each model used the square footage of the entire campus. The models were developed in a process of improving goodness of fit. To capture the influence of both undergraduate and graduate tuition and fees, a mathematical formula was used to weight these variables to deal with multicollinearity. The natural log of the enrollment variable was added in order to obtain a better fit. Results of statistical significance were recorded and best model used for the predictor model. The institutional support variable indicated whether a college or university was private or public. This variable showed positive, statistical significance across all six models for total campus square footage, as well as for core educational square footage. The enrollment variable showed inconsistent results depending upon which model was regressed. Tuition and fees showed significant consistency across models, especially once the weighting technique was employed. Endowment proved to be another variable with consistency across all six models. The Carnegie variable, indicating whether or not an institution was a research university, did not show significant consistency across models.

Tests for heteroscedasticity were accomplished using the Cook-Weisbert test. Tests for multicollinearity were accomplished using the variance inflation factor command in STATA. Model specification was checked with the use of the `ovtest` command performing the Ramsey regression specification error test (RESET) for omitted variables. Finally, scatterplots were generated to analyze the relationships between the variables, specifically looking for outliers.

The developed models utilized a regression equation to analyze the relationship between college and university square footage, where:

$$Y_i = b_0 + b_1Ug\&GrENR_i + b_2Wt(Ug\&GrTN_i \& Ug\&GrFe_i) + B_3EDM_i + b_4DP + b_5DC + e_i$$

The variables utilized in the equation for model one are defined below.

UgENR_i – This variable is undergraduate enrollment and is measured in full-time equivalent undergraduate students per year.

GrENR_i – This variable is graduate enrollment and is measured in full-time equivalent graduate students per year.

UgTN_i – This variable is undergraduate tuition and is measured in dollars per year.

GrTN_i – This variable is graduate tuition and is measured in dollars per year.

UgFe_i – This variable is undergraduate student fees measured in dollars per year.

GrFe_i – This variable is graduate student fees measured in dollars per year.

EDM_i – This variable is university endowment per FTE and is measured in dollars.

DP – This variable is whether the university is private or public (institutional control). DC – This variable is whether the university is considered a research university according to Carnegie classification.

Wt(UgGrTN_i) – This variable is the weighted average of undergraduate tuition and graduate tuition and is measured in dollars per year.

Wt(UgGrFe_i) – This variable is the weighted average of undergraduate fees and graduate fees and is measured in dollars per year.

Wt(Ug&GrTN_i & Ug&GrFe_i) – This variable is the weighted average of undergraduate tuition, graduate tuition, undergraduate fees and graduate fees measured in dollars per year.

Ug&GrENR_i – This variable is the undergraduate and graduate enrollment added together to give total enrollment measured in full-time equivalent undergraduate students per year.

The Model as a Predictor. The mean values of each regressed variable and the corresponding coefficient value were entered into an Excel spreadsheet. Equations were then generated to compute the predicted value using the following equation: $y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_3 X_3$, where β_0 is the intercept, $\beta_1, \beta_2,$ & β_3 are the variables, and $X_1, X_2,$ & X_3 are means of those variables. Table 4.10 shows the resulting square footage predictor for each model.

This predictor model was used to develop “what if” scenarios with the variables to further confirm the validity of the models. For example, based on the mean values reported in the study, and based on model 4, the predicted value at the means for core educational square footage was 110.69 square feet per FTE. That means that the model predicted that an institution with average levels of each variable (enrollment, endowment, and tuition) could be expected to have 110.69 square feet of space per student. If the same observations were used per model, relatively consistent results would be expected across models. Although there were obvious variations reported in Table 4.10 based on the specifics of each model, the values were not outside of the expected variance confirming, with reasonable certainty, that the models did not contain data entry-type errors. The predictor model is also used to draw conclusions pertaining to the variable sensitivity of the models.

Summary of Model Results. As expected, the different models employed in this study provided differing results in statistical significance of the variables. The institutional support variable, indicating whether a college or university was

private or public, showed positive, statistical significance across all six models. The enrollment variable showed inconsistent results depending upon which model was regressed. Tuition and fees showed significant consistency across models, especially once the weighting technique was employed. Endowment proved to be another variable with consistency across all six models. The Carnegie variable, indicating whether or not an institution was a research university, did not show significant consistency across models.

INTERPRETATION OF THE RESULTS

Enrollment. Enrollment proved to be an interesting variable. Enrollment showed inconsistent results depending upon which model was used, but tended to be negative when statistically significant. The base model, model one, shown in Table 4.2 and 4.3, produced significant results for both undergraduate and graduate enrollments. The undergraduate enrollment variable was negative and the graduate enrollment variable was positive. The variable also produced inflated VIF scores indicating issues with multicollinearity. This was not unexpected, and to correct the issue the natural logs were taken of undergraduate and graduate enrollment and the regressions were run. Eventually undergraduate and graduate enrollments were added together and the log of total enrollments was used. According to the diagnostic tests, adding the variables and taking the natural log produced the most reliable variable reducing the VIF from 17.4 to 1.92.

The results of adding the undergraduate and graduate enrollments together and using the natural log of the total enrollment was negative when significant. This regression result is confirmed in the predictor model indicating that square footage, while increasing with enrollment, does not do so at the same rate. As shown in figure 5.0, at enrollment levels of 5,046 students there are 150.34 square feet per student. At 20,182 students enrolled, each student has 141.26 square feet which is a total increase over previous square footage. Although the ratio is lower per student, the total square footage is increased significantly. This is not too surprising, since total square footage includes athletic facilities, wellness centers, and other square footage that appear to be less dependent upon how many students are actually on campus. This was more surprising in the core educational square footage, which includes classrooms and laboratories. Logically, student enrollment increases more quickly than campus facility square footage increased. To a point, administrators have the ability to hold more sections of classes and add more students to existing classrooms in lieu of adding additional space. In this context, the enrollment variable tended to support the arm race research (Ehrenberg, 2001; Frank, 2008; Frank & Cook, 1995; Hirsch, 1976; Sedlacek & Clark, 2003; Winston, 2000), indicating that some campus expansion was due to competitive pressure and not necessary to accommodate growing enrollments.

The lack of consistent statistical significance in enrollment as a variable in the regression equation was also supported with the predictor model. To analyze the

sensitivity of the variables, the mean total enrollment variable of 10,091 students was changed by 50%, 75%, 150%, and 200% of the mean. As figure 5.0 represents, campus square footage tended to decrease in the predictor as the enrollment variable was increased. This result indicated that campus square footage was not too sensitive to increases in enrollment and was negative based on the models in this study.

Endowments. The fact that the estimated coefficient for endowments is statistically significantly different from zero supports much of the literature in Chapter Two. Conti-Brown (2011) analyzed higher education institution endowments and documented a cultural theory that the university President's legacy is a strong consideration to how endowment proceeds are invested and spent. The correlation between endowments and campus square footage gives support for the edifice complex concept, indicating that donors might prefer to donate money for buildings with naming rights (Bassett, 1983; King, 2005). Administrators understand that naming rights to buildings allow donors to leave lasting legacies. Also documented in the literature review was the pressure administrators feel to spend the endowment proceeds to achieve a beneficial endowment-to-expense ratio. The conjecture that administrators spend endowment proceeds on campus facility expansion projects to fall strategically into a beneficial endowment-to-expense ratio was consistent with the findings in this study. Each of the considerations addressed in this paragraph are developed more fully in the implication sections of this chapter.

The fact that endowments were significant and highly correlated to the square footage of American colleges and universities as a variable in the regression equation was also supported with the predictor model. Figure 5.1 graphically illustrates the sensitivity of square footage as endowments per student were reduced by 50%, dropping the square footage per student to 140.82 from the mean of 147.32 and to 160.31 square feet per student when the endowment was doubled. This result indicated that campus square footage was sensitive to increases in endowments, supporting the results of the regression analysis for the variable of endowments.

Tuition. Like enrollment, tuition provided opportunities to improve goodness of fit in alternative models. In the base model tuitions appeared to have a strong correlation to square footage. However, testing for heteroscedasticity suggested that applying weighted averages to the variables might capture the influence of the variables while dealing with reliability issues. Adding both undergraduate and graduate fees to undergraduate and graduate tuition, and appropriately weighting the variables, appeared to be the best-fit model. Results in Table 4.2 and 4.3 showed that models five and six, where weighted average techniques were applied, produced statistically significant *t* scores in both total campus square footage and core educational square footage.

Based on these results it is reasonable to conclude that higher tuition and fees at the sample institutions provided more square footage in both categories. Not evident in the results of this research study, however, is whether increased tuitions are a result of changes in campus square footage or the cause of changes in campus square footage. The cost of a college degree is increasing at twice the rate of general inflation (United States Department of Education, n.d.). As these costs increase there has been a significant decrease in federal and state funding and more reliance on the student to fund the education with student loans (The College Board, 2006). Chapter Two documents the impact that student choice plays for campus facilities.

The statistically significant results indicating a high correlation of square footage and tuition and fees in the regression equation was also supported with the predictor model. Figure 5.2 graphically illustrates the sensitivity of square footage as tuition and fees were reduced by 50%, dropping the square footage per student to 136.57 from the mean of 147.32 and to 168.81 square feet per student when the tuition and fees variable was doubled. This result indicated that campus square footage was sensitive to increases in the weighted tuition and fees variable. This supported the results of the regression equation, showing a correlation between tuition and square footage on college and university campuses. Students want new and expanded facilities with state-of-the-art amenities (Ehrenberg, 2001; Frank, 2007; Hill, 2004; Reeves La Roche, Flanigan, & Copeland, 2010). What was also not evident, either from the results of this study or the literature, is whether students fully understand that the costs of these amenities are being shifted to them and less on the federal and state funding sources.

Fees. Student fees in both graduate and undergraduate programs were separated from tuition in models one and two. This provided statistically significant *t* score results, however, as with tuition there was suspicion that the results might have heteroscedasticity issues. Because of reliability issues in the diagnostics, the fee variables were weighted and added to tuition.

The lack of correlation in some models could be explained in the nature of fees charged to the student. Many student fees are specifically designated to an organization or activity on campus. Programs and activities are highly dependent on these fees to function and are not easily diverted to building projects unless designated as such. Fees were then added to tuition in models five and six shown in Table 4.2 and 4.3. The new variable containing the weighted average of tuition and fees provided statistically significant results.

Institutional Control. The institutional control variable, indicating whether a university is private or public, provided the most consistent results of all variables and was positive and statistically significant in every model, whether regressed against total campus square footage or core educational square footage. This indicated that public colleges and universities in the sample had more square

footage per student than private colleges and universities. This difference between square footage in public universities and private universities may be explained in part by public universities typically offering more majors and programs, and some of these majors and programs requiring lab space which significantly increases square footage per student.

Carnegie Classification. The variable indicating Carnegie classification was used to specify whether or not the institution was a research institution. In the core square footage regression models two, three, five, and six, Carnegie classification was positive and highly significant indicating the amount of core educational square footage was correlated to whether or not the college or university was a “research” institution as defined by Carnegie classification. Interestingly, the same cannot be said for total square footage of the entire campus. In the total square footage regression, the research variable was only significant in two out of the six models, indicating a lack of correlation with the research variable in those models. This was predictable considering that research universities would likely need additional square footage for laboratories and other research related activities. The entire square footage of the university would thus be less impacted by whether or not the institution was a research university.

Because low R^2 values in the study indicate that the variables used in this study do not entirely explain the square footage decisions of college and university campus facilities, other motivations should be considered. For example, the findings documented by Frank (2008), positing that colleges and universities are locked in a positional arms race forcing administrators to expand campus facilities to compete, should be considered. The results also leave plenty of room for a more cynical elucidation explained by Buchanan and Tullock (1962) as public choice theory. Public choice theory postulates that the bureaucrat personally maximizes power and utility by increasing budgets and over-expanding campus facilities. Any research in the area of square footage expansion would be remiss without acknowledging these plausible alternative theories, however they are beyond the scope of this research paper.

SUMMARY AND CONCLUSION

Enrollments at American colleges and universities are projected to decrease significantly beginning in 2014. The enrollment decline is calculated based on the end of the echo boom generational surge (Bare, 1997; Kennedy, 2011; Roach, 2008). This situation, coupled with growing online enrollment, exacerbates waning facility usage on campuses nationwide. Surplus college and university facilities may become liabilities if administrators miscalculate square footage requirements (Daigneau, 1994). Consequently, to minimize risk, administrators who make decisions regarding campus square footage should do so based on empirical data and strategic planning models.

This research explored the relationships between facilities square footage and the variables of enrollment, endowment, and tuition. The results indicated a strong correlation between endowments, tuitions, whether a university is classified as a research institution, whether the institution is public or private, and square footage of the campus facilities. The results may accordingly be useful for efforts to minimize risk.

A counterintuitive finding was the lack of correlation between enrollment and campus square footage. Although the results demonstrated correlation between the other variables and campus square footage, the results left ample space for alternative theories. Teleological theory as an explanation—based on empirical data such as enrollment, endowment, and tuition—did not fully explain square footage decisions. Therefore, alternative theories such as the arms race concept and Public Choice Theory should be considered. Although the empirical data did not fully explain decisions regarding college and university campus facility square footage, the research revealed the existence of key relationships. This research developed a predictor model that higher education administrators may use to compare campus square footage requirement numbers to those of the sample used in this study. Predictor models such as this may help to reduce the risk of square footage miscalculation.

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STUDENT PERCEPTIONS OF THE EFFECTIVENESS OF RUBRICS

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ABSTRACT

The goal of this research was to determine student perceptions of the effectiveness of rubric usage across different colleges/disciplines, age groups, gender, academic levels, and first-generation vs. non-first-generation college students. The research questions were: What are students' perceptions of rubric usage? How do students perceive rubrics' standardization of assignments? Do students perceive that rubrics have a positive or negative impact on student work? This study replicates a study by Laurian and Fitzgerald (2013) that examined students' perceptions of rubrics in a Romanian Literature course. The objective of this study was to determine if students in specific groups found rubrics more effective than others. The results of the study strongly indicated that a majority of students have positive attitudes about rubrics. More specifically, students in disciplines outside of the Arts have shown a strong preference toward using rubrics to guide their own work. The new knowledge gleaned from this study should prove valuable as it aides in the development of improved rubrics that are less creatively stifling and more applicable.

Keywords: *rubric, higher education, assessment, student perceptions*

INTRODUCTION

There has been much debate on the subject of rubrics since they gained mainstream academic popularity in the late 1970s. The primary focus of that ongoing discussion is the extent to which different types of rubrics and design characteristics enhance student achievement.

The common theme that emerges from a review of the literature shows a prevalence toward comparing scores with and without the use of rubrics, while promoting the use of specific types of rubrics to those ends (Hunter, Jones & Randhawa, 1996; Johnson, Penny, & Gordon, 2000; Andrade, 2005; Reddy, 2011). However, there is limited available research regarding the perceptions of the students who most frequently utilize rubrics.

Numerous studies conducted to evaluate how different types of rubrics impact students' scores (Reddy & Andrade, 2010; Smith, Worsfold, Davies, Fisher & McPhail, 2013). These studies emphasize the outcomes of rubric usage rather than the individual attributes that lead to improved assignment scores. Some researchers have used a slightly different methodology altogether, as they have pursued insight into the effectiveness of different types of rubrics for diverse types of assignments (Hunter, Jones, & Randhawa, 1996; Johnson, Penny, & Gordon, 2000). Similar research has delved into the individual attributes and processes involved in the design of rubrics (Rosenow, 2014; Boud & Soler, 2015; Prins, De Kleijn & van Tartwijk, 2017).

A great deal of research regarding the use of instructional rubrics is limited in focus due to an over-emphasis on only the successes and failures of rubrics. There is still very little available literature concerning student perceptions and attitudes toward the use of rubrics. This failure to examine and incorporate student feedback into rubric design has stifled the development and evolution of rubrics into normalized and standardized educational tools. Many view rubrics as creatively stifling and inapplicable due to their rigid and time-intensive development process. Careful investigation of students' attitudes toward rubrics could provide instructors with effective tools that could help mitigate the potential disadvantages of rubrics.

THEORETICAL AND CONCEPTUAL FRAMEWORK

This research study departed from previous research on the subject of rubric effectiveness by shifting the orientation of the evaluation from questions such as: *How do we design effective rubrics?* and *What do the results say about scores associated with rubric usage?* to something more specifically aligned with *What do the individuals who use rubrics the most think of them?* and *Do students perceive rubrics as effective?*

The purpose of this study was twofold. First, the researchers examined student perceptions and feedback on rubric use to uncover potential pitfalls that may inhibit a rubric's effectiveness. Second, the researchers examined differences in students' perceptions of the effectiveness of rubrics as separated by demographic characteristics.

The primary objective of this research study was the recreation of a study by Laurian and Fitzgerald (2013) that delivered a direct assessment of students' perceptions on rubric use. Laurian and Fitzgerald (2013) investigated the effects of rubrics on the writing grades of university students enrolled in a Romanian Children's literature course. The current study was designed to expand the previous study by 1) using a larger sample and to 2) evaluate the probability that students in some demographic categories may find rubrics more effective than those in other categories. The objective of previous and current studies was to determine the percentage of university students that believes the use of rubrics positively or negatively impacts their learning.

The survey questions were divided into three main areas of inquiry: student perceptions on the use of rubrics, the issue of standardization with rubric use, and whether or not rubrics helped students. This research operates on the assumption that all college and university students have at least some experience with rubrics due to their near-constant presence.

The assumption was that the results of the current study would parallel the study by Laurian and Fitzgerald (2013), which indicated that adult students behave in a manner indicative of professional researchers, and as such, go to great lengths to ensure they meet all of the requirements of a given assignment. Laurian and Fitzgerald (2013) found that 90% of students preferred the use of rubrics and thereby found them effective learning instruments. Rubrics have been both a mainstay in the academic landscape and a hotly contested subject since at least as far back as the late 1970s. The endless controversy surrounding rubrics has ensured

their status as an active research subject and source of contention among researchers for almost five decades. This increasing discord between advocates and opponents may have been deepened by the expansion of online courses and technological advances in knowledge sharing (Wyss, Freedman & Siebert, 2014; Kite & Phongsavan, 2017). In seeking to answer the research question, this study provided an informative model from which to fortify old rubrics and develop enhanced new rubrics. Academia should benefit from the knowledge gained from reviewing students' perceptions of rubric effectiveness. It is likely that if changes are incorporated as a result of this study, future rubrics could be perceived as more effective and less standardized, while providing a positive impact on students' work. Ultimately, learning in higher education could see another renaissance as more effective rubrics revolutionize adult learning. A study by Stern and Solomon (2006) investigated the impact of rubrics from a faculty perspective. The study centered on faculty comments on 598 graded papers from 30 different departments within a university in the southwestern United States. The results of the study illustrated that rubrics provide effective guidance on written assignments. Unfortunately, the scope of the study is tailored to the faculty perspective rather than the student perspective, and therefore shifts the emphasis from impact on students toward teaching methods and scoring consistency.

Additional studies (Johnson, Penny, & Gordon, 2000; Jonsson & Svingby, 2007) examining reliability and scoring consistency have contributed to the research on rubric usage. The emphasis on reliability and scoring consistency is echoed by a study conducted in a Research Methods course at the University of Minnesota (Stellmack et al., 2009). The research identified that APA-formatted papers scored by five independent raters utilizing rubrics displayed approximately 75% scoring consistency between the raters on the first paper and 98% interrater reliability on the second assignment. All of these studies offered valuable insight on rubrics' usage and impact from the faculty perspective.

The limited available data on student perceptions of the effectiveness of rubrics within the context and constraints of higher education does not adequately illuminate the areas and attributes that students find most effective. There is some research available on student perceptions of rubrics (Gezie Chang, Adamek, & Johnsen 2012; Atkinson & Lim, 2013; Wang, 2017), but little that precisely frames the problem of aligning those perspectives to rubric enhancement. There is a knowledge gap where students' attitudes toward rubrics are concerned.

An examination of the current field of research should illuminate the areas where further research consideration is needed. The research studies cited in this review were included because they sought to answer the question through an examination of student perceptions of the effectiveness of rubrics based on one of the three aforementioned areas of inquiry.

The expectation of this study was that it would significantly contribute to the ongoing discourse concerning student perceptions of rubric usage, standardization, and whether or not rubrics have any impact on student work. The study contributes to the expansion of knowledge regarding adult learners' perceptions of the factors that make rubrics truly effective. There is no better vantage point than ground level, where rubrics interact with students.

This study should be perceived as a small but crucial component of a much more significant string of related research. The objective is to make better use of the available tools and allow them to transform as the academic world evolves.

REVIEW OF LITERATURE

The current state of research that is relevant to this proposed study centers on rubric design, student achievement, and faculty perspectives (Andrade, 2005; Gezie et al., 2012; Panadero, Tapias, Huertas, 2012; Atkinson & Lim, 2013; Jonsson, 2014; Wyss, Freedman & Siebert, 2014; Dawson, 2017; Wang, 2017). Much of the literature mentions student feedback in passing, but rarely places sufficient emphasis on students' perceptions of the effectiveness of rubrics.

The current study intended to build upon the previous study by Laurian and Fitzgerald (2013) by using a larger, broader sample to investigate the possibility that students in some colleges/disciplines may find rubrics more effective than those in other colleges and disciplines. Although the previous study and the current study diverge on emphasis, the primary objective of both is to ascertain students' perceptions of rubrics.

Jonsson's (2014) work investigated professional education students' use of rubrics in three different case-study type settings: developing a survey in a statistics course, inspection of a house for real estate brokers, and a patient communication workshop. In all three settings, students appreciated rubric criteria support, and students perceived the criteria as comprehensible and useful.

A study by Gezie, Chang, Adamek, and Johnsen (2012) takes a qualitative approach to investigating both the benefits and challenges of using rubrics. The researchers found that the advantages that rubrics provided far outweighed the limitations that they presented. The current study followed suit, as the primary objective was to evaluate whether or not students across varied demographic categories shared that perspective.

Atkinson and Lim (2013) share a comparable focus as their action research study explored student perceptions of assessments and the feedback they receive based on rubrics. Their research found that approximately 95% of students recommended the use of rubrics, as they believed that rubrics contributed consistency and fairness to their professors' evaluations. Transparency of rubrics has been the focus of multiple other researchers (Panadero & Jonsson, 2013; Venning & Buisman-Piljman, 2013; Jonsson, 2014).

Atkinson and Lim's (2013) qualitative approach seems to operate well as it allows researchers to form a repository of student opinions on the structure, consistency, fairness, and efficiency of rubrics. However, it does not offer an adequate stratification of statistical evidence that either substantiates or contests rubric use.

Additionally, research into interrater reliability has found a correlation between rubric use and instructor scoring between multiple raters (Johnson, Penny & Gordon, 2000; Jonsson & Svingby, 2007). On the surface, this seems to partially validate the results of Laurian and Fitzgerald's study as it pertains to student perceptions of fair grading. According to Laurian and Fitzgerald (2013), and others (Hendry, Bromberger & Armstrong, 2009; Jonsson, 2014), students hold a strong desire to see that their work is graded objectively and fairly regardless of who is grading it. After all, the primary point of a rubric is to ensure that the expectations do not change from one student or assignment to the next. It is worthwhile to review any statistical evidence that could support a correlation between effective rubric use and improved interrater reliability.

This analysis should expose several key aspects of rubric usage that aid in guiding the research toward answering the research questions. In an effort to focus this review on the contexts and constraints of rubric effectiveness, the selected articles and studies utilized for this literature review were retrieved from online resources and based on three primary criteria: they must have included subjects or keywords or phrases such as "rubrics," "higher education," "adult education," "teaching instruments," "student perceptions," "rubric usage," and "effectiveness." Additional criteria required for inclusion in this review consisted of only empirical, peer-reviewed journal articles from 2007 to 2017.

The databases from which articles were extracted consist of ProQuest Central, Education, Academic Search Premier, Professional Development Collection, ERIC-Education Resources Information Center, PsychInfo, and Education Research Complete. Doctoral and masters' theses concerning rubrics were excluded from the review. The research topic centered on the list of the three items listed above: Rubrics usage, perceptions of standards, and positive or negative impact. Therefore, articles and studies that cited little or no correlation between the use of rubrics and student perceptions were excluded because they did not substantially contribute to the scope of the research topic. Case studies were likewise excluded due to lack of generalizability.

There were 16 empirical studies included from the twenty-two studies collected for this review. One such study by Panadero, Tapia, and Huertas (2012) offered an insightful look at the difference between the use of rubrics and self-assessment scripts as they influenced student achievement. An additional study focused solely on student perceptions of rubrics in self-assessment (Wang, 2017). Unfortunately, both of these were excluded from this review due to content residing outside of the scope of this review.

An additional study by Andrade (2005) examined the effectiveness of rubrics by suggesting that the manner in which they are developed and used either enhances or mitigates effectiveness.. This study was excluded from the review because it focused on rubric usage from a teaching and grading perspective.

Likewise, Dawson (2017, p.355) found that students typically use rubrics for "planning their response to the task; in-class formative peer assessment; and self-assessment...[while] Teachers use [it] to provide summative grading and feedback information." Because self-assessment via rubrics is not the focus of the current study, Dawson (2017) was excluded as well.

Correspondingly, a study by Wyss, Freedman, and Siebert (2014) was excluded from this review because the authors' thesis was extremely focused on the online academic environment and only tangentially included rubric development in the process. A comparative analysis of the correlation between student scores and rubric usage exceeds the scope of this review. Similarly, a study by Kite and Phongsavan (2014) was excluded as it focused on comparisons between face-to-face and online students.

The majority of the studies included in this review were quantitative in nature with the majority of them conducted using a mixed-method research methodology (Johnson, Penny, & Gordon, 2000; Stern & Solomon, 2006). A great deal of the studies utilized instruments such as pre- and post-tests, surveys, t-tests, chi-square tests, and writing samples to collect data (Jonsson & Svingby, 2007; Gezie et al, 2012; Atkinson & Lim, 2013).

METHODOLOGY

In order to maximize accessibility and convenience for the intended participants, an internet survey, constructed in Qualtrics, was distributed by email distribution to the student body of a regional university in the southwest United States. The sample was obtained through voluntary self-selection using random

distribution and a non-probability sampling method. The corrected number of participants after sanitizing the dataset to exclude incomplete responses was 228. Appendix A provides participants' demographic information in graphic format.

The objective of this study and the study by Laurian and Fitzgerald (2013) was to determine the percentage of university students who believe that the use of rubrics positively or negatively affects their learning. Although the studies share similar goals, this study deviated from the previous study in numerous areas. Laurian and Fitzgerald's (2013) study focused solely on students in a literature course, whereas this study intended to broaden the survey to include current students, undergraduate and graduate, across five colleges/disciplines in an entire university.

Another area where the current study took liberties was regarding the manner in which the data was collected. Laurian and Fitzgerald's (2013) study utilized pre- and post-tests to evaluate whether the students' perceptions shifted from the beginning of the course to its completion. The current study collected data only once during the Fall Semester of 2017.

An additional deviation from the original study is that the current study included demographic information, whereas the previous study did not. Data was divided according to demographic differences in an effort to answer the research questions accurately.

As Appendix B illustrates, the collection instrument used in this study consisted of a fifteen-question internet survey, constructed in Qualtrics, through which students were prompted to respond to questions concerning the use of rubrics along a five-point Likert scale. The survey questions were separated into three scored categories: rubric usage, perceptions of standards, and positive or negative impact.

The results of the survey were divided by student perceptions of rubrics according to the following three categories: usage, standards, and impact. A simple review of the deviations in the responses provided a comparative analysis that was used to identify differences between groups based on specific demographic information, such as age groups, first-generation vs. non-first-generation college students; graduate vs. undergraduates, colleges/disciplines, and other demographic variables.

RESULTS

The general consensus that emerges from this study is that most college and university students find rubrics effective. However, there were some discernable differences between different demographic categories. The findings have been separated according to the three major areas of inquiry identified in the research questions: student perceptions on the use of rubrics, the issue of standardization with the use of rubrics, and whether or not rubrics helped students. The results are illustrated graphically in Appendix B.

As indicated by Table 1, the results suggest that a higher percentage of females (81%) than males (54%) believed that rubrics helped their professors to grade more fairly. Additionally, there was a higher percentage of females (69%) than males (34%) who indicated that their work was better when they utilized a

rubric. This suggests that females are more apt to see positive impact stemming from the use of rubrics as illustrated by Table 2. However, the overall estimation is that the majority of participants of either gender found rubrics impactful.

Table 1. Student Perceptions of Impact by Gender

	Males	Females	Total
Totally Disagree	2	1	3
	4	10	14
Neutral	18	23	41
	16	92	108
Totally Agree	13	49	62
	53	175	228

Source: Original

Table 2. Student Perceptions of Impact by Gender

	Males	Females	Total
Totally Disagree	5	3	8
	6	18	24
Neutral	24	43	67
	10	77	87
Totally Agree	8	34	42
	53	175	228

The results of the study also showed that the majority of younger students, ages 18 to 35, held positive attitudes toward rubrics across all three constructs as shown in Appendix B. It is plausible that the small sample of students in the 55+ age group skewed the results. The fact that there were only three participants (.01%) in that category may have made their collective perceptions seem negative. There were no notable deviations in the results across the age groups.

The results did not indicate a significant difference in preference between first-generation college students and non-first-generation college students. The responses were almost completely uniform throughout each of the areas of inquiry.

An examination of the results filtered by academic level indicated that 86.05% of undergraduate students responded favorably toward the statement, “When I have a rubric I use it to inform my work,” while only 67.86% of graduate students responded favorably. This was the only discernable difference between the two groups in this category. This result was also somewhat unexpected, due to the higher frequency of writing assignments usually present in graduate-level courses. Table 3 offers a graphic illustration of the results.

Table 3. Student Perceptions of Rubric Usage by Academic Level

		Undergraduate	Graduate	Total
When I have a rubric available I use it to inform my work.	Totally Disagree	5	1	6
	Disagree	3	2	5
	Neutral	16	5	21
	Agree	67	12	79
	Totally Agree	81	36	117
	Totals	172	56	228

The demographic category with the most fluctuation between questions was which college the student was enrolled in/discipline the student was majoring in. An overview of the results shows that the majority of students in the College of Business, the College of Education and Professional Studies, and the College of Math and Science viewed rubrics as effective. The results showed overwhelmingly positive feedback toward rubric usage. The subject of rubrics, as they apply to standards, was wildly variable. Table 4 shows that approximately half of the participants responded positively to the statement, “A rubric helps me to raise the standard of my work.” Additionally, the College of Fine Arts and Design stood out as over 40% of respondents noted that they believed that rubrics stifle their creativity, as revealed by Table 5.

Table 4. Student Perceptions of Impact by College

		College of Business	College of Ed. and Prof. Studies	College of Fine Arts and Design	College of Math and Science	College of Liberal Arts	Total
	Totally Disagree	0	1	1	0	2	4
A rubric helps me raise the standards of my work.	Disagree	2	13	1	5	8	29
	Neutral	5	21	5	10	13	54
	Agree	10	32	2	30	23	97
	Totally Agree	4	21	1	6	12	44
	Totals	21	88	10	51	58	228

Source: Original

Table 5. Student Perceptions of Impact of Rubrics on Creativity by College

		College of Business	College of Ed. and Prof. Studies	College of Fine Arts and Design	College of Math and Science	College of Liberal Arts	Total
	Totally Disagree	4	7	0	3	5	19
A rubric stifles my creativity.	Disagree	10	58	2	25	23	118
	Neutral	6	12	4	13	13	48
	Agree	1	9	4	9	12	35
	Totally Agree	0	2	0	1	5	8
	Totals	21	88	10	51	58	228

Source: Original

The literature review was used to properly frame the research and illuminate the lack of available data on student perceptions of rubrics. While there have been several studies regarding faculty perceptions of rubrics, rubric design, and rubric impact on student achievement, there has been little regarding the perceptions of students.

The survey used in this study sampled a broad interdisciplinary group of students across different demographic categories, such as age groups, academic levels, colleges/disciplines, gender, and first-generation college student status. The survey was distributed via email to the entire student body at a university in the southwestern United States.

The fifteen questions, divided by constructs, rubric usage, standardization, and impact, were scored on a Likert scale. Results were filtered by demographic categories to examine whether there were distinct differences between specific groups. This research should bridge the gap in the field that examines only rubric design, student achievement, and faculty perspectives.

There was slightly less positive feedback from graduate-level students. Graduate-level students seemed to find less usage for rubrics and responded less positively to their employment. It is possible that graduate-level courses utilize rubrics less frequently. It is worth examining whether undergraduate students who prefer rubrics see a difference in assignment scores.

The findings seem to suggest that the students in the colleges that center on creativity, such as the College of Fine Arts and the College of Liberal Arts, find rubrics less impactful and more stifling. This substantiates a study by Young (2009) that suggests that rubrics suppress imaginative thought and generate an atmosphere of rigid standardization to assignments.

It is understandable that students in those fields that value creativity and more abstract theoretical principles would find rubrics constrictive. The results indicated fairly consistent responses across all of the questions that dealt with standardization. Future rubric design should focus on exploring design processes that mitigate the chilling effect of rubrics on creativity.

The same could be said for the questions measuring the construct regarding whether or not students perceive that rubrics impact achievement. The responses were nearly identical to those of the standardization construct. It is reasonable that students who find rubrics restrictive are less likely to use them, and therefore, are less likely to see any impact. Future research should assess whether or not faculty perceptions differ from students' perspectives.

IMPLICATIONS AND SIGNIFICANCE

This study should help fortify the current topic of educational research that centers on a learner-focus. A crucial step in shifting the current academic paradigm is to evaluate the tools that educators employ to aid students in becoming change-agents in their own development. As the results of this study have shown, the majority of college and university students find that rubrics are very effective components for guiding their individual learning processes.

This research should play a vital role in illuminating the salience of learner-centric instruction. This research contributes to the field of research by bridging the research between rubric design and student achievement. At the very least, it should serve as a starting point to a bigger conversation about the optimal methods for actual student transformation.

The findings should facilitate a change in the way educators view rubrics. Substantial benefits must exist if the research implies that students perceive such effectiveness. This research contributes to the practice of teaching by encouraging educators to incorporate rubrics.

The scope of this study was small, with data collected at only one university campus and in one semester. The results are moderately generalizable, but further research could expand the scope and sample for enhanced generalizability and applicability. Recommendations for future research are as follows:

1. Increase the size of the sample to include additional colleges and universities. This may ensure that the results are not merely a product of geographical differences.
2. Expand the timeline of the study to ensure optimal participation.

The results of this study imply that the majority of college and university students find rubrics effective. Therefore, it is reasonable to deduce that rubrics play a significant role in the learning process of adult students. If the world of academia is to progress, then it must incorporate the perspectives of its learners into its teaching processes. Rubrics are merely instruments by which instructors can guide their teaching and students can guide their learning. The onus is on current educators and researchers to optimize the effective use of these tools. After all, the primary function of education is to develop students into effective learners. There is no more efficient manner by which to obtain this objective than to utilize effective learning instruments.

Note: Demographic information on survey participants are available upon request. Contact the lead author if interested.

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AN ANALYSIS OF EXPECTED POTENTIAL RETURNS FROM SELECTED PIZZA FRANCHISES

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ABSTRACT

As small business entrepreneurs decide to start a small business, one possible option is franchising. A significant number of small businesses started during the last 30 years were franchises. Under a franchise model, a single proprietor gains benefits of a much larger corporation. Similar fees and monthly expenses are common to many franchise chains. However, many entrepreneurs are still confused over what fees are actually required, and what sort of monthly profits one should expect and what segment of the fast food industry offers the most potential. The McDonald's Corporation fee and monthly expense model seems to be common within the industry. This franchising model, as presented in earlier papers at the ASBBS Annual Conferences in February 2011 (Volume 18, Number 1) and in February 2015 (Volume 11, Number 1), provides important insights for the current analysis of the pizza sector of the industry. Franchise fees, royalty fees, advertising fees, purchase prices, expected monthly revenues, and potential bottom line profits will be analyzed. Pizza Hut, Domino's and Papa John's represent three national pizza franchises. These three franchise chains should serve as a very representative sample of this fast food sector. The current analysis of the pizza sector should be useful for those wanting to make enlightened comparisons and conclusions about potential bottom line profits in the pizza fast food industry. A general model will be presented for analyzing any fast food restaurant's monthly bottom line potential that can then be used by potential franchisees trying to make an informed decision about franchising.

Key Words: Franchise, Pizza Hut, baseline fees and expenses, monthly bottom line

INTRODUCTION

For most small business entrepreneurs who are considering the fast food industry or attempting to become a franchisee, the question of fees and bottom line profits are a major concern. In earlier published papers with the American Society of Business and Behavioral Sciences, comparisons of the fees, purchase prices, expenses and the projected annual revenues of various fast food restaurants have been presented. In the pizza fast food segment there are a variety of possible options that offer franchises. These include Pizza Hut, Domino's, Papa John's, Little Caesars, Mr. Jim's and CiCi's Pizza to mention a few. For the current analysis Pizza Hut, Domino's and Papa John's have been selected in order to

provide a good cross sectional look at the U.S. pizza fast food franchising industry and their bottom lines. According to “PMO Pizza magazine”, Americans will spend an estimated 44 billion dollars on pizza in 2017. Consumer demand for pizza grew 26% between 2015 and 2016. The bad news is that independent owned pizza restaurants are seeing sales drop while chain/franchise restaurants sales are increasing and they are continuing to add new stores. Market shares are shrinking for independent pizzerias while increasing for the franchise chains.

TABLE I BASE-LINE FEES & EXPENSES			
	Pizza Hut	Domino’s	Papa John’s
Monthly Fees			
Royalty % Fee	6% of sales	5.5% of sales	5% of sales
Advertising Fee (Marketing)	4.25% of sales	4% of sales	8% of sales
Purchasing Expenses			
Purchase Price	Between \$300,000 and \$2,100,000 (varies)	Between \$120,000 and \$400,000 (varies)	Between \$120,000 and \$400,000 (varies)
% Down of Purchase Price	25%	25%	25%
Franchise Fee	\$25,000	\$25,000	25,000
Projected Annual (Revenues)	\$880,000	\$750,000	\$800,000
Lease Agreement Term	20 years	10 years	20 years

In Table I, a summary of the three pizza fast food restaurants being analyzed, in this paper, are presented. This table presents different monthly fees, different projected annual revenues as well as the differences in initial purchase expenses. These fees and expenses are key factors used in this comparison analysis in order to look at bottom line profits of individual franchises. When looking at our specific pizza restaurants, we are only considering a traditional or stand-alone type of business with a drive through window and possible indoor seating. In this paper we did not consider non-traditional restaurants such as those located in airports, malls or found in some colleges. We will use the researched data on the three selected pizza franchises (Table I) to determine generic profit and loss (P&L) statements which allow us to then project bottom line profits.

For our data analysis and comparison, we will use basic descriptive statistics to summarize and present data comparing the franchise models of Pizza Hut, Domino’s, and Papa John’s. We will use a systematic comparison of fees, common industry expenses and projected annual revenues for our selected

franchises that will then allow us to figure monthly bottom line profits. This methodology will present opportunities for potential owner/operators looking into these types of businesses to make better decisions on what works best for their future financial success based on the data collected and the simplified Profit and Loss (P&L) models presented. Past and present literature searches and reviews on “franchising” offer little if any substantial data for comparisons of “bottom line monthly profits”. This is the area hopefully addressed in this paper. We believe the simple model we are presenting for analyzing potential bottom line profits can be used by potential franchisees looking into franchising to determine his or her chance for future success.

PIZZA HUT TRADITIONAL FRANCHISE --- FEES & MONTHLY BOTTOM LINE

When considering the monthly fees and bottom line profits for a Pizza Hut we are only analyzing the traditional or stand-alone type of building/business. Pizza Hut, with close to 7,500 U.S. locations, is generally recognized as the largest national/international chain of pizza fast food franchised restaurants. Pizza Hut started in 1958 in Wichita, Kansas and is currently operated under Yum Brands, Inc. The current business strategy of Pizza Hut appears to be product variety (more choices in pizza) while expanding globally. They offer sit-down restaurants, home delivery and in some locations serve beer and wine.

The purchase price of a traditional Pizza Hut varies depending on 1) past sales of existing restaurants or 2) total cost of building and opening a new restaurant. These options can vary usually run in the \$300,000 to \$2,100,000 dollar range per store, again depending on past sales and/or price of purchasing or leasing a building. The traditional Pizza Hut usually requires 25% of the purchase price to be put down by the franchisee. The franchisee must also pay an initial franchise fee of \$25,000 to Pizza Hut for a 20 year legally binding franchise agreement. In addition to the purchase cost and franchise fee, the Pizza Hut franchisee must also pay ongoing monthly fees. There is a monthly royalty fee of 6% of the monthly sales/revenues for that particular store payable to corporate Pizza Hut. There is also an ongoing advertising/marketing fee of 4.25% of monthly sales/revenues per store due to corporate Pizza Hut. This money is used for TV, radio, internet advertising, and promotions as well as other marketing expenses being supported by Pizza Hut. The average annual revenues for a Pizza Hut, as reported by Pizza Hut, are \$888,000. All of these Pizza Hut expenses and fees are separately illustrated in Table I. These fees, expenses, and revenues can now be used to predict monthly bottom line profits for a Pizza Hut. This sort of analysis shows what sort of monthly profits a potential franchisee could expect to make.

TABLE II

Pizza Hut Average Monthly Bottom Line (Approximate)	
Per Month Sales	\$74,000
Royalty Fee (6%)	- \$4,400
Advertising (4.25%)	- \$3,145
Labor (25%)	- \$18,500
Food & Paper (35%)	- \$25,900
Utilities (5%)	- \$3,700
Misc. (Insurance, Repairs, Uniforms) (5%)	- \$3,700
Total Expenses	\$59,345
Franchisee Bottom Line (w/o Mortgage)	\$14,655
Mortgage Payment	- \$5,000
Franchisee Bottom Line (w/Mortgage)	\$9,655
At Store Sale: Pizza Hut Franchisee gets equity from business sale	

Table II presents a simplified Profit and Loss (P&L) of all the monthly fees and revenues/sales for an average traditional Pizza Hut franchise. Using the reported average revenues for a Pizza Hut of \$888,000 per year, in this paper, we will estimate the monthly revenue to average around \$74,000 per month ($\$74,000 \times 12 \text{ months} = \$888,000$) for a Pizza Hut. We will then use Pizza Hut's monthly advertising fee of 4.25% and monthly royalty fee of 6% of the stores monthly revenues to figure monthly bottom line profit for a Pizza Hut (Table II). We then added the industry average of revenues for expenses such as labor (25%), food and paper (35%), utilities (5%) and miscellaneous expenses (5%) to figure an approximate bottom line monthly profit, before mortgage, of \$14,655 (Table II). Based on an estimated purchase price of approximately \$800,000 for a traditional Pizza Hut, with the required 25% put down, at 4% for 10 years, we estimate a monthly mortgage payment of approximately \$5,000. This number could vary depending on the actual purchase price, term of the loan, the interest rate, and ownership of the building (rented or purchased). Using this number (\$5,000) would result in a monthly bottom line of approximately \$9,655 to the franchisee and could increase to \$14,655 per month once the mortgage is paid off. Table II illustrates a simplified model or P&L with revenues (sales), franchise fees, and other industry expenses that can now be used to look at other pizza franchise bottom lines and make comparisons. These results will be further discussed and compared in the conclusion of this paper.

DOMINO'S TRADITIONAL FRANCHISE ---FEES & MONTHLY BOTTOM LINE

Domino's started in 1960 in Ann Arbor, Michigan by Tom Monaghan. Domino's is a global franchised restaurant with over 13,000 stores in over 85 countries and the United States. Dominos' are primarily smaller stores located in strip shopping centers. They follow a cost leadership strategy of lowest prices. They are mainly

carry-out and delivery oriented. They have enhanced the quality of their food products in recent years. They currently appear to be the industry leaders in on-line web site ordering through Facebook, Twitter, Apple Watch, etc.

Per Month Sales	\$62,500
Royalty Fee (5.5%)	- \$3,437
Advertising (4%)	- \$2,500
Labor (20%)	- \$12,500
Food & Paper (35%)	- \$21,875
Utilities (5%)	- \$3,125
Misc. (Insurance, Repairs, Uniforms) (5%)	- \$3,125
Total Expenses	\$46,562
Franchisee Bottom Line (w/o Mortgage)	\$15,938
Mortgage Payment	- \$4,000
Franchisee Bottom Line (w/Mortgage)	\$11,938
At Store Sale: Domino's Franchisee gets equity from business sale	

Using the same approach that we followed in analyzing Pizza Hut, we will now look at the fees and expenses of franchising a traditional style Domino's (Table I) to determine potential bottom line profits (Table III). Domino's purchase prices vary based on 1) the past sales of existing restaurants or 2) total cost of all the expenses of building and opening a new restaurant. Purchase prices for a Domino's are reported to run in the \$100,000 - \$400,000 dollar range. Franchisees must also pay for a Franchise agreement from Domino's of \$25,000 for a 10 year franchise legal binding agreement.

Domino's franchises have very similar monthly fees, expenses and revenues when compared to other franchises and are shown in Table III. We used \$62,500 per month for revenues based on reported annual sales of approximately \$750,000 (\$62,500 X 12=\$750,000) for a traditional store (Table I). We used the 5.5% royalty fee and the 4% advertising fee as required for a traditional Domino's (Table I). Food and paper costs should be very similar to Pizza Hut or the industry average, and we used 35% of monthly revenues. For labor we used an industry average of 20%. This is lower than Pizza Hut due to extensive on-line ordering and less sit down restaurants. The utility and miscellaneous expenses, we will assume, both remain at approximately 5% of revenues. Subtracting all the monthly expenses from the monthly revenue, we see a bottom line profit of \$15,938 without a mortgage (Table III). Adding in a smaller mortgage of \$4,000 per month (using the same parameters as Pizza Hut but based on lower purchase prices and smaller scale facilities), we see a bottom line profit of \$11,938 for your traditional

Domino’s (Table III). Again, this mortgage payment could vary for various franchisees depending on the purchase price, terms of the loan, interest rates and the amount initially put down by the franchisee. These results will be further discussed and compared in the conclusion paragraph of this paper.

PAPA JOHN’S---FEES & MONTHLY BOTTOM LINE

Papa John’s was started in 1983 by John Schnatter in Jeffsonville, Ind. Papa John’s is an international franchised pizza restaurant with approximately 2,500 stores in the U.S. and another 1,000 stores in 29 other countries. Papa John’s follows a strategy of healthy, quality pizzas. Their motto is “Better ingredients, Better pizza.” They insist on “one supplier” quality control centers for all franchisees to insure product consistency. In recent years, they have increased on-line ordering capabilities similar to Domino’s. Papa John’s is mainly carry-out and delivery oriented and located in strip shopping centers.

TABLE IV Papa John’s Average Monthly Bottom Line (Approximate)	
Per Month Sales	\$66,666
Percent Rent (5%)	- \$3,333.30
Advertising (8%)	- \$5,333.28
Labor (20%)	- \$13,333.20
Food & Paper (35%)	- \$23,333.10
Utilities (5%)	- \$3,333.30
Misc. (Insurance, Repairs, Uniforms) (5%)	- \$3,333.30
Total Expenses	\$51,999.48
Franchisee Bottom Line (w/o Mortgage)	\$14,666.52
Mortgage Payment	- \$4,000
Franchisee Bottom Line (w/Mortgage)	\$10,666.52
At Store Sale: Papa John’s Franchisee gets equity from business sale	

Using the same approach that we used for Pizza Hut and Domino’s, we will now look at the fees and expenses of franchising a traditional style Papa John’s (Table I) to determine potential bottom line profits (Table IV). Papa John’s purchase prices again can vary based on 1) the past sales of existing restaurants and/or 2) on the total expense of building and opening a new restaurant. Purchase prices for a Papa John’s are reported to be between \$120,000 and \$400,000, with emphasis on smaller leased strip shopping center buildings. This is very similar to the approach of Domino’s. Franchisees must also pay for a Franchise Agreement from Papa John’s of \$25,000 for a 20-year franchise legal binding agreement.

Papa John’s franchise monthly fees, expenses and revenues are all shown in Table I. We used \$66,666 per month for revenues based on reported annual sales of approximately \$800,000 for a traditional store (Table I). We used the 5% royalty

fee and the 8% advertising fee as required for a traditional Papa John's. Food and paper cost should be similar to the industry average and we used 35% of monthly revenues. For labor we used the 20% similar to how we figured Domino's. The utility and miscellaneous expenses we will assume again remain each at approximately 5% of revenues. Subtracting all the monthly expenses from the monthly revenue, we see a monthly bottom line profit of \$14,666.52 without a mortgage (Table IV). Adding in a mortgage of \$4,000 per month we now see a bottom line profit of \$10,666.52 per month (Table IV). We again used a lower mortgage payment of \$4,000 (similar to Domino's) due to lower expenses involved in purchasing a Papa John's. Again, this mortgage payment could vary for various franchisees depending on the purchase price, terms of the loan and the amount initially put down by the franchisee. These results will be further discussed and compared in the conclusion of this paper.

FRANCHISE PIZZA CONCLUSIONS

Once you have determined the various percentages of revenue required to be paid in monthly franchise (royalty fee and advertising fee), combined with the projected annual revenues that a normal franchise can expect to make (as shown in Table I), you can formulate a simplified profit and loss statement to estimate monthly bottom line profits. These franchise fees and revenue estimates can be obtained from 1) the corporation's Uniform Franchise Offering Circular--- which is usually only made available to pre-qualified potential franchisees or 2) can usually be found on most corporate websites. This is the type of information that can significantly help a potential franchisee determine their monthly profit for any type of fast food franchise.

In this paper we did not discuss in great detail the actual costs of purchasing the franchise since costs vary from store to store and depend on the negotiated sale price of an existing restaurant or the cost of building a new restaurant. These factors would determine the actual amount of the mortgage payment. For our purchase price we estimated mortgage payments based on approximations of what we felt were reasonable with 25% down at 4% for 10 years all based on the costs as presented for buildings and equipment by the corporate headquarters. It appears most Pizza Hut buildings are owned or purchased by the franchisee while Domino's and Papa John's lease store space. Hence, in this paper we consolidate "rent or purchase" options under the mortgage cost line in our P&L statements. These mortgage payments could also vary based on the amounts initially put down by the franchisee. When a potential franchisee is comparing bottom line profits (Tables II-IV), they should also analyze the impact of the monthly franchise fees and expenses as well as the predicated monthly revenues. This simple technique of subtracting the appropriate corporate fees and common expenses (food, labor, etc.), from the projected monthly revenues, provides numerous useful insights about a franchise. The potential franchisee can now figure what sort of mortgage payment can realistically be made as well as what sort of targets for food and labor need to be set and established in order to be profitable. A potential franchisee can

use this generic model to analyze any pizza fast food franchise or any other fast food segment to make comparisons and analyze potential profits.

When looking at our sample of Pizza Hut, Domino's and Papa John's, we see numerous similarities with some differences. Following are some of the things that stand out in our sample of restaurants and that could be further analyzed by a potential franchisee:

- 1) The strategies of our three selected franchises all seem to be somewhat similar but with some marked differences. Pizza Hut is looking at more food choices and larger, faster global growth. Domino's is looking for improved food quality and updated store appearance. Domino's is also focusing on the younger consumer with more on-line ordering and faster delivery with customer tracking capabilities. Papa John's appears to be heavily focused on "Better ingredients, Better pizza" with controlled global growth.
- 2) The monthly royalty fees (Table I) are all similar (5%-6% range) and all essentially have a similar fee and expense structure in place that are found in most fast food franchises.
- 3) One expense that does stand out is Papa John's requirement for a monthly 8% marketing fee. This is significantly higher than the 4.25% of Pizza Hut and the 4% of Domino's. This advertising fee does however appear to be successful when you consider the higher annual revenues being claimed by Papa John's versus Domino's (\$800,000 vs. \$750,000).
- 4) Pizza Hut claims the largest revenues which may be influenced by alcohol sales which Domino's and Papa John's do not include. All three of our franchises still, however, have similar monthly bottom lines (before subtracting a mortgage) of approximately of \$14,000 to \$16,000.
- 5) When a mortgage is added in, the largest bottom lines are shown by Domino's and Papa John's (approximately \$10,000 to \$11,000). Pizza Hut's smaller bottom line could be a result of larger purchase prices for larger sized stand-alone buildings.
- 6) Domino's and Papa John's appear to offer the most opportunities for growth in the U.S. with a corporate strategy currently in place to grow and expand the overall franchise. These two also encourage franchisees to own and operate multiple store locations in order to increase overall profits for the franchisee.
- 7) It appears all of our analyzed companies can be profitable in varying degrees. Additionally, all three of our franchises provide the franchisee equity in the business upon sale of the business (differing from "licensing options" in businesses like Starbucks and Chick fil-a).

One should not overlook the fact that this model does not always reflect true bottom lines since location, marketing, and the amount of time and effort put in by the franchisee will impact bottom line success. Potential franchisees using this model, can now consider numerous variations of revenues and expenses that best fits their management style and business strategy. Another fact to be considered is the ownership of multiple fast food restaurants. One should not assume that each individual store in a group of multiple stores will perform as well as one individual store as shown in our bottom line results. Owning multiple stores usually results in reduced bottom line profits of the individual stores. In other words, owning three Domino's will probably not result in a bottom line of 3 X \$11,938. You should expect something less due to management issues of increased food and/or labor. This is a similar phenomenon in all franchised fast food stores. Hopefully, our simple but yet effective method of analyzing fast food bottom line profits, is a potential tool franchisees/licensees should consider before purchasing any fast food business.

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COGNITIVE FLEXIBILITY, PROCRASTINATION, AND NEED FOR CLOSURE LINKED TO ONLINE SELF- DIRECTED LEARNING AMONG STUDENTS TAKING ONLINE COURSES

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ABSTRACT

This study examined the links between self-directed learning online with students' propensities toward cognitive flexibility, procrastination, and need for closure. Over 200 college students completed measures of online self-directed learning, cognitive flexibility, procrastination, and need for closure. Regression analyses indicated that students with higher cognitive flexibility scores were better at exploring online sources, engaging with peers and instructors online, and monitoring the success of their learning. Students with high procrastination scores were less proficient in time management for online courses. Students with a strong need for closure were less proficient in managing their stress in online courses.

Key Words: Cognitive flexibility, online learning, self-directed learning, procrastination, time management

INTRODUCTION

Cognitive flexibility entails the propensity to interpret information, make decisions, and modify attitudes in the face of changing environments or new information (Martin & Rubin, 1995). The purpose of this research is to extend the investigation of cognitive flexibility into the online course work. It is an exploration of the links between self-directed learning online with cognitive flexibility and the psychological characteristics of procrastination and need for closure.

Self-directed learning in the online environment emphasizes that the learner has a sense of autonomy in the learning processes. The educational environment is flexible; lectures and discussions are asynchronous. In addition to the self-regulation processes of studying, the online self-directed learner is making decisions about when to learn, how to pace the learning, and what additional online resources they may use in the learning process (Song & Hill, 2007).

Although the online environment poses its own challenges, it is critical to consider students' psychological variables (as opposed to just the online environment). The focus of this study examines three psychological variables, cognitive flexibility,

procrastination, and need for closure. These characteristics are likely to affect how students explore online learning, how they manage their time, and their willingness to interact with others online.

Cognitive flexibility is described as the propensity to be vigilant for the need to change one's mind or actions, then making adjustments in change in action, and evaluating the effectiveness of the change (Spiro, Collins, & Ramchandran, 2007). Cognitive flexibility allows individuals to cope with an ever changing and complex environment.

Procrastination is the intentional delay in carrying out tasks to the degree that discomfort is felt as the deadline looms near. Procrastination has been linked to poor academic performance (Hoa, 2015). Need for closure is an effort to experience predictability and decisiveness. One quickly seizes upon an answer and resists change or freezes on the answer (Kruglanski, 1990). Need for closure results in impulsive decisions and close mindedness toward changing one's decision (Roets & Heil, 2011).

Hence, in this study, we examine three psychological variables inherent in students generally (as opposed to online environment only). These characteristics are likely to affect how students explore online, how they manage their time, and their willingness to interact with others online.

METHOD PARTICIPANTS

College students from two universities (West Coast $n = 119$ and Midwest $n = 119$) participated in this study. The majority of students were female (60%). Their average age was 25 (range from 19 – 54, $SD = 6.48$). Although ethnicity varied the majority of students with either Euro-American or Asian American (African American = 4; Asian American = 55; Indian American = 4; Euro-American = 98; Hispanic/Latino = 34; Non-identified = 33). Half of the students were business majors. The remaining 50% of students were from the social sciences, such as education, psychology, and communication. Students were offered extra credit for their participation.

INSTRUMENTS

Self-Directed Learning Online

Self-Directed for online learning was assessed using the Khat (2015) measurement. This instrument consists of 40 statements about students' thoughts and actions during online learning. Students responded to a 6-item scale from strongly disagree to strongly agree to items about online learning such as the following. "The items I gather for my assignments are relevant." "I find excuses for not studying." "I do poorly on tests and examinations." For the purpose of this study we categorized the subscales into five subsets. Online learning processes

subsets included assignment management, online learning proficiency, and technical proficiency. Online interactions with peers and instructors included online discussion proficiency and seminar learning proficiency. Online time management included online procrastination management and online time management. Online stress included stress management. Monitoring online learning success included comprehension competence and examination management. Cronbach alphas range from .66 to .86. Scores predict students' GPA.

Cognitive Flexibility

Cognitive flexibility was measured by a 12-item instrument (Martin & Rubin, 1995) which assess individuals' awareness and willingness to change based on situational demands. Students responded to a 6-item scale from strongly disagree to strongly agree to items about online learning such as the following. "I can communicate an idea in many different ways." "I have many possible ways of behaving in any given situation." Cronbach alpha has been reported as .80. Test-retest reliability has been shown as .83.

General Procrastination

General procrastination (in general as opposed to online) was measured with a 7-item instrument (Tuckman, 1991) that assesses individuals' inclination toward delaying activities until the last minute. Students responded to a 6-item scale from strongly disagree to strongly agree to items about online learning such as the following. "I postpone starting in on things I don't like." "I manage to find an excuse for not doing something." Cronbach alphas has been reported as .90. Scores on this instrument predict self-regulated learning (Tuckman, 1990).

Need for Closure

Need for closure was measured with a 15-item instrument that measures individual's need for quick decisions and predictability. Students responded to a 6-item scale from strongly disagree to strongly agree to items such as the following. "I dislike unpredictable situations." "I would rather make a decision quickly rather than sleep on it." Cronbach alpha for this scale is .87. Test-retest correlation has been shown as .79 (Roets & Hiel, 2011).

PROCEDURE

An online survey using Qualtrics was constructed. Questions assessed students' cognitive flexibility, procrastination, need for closure, self-regulation online, experience with online classes, and basic demographic information. Two versions of the survey were constructed by re-ordering the assessments in each. This was done to determine whether the order the questions would affect the results.

RESULTS

Psychometric Properties

Each key variable was examined for internal reliability (Cronbach alpha) and skewness. No variables were skewed above 1.0.

In Table 1, we tested differences between universities among all key variables. There were no significant differences between universities for any of the key variables, therefore, university affiliation was not included in subsequent analyses. Nor were there any differences for order effect.

Table 1: Cronbach Alphas and Descriptive Statistics of Self-Directed Learning Online and Cognitive Characteristics

Key Variables	Cronbach Alpha	<i>M</i>	<i>SD</i>
Assignment Management	.70	4.34	0.74
Seminar Learning Proficiency	.70	3.85	0.90
Examination Management	.68	3.68	1.15
Time Management	.78	4.38	0.90
Comprehension Competence	.86	4.24	1.06
Discussion Proficiency	.82	4.10	1.14
Learning Proficiency	.80	4.15	0.99
Procrastination Management	.79	3.29	1.06
Stress Management	.74	2.21	1.05
Technical Proficiency	.78	4.83	0.99
Procrastination in General	.72	3.40	0.74
Need for Closure	.68	3.58	1.02
Cognitive Flexibility	.80	4.73	0.58

Note. Scores ranged from 1 (strongly disagree) to 6 (strongly agree).

Table 2 shows the correlations among the self-directed learning variables.

Table 2: Correlations Between Self-Directed Learning Online and Cognitive Characteristics

	Cognitive Flexibility	Procrastination	Need for Closure
Assignment Management	.34	-.26	-.17
Seminar Learning Proficiency	.28	-.11	.01
Examination Management	.33	-.23	-.11
Time Management	.10	-.42	.05
Comprehension Competence	.31	-.21	-.22
Discussion Proficiency	.28	-.25	-.18
Learning Proficiency	.31	-.20	-.21
Procrastination Management	.06	-.42	-.13
Stress Management	.02	-.20	-.27
Technical Proficiency	.29	-.14	-.18
Procrastination (in General)	-.29	1.0	.17
Need for Closure	-.22	.17	1.0

Note. Correlations above .20 are significant.

Table 3 shows the correlations between the psychological variables and the self-directed learning variables.

Table 3: Correlations Among Self-Directed Learning Characteristics

	Assign	Seminar	Exam	Time	Comp	Discuss	Learn	Proc	Stress
Assign									
Seminar	.36								
Exam	.23	.11							
Time	.30	.31	.10						
Comprehend	.63	.14	.28	.19					
Discuss	.55	.17	.16	.25	.57				
Learning	.68	.22	.28	.18	.70	.66			
Procrastinate	.34	.16	.10	.39	.33	.42	.45		
Stress	.03	-.02	.20	-.022	.17	.16	.14	.11	
Tech	.34	-.05	.18	.17	.36	.49	.48	.26	-.04

Predicting Self-Directed Learning

Analyses addressed the overarching question: Do psychological characteristics, previous online class experience, and demographic variables contribute to students' self-directed learning for online classes? Each self-regulation variable was regressed on psychological variables (cognitive flexibility, procrastinate, need closure) and demographic variables (age, gender, education level, English as first language, prior online course experience) in step-wise regression. In each step of the regression the significant variable accounting for the most variance entered. Each regression analysis was complete when none of the remaining variables were significant. Table 4 shows the overall pattern of results. Table 5 shows the results for each of the nine regressions. Although essential details of each regression are shown in Table 5, the regression equations can be discerned from this information. For example the regression equation that predicts Assignment Management is as follows: $Y = 2.13 + (.47)*\text{cognitive flexibility} + (-.16)*\text{procrastination} + (.22)*\text{gender}$.

Table 4: Pattern of Significant Predictors and the Valence of the b weight

Online Criterion Variable	Predictor Variables						
	Cognitive Flexibility	Procrastinate In General	Need for Closure	Gender	Online Class Experience	Educ	Age
Assignment Management	+	-		w			
Seminar Learning Proficiency	+				-		
Examination Management	+			m		+	
Time Management Comprehension Competence	+	-	-	w		+	
Discussion Proficiency	+	-					
Learning Proficiency	+			w	+		
Procrastination Management		-		w	+		
Stress Management Technical Proficiency	+		-		+		+

Note. Plus and minus signs show significant b weights and their valence. The letters “m” and “w” represent either men or women having significantly higher scores.

Table 5 Regressions Predicting Online Self-Directed Learning

Table 5					
Online Criterion Variable	Predictor Variable	R^2	b-weight	F change	sig
Assignment Management	Cognitive flexibility	.14	.47	29.67	.001
	Procrastination	.02	-.16	5.02	.03
	Gender	.02	.22	4.22	.04
Seminar Learning Proficiency	Cognitive Flexibility	.08	.44	15.82	.001
	Online Class Experience	.02	-.04	4.64	.03
Examination Management	Cognitive Flexibility	.10	.58	20.78	.001
	Education	.03	.34	5.42	.02
	Gender	.02	-.38	5.27	.02
Time Management	Procrastinate (general)	.20	-.55	46.90	.001
Comprehension Competence	Cognitive Flexibility	.12	.61	24.10	.001
	Education	.08	.53	17.88	.001
	Gender	.03	.40	7.04	.009
	Need for Closure	.02	-.15	4.68	.03
Discussion Proficiency	Cognitive Flexibility	.08	.55	16.98	.001
	Procrastinate (general)	.04	-.30	7.49	.007
Learning Proficiency	Cognitive Flexibility	.10	.55	21.25	.001
	Online Experience	.03	.05	6.95	.009
	Gender	.03	.34	5.48	.02
Procrastination Management	Procrastinate (general)	.19	-.62	43.50	.001
	Gender	.04	.42	8.27	.005
	Online Experience	.03	.06	8.01	.005
Stress Management	Need for Closure	.07	-.28	13.90	.001
	Age	.03	.03	5.22	.02
Technical Proficiency	Cognitive Flexibility	.09	.48	7.34	.001
	Online Class Experience	.03	.05	5.70	.02

Online Learning Processes

When assignment management was the criterion variable, three predictor variables were significant, specifically, cognitive flexibility, procrastination, and gender. These accounted for 18% of the variance. Students with higher cognitive flexibility, less procrastination, and women reported being able to manage the online assignments.

When online learning proficiency was the criterion variable, three predictor variables were significant, specifically, cognitive flexibility, online experience, and gender. They accounted for 16% of the variance. Students with more cognitive flexibility, more online experience, and women were more likely to report better studying proficiency with online courses.

When technology management was the criterion variable, two predictor variables were significant, specifically, cognitive flexibility and online course experience. They accounted for 11% of the variance. Students with more cognitive flexibility and more online course experience, were more likely to report anxiety with technology while taking an online course.

Interacting with Peers and Instructors

When online discussion proficiency was the criterion variable, two predictor variables were significant, specifically, cognitive flexibility and procrastination. They accounted for 12% of the variance. Students with more cognitive flexibility and less procrastination habits, report having better experiences with online discussion.

When seminar learning proficiency was the criterion variable, two predictor variables were significant, specifically, cognitive flexibility and online experience. They accounted for 10% of the variance. Students with higher cognitive flexibility and fewer online experiences reported more benefits when experience seminars in online classes.

Time Management

When procrastination management was the criterion variable, three predictor variables were significant, specifically, procrastination in general, gender, and online experience. They accounted for 26% of the variance. Students who were less inclined to procrastinate in general, women, and students having more online experience were less likely to procrastinate with online courses.

When time management online was the criterion variable, one predictor variable was significant, specifically, procrastination in general. It accounted for 20% of the variance. Students who were less likely to procrastinate reported better time management for online courses.

Stress Management

When stress management was the criterion variable, two predictor variables were significant, specifically, need for closure and age. They accounted for 10% of the variance. Students with less need for closure and older students were more likely to report being able to manage stressed with online learning.

Monitoring Learning Success

When comprehension competence was the criterion variable, four predictor variables were significant, specifically, cognitive flexibility, education level, gender, and need for closure. They accounted for 24% of the variance. Students with higher cognitive flexibility, more years in college, less need for closure, and women, were more likely to report comprehending material online.

When examination management was the criterion variable, three predictor variables were significant, specifically, cognitive flexibility, education level, and gender. They accounted for 15% of the variance. Students with more cognitive flexibility, more education, and men, reported for confidence with online tests.

DISCUSSION

This study provides insight into student characteristics that contribute to their self-directed learning while taking online courses. Cognitive flexibility had the most prevalent significance. Cognitive flexibility was linked to exploring and studying in an online environment, student interaction with their online peers and instructors, and proficient use of technology. All of these learning competencies may explain why cognitive flexibility also predicted success with monitoring learning success.

The time and stress variables were linked to either general procrastination or need for closure. Specifically, general procrastination predicted poor online time management and online procrastination. Need for closure predicted poor stress management.

Overall, this study has implications for instruction both online and off line. First, previous research has indicated that cognitive flexibility, procrastination, and need for closure influence learning off line. Instructors may wish to support cognitive flexibility by encouraging students to explore new ideas by using multiple sources and freely engaging with their peers. Instructors are well advised to discourage procrastination by requiring frequent task completion. Instructors may try to alleviate the anxiety of need for closure by providing timely, feedback when students are on their journey of exploration and discovery of ideas. Ongoing feedback will let students know if they are on the right track (or need to find a different path). It also provides psychological comfort. Indeed, when instructors have well developed courses and deep understanding of where students procrastinate or go off track, they may want to work with software developers to provide automatic feedback at specific points in the online course.

This research has limitation that may be addressed in future research. Other measures of psychological variables and self-directed learning may add insight. Online real-time data collection may provide more detailed understanding of the role of exploratory behavior and self-directed learning. Testing instructional interventions to enhance both the psychological variables and the self-directed learning processes would allow for causal claims.

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LEARNING STYLES OF HISPANIC STUDENTS

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ABSTRACT

This study was adapted from a learning styles questionnaire in *College Study Strategies* (Laskey & Gibson, pp. 52-53, 1997) and is a continuation of previous research by the authors. The authors administered the adapted questionnaire for two years to undergraduate education and legal online students in a Southern Hispanic serving institution. The questionnaire allowed students to identify their preferred method of learning online material. Results of the learning styles questionnaire will be presented and compared with the previous year's results. A discussion of field dependent and independent learning styles for Hispanic online learners will be presented. Recent research and the evidentiary rationale for attempting to match specific learning styles and activities will be explored.

KEYWORDS: Online Courses, Field-Dependent, Field-Independent, Learning Styles

INTRODUCTION

How an individual approaches learning and retaining new information will depend on many different factors – only one of which can be identified as learning styles. Depending on the perspective of the researcher, the identification, classification and definition of learning styles varies widely. “How learners gather, sift through, interpret, organize, come to a conclusion about and store information for further use” is one definition of learning styles (Chick, n.d.). In addition, the interchangeable terminology of learning styles can be confused with terms such as thinking styles, cognitive styles, and learning modalities. In this paper, as in the previous paper of Jones & Blankenship (2017), the view has been adopted that learning styles refer to “the preferential way in which the student absorbs, processes, comprehends and retains information” (Teach.com, 2016). In exploring learning styles, Jantan and Razali (as cited in Othman & Amiruddin, 2010) define learning styles as the way a student deliberates, as well as how they approach the processing of material, knowledge, and experience. Each individual possesses a different mix of learning styles; some that may be more dominant than others or some that may be used depending on the circumstances and the information to be learned (Learningstyles.com, 2016). “Despite the popularity of learning styles and inventories, it is important to know that there is no evidence to support the idea that matching activities to one’s learning style improves learning” (Chick, n.d.). Pashler, McDaniel, Rohrer and Bjork (2009) reviewed hundreds of published research studies to determine whether there was credible evidence to support using learning styles in instruction. They concluded that “although the literature on learning styles is enormous,” they “found virtually no evidence”

supporting the idea that “instruction is best provided in a format that matches the preference of the learner” (Pashler, McDaniel, Rohrer & Bjork, 2009, p. 105). Despite the fact that the literature on learning styles have indicated no supporting evidence for matching learning styles to successful retention of information, there are similar quantities of literature promoting the use of different types of learning styles to assist students in learning and retaining information. Thus, the learning styles upon which this study will be concentrating are the field dependent and field independent models.

FIELD DEPENDENCE/FIELD INDEPENDENCE

Learning styles and learning strategies have been the focus of many academic research studies. The concept of learning styles was described by Kolb as “the process whereby knowledge is created through the transformation of experience” (Kolb, 1984, p. 38). Weinstein and Mayer offered a broader definition of learning strategies as those “behaviors and thoughts that a learner engages in during learning and that are intended to influence the learner’s encoding process” (Weinstein & Mayer, 1986), p. 315). Witkin, an American psychologist, began his exploration of one dimensional models of variation in cognitive styles in the early 1960s (Witkin, Dyk, Faterson, Goodenough, & Karp, 1962). Witkin’s theory of field dependent-field independent cognitive styles has been extensively used in research (Saracho, 1998). His Embedded Figures Test (EFT) shows examinees a simple figure and then asks participants to locate that figure which is embedded within a relatively complex design (Goodstein, 1978). As Woolbridge and Haimen-Bartolf (2006) explained, citing Witkin and Goodenough (1981, p. 15), “To locate the simple figure it is necessary to break up the exposed pattern so as to expose the figure. It was found that subjects who had difficulty separating the sought-after simple figure from the complex design . . . were the ones who were field dependent. Conversely, people who were field independent . . . found it easy to overcome the influence of the organized complex design in locating the same figure within it.” Thus, the construct of field dependence-field independence refers to “the way individuals respond cognitively to confusing information and unfamiliar situations,” and the behaviors that the responses produce (Irvine & York, 1995). Griggs and Dunn (1996) stated that, “Field-dependent individuals are more group oriented and cooperative and less competitive than field-independent individuals.” Wooldridge and Haimen-Bartolf (2006) reviewed the literature on field-independence/dependence research and found a common theme: field-dependent learners will “require more structure” than field-independent learners “in order to achieve the same level of learning” (p. 251).

Griggs and Dunn (1996) reviewed research on Mexican-American (i.e., Hispanic) students’ learning styles and summarized results into environmental; emotional; sociological, physiological, and psychological categories. They concluded teachers should expect larger numbers of Hispanic students to prefer: “(1) a cool environment; (2) conformity; (3) peer-oriented learning; (4) kinesthetic instructional resources; (5) a high degree of structure; (6) late morning and afternoon peak energy levels; (7) variety as opposed to routines; and (8) a field-dependent cognitive style” (Grigg & Dunn, p. 4).

Mestre (1997) cautioned awareness of cultural differences when demonstrating the use of computer accessed information. She stated, “. . . field-dependent learners, such as Latinos, must see the big picture, seek to find personal relevance in the task at hand and require that some sort of personal relationship is established between the instructor and the student” (p. 191).

METHODOLOGY

This study is a continuation of an earlier study, *Learning Style Preferences and the Online Classroom*, published in 2017 by Jones & Blankenship (for clarity, referred to herein as the 2016 Jones & Blankenship study). In that study, the majority of Hispanic students participating listed themselves as field independent learners while up to that point, studies had identified the majority of Hispanic students as being field dependent learners (Griggs & Dunn, 1996). Because the results of that study ran contrary to other studies, the authors decided to run the study for another year to ensure the description of Hispanic learners was accurate.

In continuing this study, the authors included the adapted version of the field dependent and field independent inventory from Laskey and Gibson’s (1997) *College Study Strategies: Thinking and Learning* (pp. 52-53) and incorporated this inventory as part of the orientation section of their courses. Students enrolled in the authors’ legal and education online courses during the fall 2017 semester were provided the opportunity to take this inventory at the beginning of the semester if they wished to find out which style was dominant for their learning. No grades, rewards or penalties were offered for taking or not taking this inventory. This survey was included as part of the students’ orientation into the courses.

Participants	Total Number of Possible Respondents	Total Actual Respondents	Percentage
2017 Study	154	83	53%
2016 Study	200	121	60%

FINDINGS

This study focuses on field-dependent and field-independent aspects of learning styles and which of these two styles may be more dominant for Hispanic learners. In an effort to compare the findings of this 2017 study and the 2016 Jones & Blankenship study, data from both studies will be reported. Out of approximately 154 possible participants, 87 participants or 57% (four unresponsive) of the inventories were submitted for a total of 83 responses or 53% completed responses to the 2017 survey. In the 2016 study, out of 200 possible participants, 121 participants or 60% completed the survey. The number of responses in both surveys were within the same range.

Total Number	Field-Dependent	Field- Independent	Equal or No Dominant Style

2017	24	28%	41	49%	18	21%
2016	31	25%	64	52%	26	21%

In establishing the number of responses in a particular learning style, an aggregate number is reported for each category: Field Dependent Learners, Field Independent Learners and an Equally Dependent and Independent Learners or no dominant style category. The number of participants in this study that had the majority of their responses in the field dependent category was 24 participants or 28% of the total responses.

Dependency and Ethnic Category	Responses 2016	Percentage of Responses 2016 (rounded)	Responses 2017	Percentage of Responses 2017 (rounded)
Field Dependent Responses from Hispanic Students	27	22%	19	23%
Field Independent Responses from Hispanic Students	47	39%	32	38%
Equal Number Field Dependent and Field Independent Responses from Hispanic Students	21	17%	14	17%
Field Dependent Responses from Non-Hispanic Students	4	3%	5	6%
Field Independent Responses from Non-Hispanic Students	17	14%	9	11%
Equal Number of Field Dependent and Field Independent Responses from Non-Hispanic Students (No Dominant Style)	5	4%	4	5%
Total Number of Participants	121	100%	83	100%

The number of participants in this study that had the majority of their responses in the field independent category was 41 participants or 49% of the total responses and the number of participants that had an equal amount of field dependent and field independent responses or no dominant style was 18 or 21% of the total responses.

Table 4: Responses by Question

Dependency Characteristic	Question Number	Number of True Responses 2017 N=83	Number of True Responses 2016 N=121	Percentage of True Responses 2017	Percentage of True Responses 2016
Field Dependent	#2 I study with friends or in a group	44	28	53%	23%
Field Dependent	#5 I am not overly motivated to study unless I have deadlines to meet	34	37	41%	31%
Field Dependent	#6 I tend to procrastinate	58	51	70%	42%
Field Dependent	#8 I prefer teachers who provide careful course outlines and objectives	79	71	95%	59%
Field Dependent	#10 I prefer teachers who require participation in a class discussion board where my contributions are graded.	61	53	74%	43%
Field Independent	#1 I like to study alone	74	111	89%	92%
Field Independent	#3 I like to study in a quiet place	75	113	90%	94%
Field Independent	#4 I enjoy my studies and do not need any outside motivation to study	40	72	48%	60%
Field Independent	#7 I am usually prepared	70	101	84%	83%
Field Independent	#9 I prefer teacher who use lectures and textbook readings as a method of teaching	58	98	70%	81%

When looking at the ethnicity of the responses in this study, out of the 83 participants, 65 students or 78% were of Hispanic origin while 18 students or 21% were non-Hispanic. In the 2016 study, 95 participants or 78% were of Hispanic origin while 26 participants or 21% were non-Hispanic. Comparatively, the number of Hispanic and non-Hispanic students in both studies was steady. Because the authors' work at a Hispanic-serving institution, these percentages were not surprising. Of the 18 non-Hispanic participants or 21% in the 2017 study and the 26 non-Hispanic participants or 21% in the 2016 study, no effort was made to identify specific racial categories.

In Table 4, the authors report each question and whether it was considered a field dependent or field independent characteristic if the participant answered with True. In this survey and reflected in Table 2, questions 2, 5, 6, 8 and 10 are statements that if a participant responds with True, this response indicates field dependent

characteristics. Questions 1, 3, 4, 7 and 9 are the statements that if a participant responds with True, this response indicates field independent characteristics.

It is interesting to note that the Field Dependent Questions from 2017 reported between 10 – 36% higher than the previous year; whereas, except for Question 7, the Field Independent Questions from 2017 had lower percentages reported.

While Griggs and Dunn (1996) found Hispanic students to be field dependent, Jones and Blankenship's 2016 study found Hispanic students to be more field independent. This 2017 study once again finds Hispanics to be more field independent. This difference might be attributed to the fact that all students in both the 2016 and 2017 studies were in online classes and online classes may require more of a field independent learner. This difference could also be attributed to the rising English proficiency of Latinos. The English proficiency share of U.S. born Latinos rose 17.7% in the 35 years from 1980 to 2015 (89.7% in 2015 compared to 71.9% in 1980) (Flores, 2017).

The difference might also be attributed to the dramatic decrease in Hispanic high school dropout (34% in 1999 to 10% in 2016) and their increasing college enrollment (32% of Hispanics ages 18-24 in 1999 to 47% in 2016) with 3.5 million Hispanics enrolled in public and private U.S. colleges in 2016 compared with 1.3 million enrolled in 1999 (Gramlich, 2017). Nevertheless, even with these increases, Hispanics are still less likely than other groups to obtain a four-year college degree (Gramlich, 2017). Online undergraduate Hispanic enrollment has also increased from 8% in 2012 to 11% in 2016 (Clinefelter & Aslanian, 2016) and black and Hispanic college graduates are more likely than whites to have taken a class online (35% v. 21%) (Parker, Lenhart & Moore, 2011).

In reviewing their similar 2017 and 2016 results, the authors also examined literature that downplays the importance of learning styles. In 2009, *Psychological Science in the Public Interest* commissioned four prominent psychologists to dispassionately assess, “the scientific evidence underlying practical application of learning-style assessment in school contexts” (Pashler, McDaniel, Rohrer & Bjork, 2009). The researchers were charged with the task of determining whether scientific evidence supported current learning-style practices. They acknowledged dominance of the meshing hypothesis, i.e., that “instruction is best provided in a format that matches the preferences of the learner. . .” (Pashler, McDaniel, Rohrer & Bjork, 2009, p. 105). After an extensive review of the literature, they found most learning style research scientifically lacking and noted, “very few studies have even used an experimental methodology capable of testing the validity of learning styles applied to education. Moreover, of those that did use an appropriate method, several found results that flatly contradict the popular meshing hypothesis” (Pashler, McDaniel, Rohrer & Bjork, 2009).

RECOMMENDATIONS

Pashler, McDaniel, Rohrer and Bjork (2009) do suggest “locus of control” as a possible avenue of future research (p.115). This personality measurement “refers to an individual’s belief about whether his or her successes or failure are a consequence of internal or external factors” (p. 115). Simply stated, this means that students with an internal focus of control would believe that outcomes are a consequence of their actions while students with an external locus of control would believe that outcomes are unrelated to their own actions. Learners with an internal locus of control might fare better with less structured instructions while those with an external locus of control would achieve more with highly structured instruction. There are uncertainties, however, in defining the precise instructional treatments (e.g., group v. individual work) that interact with locus of control. Therefore, online educators should beware of expanding on this statement and jumping to hasty conclusions. For example, they might offer group projects to their field dependent learners on the assumption they prefer a more structured learning environment, and giving individual projects to field-independent learners on the assumption they might prefer a less structured learning environment.

Chick (n.d.) offered a succinct summary of the learning style debate: “Despite the popularity of learning styles and inventories. . . it’s important to know that there is no evidence to support the idea that matching activities to one’s learning style improves learning.” Pithers (2002) also pointed out, teachers need not slavishly adopt field dependent styles and behaviors to match field dependent students because in the work place, the learners may need to adopt a different style or information approach to achieve the most appropriate or the ‘best’ quality decision or solution.

However, online instructors can still take advantage of the results of Clinefelter and Aslanian’s 2016 annual study of the demands and preferences of 1,500 online college students. (Clinefelter & Aslanian, 2016). Their study revealed that engagement with classmates is seen as important or very important to 45% of college students. In this connection, they also reported that posting to online message boards was the preferred way to stimulate engagement in online classes, followed by group projects, and having a work partner (Clinefelter & Aslanian, p. 46). The researchers recommended that online instructors who do not require face-to-face interaction “need to focus on finding and designing course activities to enable students to engage with each other” (p. 46).

The bottom line advocated in 2016 continues today: “students need more discipline to succeed in an online course than in a face-to-face course” (Allen & Seaman, 2005). Finally, as Matias (2015) reminds online instructors, “Teaching fully online takes time. Learning fully online takes time.”

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FIVE PILLAR DEPLOYMENT PLAN: A JOURNEY TO DEPLOYMENT IN EMS SYSTEMS

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ABSTRACT

Emergency Medical Services (EMS) systems are held to standards that designate minimum response times. As such, EMS systems across the world have begun using deployment plans (or System Status Management) to provide access and appropriate responses to those who are in need of emergency medical services). This paper will discuss a large healthcare system (LHS) in the southern region of the United States in order to highlight deployment plans, its benefits, as well as its challenges. This particular system went from a limited deployment plan to implementing a deployment plan that is dynamic in nature. Findings from the case example presented suggested that deployment plans should be evaluated through five pillars- service, quality, stewardship, teamwork, and growth.

Key Words: Healthcare, emergency medicine, prehospital, emergency medical services, response time

INTRODUCTION

Many Emergency Medical Services (EMS) system administrators struggle with the issue of deployment. The City of Austin dealt with this issue in 1978 when it examined its EMS system by conducting a study to determine the best process for the movement of its ambulances to improve response times by strategically placing units in areas throughout the city. This process of strategic placement is known as deployment. It involves the movement of resources that correspond to the demand of calls for a specific time period. Results of the 1978 study concluded that using deployment saved the city millions of dollars in construction and operating costs. Consequently, the Austin City Council approved deployment in 1980 (Eaton, Daskin, Simmons, Bulloch, & Jansma, 1985). The importance and benefits of deployment in the EMS industry are significant, and similar in many ways to that of the airline industry (Aehlert & Fitch, 2011). Time is money and airlines have to be on time and provide the safest environment for their passengers and employees. There are many metrics that are associated with demand (geography, population density, high call volume areas, time of day, time of year, etc.) and these metrics are very important in determining the right plan. Fitch states, "American Airlines uses a different strategy than Southwest, but both are very respected airlines" (Aehlert & Fitch, 2011). This depicts a great example of how many services can be different based on their own needs and contractual responsibilities. Deployment plans are used to manage the resources that are working during any given time. There are plans that consider geography only and place units that provide the best coverage depending on the "level" (the number of units available). Under such

plans, resources are moved based upon the level in order to provide the best coverage and decrease response times.

EMS communication centers have primary responsibility for the appropriate movement of units based on the level. Dr. Fitch defines deployment as, “the art and science of matching the production capacity of an ambulance system to the changing patterns of demand placed on that system. They involve strategies and tactics used to manage the resources available to anticipate and prepare for the next call” (Aehlert & Fitch, 2011). While the importance of deployment in effectively managing demand is undisputed, there are benefits and disadvantages that must be considered in coming to a determination on how to proceed. Benefits of deployment plans include the readiness of available resources to reduce response times. This satisfies the contracts of governing bodies, established regulations, and guidelines that are set by EMS administration for high performance systems. Another key factor of deployment is that resources are strategically placed to help reduce the number of lights and sirens responses across large distances. Lights and sirens responses are considered to be the use of an audible siren and lights that are around the exterior part of the ambulance to notify the traveling public that the ambulance is responding to an emergency call and is requesting the right of way. Reducing the number of lights and sirens responses across large distances is important, as 60 percent of auto accidents involving ambulances occurred while the ambulance was responding to a call with lights and sirens activated and 58 percent ended in a fatality (Kahn, Pirrallo, & Kuhn, 2001). Such statistics may be reduced through the reduction of traveled miles with lights and sirens activated by way of deployment.

In addition to decreasing potential auto accidents, reducing light and siren responses across large distances can also improve public perception. Having ambulances in close proximity helps residents feel more secure and appreciative that an EMS unit is strategically placed close to the area and ready to respond. Certain deployment plans, referred to as “mobile,” have a shorter “chute” time (that is; time from dispatch to en route). These plans help with public image and decrease anxiety among the public. Furthermore, an additional benefit can be improved employee satisfaction among EMS workers. A decrease in employee satisfaction has been observed in systems without a deployment plan because EMS workers are often in an ambulance for prolonged periods of time (up to 12 hours in the system being reviewed). For such employees, notable areas of improvements can be made. Many report bringing their own lunch, and not having a way to heat up their food while in an ambulance. Employees also reported being in the unit for long periods of times without a comfortable place to sit down. In addressing those concerns, one suggestion from personnel is to build more stations. While that is favorable, building commercial structures are quite expensive and current budget constraints do not allow for that kind of expenditure. Another frequent concern is the “wear and tear” on the ambulances due to their active status and traveling long distances on runs over a 24-hour period. All of these issues are factors that should be considered when evaluating deployment plans.

EVALUATING EMS DEPLOYMENT PLANS

Response times for EMS units as defined by the National Fire Prevention Agency (NFPA) 1710 is the time elapsed from the moment that the call is received and the unit arrives on scene (National Fire Prevention Agency, 2016). This includes the time that it takes to process the call, dispatch the appropriate unit, and the time it takes for the unit to arrive on scene. Most agencies or governing bodies will set response time standards for each call type; emergency life threatening calls have an overall compliance of 8 minutes and 59 seconds in 90 percent of the agencies while emergency non-life-threatening calls have an overall compliance of 11 min and 59 seconds in 90 percent of agencies. In terms of non-life threatening calls, compliance time is approximately 14 minutes and 59 seconds. Although the aforementioned are the time standards primarily used, some agencies will differ in these measurements based on geography and population density.

Many agencies have adopted the standards set by the International Academy of Emergency Dispatch, which are based the severity of the call. Protocols for emergency medical calls were developed by Jeff Clawson, M.D. after he was appointed the Salt Lake City Fire Surgeon that oversees the Medical Priority Dispatch Center (MPDS). These protocols are based on evidence-based medicine that is designed to have a call taker in a 9-1-1 communication center ask a specific set of questions to determine the severity of the call. The most pertinent questions are always asked first to identify life-threatening cases, to deliver a quick dispatch of the unit and to start pre-arrival instructions. Pre-arrival instructions are included in protocols to provide directions to individuals who call 9-1-1 for assistance. The pre-arrival instructions include: CPR instruction, child birth, bleeding control, aspirin administration when the patient is having chest pain, EpiPen administration for severe allergic reactions and Narcan administration for overdoses. Over the years, there have been questions about the effectiveness and accuracy of the protocols, and whether or not the protocols correlate to the clinical condition of the patient once an ambulance arrives on scene. In fact, Dr. Clawson and a team of his researchers initiated a study that examined the calls that were overridden by the dispatchers to a send a higher response. Results of the study showed that in many instances in which the dispatcher overrode the call, the patient often lacked the signs depicting that the call needed to be overridden (Clawson et al., 2007).

MEDICAL PRIORITY DISPATCH SYSTEM AND DEPLOYMENT PLANS

The Medical Priority Dispatch System (MPDS) is designed to send the most appropriate resource(s) at the right time and deployment plans are designed to place resources around the geographical area that has the best chance to meet response times. The MPDS and deployment plans go hand in hand and it is very hard to have one without the other (Clawson et al., 2007). Deployment plans are put into place in systems that have a high call volume (60-100 calls per day) and in areas that need resources throughout the city. MPDS helps the dispatchers by sending a unit to the highest priority call closest to the unit. For example, if Unit A was dispatched on a low priority call but a high priority call came in that was closest to Unit A, then the dispatcher would divert Unit A to the highest priority

call. Simultaneously, deployment plans ensure that the service area is covered adequately with the number of ambulances that are in the system.

IMPLEMENTING DEPLOYMENT PLANS

Deployment plans can be very simple in nature or can be very complex depending upon the EMS system's demands. The first step of developing a plan is to review when and where calls are happening. Computer software systems are available that assist in identifying areas of high call volume by time of day (Hall & Peters, 2007). When reviewing call volume, a time frame of the previous 16 weeks is recommended. This allows the use of recent data and more reliable judgement calls or recommendations on the most appropriate locations to place units. Additionally, a detailed review of response times should be conducted to determine the system's ability to meet time response requirements. This will allow the system to determine if additional units are necessary or to maintain systems that are meeting their time response requirements. With that said, response time goals must be clearly defined based on the requirements of the system (Lam et al, 2014). Once all of the parameters have been examined, the first draft of the deployment plan needs to be reviewed. Meeting with a team can assist in ensuring that the plan fits the needs of the agency (Gartner et al., 2012).

Dynamic deployment plans are not stagnant and for them to be effective, must be reviewed on a consistent basis. Any calls that have a missed response time should be reviewed to identify the cause. Call density in locations must also be consistently reviewed to identify trends of calls being moved to a new location that may include new neighborhoods or city expansion. Any type of sporting events or other events that could have an effect on the systems load of call volume should also be considered. Deployment plans are always evolving and call history moves frequently and can differ from winter to summer months. Since deployment plans must be consistently monitored, most agencies use a computerized system that will compare deployment plans to determine if there are changes that need to be made. These systems are state of the art and evaluate calls from the time of day, day of week, and even the time of year. These systems use formulas that constantly evaluate call locations and in turn, develop a "heat map" to depict where calls are occurring. For agencies without such software, there are many programs that can import data into Excel to display data in heat maps. Consistent review and revisions to deployment plans, as well as comparisons to previous plans, will help to ensure that response time trends are trended in the positive directions.

BENEFITS OF DEPLOYMENT PLANS

Deployment plans can be effective in helping to achieve monetary savings. Many EMS agencies are contractual and thus receive incentive dollars for achieving above minimum required response times. Furthermore, contractual renewal is often dependent upon meeting required response times. Deployment plans can also cost agencies money if they are not designed and implemented in a manner that results in efficient outcomes. This often occurs when there are no restrictions on what are considered "post to post" moves. "Post to post" moves occur when units are moved all over and overlap each other instead of the closest unit being sent to the closest posting location or a geographical location in which the unit. In addition

to potential cost savings, deployment plans and ambulance response times are an important part of healthcare provision, as shorter ambulance response times increase the likelihood of survival; particularly in patients with life-threatening event (Swalehe & Aktas, 2016).

A CASE EXAMPLE: EMS DEPLOYMENT PLAN

A LHS EMS did a comparative study of its deployment plan to determine where improvements could be made. In 2017, the LHS undertook a waste walk associated with Lean Six Sigma to determine where the health system could save money. The purpose of the waste walk was to determine where money was being wasted, which procedures could be more efficient, and what non-essential items could be cut from the budget. The LHS participated in this waste walk with a new deployment plan. During the data collection process, a team of personnel evaluated the number of miles, on average, that a unit was driving every day. The team then looked at how many of those miles were associated with “post to post” moves or sent to a posting location and then immediately sent somewhere else because the deployment plan was not using the same locations throughout the plan. For example, it was identified that an ambulance was frequently moving from one location to another because the plan had different locations to which the ambulance was required to move when on a call. It was determined that the deployment plan should be changed to have the same locations at each level of deployment where a level for deployment is based on how many ambulances are available at any given time. As such, that level will change as ambulances are dispatched on calls or as they become available from a current call. For example, the plan should include the same posting points from level 10 (10 units available) to level 1 (1 unit available) to help alleviate the posting moves because the system was changing dramatically during the peak hours and units were driving in circles causing an elevated number of miles driven. The LHS EMS deployment plan also had an effect on employee satisfaction. Under the current plan, employee satisfaction declined due to the many post to post moves. Furthermore, in examining the contractual requirements that are in place with the city in which the LHS operates, the EMS deployment plan showed a need for improvement in response times. While the response times were meeting the required goal, it was determined by leadership that the response times were on the brink of becoming non-compliant.

THE FIVE PILLAR DEPLOYMENT PLAN

The LHS EMS leadership team evaluated the system’s plan by looking at the five pillars of the LHS strategic plan to make the necessary adjustments to the deployment plan. The five pillars of the health system are: Service, Quality, Stewardship, Teamwork, and Growth. The new deployment plan consisted of specific points that included the strategic plan and were presented to the LHS board of managers.

Service is the passion of the LHS and the new deployment plan looked at the need to improve service delivery. Deployment is not just moving units around to cover the areas that need to be filled. Deployment plans must also provide excellent service to the people that the system serves. Improving the service pillar in the

deployment system may include objectives such decreasing response times and ultimately, getting to patients in a timely manner.

Quality is also a major component in the EMS system and the LHS. Quality of care goes beyond how the patients are treated and includes getting to patients quickly, and safely. The quality of a deployment plan also includes looking at the traveling public and decreasing the distance that is traveled with lights and sirens in order to decrease the possibility of vehicle accidents. Quality is a very important component of deployment plans because their effectiveness will directly affect patient care. If there is not an effective deployment plan in place, the quality of the delivery of care could be compromised.

Stewardship is a key focus of the LHS EMS. Stewardship was identified as being an important element in the revamping of the deployment plan because giving a monetary value to change helps in showing a measurable result on the plan modifications. For example, if the LHS EMS total cost per transport was 60 cents per mile and there was a reduction of 30 miles per day for 10 ambulances that were on duty in a 24-hour period, there would be a cost reduction of \$65,700 per year. Over a 3-year period, these savings could purchase a new, completely outfitted, ambulance. This helps with capital budget purchases in showing the cost savings when determining the need for new equipment within the organization. Fiscal responsibility inside the organization will give more purchasing power for future projects when requested and contribute to the positive bottom line of the LHS. Savings every year and a positive bottom line also benefit employees through benefits such as bonus payments.

The next pillar, teamwork, is required to efficiently implement and manage deployment plans. Deployment plans take tremendous effort from the communications center staff to the field crews that are posting in the ambulances every day. Posting can be described as an ambulance sitting on a street corner ready and available for the next call. Posting is an essential part of deployment because the units are placed strategically inside the city in which they respond. Teamwork is also demonstrated by intertwining fiscal responsibility with contributions to a positive bottom line. Additionally, teamwork within the organization helps to improve employee satisfaction across the system by helping employees do their job effectively, which in turn can improve proficiency across the organization. Teamwork also means including everyone in decision-making; from supervisors to line workers. Inclusion empowers employees and gives them a sense of purpose and ownership inside the organization. Furthermore, the process of choosing a deployment plan fosters teamwork, as it should have buy-in and input from all parties involved in order to be successful.

The last pillar, growth, is important for EMS because there are new innovations and new studies that are consistently taking place to improve pre-hospital medicine—from Emergency Medical Dispatchers to the paramedics that arrive on the scene to treat patients. Growth has to be planned and succession planning is a critical part of the planning as this creates future leaders that will continue the legacy of the organization. Another key aspect of growth is looking for trends of growth in the population and identifying where additional units may be needed, as

well as looking at the potential need for specialized transports. Specialized transports could include a Neonatal Intensive Care Unit transport ambulance, critical care transport ambulance to transport critically ill patients to other hospitals or from other hospitals, or even a bariatric ambulance to ensure the comfort of bariatric patients. All of these specialized units should be available to use inside the deployment plan that allows for more ambulances to be readily available at any given time. This helps reduce the response times and will help the public feel more secure with less response times.

The LHS discussed in this paper and its journey to deployment was not only a challenge to implement but also a challenge in terms of buy-in from the front-line staff. The beginning of the journey started with the administration sitting around a table to discuss where EMS calls were occurring during different times of the day and different times of the week. Analytics during this time were crucial to the success of finding the most appropriate locations to use in the deployment plan based on when and where calls were occurring. An analysis was done to see if there was a peak time of day (busiest call volume) in which ambulances were needed to maintain response times; it was determined that ambulance resource allocation was needed to take additional coverage from a slow time of day to a busier time of day. This included monitoring response times for all calls within the organization's operational city limits. A process for evaluating calls in which the unit did not meet the response time, as well as the cause for the missed time, was developed.

Like any other plan, deployment plans are not always perfect on the first implementation. Constant modifications had to be made to the first deployment plan because there were indicators that certain posting locations were not working well with the system. Much of this was identified through feedback received from the Emergency Medical Technicians and Paramedics working in these ambulances. During this time, the LHS EMS constantly evaluated different scenarios of deployment. The waste walk charged EMS administration with conducting a detailed evaluation of the entire EMS operation. This is where the "post to post" movement reduction idea emerged. The LHS EMS found that there could be cost-saving benefits if the number of miles driven from post to post moves were reduced. The key to changing the plan was to implement the best dynamic posting plan that has the same posting locations throughout the entire plan. This means that they looked at level 5 and made sure that all level 4 posting locations were included to keep all locations consistent; this ensured less "post to post" moves while providing adequate coverage. The LHS EMS administration examined a new program from a data system that compiled data to determine the best locations for ambulances to post. This process was enlightening for the team as it enabled them to understand how best to simplify the process and make the best decisions for the team in an effort to improve employee satisfaction and improve efficiency of the department. The process resulted in a decrease of approximately 45 miles driven per truck per 24-hour shift, which was much greater than expected.

CONCLUSION

Deployment plans and their development are an everyday way of life for many EMS systems. They are an important aspect of providing the best care possible to patients and ensuring that the right resources go to the right calls in the right amount of time. Deployment plans have a higher purpose than simply moving ambulances around. They are there to provide efficient service and to provide citizens with the service that they need for peace of mind. Furthermore, deployment plans are an important part of fiscal responsibility by driving costs down even when call volumes are up. They can improve response times, assist with contract renewals, and can transform an EMS system to a high-performance EMS system.

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TABLETS Vs. TRADITIONAL LAPTOPS: AND THE WINNER IS...

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ABSTRACT

In the highly competitive environment of electronic devices, technological advances are playing an increasingly essential role in providing the means to improve effectively the design, functionality, efficiency, and reliability of today's systems for communication, data processing, and any spinoffs. Advances in miniaturization and nanotechnology have allowed the electronic industry to exploit new ways to quickly improve previous devices and provide the business and consumer markets multiple platforms and choices to satisfy their needs and wants. This rapid and sometimes dramatic change in options has affected the way consumers or buyers evaluate their purchases. What is the right choice? What do we really need? How can we avoid duplication, and yes, what will be more cost effective? In this ocean of multiple brands and devices, we are focusing on two generic terms to encompass two categories of products: tablets versus traditional laptops. This study is exploring preference levels for different applications already in place or that could be included in both tablets and traditional laptops. We classify these applications to include, schoolwork, access to software, general organizer, communications and social media, and personal use. A questionnaire was designed to determine the level of preference for different applications under the previously mentioned classification. The electronic manufacturers could find the information very useful as they consider new developments in this area.

Key Words: Laptops, Tablets, Social Media, Education

INTRODUCTION AND LITERATURE REVIEW

In the highly competitive environment of electronic devices, technological advances are playing an increasingly essential role in providing the means to improve effectively the design, functionality, efficiency, and reliability of today's systems for communication, data processing, and any spinoffs. Advances in miniaturization and nanotechnology have allowed the electronic industry to exploit new ways to quickly improve previous devices and provide the business and consumer markets multiple platforms and choices to satisfy their needs and wants. This rapid and sometimes dramatic change in options have affected the way consumers or buyers evaluate their purchases. What is the right choice? What do we really need? How can we avoid duplication, and yes, what will be more cost effective? In this ocean of multiple brands and devices, we are focusing on two

generic terms to encompass two categories of products: tablets versus traditional laptops.

In education, laptops continue to satisfy the need for standard, on site, devices that allowed institutions to provide specific areas for students to benefit from their use. In fact, laptops were first in place before the innovation that today we call tablets. Many institutions today have adopted the new mobile technology. According to Martinez-Estrada & Conaway (2012), many educational institutions from primary schools to higher education have successfully adopted tablets.

Today's electronic manufacturers continue to enhance these devices by improving direct-touch interfaces and new ideal screen sizes (Brasel, 2015). In addition, transmission speed, extended battery life, and audio-visual functions have been significantly enhanced. When it comes to tablets and laptops, we are facing a technological crossroad. Electronic manufacturers are seeking new avenues of development, and they are rapidly introducing hybrid options (tablet-laptop) that will provide the best of both worlds. However, which one of these devices will be the dominant and most influential in determining the upcoming new technological development.

It is undeniable that tablets had gained a lot of momentum over traditional laptops in both the business and consumer markets—especially in education. In business, according to Mantell (2012), tablets take full advantage of the development of apps and cloud-based platforms and in a relative short time could leave the traditional computers and other similar devices behind in the workplace. On the other hand, for multitasking, high volume processing needs, screen size and/or multiple screens connectivity (sometimes necessary for business operations) tablets do not offer the same flexibility as traditional computers or laptops. (Mantell, 2012).

In education, both traditional laptops and tablets have significantly improved the accessibility of information and the learning experience for faculty and most importantly for students. The use of tablets, however, has increased all over the world, providing a very positive impact now that will surely grow in the future. Churchill and Wang (2014) indicate that mobile technologies, such as the iPad, helps students by providing the flexibility of learning anywhere, anytime by accessing internet resources to capture and manage information and instantly share the experience by communicating with others, locally or around the world.

Concerning consumers as personal users (i.e., students or otherwise), the usage decision for tablets and traditional laptops or desktop computers is one guided by usage needs, efficiency, and practicality. According to Goldsborough, tablets are great for social networking, web browsing, e-mail exchange, movies, reading, etc. Other positive aspects include; less expensive, easier learning curve, improved battery life, and more convenient for people on the move. Laptops nevertheless continue to have advantages in areas such as writing papers, editing photos/movies,

for heavy work on spreadsheets, producing or maintaining websites, preparing presentations, etc. (Goldsborough, 2014).

Byoung-Dai and colleagues consider that continued improvements in technology, will significantly enhance the mobile devices with the use of nanomaterials to improve power management, memory capacity, and computational capabilities (Byoung-Dai et. al. 2013).

As we continue to experience the evolution of innovation in mobile devices brought about by new technological developments, important questions remain. Will electronic manufacturers move towards consolidation by providing a device that can take the place of current multiple platforms? Will such a device be able to satisfy multiple consumer and business needs based on a variety of models/options? Finally, what combination of applications will be the most useful to satisfy the diverse and/or multiple needs of different users?

This study is exploring preference levels for different applications already in place or that could be included in both tablets and traditional laptops. We classify these applications to include, schoolwork, access to software, general organizer, communications and social media, and personal use. A questionnaire was designed to determine the level of preference for different applications under the previously mentioned classification. The electronic manufacturers could find the information very useful as they consider new developments in this area.

METHODOLOGY

We used a questionnaire designed to collect data on levels of preference classified by schoolwork, access to software, general organizer, communications and social media, and personal use. The same set of categories and applications was used for both tablets and traditional laptops using a five point, balanced, preference scale from Least Preferred to Most Preferred. Subjects were asked to evaluate their preferences on the applications for each of the mobile devices. Demographic/classificatory questions were included to be able to evaluate potential differences between the participants. Business students from a small public university in a southeastern state represented the population of interest. A non-probability convenience sample of twelve business courses was selected. A total of 175 questionnaires were collected from a captive population of 259 students. An effective response rate of 73.5% was attained after twenty-one questionnaires were rejected for lack of completion or other concerns. The purpose of the study as well as the voluntary nature of participation was timely disclosed and made clear to participants. Research procedures were properly followed to assure the students' anonymity, to maintain the privacy of the information, and to avoid duplications in participation.

FINDINGS OF THE STUDY

Table 1 shows the demographic profile of the students surveyed. The majority of those surveyed were female (55%), and approximately 88% of the students were either White or African American. The students surveyed were mostly juniors and seniors, with only 15% sophomores and no freshman. Ninety six percent of the students are full time students. Management/Marketing accounted for 46% of the students surveyed while Accounting and Health Management combined for 46% of the students. Financial services accounted for 9% of those surveyed. Seventy five percent of the students were between the ages of 20 and 22. Sixty-five percent of the students work, and approximately 42% of those students work up to 20 hours a week.

Significant differences were examined within each of the five categories of comparisons: School Work, Access to Software, General Organizers, Communications/Social Media, and Personal Use. The Z test for the difference between two proportions was used to test for differences between the responses for the two extremes, Least Preferred (1) and Most Preferred (5). Data analysis in tables 2 to 6 examines and assesses the differences in student perceptions in detail.

Table 1								
Sample Characteristics								
Description	Gender	Race	Class	Status	Emphasis	Age	Work	Hours Work
Male	45%							
Female	55%							
White		61%						
African American		27%						
Hispanic		5%						
Asian		5%						
Other		2%						
Freshman			0%					
Sophomore			15%					
Junior			39%					
Senior			46%					
Part-time Student				4%				
Full-time Student				96%				
Accounting					24%			
Financial Services					9%			
Health Care MGMT					22%			
MGMT/MKT					46%			
17-19						12%		
20-22						75%		
23 or more						13%		
Work							65%	

Don't Work							35%	
Up to 10 Hours								15%
Up to 20 Hours								42%
Up to 30 Hours								26%
More than 30 Hours								17%

The comparison between student use of tablets and laptops concerning schoolwork is presented in Table 2. The use of laptops is significantly higher than tablets when accessing school systems such as Blackboard and Web systems. In addition, homework and printer access is heavily favored toward laptops. This would seem logical since laptops tend to be more user friendly in these areas. However, even though the percentage of students that most prefer laptops is greater than tablets, there is not a significant difference for E-Books. This may indicate that more and more students are beginning to realize the convenience of using tablets to access textbooks.

Table 2
School Work Comparisons

Tablets					School Work	Traditional Laptops				
LP	MP	LP	MP	LP		MP				
1	2	3	4	5		1	2	3	4	5
32%	11%	12%	17%	27%	E-Books	23%	8%	19%	16%	34%
5%	23%	26%	10%	6%	School Systems	2%	3%	8%	13%	*74%
40%	23%	16%	11%	10%	Home-Work	2%	2%	6%	12%	*78%
44%	14%	21%	9%	12%	Access Printers	1%	2%	10%	19%	*74%

LP = Least Preferred MP = Most Preferred * = Significant difference at .05 alpha

Table 3 analyzes the results from Access to Software. In the area of word processing, presentation Software, spreadsheets, the clear choice is Laptops. Even though tablets have these capabilities, students are primarily using laptops for these purposes. This may be explained by the fact that laptops have larger keyboards that are easier to input data or write papers. In addition, laptops are more readily accessible for connecting to projectors. Tablets would have to improve greatly in these areas before they can compete for student usage.

Table 3
Access to Software Comparisons

Tablets					Access to Software	Traditional Laptops				
LP		MP				LP		MP		
1	2	3	4	5		1	2	3	4	5
52%	16%	14%	7%	12%	Word Processing	1%	1%	3%	6%	*89%
52%	18%	13%	8%	10%	Presentation Software	1%	1%	3%	10%	*84%
55%	16%	13%	9%	7%	Spread Sheet	1%	1%	5%	8%	*85%
53%	17%	14%	6%	9%	Data Base	2%	3%	7%	10%	*78%

LP = Least Preferred MP = Most Preferred * = Significant difference at .05 alpha

Table 4 reflects the student’s use of tablets and laptops as a general organizer. The results of the survey reflect a significantly higher use for tablets over laptops. This may be explained by the smaller size and ease of use for tablets over laptops in accessing calendars and appointments, memo pads, to do lists, and address/phone books. Students do use laptops as a general organizer to some degree, but not nearly as extensive as tablets.

Table 4
General Organizer Comparisons

Tablets					General Organizer	Traditional Laptops				
LP		MP				LP		MP		
1	2	3	4	5		1	2	3	4	5
13%	5%	15%	19%	*48%	Calendar Appointment	35%	20%	19%	11%	15%
13%	7%	19%	16%	*45%	Memo Pad	31%	20%	23%	13%	13%
12%	6%	15%	18%	*49%	To Do List	35%	20%	19%	12%	14%
14%	6%	13%	14%	*52%	Address Phone Book	47%	18%	17%	7%	12%

LP = Least Preferred MP = Most Preferred * = Significant difference at .05 alpha

Table 5 shows the use of tablets and laptops in the category of Communications and Social media. The authors acknowledge that smart phones may be the primary choice by students in this area, but students have other options available to them. The use of tablets and laptops as communication and social media is mixed. The students significantly favored laptops in accessing the internet and sending and receiving emails. However, students preferred using tablets for voice mail and social media.

Table 5
Communication/Social Media Comparisons

Tablets					Comm/Social Media	Traditional Laptops				
LP		MP				LP	MP			
1	2	3	4	5		1	2	3	4	5
12%	6%	14%	21%	46%	Internet Access	9%	4%	11%	12%	*64%
31%	10%	15%	11%	*32%	Voice Mail	52%	19%	13%	6%	10%
16%	6%	15%	20%	43%	E-Mail	10%	4%	16%	12%	*58%
10%	3%	6%	15%	*65%	Social Media/Other	30%	19%	20%	13%	18%

LP = Least Preferred MP = Most Preferred * = Significant difference at .05 alpha

Table 6 shows the use of tablet and laptop usage by students for the purpose of personal use. The results of the survey tend to favor tablets over laptops even though there were no significant differences in video and TV players. There were significant differences in the area of book reader, alarm clock, and games. Students tend to use tablets for personal reading over laptops. In addition, students prefer tablets for waking up in the morning and playing games.

Table 6
Personal Use Comparisons

Tablets					Personal Use	Traditional Laptops				
LP		MP				LP	MP			
1	2	3	4	5		1	2	3	4	5
15%	1%	13%	16%	*55%	Book Reader	37%	14%	22%	12%	14%
18%	5%	18%	18%	40%	Video Player	14%	4%	20%	19%	43%
20%	7%	20%	16%	38%	TV Player	18%	4%	17%	17%	44%
20%	5%	13%	10%	*52%	Alarm Clock	66%	9%	13%	4%	9%
15%	6%	14%	10%	*54%	Games	39%	12%	17%	10%	22%

LP = Least Preferred MP = Most Preferred * = Significant difference at .05 alpha

CONCLUSIONS AND RECOMMENDATIONS

The results of the survey revealed significant differences among student usage in regard to tablets and laptops in all five categories. With regard to the category of School Work, three of the four areas indicated significant differences in favor of laptops. These areas were school systems, homework, and printer access showing 74%, 78%, and 74% most preferred respectively in favor of laptop usage. In the category of Access to Software, laptops were overwhelmingly preferred with significant differences in the areas of word processing (89%), presentation software (84%), spreadsheet (85%), and data base (78%).

However, tablets were preferred in most of the remaining three categories of General Organizer, Communication/Social Media, and Personal Use. In the category of General Organizer, all four areas showed a significant difference in favor of the use of tablets. Specifically, the significant differences for the use of

tablets were preferred for calendar and appointments by 48%, use as a memo pad by 45%, for “to do lists” by 49% and as an address/phone book by 52%.

Significant differences were mixed in the area of Communication/Social Media. Those significant differences in favor of using tablets for voice mail and social media were 32% and 65% respectively. Laptops were preferred for internet access and email by 64% and 58% respectively with both having significant differences over tablet usage.

The Personal Use category had three areas that resulted in significant differences. These areas were as a book reader with a 55% most preferred status over laptops, as an alarm clock with a 52% most preferred status, and for playing games with a 54% most preferred status. The authors recognize the fact that tablets are more lightweight and easier to transport, and this fact may play a role in their being favored in these areas. Surprisingly, in the areas of video player and TV, the results were close, but none was significant. As a video player, the results were that laptops were most preferred at 43% vs. the tablet at 40%, while as a TV, the laptop was most preferred at 44% vs. 38% for the tablet. Most likely, the larger screen on the computer may have some bearing on these results.

Concerning current data, further analysis could be conducted in the area of significant differences between male and females regarding the use of tablets vs. laptops. A general assumption by the authors is that females may find tablets more useful in reading, while males may use the tablets more for gaming; however, the results could be enlightening. Other demographics such as student classification and emphasis area could also be tested for significant differences. Target marketing strategies could be developed from this data for promoting the sales of tablets vs. laptops.

Future research could be conducted in the area of tablets vs. laptops by adding questions pertaining to cost or by adding a qualitative question asking why students prefer one over the other in certain areas. A general assumption by the authors is that if students have limited income with the option of choosing a \$600 tablet versus a \$600 laptop, they will choose the laptop because of its school related usefulness. Most students have smartphones that do some of the same functions as tablet; therefore, there is no need to spend on another device such as a tablet. Additionally, the authors have already conducted research on smartphones versus tablets and have come to the same conclusion as to student choice between the two; however, the research could be extended to smartphones versus laptops. A hypothetical question might be included in the smartphone versus laptop analysis which asks the students a question regarding choice such as “If you could afford only one device, a smartphone, tablet or laptop, which would you purchase?” The responses might be very interesting!

In conclusion, who is the winner in the battle between tablets vs laptops? Among all five categories, there were seven areas with significant differences in favor of laptops and nine areas with significant differences in favor of tablets; therefore, in terms of numbers, tablets appear to be the winner. However, two major areas of use are being considered, school versus personal usage. The authors note that visually, there are more laptops being used in the classroom as compared to tablets. However, students appear to prefer tablets for personal use. The question of whether tablets would replace smartphones with students, has previously been conducted by the authors with the answer being overwhelming "no" in the area of personal usage. Students prefer smartphones for personal use (Santandreu and Shurden, 2016).

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