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GUIDELINES FOR SUBMISSION

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Include a title page with manuscript which includes the full names, affiliations, address, phone, fax, and e-mail addresses of all authors and identifies one person as the Primary Contact. Put the submission date on the bottom of the title page. On a separate sheet, include the title and an abstract of 150 words or less. Do not include authors' names on this sheet. A final page, "About the authors," should include a brief biographical sketch of 100 words or less on each author. Include current place of employment and degrees held.

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A New Approach for Teaching Customer Personality Types in the Personal Selling Course

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Knowledge of the "styles" of salespeople and customers has long been associated with effective selling performance. Therefore, numerous sales scholars and trainers have developed ways of classifying salespeople and customers. However, those approaches typically entail much cognitive effort and skill to ensure appropriate categorization of a salesperson's customers (or prospects). Given this dilemma, students in personal selling courses likely require a relatively easy-to-use method to enhance their ability to accurately classify individuals (a la customers in a sales context). Accordingly, we present an alternative—psycho-geometrics—that is potentially easier and more efficient to utilize than extant personal style classification schema. In particular, we develop and psychometrically analyze a scale designed specifically to assess personality types of psycho-geometric "types." Implications for educators teaching personal selling courses and/or interested in undertaking germane research in the area are also provided.

INTRODUCTION

The nature of the professional selling position is dynamic. Accordingly, job knowledge, skills, responsibilities, and tasks that were of import in the past need to be complemented with or supplanted by contemporary ones (Adamson, Dixon, & Toman, 2013; Dixon & Tanner, 2012; Lassk, et al., 2012). In other words, the requisite requirements of the erstwhile sales job are different from the current one. In other words, to paraphrase a former advertising tag line, "This ain't your father or mother's kind of selling." If

today's sales position is different from the past, then university personal selling courses need to prepare their charges with skills and abilities that can assist them in dealing with the protean buyer-seller environment.

In their assessment of the state of sales education in the college curriculum, Deeter-Schmelz and Kennedy (2011, p.56) aver that "[i]nterest in sales education has never been stronger." Peradventure this is partially a function of marketing faculty's realizing the need to prepare their sales students for this changing selling environment. Despite keen interest in the sales curriculum, however, research focusing on courses in this area has been minimal (e.g., Anderson, et al., 2005). Indeed, a recent review of the sales education literature found only 107 germane articles (in four especially relevant journals) over a 33-year period, thus ultimately leading the researchers to assert, "…the truth is that the sales education literature is relatively underdeveloped. We thus encourage research across wide-ranging topics…" (Cummins, et al., 2013, p. 75). The purpose of the present study, then, is to heed the foregoing call for additional empirical work in sales education. We do so by exploring a key issue facing sales educators and field sales personnel alike: how to correctly and efficiently classify customers based on their personality types (or styles). Categorizing customers (or prospects) accurately requires students in personal selling courses to learn a specialized, fundamental job skill. In fact, Finch, Nadeau, and O'Reilly (2012) discerned that marketing practitioners perceived foundation skills were especially important when hiring marketing majors.

Knowledge of the "styles" of salespeople and customers has long been associated with effective selling performance (e.g., Anderson, Dubinsky, & Mehta, 2014). Originating in the work of the Wilson Learning Center (Merrill & Reid, 1981; Mok, 1982; Wilson, 1987), salespeople are routinely trained to adapt their selling styles to that of their customers (e.g., Homburg, Müller, & Klarmann, 2011). The underlying theory is that a salesperson will communicate with a customer more effectively if their styles are compatible (e.g., Zimmer & Hugstad, 1981). Salespeople whose styles are incompatible with that of their customers will "flex" away from their own style and assume one that is more appropriate. This process is a form of adaptive selling— à la "selling smarter" rather than "selling harder" (Sujan, Weitz, & Sujan, 1988).

Adapting to customers' personality styles should abet enhancing rapport in the buyer-seller dyad (e.g., Merrill & Reid, 1981; Zimmer & Hugstad, 1981). Augmenting rapport with customers can foster increased trust within the dyad, which ultimately could conduce to improved salesperson performance (e.g., Bowler, 2011; Wood, 2006). Therefore, accurately classifying customers' personality types conceivably would be a boon with which sales personnel can ameliorate their efficiency and effectiveness.

The notion of people differing in their "styles" originated in the work of Jung (1921) who isolated a set of personality types. Jung isolated three dimensions on which personalities vary: introversion(I)-extroversion(E), sensing(S)-intuition(N), and thinking(T)-feeling(F).[1] Based on Jung's analyses, Myers and Briggs developed a multi-item instrument to assess personality types (Myers & McCaulley, 1985). This instrument is the most widely used personality measure for "non-psychiatric" populations (Lloyd, 2012; Myers, 1993; Nasca, 1994). The Myers-Briggs Type Indicator (MBTI) assesses each individual on the three Jungian dimensions and one additional dimension (judging[J]-perceiving[P]).[2] Individuals are then classified on each dimension, and a composite personality type is developed. For example, an "ESTJ" is a person high on the extraversion, sensing, thinking, and judging dimensions in contrast to an "INFP," who is strong on introversion, intuition, feeling, and perceiving. MBTI results in a total of 16 personality types that are distinctly different from each other.

The foregoing implies that the MBTI may hold value for classifying a salesperson's customers. Notwithstanding its potential, however, the MBTI is cumbersome to administer (owing to the length of the instrument—over 80 items). Moreover, from the perspective of a salesperson, it is difficult to assess the type of the customer (as there are 16 alternative types). Although in-depth knowledge of their own personalities might be interesting to salespeople, not all the information contained in the test is useful in the sales situation. The difficulties are compounded for those who need to "read" the personality types of their customers so that they can adapt their behavior appropriately.

In an effort to address these difficulties, numerous sales scholars and trainers have developed ways of classifying salespeople and customers, defined by such things as personal styles (Merrill & Reid, 1981), communication styles (Manning & Reece 1992), behavioral styles (Alessandra, Wexler, & Barrera, 1987), sales behaviors (Buzzotta, Lefton, & Sherberg, 1982; Jolson, 1984), orientation to the sale (Blake & Mouton, 1980), sex role identity (Comer & Jolson, 1991), and buyers' behaviors and characteristics (Dubinsky & Ingram, 1981-1982). More recently, Larson and Bone (2012, p. 498) investigated the customer-salesperson interaction from the customer side only. Owing to frequent interaction with salespeople, most customers develop "a multifaceted disposition that guides their behavior in any salesperson interaction" (i.e., a customer's disposition toward salespeople). The disposition is made up of seven dimensions: convincibility, avoidance, empathy, distrust, relationship seeking, self-presentation, and information seeking. Marketing academics see merit in such heuristics or selling aids and are likely to incorporate them into their personal selling courses. Indeed, traditional personal selling texts discuss selling styles (e.g., Anderson, Dubinsky, & Mehta, 2014; Castleberry & Tanner, 2010).

Most of the aforementioned alternatives consist of a matrix that classifies salespeople/customers into quadrants characterized by strong, forceful personal characteristics on the one hand and softer, more intuitive ones on the other. Admittedly, matrices can be valuable. However, they likely entail much cognitive effort to ensure appropriate categorization of a salesperson's customers. Accordingly, we present an alternative—psycho-geometrics—that is (a) potentially easier and (b) more efficient to utilize than extant personal style classification schema. Owing to these two favorable attributes, the proposed categorization scheme should be especially useful when teaching personality styles in personal selling courses. Therefore, the purpose of this paper is to briefly describe key ideas underlying psycho-geometrics and then develop and psychometrically analyze a scale with which to measure the psycho-geometric types—thus facilitating personal selling educators' efforts in teaching students how to become adept at ascertaining others' personality styles.

PSYCHO-GEOMETRICS

Psycho-geometrics (Dellinger, 1989) is an alternative way of classifying personality in general and customers and sales personnel in particular. Dellinger believes that personalities resemble familiar geometric shapes. Derived from the Jungian concepts of personality types, and roughly corresponding to the various classifications commonly used in sales to assess styles, psycho-geometrics differs in that it is not a dimensional model. Rather, it describes people's personalities in holistic terms by evoking images of geometric shapes. Less complex than those defined by the MBTI, the types are easily recognized by others and the underlying concepts easy to acquire and remember (a la classification into groups). According to Dellinger, all people possess aspects of each psycho-geometric type, and the relative dominance of each changes as they move through the life cycle. This is in contrast to the notion of "communication styles," which tend to be relatively stable over time (Manning & Reese, 1992).

Benefits of Psycho-Geometrics

Psycho-geometrics is predicated on the idea "that we tend to be attracted to certain shapes and forms…based on our personalities, our attitudes, our education and experiences, and based on the way in which our individual brains function (Dellinger, 1989, p. 2). She avers that its use can assist one in ascertaining the beliefs, values, and attitudes of others one meets and then "flexing" via communication to get what one desires from the other person. As such, the benefits of psycho-geometric types over the more traditional notions of communication or behavioral styles in the sales situation are as follows:

- The psycho-geometric "types" are holistic, not derived dimensionally. It is easy for students to learn the types by evoking images of shapes, rather than determining the germane quadrant for each customer in a matrix.
- It is easy for students to remember the types by shape association.
- Psycho-geometric types are not immutable. Change is recognized throughout the life cycle and even from day to day.

- Above all, psycho-geometrics can be fun, thus facilitating students' enjoyment of learning.

Psycho-Geometric Types

Four psycho-geometric types resemble those specified by the previous "style" theorists: box, triangle, circle, and squiggle (see Table 1). However, Dellinger (1989) adds an additional type, one that represents an individual in transition, and is labeled a "rectangle." We deviate from Dellinger's terminology here, preferring the irregular shape of the "trapezoid" to the parallelism of the "rectangle." The following description of the psycho-geometric types is paraphrased from Dellinger (1989).

Box

The "box" is an angular, symmetric shape, composed of equal lines and angles. In the form of a square, it is the most structured of the shapes. Boxes place great emphasis on organization and logical structure. They are hard workers with strong attention to detail, easily seen as perfectionists. They get the job done, but do not function well in situations that are not well defined. Boxes are typically found in positions such as accountants, computer programmers, administrators, secretaries, and government workers. The box type is roughly comparable to the Analytical (Merrill & Reid, 1981), Reflective (Manning & Reese, 1992), Indifferent (Blake & Mouton, 1980), Submissive-Hostile (Jolson, 1984), and Undifferentiated (Comer & Jolson, 1991).

Triangle

The "triangle" represents leadership. A linear shape, its focus is on the top. The triangle is the shape of the pyramids of Egypt—burial places for the pharaohs (those at the apex). Thus, it is associated with royalty. Triangles are very decisive people, strong leaders and decision makers. Highly competitive, they are found in leadership positions in major corporations. They are "to the point." Their directness leads others to respect and fear them, but they are probably not loved. Triangles are typically found in positions such as executives, politicians, business owners, and military officers. The triangle type is roughly comparable to the Driver (Merrill & Reid, 1991), Director (Manning & Reese, 1992), Domineering (Blake & Mouton, 1980), Aggressive (Jolson, 1984), and Masculine (Comer & Jolson, 1991).

Circle

The "circle" is the mythical symbol for harmony. The shape is round and smoothly symmetrical. Circles are sensitive people and sincerely care about others. They excel in communication because they are good listeners and are generally empathetic. They tend to be team players who constantly strive to please others by accommodating them. They love working with people. Circles tend to be found in positions such as secretaries, nurses, teachers, and human resource specialists. The circle type is roughly comparable to the Amiable (Merrill & Reid, 1981), Supportive (Manning & Reese, 1992), Eager-to-Please (Blake & Mouton, 1980), Submissive-Warm (Jolson 1984), and Feminine (Comer & Jolson, 1991).

Squiggle

The "squiggle" represents creativity. The shape is the only one that is open- ended. Squiggles are conceptual and intuitive, not linear, thinkers and jump to conclusions, skipping deductive processes. They are constantly looking for new ways of doing things. Their friendly behavior leads them to be the life of the party. They are future oriented, more interested in possibilities than reality. They dislike highly structured environments, desiring variety and stimulation instead. Typically, squiggles are artists, musicians, professors, researchers, entrepreneurs, inventors, and interior decorators. The squiggle type is roughly comparable to the Expressive (Merrill & Reid, 1981), Emotive (Manning & Reese, 1992), Solution Seeker (Blake & Mouton, 1980), Assertive (Jolson, 1984), and Androgenous (Comer & Jolson, 1991).

TABLE 1
EXTANT STYLE THEORIES VIS-À-VIS PSYCHO-GEOMETRIC SHAPES

Authors	Focus	Box	Triangle	Circle	Squiggle
Merrill and Reid (1981)	Personal Styles	Analytical	Driver	Amiable	Expressive
Manning and Reece (2001)	Communication Styles	Reflective	Director	Supportive	Emotive
Alessandra, Wexler & Berrera (1987)	Behavioral Styles	Thinker	Director	Relator	Socializer
Blake and Mouton (1980)	Orientation to the Sale	Indifferent	Domineering	Eager-to-Please	Solution Seeking
Buzzotta, Lefton & Sherberg (1982) Jolson (1984)	Sales Behaviors	Submissive-Hostile	Aggressive	Submissive-Warm	Assertive
Comer and Jolson (1991)	Sex Role Identity	Undifferentiated	Masculine	Feminine	Androgynous

SOURCE: Manning and Reece (2001)

Trapezoid

The "trapezoid" is a shape in transition. Trapezoids are "growing out of the box," experiencing changes on a daily basis. This leads to their need for excitement and variety as well as provides an explanation for their short attention span and compulsive, erratic behavior. Trapezoids are dissatisfied with their lives and are searching for better situations. They are unpredictable and may appear to be different people from day to day. Trapezoids are typically adolescents, recent college/high school graduates, new employees, or new retirees.

Research Questions

The primary purpose of this paper is to present a paper and pencil self-report instrument that can be used to assess psycho-geometric types. A secondary purpose is to determine the degree to which individuals (e.g., students qua salespeople in personal selling courses) can accurately assess the types of others (e.g., customers). Essentially, this study is an empirical investigation of a construct (Mowen & Voss, 2008). The following research questions were formulated to guide the analysis:

- RQ-1: Can five dimensions (corresponding to the five psycho-geometric types), be identified from the data? Do the items have acceptable internal consistency so that they can be combined into scales? Do the same dimensions appear in self-ratings and in ratings by others?
- RQ-2: Do Raters and Targets agree about the ratings? In particular, do they agree about (a) the overall ratings and (b) the individual items within the scales? Do the evaluations of Raters and Targets correlate within dyads?

METHOD

A convenience sample of paired dyads participated in the study. Each dyad consisted of a Rater and a Target. Raters described Targets on a series of items designed to measure psycho-geometric types. Targets described themselves on the same items.

Sample

The Raters were students from three U.S. universities. All were students of sales management who intended to embark on careers in sales. Although in general students are not considered to be desirable respondents in sales research, we felt that they were indeed appropriate in this study for three reasons. First, a student sample is appropriate when testing theory (Calder, Philips, & Tybout, 1981; Peterson, 2001); in this case, we were interested primarily in assessing the validity of the item sets. Second, there was a good fit between the research questions asked and the research method used (Cooper & Pullig, 2013; Henry, 2008). More specifically, students participating in the study were professionally-oriented, budding salespeople, some with sales experience. As such, these students are, in essence, salespeople in training. Third, we were not making inferences about the impact of the “types” on selling effectiveness or business relationships. Interest was chiefly on scale item pertinence vis-à-vis reliability, validity, and context.

Data were obtained from 161 dyads. Most of the Targets were friends of the Raters (55.3%). The rest had a variety of relationships with the Rater, including spouses (3.7%), parents (8.7%), other relatives (11.2%), and business associates (9.9%). Targets were approximately evenly divided between males (54.7%) and females (42.2%). Raters were also approximately evenly divided between the sexes. Also, both sets were relatively young, with 63.4% between 18 and 25 years old, although there were some older individuals in the sample of Raters.

Procedure

Each Rater was instructed to enlist the cooperation of another individual (Target), whom the Rater felt he/she knew well, and invite the individual to complete a self-report measure of his/her own personality characteristics (self-rated questionnaire). The questionnaire was returned in a sealed envelope to the researchers. Raters described Targets on the same series of items (other-rated questionnaire). The

questionnaires were matched but analyzed as two separate data sets, referred to subsequently as "self-rated" and "other-rated" data.

Items

The items on the questionnaires were developed to assess each of the five psycho-geometric types. These items were worded so that they would tap into the way the types would be perceived in a selling context. They were measured on a 7-point Likert scale, where "1" indicated strongly disagree and "7" indicated strongly agree. Fifteen items were included to measure box; 19, triangle; 19, circle; 15, squiggle; and 15, trapezoid. Items corresponding to the five types were alternated on the questionnaire.

A global rating of the psycho-geometric types was completed only by the Rater and consisted of a single-item evaluation on a scale from 0 to 100, where "0 to 29" indicated low, "30-59" indicated moderate, "60-79" indicated high, and "80-100" indicated very high. Raters were given descriptions of the five types and the following instructions:

> *The makeup of the person you are describing can be defined by the characteristics of five geometric shapes...the box, triangle, trapezoid, circle, and squiggle. Read each of the following shape descriptions carefully. Identify the shape that is* **most** *suggestive of the person you are analyzing. Then assign a number from 1 to 100 to measure the degree to which the person conforms to that shape. For example, if you feel the person is predominantly a box and rates "very high" on box characteristics, you will assign a score from 80 to 100. Then select the next most dominant shape describing that person (perhaps the circle) and assign a score attesting to his/her characteristics. Then assign ratings to the person for the other three shapes. Place the ratings in the appropriate spaces on page one.*
>
> *In summary, the person will be assigned 5 scores, one for each shape. A person may be rated high for some shapes, low on others, high on all, or low on all. The scores, high or low, are not in any way predictive of the person's character, success patterns, or goodness or badness. They do nothing more than identify the person and differentiate him/her from other people.*

This process resulted in a single "other-rated" global evaluation of each psycho-geometric type for each Target.

ANALYSIS

As a preliminary check, the internal consistency of the full set of items for each of the five psycho-geometric types was examined within each data set. For the *self-rated* scales they were as follows: box (α = .668), triangle (α = .815), circle (α = .809), squiggle (α = .771), and trapezoid (α = .833). For the *other-rated* scales they were as follows: box (α = .674), triangle (α = .796), circle (α = .843), squiggle (α = .762), and trapezoid (α= .808). These were acceptable with the exception of the box scale; it was lower than the recommended value of α = .70 (Nunnally, 1978). This was true in both evaluation sets.

Dimensionality

Next, dimensionality was assessed. For each data set separately, the complete set of items was independently subjected to a principal components analysis with varimax rotation to determine whether five discrete dimensions corresponding to the five types would emerge. In both data-sets, the same five orthogonal dimensions emerged (Tables 2 and 3); the same items cross-loaded and were eliminated. This reduced the data set to 4 box items, 4 triangle items, 8 circle items, 5 squiggle items, and 5 trapezoid items. Internal consistencies were examined for each scale within each data set (Tables 2 and 3), and all were within the range of acceptable values (ranging from α = .72 to .88). Therefore, we concluded that each subset could be combined into a measurement scale. The items were summed and averaged to use as "summated" scores in the analysis.

TABLE 2
PRINCIPLE COMPONENTS ANALYSIS OF SELF-RATING SCALES

Items	Box	Tri-angle	Circle	Squiggle	Trapezoid
Box scale					
Is often overly cautious and conservative	.50	-	-	-	-
Prefers structured situations	.81	-	-	-	-
Prefers established routines	.77	-	-	-	-
Enjoys a controlled work environment	.67	-	-	-	-
Triangle scale					
Is highly competitive	-	.83	-	-	-
Has a "must win" attitude	-	.83	-	-	-
Craves prestige, authority, and position	-	.70	-	-	-
Likes to be in control of others	-	.66	-	-	-
Circle scale					
Finds it important to know others are happy	-	-	.79	-	-
Tries to soothe ruffled features	-	-	.65	-	-
Tries to maintain harmony at all costs	-	-	.72	-	-
Is a caring person	-	-	.77	-	-
Influences others through friendliness & openness	-	-	.69	-	-
Creates an atmosphere of well-being	-	-	.62	-	-
Will go to great lengths to avoid hurting people's feelings	-	-	.75	-	-
Tends to respond with the heart rather than with the head	-	-	.64	-	-
Squiggle Scale					
May want to do something wild and weird that was never done before	-	-	-	.64	-
Won't hesitate to try something new and/or unknown	-	-	-	.74	-
Thrives on opportunities to be creative	-	-	-	.54	-
Is attracted to new or unique things, ideas, or people	-	-	-	.78	-
Loves change for its own sake	-	-	-	.54	-
Trapezoid scale					
Is going through a period of transaction	-	-	-	-	.67
Is attempting to establish his/her identity	-	-	-	-	.77
Behavior is somewhat inconsistent at this time	-	-	-	-	.72
Is trying to get his/her feet on the ground	-	-	-	-	.74
Is attempting to establish his/her identity	-	-	-	-	.86
Cronbach alpha	.73	.80	.86	.78	.83

TABLE 3
PRINCIPLE COMPONENTS ANALYSIS OF OTHER-RATING SCALES

Items	Box	Tri-angle	Circle	Squiggle	Trapezoid
Box scale					
Is often overly cautious and conservative	.73	-	-	-	-
Prefers structured situations	.67	-	-	-	-
Prefers established routines	.70	-	-	-	-
Enjoys a controlled work environment	.58	-	-	-	-
Triangle scale					
Is highly competitive	-	.81	-	-	-
Has a "must win" attitude	-	.83	-	-	-
Craves prestige, authority, and position	-	.57	-	-	-
Likes to be in control of others	-	.62	-	-	-
Circle scale					
Finds it important to know others are happy	-	-	.80	-	-
Tries to soothe ruffled features	-	-	.72	-	-
Tries to maintain harmony at all costs	-	-	.78	-	-
Is a caring person	-	-	.79	-	-
Influences others through friendliness & openness	-	-	.62	-	-
Creates an atmosphere of well-being	-	-	.74	-	-
Will go to great lengths to avoid hurting people's feelings	-	-	.82	-	-
Tends to respond with the heart rather than with the head	-	-	.57	-	-
Squiggle Scale					
May want to do something wild and weird that was never done before	-	-	-	.66	-
Won't hesitate to try something new and/or unknown	-	-	-	.54	-
Thrives on opportunities to be creative	-	-	-	.57	-
Is attracted to new or unique things, ideas, or people	-	-	-	.62	-
Loves change for its own sake	-	-	-	.73	-
Trapezoid scale					
Is going through a period of transaction	-	-	-	-	.64
Is attempting to establish his/her identity	-	-	-	-	.81
Behavior is somewhat inconsistent at this time	-	-	-	-	.50
Is trying to get his/her feet on the ground	-	-	-	-	.81
Is attempting to establish his/her identity	-	-	-	-	.85
Cronbach alpha	.70	.73	.88	.72	.83

When items are eliminated from a set, a concern in scale development is whether the underlying meaning of the measure might be altered. In order to assess whether the elimination of items had altered the meaning, correlations between the summated scores and corresponding sets of original items were examined within the two sets. All were large and significant for both data sets. The findings for the *self-rated* data set were as follows: box ($r = .778$, $p < .001$), triangle ($r = .804$, $p < .001$), circle ($r = .913$, $p < .001$), squiggle ($r = .852$, $p < .001$), and trapezoid ($r = .894$, $p < .001$). For the *other-rated* data set, the results were as follows: box ($r = .799$, $p < .001$), triangle ($r = .736$, $p < .001$), circle ($r = .950$, $p < .001$), squiggle ($r = .867$, $p < .001$), and trapezoid ($r = .848$, $p < .001$). The results suggest that little substantive information had been lost in the item reduction process.

Construct Validity

In order to assess the construct validity of the scales, we evoked the concept of the "multitrait-multimethod matrix" (Cambell & Fiske, 1959). Initially, the cross-method correlations (between the combined self-rated scales and the other-rated scales) were examined and found all of them to be large, positive, and statistically significant: box ($r = .536$, $p < .001$), triangle ($r = .587$, $p < .001$), circle ($r = .617$, $p < .001$), squiggle ($r = .626$, $p < .001$), trapezoid ($r = .588$, $p < .001$)—thus indicating convergent validity. The cross-trait correlations were all very small and were not statistically significant, thus demonstrating discriminant validity.

We then examined the correlations between the summated *self-rated* scales and the single global measure of psycho-geometric types. The correlations were smaller, but four of the five were statistically significant: triangle ($r = .225$, $p < .004$), circle ($r = .399$, $p < .001$), squiggle ($r = .253$, $p < .001$), and trapezoid ($r = .344$, $p < .001$). Only the correlation with the box was not significant ($r = .093$, $p > .238$). A similar pattern emerged in the correlations between the *other-rated* scores and the global measures. Four were statistically significant: triangle ($r = .154$, $p < .05$), circle ($r = .341$, $p < .001$), squiggle ($r = .201$, $p < .01$), trapezoid ($r = .328$, $p < .001$)—and one was not (box [$r = .071$, $p > .368$]). Therefore, the box did not correlate significantly in either the self-rating or other-rating case.

Agreement Between Raters and Targets

The next concern was whether Raters and Targets agreed about the ratings. As a first step, we compared the mean values of the summated scores (Table 4). We found significant differences between the mean values for self- and other-ratings for the circle scale, and differences at the .10 level for the squiggle scale. No significant differences were found between self- and other-ratings for the box, triangle, or trapezoid scales. In each case, the mean values for the self-rated scores were higher than those of the other-rated scores.

TABLE 4
A COMPARISON OF MEAN VALUES OF SELF-RATINGS AND OTHER-RATINGS ON THE SUMMATED SCALES

	Self-Rating	Other's Rating	Significance
Box	4.266	4.174	.289
Triangle	4.705	4.554	.110
Circle	5.329	5.136	.009
Squiggle	4.892	4.752	.055
Trapezoid	4.148	4.124	.833

TABLE 5
ITEM MEAN VALUES

Items	Self	Other
Box scale		
Is often overly cautious and conservative	3.71	3.49
Prefers structured situations	4.69	4.57
Prefers established routines	4.31	4.39
Enjoys a controlled work environment	4.35	4.25
Triangle scale		
Is highly competitive	5.30	5.02*
Has a "must win" attitude	5.01	4.68*
Craves prestige, authority, and position	4.53	4.51
Likes to be in control of others	3.98	4.00
Circle scale		
Finds it important to know others are happy	5.72	5.32*
Tries to soothe ruffled features	5.20	4.91*
Tries to maintain harmony at all costs	4.79	4.66
Is a caring person	6.09	5.85*
Influences others through friendliness & openness	5.46	5.37
Creates an atmosphere of well-being	5.43	5.36
Will go to great lengths to avoid hurting people's feelings	5.25	5.17
Tends to respond with the heart rather than with the head	4.68	4.45
Squiggle Scale		
May want to do something wild and weird that was never done before	4.98	4.78
Won't hesitate to try something new and/or unknown	5.16	5.02
Thrives on opportunities to be creative	5.12	4.96
Is attracted to new or unique things, ideas, or people	5.29	5.19
Loves change for its own sake	3.91	3.82
Trapezoid scale		
Is going through a period of transaction	4.83	4.77
Is attempting to establish his/her identity	4.27	4.24
Behavior is somewhat inconsistent at this time	3.40	3.55
Is trying to get his/her feet on the ground	4.16	4.04
Is attempting to establish his/her identity	4.07	4.02

Next, we compared the mean values of the individual items (Table 5). We found two items in the triangle scale and three in the circle scale that were significantly different from each other (suggesting some lack of agreement about the intensity of the trait). As with the summated scales, the means of the individual self-rated items were higher than those of the other-rated items. No items were significantly different in the box, trapezoid, or squiggle scales.

Correspondence Within Dyads

Although this analysis shows the degree of agreement between the mean scores of the *groups* of raters, it does not show the degree of actual agreement within *individual dyads* of Target and Rater. In order to assess this, we looked at the dyads individually. In the manner of Jolson and Comer (1997), we collapsed the responses into two categories: those that thought that the Target had the trait and those that did not. We recoded the responses "strongly agree" "agree" and "somewhat agree" as positives (the perception that the Target possessed the characteristic, coded as 1). Those that responded "strongly disagree," "disagree," and "somewhat disagree" were recoded as negatives (the perception that the Target did *not* possess the characteristic, coded as 0). The response "neither agree nor disagree" was considered as a negative (coded as 0), because being unable to determine whether the pairs of items had the characteristic would seem to be an indication of the absence of the characteristic. For each item, the self-rated score was subtracted from the other-rated score to determine whether the Rater and Target agreed: zero indicated Rater and Target agreed about the characteristic; +1 indicated that the Rater believed the Target had the characteristic, but the Target did not; -1 indicated that the Target believed he/she had the characteristic, but the Rater did not. As shown in Table 6, Target and Rater were in agreement between 60% and 85% of the time. Thus, there was moderate agreement within the dyads. These findings infer that there is some degree of variance in the ability of Raters to evaluate Targets.

TABLE 6
AGREEMENT BETWEEN SELF-RATINGS AND OTHER-RATINGS (PERCENTAGE)

	Difference		
Items	-1	0	1
Box scale			
Is often overly cautious and conservative	17.4	68.3	14.3
Prefers structured situations	18.6	68.3	13.0
Prefers established routines	16.1	67.7	16.1
Enjoys a controlled work environment	18.0	64.6	17.4
Triangle scale			
Is highly competitive	16.8	75.8	7.5
Has a "must win" attitude	16.1	74.5	9.3
Craves prestige, authority, and position	18.6	67.7	13.7
Likes to be in control of others	17.4	66.5	16.1
Circle scale			
Finds it important to know others are happy	13.7	84.5	1.9
Tries to soothe ruffled features	19.9	69.6	10.6
Tries to maintain harmony at all costs	20.5	65.8	13.7
Is a caring person	11.2	84.5	4.3
Influences others through friendliness & openness	10.6	80.7	8.7
Creates an atmosphere of well-being	11.2	75.8	12.4
Will go to great lengths to avoid hurting people's feelings	16.1	73.3	10.6
Tends to respond with the heart rather than with the head	19.3	67.7	13.0
Squiggle Scale			
May want to do something wild and weird that was never done before	15.5	72.7	11.8
Won't hesitate to try something new and/or unknown	11.8	80.1	7.5
Thrives on opportunities to be creative	14.9	75.8	9.3
Is attracted to new or unique things, ideas, or people	13.7	77.6	8.7
Loves change for its own sake	19.9	67.7	12.4
Trapezoid scale			
Is going through a period of transaction	15.5	77.6	6.8
Is attempting to establish his/her identity	20.5	64.0	14.9
Behavior is somewhat inconsistent at this time	13.0	72.7	14.3
Is trying to get his/her feet on the ground	12.4	73.9	13.7
Is attempting to establish his/her identity	19.3	67.7	13.0

DISCUSSION

The primary objective of this paper was to present an instrument that could be used to measure the five psycho-geometric types on order to assist students in personal selling courses in learning how to categorize customer types. The measures developed appear to offer the potential of doing so in the following ways:

- They are dimensional. Five clear dimensions were isolated by principal components analysis corresponding to the five psycho-geometric types.
- They are reliable. Internal consistencies for each scale were greater than Nunnally's (1978) criterion of $\alpha = .70$.
- They exhibit construct validity. Convergent validity was demonstrated by examining (1) the correlations between the summated self-rated scales and the corresponding other-rated scales and (2) the correlations between each summated scale and each global measures. Discriminant validity was demonstrated by the successful principal component's analysis and the insignificant cross-trait correlations. By this analysis, all except for the box scale appear to have construct validity.

The secondary objective of this paper was to determine whether individuals can accurately "read" the psycho-geometric types of other people. Although the agreement between Target and Rater was not perfect, it was substantial. Accordingly, there is reason to believe that it is possible for one individual to assess the psycho-geometric type of another with some accuracy. The agreement seems strongest in the case of the circle and weakest in the case of the box. In addition, the agreement was better on the specific item sets than on the global measure. This suggests that the raters either did not completely understand the specific types holistically or that the set of items, themselves, did not reflect the global types.

Traditionally, with personality measures, only moderate agreement has been found among raters (e.g., Berr, Church, & Waclawski, 2000). In the case of psycho-geometrics, the researchers presupposed that the holistic concepts of the psycho-geometric shapes would make recognition of these types easier. Given this presupposition, the key indicator of accuracy should be the global measure. Respondents seemed less able to assess psycho-geometric traits accurately on the global measure than on the more specific characteristics, which was disappointing.

The failure of the box scale to correlate with its global measure was also disappointing. In examining the items of the box scale, we thought it was possible that some of the key box characteristics were lost in the item reduction process. The box is a meticulous worker who exhibits a strong attention to detail. The items that tapped this may have been eliminated. However, the strong correlation between the original items and the reduced set of box items suggests this was not the case. The items of the box scale clearly need more work so that they more accurately reflect the box type.

Perhaps there may have been some social desirability effects associated with the ratings of box. Although the shapes were conceived in "nonjudgmental" terms (Dellinger, 1989), among students of sales management there may be some stigma to being a box. After all, boxes are not outgoing, but rather hardworking, conscientious people resembling the stereotype of the accountant (possibly evoking the image of a "nerd"). Some of the Raters may have been reluctant to describe their "friends" in these terms. Some of the box-like Targets may have felt the same way and have tried to hide these characteristics from their Rater friends. Such factors would have confounded the evaluations.

Recognition of the types could have been marred by such factors as the inability to control for such factors as lack of training of Raters, individual differences, rater biases, cultural differences, as well as the personality preferences of the individual being rated (enumerated by Berr, Church, & Waclawski, 2000). In addition, the Raters had not received training in psycho-geometric types. They had only an introductory knowledge of the subject. They were also inexperienced in the practice of reading people. With training in what to look for and experience in the field, they might be better able to identify the types. The Raters were students and may not have understood the context in which the items/types were presented. If true, the evaluations would improve as the Raters gain experience as salespeople working with actual customers in the selling situation.

Arguably, the results of this study might lead sales educators to question the value of our proposed typology. Given that this is the *initial* investigation of the efficacy of this typology in a sales setting as well as the generally favorable findings, further investigation is warranted before dismissing the concept. The simplicity of this typology and its easily remembered figures may well present a superior alternative to the extant customer types. Previous researchers have questioned the extent to which salespeople, particularly new and junior sales personnel, are able to identify customer types using the existing taxonomies (e.g., Jolson, 1984). Geometric figures, owing to their simplicity, are likely to be easier with which to categorize customers and then adapt accordingly than mere verbal descriptions. So, professors teaching personality styles in their personal selling courses should give serious consideration to instructing students about psycho-geometrics and the value that they can provide in assisting students to learn how to classify customers. The words of Kimball (2007, p. 68), although stated in a different marketing education context, precisely reflect the present situation:

> *Educators can begin the process by identifying the key concepts within traditional coursework materials, note those areas that could benefit from additional emphasis, and …help students discover essential…[knowledge] in the learning laboratory...*

Limitations of the Study and Suggestions for Future Research

Given that our preliminary results are promising, further empirical research may well lead to the development of a valid psycho-geometric scale that merits use in personal selling courses. The study has several important limitations, though. They are suggestive of future research avenues.

- Targets had a variety of relationships to the Raters. Raters selected their own Targets on the basis of their prior relationship with them. This may have caused the data to be contaminated with situational factors unrelated to the study at hand. Future research should control the type of relationship between Raters and Targets. Ideally, the relationship should be that between a salesperson and customer.
- The Raters knew the Targets very well. Indeed, the Targets had been selected to participate because of this knowledge. Future research should address the issue of how well the Target could be evaluated on a first meeting (initial selling encounter).
- The Raters were students not practicing salespeople. The lack of experience working with customers in the sales encounter makes it difficult to make inferences about their ability to recognize these types in the field. Further work should be conducted using experienced salespeople as Raters.
- The box items failed to correlate with its corresponding global rating. More work should be done in developing items for the box scale and examining its construct validity.
- The study did not attempt to identify characteristics of Raters who had better ability than others to assess the types. Subsequent empirical efforts should examine the relationship between personal qualities (e.g., empathy) and their ability to do this.
- This investigation did not attempt to make any inferences about the relationship between the ability to recognize these types, selling behaviors and selling effectiveness. A long-term goal for this project should be to determine the manner in which the ability to assess types, ability to adapt selling behavior, and the successfulness of the sales outcomes.

ENDNOTES

1. The sensing-intuitive dimension refers to the degree to which individuals prefer concrete facts (sensing) as opposed to looking beyond the actual to the possible (intuitive). The thinking-feeling dimension refers to the degree to which individuals are logical and left-brain dominated (thinking) as opposed to the emotional, right-brain dominant (feeling). The extroversion-introversion

dimension refers to the degree to which the individual is outgoing and gregarious (extroversion) versus self- contained and content to remain within the self (introversion).

2. The judging-perceiving dimension refers to the degree to which individuals tend to be organized and plan their life environments (judging) versus the degree to which they tend to be flexible and spontaneous in their lives and environments (perceiving).

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*This project originated with Professor Emeritus Marvin A. Jolson (University of Maryland), now deceased, who had keen enthusiasm for the notion of psycho-geometrics and introduced it into his sales training seminars. In essence, he was our muse. In writing this article, the research group has tried to bring Professor Jolson's unfinished work to fruition. This article is dedicated to him for his gracious sagacious guidance, verve, and assistance on the topic.

Going Green in University Computer Labs

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We investigate energy consumption in university computer labs, in order to determine strategies for reducing energy costs without adversely affecting lab users. This research is part of a multi-stage project that incorporates data gathering, analysis, solution exploration, model development, and strategy implementation. In this paper, we report primarily on the first three stages, along with some discussion of strategy implementation. The initial data gathering was conducted at Abilene Christian University (ACU), across five computer labs, with over 100 computers surveyed. These computers have been used as a representative sample of computer configurations across the ACU campus, due to their near uniform hardware and software configurations according to the university's IT policies and procedures. Based on our data collection, we compared the computers' idle time with their actual usage time, and show that a large amount of energy is being unnecessarily wasted. With this data, we calculated the current energy usage of the surveyed computers, and then extrapolated our findings to the rest of the university based on ACU's computer lab equipment list. Simple strategies such as switching computers to sleep soon after class, running a campaign to switch off monitors, and waking the computers on LAN, are shown to substantially reduce energy waste. Across ACU, we estimate thousands of dollars per year in savings. Finally, we also discuss concerns and challenges related to the proposed strategies, and proffer some solutions to illustrate the feasibility of our recommendations.

INTRODUCTION

Abilene Christian University (ACU) is a selective, private, master's-level university located in Abilene, Texas. Enrollment for the 2010-2011 fall semester was 4,728, while average enrollment is about 4,700 (ACU Profile, 2012). According to the university's education technology list of equipment, there are over 750 computers in university labs, classrooms, and offices, with the majority being Dell desktops running Windows XP or Windows 7. Our research began with the observation that ACU, like most universities, did not seem to have specific energy conservation strategies in place (particularly for their lab computers). Even though some of the labs are only used for a few hours of the day, the computers are almost always on, including over nights, weekends, and holidays. This led us to believe that there was potential for ACU to save a considerable amount on energy costs through the creation and implementation of various energy conservation strategies. From our initial literature review, we found that ACU is not alone in this regard - energy conservation issues also affect many other universities. According to a study done at the University of Louisiana at Lafeyette, computers are rarely turned off,

even if not in use (Kozman et. al, 2011). Similarly, improving energy efficiency could be beneficial for businesses. According to New Zealand's Energy Efficiency & Conservation Authority, if their business sector were to improve its energy efficiency (cost effectively), over $2 billion per year could be saved (New Zealand Management, 2011).

With this knowledge, we sought to determine whether or not ACU was making efficient use of its energy, and if not, what could be done to improve. The major aspects of this research included data collection, analysis, and solution exploration, though in the future we would like to expand this research to model development and strategy implementation. After collecting the relevant data (computer type, quantity, power settings, etc), we analyzed this information to determine how much we could improve energy efficiency at Abilene Christian University. In this analysis, we share some possible solutions, and also discuss their related challenges and concerns.

DATA COLLECTION

To begin our research, we surveyed the Mabee Business Building, which is a part of the College of Business Administration at ACU. We began with this building primarily due to its ease-of-access, and because it had multiple computer labs. We also surveyed a computer lab in the Zona Luce Building, which is a part of the Department of Agricultural and Environmental Sciences. In total, we counted 138 computers in the surveyed labs and classrooms (see Table I), with the majority being Dell Optiplex 380 workstations (64%). The second and third most popular computer types were Dell Optiplex 330s (14%), and 20" Apple iMacs (9%). In addition to this, we counted 135 monitors (see Table II). The discrepancy between the total desktop and total monitor count can be attributed to a small group of computers with dual monitor setups, and also to the 20" iMacs (where the monitor is considered to be a part of the desktop unit).

TABLE I
COMPUTER TYPES AND QUANTITIES

Computer Type	Quantity
20"Apple iMac	13 (9.4%)
Apple Mac Mini	2 (1.4%)
Dell Optiplex 330	19 (13.8%)
Dell Optiplex 360	11 (8.0%)
Dell Optiplex 380	88 (63.8%)
Dell Optiplex 390	4 (2.9%)
Dell Precision 350	1 (0.7%)

During the 2012 spring break, when the majority of students were not on campus, we again surveyed some of the labs where these computers were located, in order to determine whether or not the computers were on or in use. Of the 100 computers surveyed during this break (Mabee Business Building labs 314, 315, 317; Zona Luce lab 104), only nine machines were turned off (less than 10%), though none were in use at the time of this survey (~11am on Wednesday).

TABLE II
MONITOR TYPES AND QUANTITIES

Computer Type	Quantity
Acer X193W+	21(15.6%)
Aquos Quattron (TV)	2 (1.5%)
Dell 1909W	88 (65.2%)
Dell 1702FP	1 (0.7%)
Dell E1709W	4 (3.0%)
Dell E198WFP	19 (14.1%)

After determining both the type and quantity of the equipment found in the classrooms and computer labs, we attempted to determine the equipment's power consumption during various states of power (e.g. on, sleeping, and off) by cross-referencing the Energy Star product list and the device manufacturer's specifications (see tables III and IV) (Energy Star, 2012a). Since Energy Star has the resources to accurately measure equipment power consumption, we decided to use their data rather than measuring equipment power consumption on our own.

TABLE III
DESKTOP POWER USAGE IN VARIOUS STATES

Computer Type	Watts (On)	Watts (Sleep)	Watts (Off)
20" iMac	26.17	1.49	0.61
Dell Optiplex 360	39.36	1.12	0.52
Dell Optiplex 380	49.40	1.27	0.88
Dell Optiplex 390	36.97	2.64	0.26
Mac Mini 4,1	12.40	1.57	0.61

TABLE IV
MONITOR POWER USAGE IN VARIOUS STATES

Monitor Type	Watts (On)	Watts (Sleep)	Watts (Off)
Acer X193W+	17.06	0.34	0.3
Aquos Quattron	NA	NA	NA
Dell 1702FP	NA	NA	NA
Dell 1909W	17.68	0.43	0.35
Dell E1709W	19.37	0.43	0.4
Dell E198WFP	NA	NA	NA

One of the most interesting findings of this initial mapping was that the most common computer (Optiplex 380) was also the one with the highest power usage of the computers surveyed (see table III). Consequently, we determined that it was imperative that good solutions be found to reduce power consumption. At the same time, one of the least used machines (Mac Minis) had the lowest power consumption. However, this difference in quantity can be partially attributed to their difference in price ($369 vs $599). In the 'on state', an Optiplex 380 uses about four times more power (.049 kW) than a Mac Mini (.012 kW). Interestingly enough, the 20" iMacs use roughly half the power (.026 kW) that the 380s use, despite having 20" displays built into the system. In contrast, the Dell 1909w monitors that accompany the 380s use about .018 kilowatts (in addition to the desktops' .049 kW).

We then checked the various computer types and determined their configured time-to-sleep and time-to-off (per lab), as these settings have the potential to greatly impact energy consumption. We found that none of the computers were configured to completely turn off after any period of time, and only 21% (29 of 138) were configured to go to sleep after some period of time (see table V). The default (factory) power settings for these computers would normally cause them to sleep after 10, 15, or 30 minutes, so it appears that this setting has been changed as a part of ACU's desktop imaging process. However, 122 (88%) of the desktops were configured to turn off the monitors after some period of time (see Table VI). We also found that for monitors, there was very little difference between power used when sleeping and off, though there was a slightly bigger difference for the same comparison with desktops (see tables III and IV).

TABLE V
COMPUTER TIME-TO-SLEEP VS MANUFACTURER DEFAULTS

Computer Type	Time-to-sleep	Defaults
20" Apple iMac	3 hours	10 minutes
Apple Mac Mini	3 hours	10 minutes
Dell Optiplex 330	None	NA
Dell Optiplex 360	15 minutes	15 minutes
Dell Optiplex 380	None	30 minutes
Dell Optiplex 390	15 minutes	15 minutes
Dell Precision 350	None	NA

TABLE VI
MONITOR TIME-TO-SLEEP VS MANUFACTURER DEFAULTS

Monitor Type	Time-to-sleep	Defaults
Dell E198WFP	20 minutes	NA
Acer X193W+	15 minutes	15 minutes
Dell 1909W	60 minutes	15 minutes
Dell E1709W	60 minutes	15 minutes
Dell 1702FP	0 minutes	NA
Aquos Quattron	0 minutes	10 minutes
Dell E198WFP	20 minutes	NA

It is important to note that though some of the computers have been configured to turn on a screensaver after a few minutes, these screensavers do not save any power. According to Energy Star (Energy Star, 2012b), most screen savers do not save money, and some graphically-intense screen savers may actually double a computer's rate of energy consumption and prevent it from entering sleep mode. In our survey, the monitor power consumption seemed to be a fairly significant finding, as the monitors, though modern, draw a lot of power. Even when the system is simply updating or displaying an all black screensaver, the monitors are operating at full power.

ANALYSIS

After we finished collecting the necessary data, we began to analyze our findings to determine whether or not we could improve the energy efficiency (and if so, by how much).

Assumptions

In order to simplify the data analysis, it was necessary to make a number of base assumptions.

- All computers (of the same model) have identical specifications. Based on ACU's IT policies, computers of the same type usually have identical system images. We verified this by checking computers of the same type in different labs, and all computers surveyed appeared to have the same specifications.
- Based on classroom and lab schedules, all computers that are configured to go to sleep will do so once per day. In actuality, some computers with a short enough time-to-sleep/off will go to sleep between classes, which increases the idle time per computer per day (in contrast to continuous usage, where all computers would go to sleep/off only once per day).
- Classes are assumed to use all computers. In practice, some classes may not use all of the available computers.
- Computers are assumed to not be in use outside of classes. In practice, some students may use the lab computers outside of class, increasing the 'on time'.

Data Analysis

Keeping these assumptions in mind, we began to analyze the data we had collected. In order to determine the hours per day that the surveyed computers were in use, we referenced the class schedule for each lab (MBB Course Schedule, 2012). Using the class information for the spring 2012 semester, we then calculated the actual usage by taking the hours in-use, averaging them per day over a week, and then adding the time-to-sleep/time-to-off for each day (where applicable).

In the case of labs 314, 315, and 317, the computers are almost always on, but are not in use for the vast majority of the time. This is clearly not an efficient use of power, and can certainly be improved. Though unexpected, this has led to discussions of completely removing these lab computers, and instead possibly requiring students to have a laptop as a part of admission to an SITC program at ACU. These three labs contain 82 computers total (59% of all surveyed computers), and use a significant amount of power. On the other hand, lab 214 and 302 are good examples of efficient energy use. In lab 214, the computers are configured to go to sleep after 15 minutes, while the iMacs in lab 302 are configured to go to sleep after 3 hours. If we were to set similar settings for all computers, we could greatly reduce the idle time, thereby reducing overall energy costs. An interesting finding was that only the Optiplex 360s and 390s (10.9% of all surveyed computers) were configured with the manufacturer defaults regarding system power settings. The configured time-to-sleep/time-to-off for all other surveyed computers was much higher than the manufacturer defaults. For example, the Optiplex 380s were configured to never turn off or sleep, and the iMacs were configured to go to sleep after 3 hours.

Potential Savings

Using the aforementioned data, we began to calculate the costs and potential savings for the surveyed computers. During the 2010 fiscal year (up to May 2011), the average cost of electricity was 8.1cents per kWh. In the 2011 fiscal year, the average cost was 8.72 cents per kWh. ACU is contracted to buy electricity at a set rate up to an agreed cap, beyond which the electricity cost is set at the market rate. Not including the equipment for which we do not have the necessary power usage data, with the current power settings, we estimate the total kilowatt hours used per day to be a little over 90. At 8.72 cents per kWh, this translates into almost $8 per day. At first glance, this may not seem like much, but the typical computer upgrade cycle at ACU is three years (though it often gets stretched to four years for a variety of reasons). In one year, at 8.72 cents per kilowatt hour, these computers would cost the university over $2,800 to run (or around $8,500 in 3 years). However, if the power settings for all lab equipment were to be reset to the manufacturer defaults, the kilowatt hours used per day would drop to *less than 7*. At the same 8.72 cents per kWh, this comes to a little more than 50 cents per day, or about $200 in a year. This translates into cost savings of over $2,600 per year, and about $8,000 over three years. If the upgrade cycle is extended to four years, as it often is, the savings would be closer to $11,000. With 750 computers

on campus, if the other computers have similar power settings, there could be significant savings across the university. In our preliminary comparison, extrapolating the data across campus could save ACU almost $20,000 per year.

FIGURE 1
ACTUAL USAGE VS TIME ON, AVERAGED PER DAY OVER A WEEK

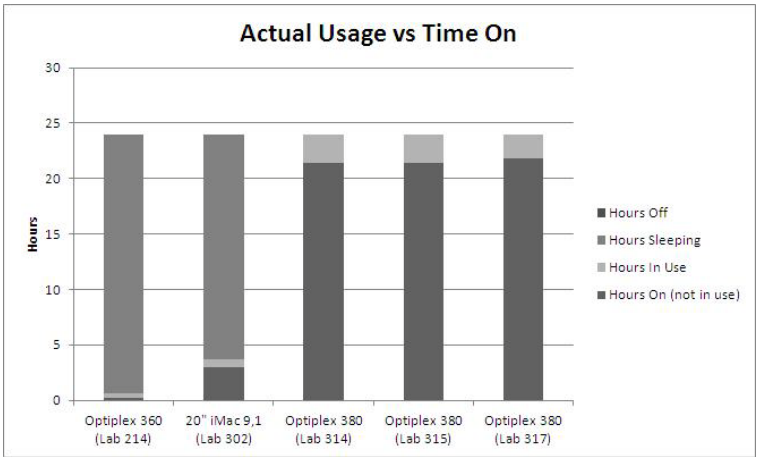
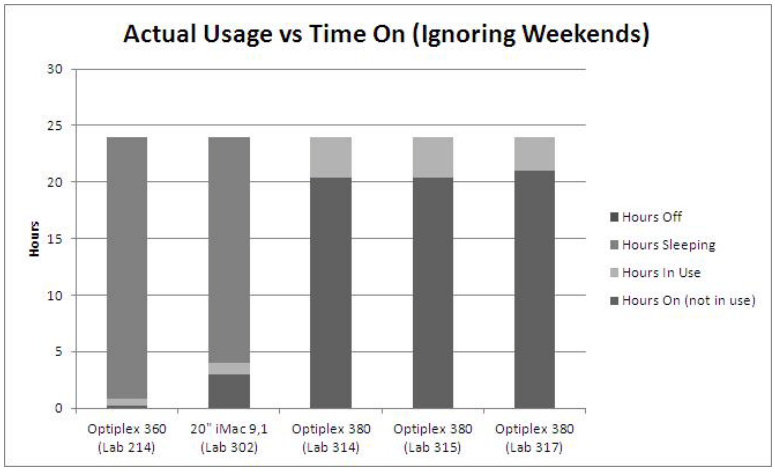


FIGURE 2
ACTUAL USAGE VS TIME ON, AVERAGED PER DAY (IGNORING WEEKENDS)



SOLUTION EXPLORATION

After collecting the data and doing a preliminary analysis, we began to discuss the possible solutions. The most obvious answer would be to change the power settings for lab computers (which seems to be a fairly simple solution), but due to ACU's management software and policies, this is not easily doable. Also, based on the overall low usage time of the lab computers in Mabee Business Building, we began to discuss the possibility of reducing the number of lab computers, or even removing them completely. This could bring significantly more savings to the university, but would require a detailed study of the power usage and effective cost of requiring students to bring their own laptops. This would also lead to a number of new issues that would need to be addressed (e.g. standardizing hardware requirements, access to

software, device and network security, etc). To complicate matters further, many students already bring their own computing devices to class (including laptops, tablets, smart-phones, etc).

Despite the fairly significant potential benefits to implementing stricter power settings for the equipment, there are some challenges and concerns that must be addressed. At ACU, computers are left on due to the remote management software used by the system administrators. This software is used to maintain, update, and image computers, but since ACU does not currently use wake-on-LAN, computers must be left on all the time. Under the current university configuration, most computers are "frozen" in a certain state with Faronics' computer management software "Deep Freeze", in order to prevent lasting unwanted or dangerous changes (Deep Freeze Enterprise, 2012). Any changes made to a computer while in this frozen state are completely rolled back when the system next restarts. Partially because of this, updates to computers must be done overnight, or during some other time when they are not in use. They are automatically "thawed", updated, and refrozen. However, even though Deep Freeze can remotely thaw machines for maintenance and updates, it does not look like this is occurring, at least not regularly. In at least one lab, most of the computers had a number of Windows updates that had not been applied.

Wake-on-LAN (WOL) is a technology that allows computers to be woken up remotely by a special Ethernet packet sent to their network interface cards (NIC) (McKaughan et. al., 1998). Some IT managers at ACU have discussed switching from Altiris to Dells' Kace system. Kace works with wake-on-LAN technology, and would allow system administrators to shutdown computers without worrying about remote updates and maintenance. Also, since we determined that monitors can have a fairly significant impact on energy usage, we proposed the idea of implementing a simple "Switch-Off-Screens" campaign", where we would encourage students through word of mouth. However, if we were to attempt such a campaign, uninformed students may think a computer is off when only the monitor is turned off, possibly wasting class time by forcing the machine to undergo a hard reset.

FUTURE RESEARCH

In the future, we would like to expand our research to other buildings on ACU's campus, and possibly to other universities. One possibility is the development of a public energy savings calculator, so that universities could quickly and easily input the number and type of computers, as well as their class schedule and computer power settings, in order to receive a good estimate of their potential for savings. Dell has a Client Energy Savings calculator available on their website, but it is missing some parameters that universities may find useful (and only takes into account Dell equipment) (Dell Inc, 2012). Another possibility for future research is an investigation of wake-on-LAN technology. This technology has been proven to work, but why is it not more commonly used? A paper dealing with WOL would discuss its potential benefits and issues, as well as the details of its implementation. In addition to this, we will work on developing a model for energy conservation at the university level. Finally, a study of student computers/devices and study habits could be useful in determining the necessity of having computer labs as opposed to having students bring their own devices.

CONCLUSIONS

Through our research, we have found that there is a large potential for financial savings by increasing energy efficiency. Across ACU, our pilot campus, we have estimated thousands of dollars per year in savings. Based on these findings, other universities or businesses may also have the potential for drastically reducing their energy costs. However, there are still many challenges that must be addressed, which is the focus for our future research. Of particular interest to us is the development and implementation of a web application that will provide an interface for universities and other organizations to enter their lab parameters in order to easily estimate their own energy usage.

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Virtual Interactive Real-Time Instructor-Led (VIRI) Learning: the Case of Synchronous Blended Learning in Introductory Undergraduate Course

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While interest in blended learning courses is increasing, it means different things to different people. Traditionally, the online component of blended courses has been asynchronous with course content hosted on learning management systems. Both students and researchers value the use of synchronous communication for the online component and some argue it is a necessary feature for there to be learning (Swan, 2003). This paper considers the use of virtual interactive real-time instructor-led (VIRI) technology innovation for blended learning, and discusses the challenges revealed through student and instructor feedback and recommends solutions for an effective blended learning environment using (VIRI) technology to teach introductory undergraduate courses.

Blended learning is becoming more common at educational institutions not only because of increasing enrollment and administrators who see it as a panacea for reducing costs, but also because of student demand for more flexibility in course delivery (Di Angelo, 2012; Steiner & Hyman, 2010). For example, post-secondary education (PSE) participation rates have reached an all-time high in Ontario (59%). The provincial government continues to put pressure on PSE institutions to increase enrollment for several reasons (Norrie & Lin, 2009). While demand for PSE education is increasing, public operating and capital budgets to support this increased demand are not keeping pace, consequently putting significant pressures on university administrators to look for ways to reduce costs (CAUT, 2009). Many universities view online or blended learning as a way to "increase the efficient and effective use of existing human and capital infrastructure … and avoid duplication and unnecessary costs" (Council of Ontario Universities, October 2012, p. 7). The contemporary student, often referred to as Gen-X, Millennials, the Nintendo and Net Generation, prefers more flexible learning opportunities (Duffy, 2008). Between 2002 and 2007, the number of students enrolled in online courses more than doubled. Some argue that online learning is not only an effective format to deliver courses (Steiner & Hyman, 2010), but also an appropriate next step in the advancement of learning for this digital generation of students who are accustomed to surfing the Internet, texting friends and sharing their lives on social media websites.

The common form of delivery in blended learning offerings is asynchronous non-real time interaction with an instructor. Instructors host static content on learning management systems or other websites. Some advancement in blended learning offerings have been made where instructors host interactive content with which the student can engage, yet it still may not meet the needs of the student. For teaching to be effective, Picciano (2002) argues it is necessary to include dynamic interaction between students and

the content, between students and other students, and between the instructor and the student. For dynamic content to be effective, it may be necessary to mimic the types of interactions that take place in the face-to-face classroom. A Virtual Interactive Real-time Instructor-led (VIRI) classroom may provide one solution (Francescucci & Foster, 2013). This paper provides qualitative insights about using a VIRI classroom as a method for offering blending learning opportunities to students in order to mimic the dynamic nature of face-to-face classroom experience. It begins with a background on blending learning, and presents the findings of an ethnographic study that uses VIRI classroom technology in a blended learning format for an introductory undergraduate course. It ends with a discussion of insights gained through and recommendations developed from student feedback and instructor reflections about the use of VIRI Technology in an introductory undergraduate course.

BACKGROUND

While online learning has been defined in many ways (Anderson, 2008), the definition of blended learning is even more ambiguous. To be considered blended learning, the online or electronic portion of the course content must be between 20 and 80% (Garrison & Kanuka, 2004; Klein, Noe, & Wang, 2006). For the purpose of this paper, blended learning is defined as the integration of traditional face-to-face classes with elements of online learning, be it static, dynamic, synchronous, or asynchronous.

Swan (2003, p. 4) argues that central to the concept of online education is the notion of interaction, defined as "reciprocal events involving at least two actors and/or objects and at least two actions in which the actors, objects and events mutually influence each other", which is necessary for there to be learning. Research has shown that students value synchronous online learning because real-time interaction provides immediate feedback much like the traditional face-to-face classroom setting (Park & Bonk, 2007; Sparks & Mentz, 2006). Much of the research to date has concentrated on the benefits of online interaction, especially between instructor and students (Jiang & Ting, 2000). Cao, Griffin, and Bai (2009) found that real-time interaction between student and instructor, led to increased satisfaction with the course. While the issue of asynchronous versus synchronous learning has been the primary subject of online education, it has relevance for blending learning environments as well. Today Gen-X or Millennials, expect to be able to learn in a variety of ways that also include interaction through synchronous online tools.

The objective on this paper is not to compare the available synchronous online learning platforms, but to share the challenges that may arise from using one of them and how one may overcome these challenges to enable a student to have a successful blended learning experience. A second objective of this paper is to add to the body of knowledge on the impact on student learning from the perspective of the instructor teaching in a blended learning course by sharing the knowledge gained by teaching in this format and by analyzing the qualitative feedback of students.

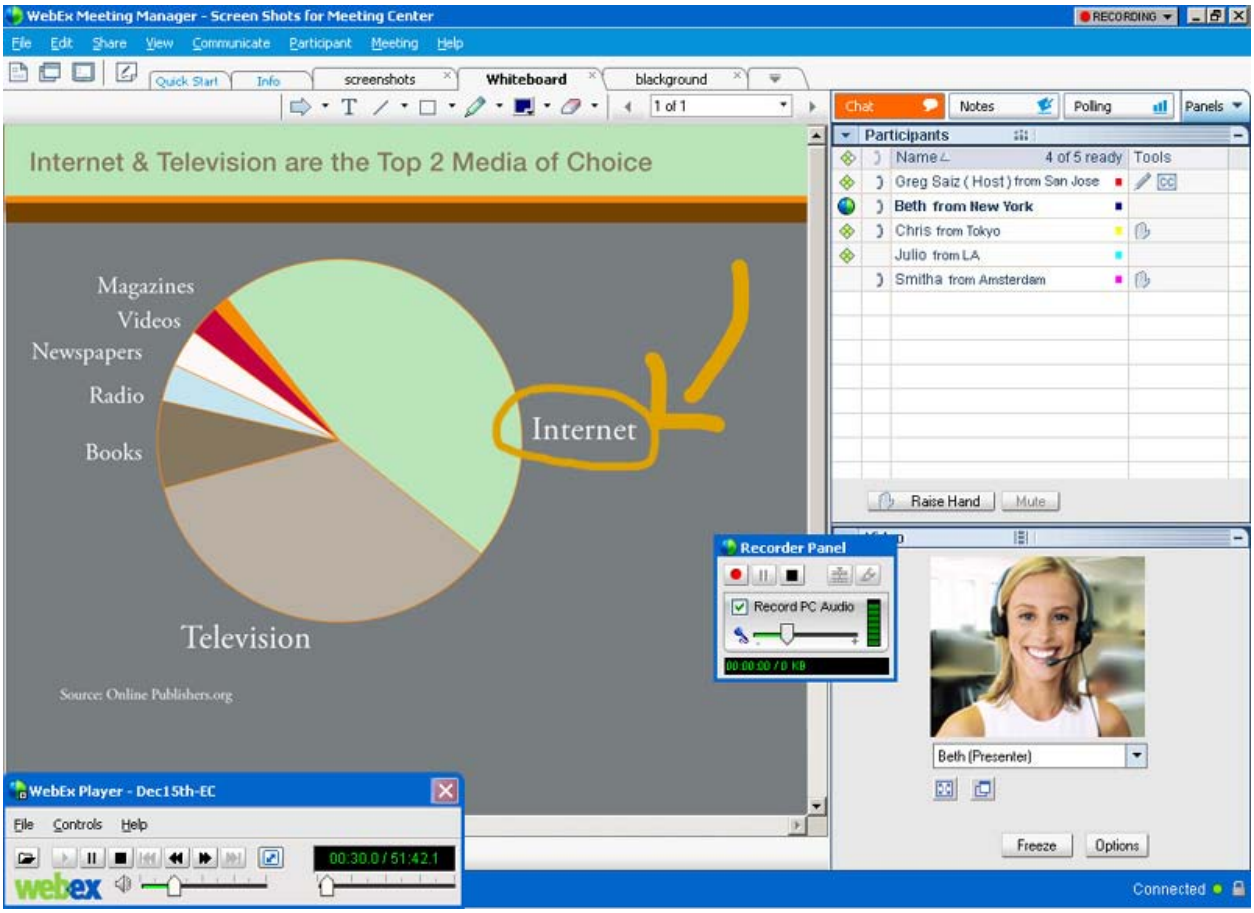
THE VIRI CLASSROOM EXPERIENCE

The VIRI classroom provides a virtual interactive real-time instructor-led experience for students (Francescucci & Foster, 2013). The VIRI classroom is a virtual classroom platform that is delivered over the Internet. Instead of gathering in a physical classroom, the teacher and students meet in a virtual classroom that is located on the Internet. There are several vendors who provide VIRI-like technology. In this research, the technology used was Cisco System's WebEx Training Center. We chose it over other technologies based on the teaching instructor's knowledge and experience of VIRI-like technologies. While students can login to the VIRI classroom from a location of their choice, they are required to login at the same pre-determined time. The fixed-time requirement facilitates real-time interaction both among students and with the instructor.

Once students log in, they are in the virtual classroom. While in the virtual classroom, students are required to use a personal computer and a headset to establish their presence in the virtual classroom. The VIRI classroom includes a presentation window that is used to deliver the real-time content, a video

window that displays a video of the speaker, and a number of tool panels (see Figure 1 for an image). The tool panels include a participant list window, a chat tool, a question and answer tool, and a polling tool. The participant window also provides a number of indicators and tools for the instructor to help them manage the VIRI classroom interaction. For example, the participant window indicates who is online, who has a working headset installed, who has their microphone engaged and also includes an individual feedback icon for each student. Students can use their feedback icon to provide non-verbal feedback to the instructor. The VIRI classroom environment simulates the teacher and student engagement in a face-to-face classroom. For example, the instructor can lecture on a topic, ask students questions and ask a student to respond verbally. The instructor can also break the students into groups for small group discussion. Further the session can be recorded to maintain a record of attendance and, if desired, the instructor can make the recording available to students for review or for those who may have missed the session.

FIGURE 1
IMAGE OF VIRI TECHNOLOGY



Source: WebEx Press Kit, retrieved from http://www.webex.com.hk/en/webex/press-kit.html

BLENDED LEARNING FORMAT

In this research, students enrolled in the blending learning course, take half of their classes in a face-to-face classroom, and the other half in a VIRI classroom. Starting in the second week of classes, students

alternate between attending the face-to-face classroom and the VIRI classroom. The first face-to-face class includes a mini-training session about the software to ensure student understanding of the VIRI classroom technology. Students taking the blended learning course receive the same lectures, assessments and access to online course resources as the regular face-to-face sections of the same course. The key difference between the blended and face-to-face course offerings is the method of lesson delivery. For the blended format, half of the lessons are delivered in the VIRI classroom environment.

COURSES TAUGHT

The blended learning courses were taught over two semesters. The first semester was a pilot phase. The purpose of the pilot phase of the project was to allow the instructor to become familiar and at ease with using the VIRI classroom technology, so that it would not affect the follow-up phase. The pilot took place in the Fall of 2011 at a large urban university, where the instructor taught two sections of an introductory undergraduate course in a blended learning format using the VIRI classroom technology. All sections contained 90 students each. Then, in the following semester, the same instructor taught an additional blended learning course in which data were collected. The purpose of the follow-up phase was two-fold. The first objective was to solicit feedback from students about their likes, dislikes, and suggested improvements for the blended learning format of the course. Feedback was solicited from participating students through a structured questionnaire, which included some open-ended questions. The second objective was to understand the technological and administrative requirements for teaching and learning in a VIRI classroom environment. The findings related to the technological and administrative requirements were developed based on ethnographic reflections of the instructor who taught the three sections of the blended learning course.

FINDINGS

Student Feedback

At the end of the semester of the follow-up phase, students were asked to complete a survey to provide feedback on what they liked best, what they disliked the most and what changes or improvements they would recommend for future blended learning courses. The top three categories for the items students liked best about taking a blended learning course included: the convenience of not having to go to class; the ability to join the VIRI classroom from anywhere; and the savings of time or cost of travel by not having to come to campus. Table 1 provides a sampling of the comments coded in each of these categories. It appears that blended learning courses that use VIRI classroom technology for half of the classes, address the current student need for flexible learning opportunities by allowing students to attend classes at the location of their choice.

TABLE 1
SAMPLE COMMENTS FOR TOP 3 CATEGORIES OF "BEST THING ABOUT THE COURSE"

Convenience of not having to go to physical classroom
the convenience of staying at home and being able to attend class and being able to view all the material easily
There was the convenience of not having to go to class however there were still opportunities to interact with the professor and other students during the face-to-face lectures.
The convenience of not having to come to class, but instead, go home earlier on Thursdays.
The hybrid course was very convenient to attend.
do not have to come to class and its convenient to sit in my own desk and wearing my pajamas while I'm studying.
Having the same course taught at a much more convenient location, and much more comfortable.
It was convenient rather than coming to class and also I'm a shy person, so it was easier to talk online rather than in class because I could have asked questions in the Q&A chat box.

Able to join classroom from alternate location
Being able to attend from home
That I could attend classes from home.
Being at home during lectures and being less intimidated to ask and answer questions
Staying home and attending the hybrid course in my room
being able to be at home at still be in class

Savings of time or cost of travel by not having to come to campus
The fact that I did not have to travel far
The online courses allowed me to stay home … without worrying about allocating time to commute to and from class.
I was also able to save on the transportation money that would have been spent that day.
I was able to stay at home and save the commute time. It takes me about an hour and a half to get downtown.
no traveling time need to for course when its online
That I did not have to commute on Thursdays

The top three categories for items that students disliked most about taking a blended learning course included: the difficulty in concentrating during a VIRI class; the technical issues associated with joining or participating in a VIRI class; and the difficulty in engaging with other students. Table 2 provides a sampling of the comments coded in each of these categories. Students expressed concern about their ability to concentrate during a VIRI class for extended periods of time. They indicated it was too easy to get distracted by either other content on their computer or other situations in the environment from which they joined the VIRI class. This may be partially due to the visual anonymity afforded to VIRI classroom participants, because the instructor cannot physically see them, and or because they have no one physically present to manage their distracted behavior. This supports the position argued by Swan (2003) that interaction is necessary to support learning and suggests that it is important to build interaction into the online delivery of the lesson to keep the attention of students which will aid in their learning.

The technical issues identified in the dislikes are primarily related to Internet connectivity issues and or headset problems. Although we asked students to join the VIRI classroom from a wired connection, some still chose to connect using a WIFI connection. Similarly, even though we recommended that students bring their headsets to the simulation and test their connections, some students still had difficulty with their headset connections. This suggests that it is important to reinforce the message to students that the type of connection they choose may impact their learning experience. Furthermore, as the implementation and adoption of VIRI-like blended learning courses increases across a university, the headset issue will diminish as after students fix it for one course, it will be resolved for future courses.

Last, is the issue of engagement with other students. Some of the student interaction issues may be related to forming groups for collaborative work or engaging in group breakout discussion sessions. Again, the visual anonymity makes it easier for participants to disengage in group discussion. Further, because students only meet face-to-face half of the time, it makes it more difficult to form relationships with fellow classmates, a prerequisite to forming groups for group work assignments. To address these concerns, an instructor may consider creating an incentive or monitoring the participation within online breakout groups. To address the group formation issue, it may be necessary to create icebreaker type opportunities, or to randomly assign students to groups to alleviate the issue.

TABLE 2
SAMPLE COMMENTS FOR TOP 3 CATEGORIES OF
"WORST THING ABOUT THE COURSE"

Difficulty concentrating easily distracted
I found it very hard to concentrate learning strictly from a computer screen.
Getting messy, distracted at home, can't speak and ask question directly.
I don't feel I took away as much from the virtual classes because I found it a little harder to concentrate.
Difficulty concentrating, got distracted more easily, less motivation to attend, strain on eyes
A bit harder to pay attention
easily distracted.
no face to face interaction, more easily distracted
Sitting in a chair for three hours and being really bored because there is not social interaction among friends
it is so hard to concentrate because I did not see the professor teach in front of me and there are more distractions such as cellphone, etc.
difficult to focus
I found that I would get distracted very easy.

Technical Issues with joining or participating
The rare technological glitch.
the fact that sometimes it disconnects you from the classroom and you have to sign in again.
in virtual classroom things like handouts or certain technical glitches.
I had trouble connecting to the virtual classroom the first class and therefore missed half of the lecture and had to make up the material so it was quite a frustrating and unpleasant experience.
The poor wireless internet connection to WebEx caused me to lose connection.
Mainly the fact that i couldn't properly connect.
Internet connection was spotty, even with wired connection
internet connection, keeping track
The internet connection sometimes would give problems.
Technical difficulties with classmates' headsets.

Difficulty engaging with other students
The online classes didn't allow me to connect with other students and make friendships.
Less engagement between students and the professor.
The group project: having classes online made it more difficult to meet up with group members.
The worst thing was when we broke up into break out groups in the online class and no one seemed to want to contribute or talk at all when trying to come up with an answer to present to the rest of the class.
Made it harder to find a time where all my group members were willing to meet.
The lack of student co-operation in terms of group work

The top three changes that students suggested to improve the blended learning experience in a VIRI classroom include: addressing the technical issues with the VIRI class; offering more blended learning or

VIRI-only courses; and improving the ease of use of the VIRI classroom. Table 3 provides a sampling of the comments coded in each of these categories. Many students suggested that the Wi-Fi connectivity issues should be addressed to allow students to connect using a wireless connection. The difficulty with Wi-Fi connectivity is that it is not a function of the VIRI classroom technology, but a function of the students' wireless service provider and the Wi-Fi hardware used by the student. Therefore, it is not something that can be addressed by the VIRI technology service provider. However, one may consider evaluating headset hardware and recommending a preferred headset that is easier to integrate with most computers.

The second most reported suggestion was to offer more blended course offerings. It appears students enjoyed the blended course and wanted to take more courses in that format. This suggests that the VIRI technology used in blended learning courses may be an effective tool in meeting the learning needs of students.

Finally, in terms of ease of use, these suggestions were primarily related to improving the navigation within the VIRI classroom. Students found that a number of the functions within the VIRI platform are not intuitive or user-friendly. Some functions are difficult to figure out, while others require too many steps to complete (e.g. breakout session – the session leader has to turn everyone's microphone on once in the breakout session, instead of having the microphones turn on automatically or adding a button that students press when they want to speak). To address this last category of changes, one may consider evaluating the alternative VIRI-like technology platforms to assess which is the most user-friendly and intuitive for students in order to remove any obstacle that might hinder the learning experience.

TABLE 3
SAMPLE COMMENTS FOR TOP 3 CATEGORIES OF "SUGGESTED CHANGES"

Address technical issues
try to make it a wireless connection.
Improve the Internet connection
Not wired connection and shorter hours
Enable the use of Wi-Fi to connect to the virtual classrooms
To improve the system to enable wireless connection participation.
Improve internet connectivity
being able to connect using Wi-Fi

Offer more virtual classes
Make more classes virtual.
I suggest doing the entire class over the virtual classroom. I really enjoyed it.
have more of the classes online
Make the whole course virtual classrooms oppose to face to face.
I think more virtual classes will make this course better.
Make sure there are more online classes and to take attendance of students that are in class.

Make it easier to use
Easier navigation through whiteboard and discussion areas.
Make them more user-friendly.
Making the virtual classroom easier to use.

Ethnographic Reflections

In addition to the student feedback, it is also important to understand the instructor's perspective on teaching in a VIRI classroom. What follows is a summary of the reflections of an instructor who taught three classes of an introductory undergraduate course using the VIRI classroom technology.

There is a significant learning curve for any instructor who teaches in a VIRI classroom. The learning curve is associated with understanding the tool and its associated functionality and how to integrate it with course pedagogy. The instructor who taught the blended learning course, using the VIRI classroom, is more technically savvy than a typical instructor at a large urban university and may be considered an early adopter of technology. The instructor also had experience with the basic version of WebEx technology. Even with the instructor's familiarity with technology and with WebEx, there is still a great deal of learning that is necessary to become proficient in teaching in a VIRI classroom. It may be necessary for less technically sophisticated instructors to invest more time and effort learning how to use or adjust one's pedagogy to take full advantage of the VIRI classroom technology. Therefore, to increase the success or adoption of blended learning courses that use VIRI-like technology, it will be necessary to simplify the use for instructors and possibly create trial opportunity for instructors in order to increase their comfort level and the adoption of the new technology (Rogers, 2003).

In addition to the significant learning curve to become proficient in teaching in a VIRI classroom, a great deal of effort is required on the part of the instructor when teaching in a VIRI classroom. The instructor requires greater 'mental overhead', when teaching in a VIRI classroom. Not only does the instructor need to think about the typical pedagogy that is part of delivering any face-to-face lecture, but in addition, in a VIRI classroom there is significant administrative thinking to ensure the VIRI classroom operates as expected. For example, in a face-to-face class, the instructor can simply ask a question and very quickly see a show of hands from students and ask a student to respond. In a VIRI classroom, to mimic the experience of asking a question, there are additional steps the instructor must take because the students are not physically in front of him. These steps include scrolling through the participant window to determine which students have "virtually" raised their hands, selecting the student, passing the microphone to that student, turning on the microphone for the student, checking to see if the student's microphone is working and finally receiving the response. Teaching in the VIRI classroom means the instructor not only needs to concentrate on pedagogical delivery of the lesson, but also must deal with the administrative overhead of operating the VIRI classroom. Therefore, to increase the success or adoption of VIRI technology in blended learning courses, it may be necessary to ensure that the new innovation (VIRI-technology) is compatible with the past practices of faculty (Rogers, 2003). To increase adoption it may be necessary to consider solutions that minimize or eliminate incremental 'mental overhead' by choosing technology that is compatible with the current pedagogical practices of faculty.

The challenge of adequate Internet bandwidth can impact the classroom experience. While the instructor always used a wired connection when teaching VIRI classes, he did experience one disconnect to the VIRI classroom during the 15 class sessions taught over the course of eight months. The instructor felt that the connection issue was an anomaly associated with his Internet service provider and does not believe this would be a challenge for other instructors who may use the VIRI classroom through a wired connection. However, the disconnection issue for students was much more significant. The instructor could see when a student was disconnected and had reconnected. While the issue was more significant for students, it was primarily due to Wi-Fi connectivity issues. Therefore, it becomes crucial that students understand the need to use a wired connection to participate in the VIRI classroom, so that there is no impact on their learning experience.

The VIRI classroom is quite good at mimicking the face-to-face classroom experience. Students were able to engage in class discussion much the same way they would in a face-to-face classroom. However, the implementation of the functionality in the VIRI classroom sometimes impacts the flow of the lesson. The way the functionality has been implemented is not as user-friendly or intuitive as it could be. This may be a factor of the VIRI technology used in this study. When considering an implementation of VIRI technology in blending learning courses, an institution may consider evaluating other alternatives

available and seeking the input of faculty members who may use the technology to increase adoption. Rogers (2003) argues that innovations, which are simple and easy to use, are adopted much more quickly.

A final major challenge with VIRI classroom technology is the ability of the instructor to gauge students' comprehension of the lesson content. In a face-to-face classroom, instructors have the ability to see students' reactions and read their non-verbal cues to determine if they comprehend the concepts or topics being taught. They can immediately adapt their lesson to improve comprehension. In the VIRI classroom, the instructor cannot see the students. Therefore, it is necessary for the instructor to use alternatives techniques, such as polls, quizzes, or other techniques to gauge student comprehension of the lesson. For an instructor transitioning to teaching in a blended learning format using VIRI technology, a significant amount of lesson plan rework may be required.

RECOMMENDATIONS

The following recommendations are important to consider when making the decision to implement blended learning courses using VIRI classroom technology. The first set of the recommendations is directed at addressing the concerns of students, which are designed to improve the student learning experience. The second set of recommendations is directed at addressing the adoption of VIRI-like technology by faculty in the delivery of blended learning courses.

In order to improve the effectiveness of the VIRI classroom experience, students should be required to use a headset, to login from a location that is free from background noise and to connect using a wired connection. These measures will ensure an optimum technical environment for effective learning in a VIRI classroom. It is recommended that students be required to use a webcam, in addition to the headset, in the VIRI classroom. The webcam would transmit the student's video only when they attempt to speak or when being called upon by the instructor for a contribution to the discussion. Video could also be used during breakout sessions. The use of video would increase student accountability and concentration during the VIRI classroom lesson, knowing that the instructor could see them at any time. The use of video will also help students to get to know one another because it will help students put a face to a name. This may also aid helping students form groups for collaborative work.

Rogers (2003) argues that to increase the likelihood of adoption of new innovations, they must be compatible with existing practices; they must be simple and easy to use; and users should be encouraged to participate in a trial of the new innovation. Therefore, for institutions' considering the implementation of VIRI-like technology for blending learning courses, the following recommendations are suggested in order to increase the likelihood of adoption of this new technology.

First, higher education institutions should consider the use of dedicated resources to handle the classroom administration during an instructor's lesson. These dedicated resources could be trained to operate and troubleshoot the VIRI classroom technology on behalf of instructors, thereby freeing up the instructor to focus on lesson delivery much like their face-to-face classroom responsibilities. The efficiencies gained by having dedicated resources could ease the transition of faculty into the teaching of blended learning courses. It may also reduce the resistance to change, if an instructor is not required to change what they already do today. This would eliminate the additional mental overhead that is required for an instructor to teach a lesson and administer the VIRI classroom technology.

Second, in large-scale deployments, institutions should consider centralized training for students to minimize the use of limited classroom time for training students to use the VIRI classroom technology. By having a student take centralized training outside of classroom time, they would only need to be trained once; instead of each time they take a blended learning course, thereby minimizing the use of limited class time for technical training. Further, it may be prudent for institutions to also conduct centralized training for instructors who are considering teaching blended learning courses using VIRI classroom technology. Armed with this training, instructors could easily adapt their course pedagogy for a blended learning environment.

Finally, for any institution implementing VIRI classroom technology, it is recommended that they standardize on one VIRI classroom technology and develop a strategic partnership with that service

provider to further develop the technology to suit the needs of the educational environment by developing a version that is more user-friendly and intuitive for students and instructors in blending learning courses. Standardizing on one technology also minimizes the amount of training and retraining that would be required on the part of students and instructors.

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The Effects of Informal Faculty-Student Interaction and Use of Information Technology on Non-Traditional Students' Persistence Intentions and Educational Outcomes

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Most previous research has not found social integration to have an impact on non-traditional (NT) students' education outcomes. The purpose of this study was to see the effects of information technology (IT) and informal faculty-student interaction on education outcome for NT students, and to see if IT will enhance the impact of informal faculty-student interaction on academic integration. The results indicate that informal faculty-student interaction has a positive effect on academic integration and persistence intention and that the use of information technology has a positive effect on academic integration and psychological outcomes.

INTRODUCTION

Previous research has shown a positive relationship between student-faculty interaction and academic achievement, educational aspiration, intellectual growth and academic satisfaction among traditional students (Kim & Sax 2009; Newswander & Borrego 2009; Pascarella & Terenzini 1976). Some researchers have found the interaction to also help with student persistence intentions, or retention while others focused on the impact to academic and non-academic experiences along with persistence intentions (Cotton & Wilson 2006; Gardner 2007; Pascarella & Terenzini 1976; Severiens & Schmidt 2009; Tinto 1975). In their study, Read et al. (2003) found that constraints on the availability of instructors to interact with students outside the classroom setting creates a distancing effect in the students' minds. These interactions generally consist of formal interactions in the classroom setting and informal interactions outside of class. However, studies by Endo and Harpel (1982) showed that informal student-faculty interaction impacts students more than formal interaction does. For this paper, student-faculty informal interaction is defined as students' active involvement in informal interaction, and faculty-student interaction is defined as faculties' active involvement in informal interaction. Kobrak's (1992) study showed that black students benefitted more from informal faculty-student interaction than they did from formal interaction in terms of their persistence intentions.

The issues with NT students have become more of a concern for universities today because of the short supply of traditional students and because of the increase in the numbers of NT students. The NT students are coming back for career changes, promotion requirements or just for personal enrichment and their numbers are increasing (Brinkworth et al. 2009; Jamelske 2009; Spellman 2007).

The results from Thompson's (2001) study of NT community college students concurred with prior studies that showed informal student-faculty interaction has the greatest overall effect on science- and mathematics-based academic achievement. However, the link between informal student-faculty interaction and NT student retention needs to be further clarified. Although previous research has shown that informal student-faculty interaction does have a positive impact on student retention, that relationship was not validated in Thompson's study. It has been suggested that this may be attributed to the fact that there are additional time constraints on NT students due to their work and possibly due to family obligations. This was also found to be true in studies done by Cotton and Wilson (2006) and Metzner and Bean (1987) where neither membership in campus organizations, faculty contact nor identifying with friends who were also enrolled had an effect on student dropout rates or persistence intentions. Christie et al. wrote that these social and institutional factors "…are crucial to a deeper understanding of the nature of non-completion." (2004, page 621). However, this raises the question of how we can increase the impact of faculty-student interaction on NT students. The first part of this current study is to see if more active faculty involvement in the faculty-student interaction will significantly increase the impact on education outcome.

In addition, Metzner and Bean's (1987) study of attrition for NT students examined environmental variables such as finances and the support and encouragement of significant others. These variables were found to directly influence the NT students' psychological outcomes and their persistence intentions. Laird and Kuh (2005) and Paul and Mukhopadhyay (2001) examined the use of information technology (IT) to see the impacts on collaborative learning and student-faculty interaction among traditional students. They found that IT does have a strong impact on both active and collaborative learning and student-faculty interaction. It is thought that the use of IT can mitigate the time constraints faced by NT students by facilitating their learning and communication. IT here refers to email, the WWW and collaborative technologies. Thus the second part of this current study is to see what effect the use of IT has on the academic outcomes, the psychological outcomes and the persistence intentions of NT students.

BACKGROUND AND HYPOTHESES

Definition of a Non-traditional (NT) Student

Unfortunately, there are various definitions for the term "NT student" among researchers today. Bean and Metzner (1985 p.489) state "A nontraditional student is older than 24, or does not live in a campus residence (e.g., is a commuter), or is a part-time student, or some combination of these three factors; is not greatly influenced by the social environment of the institution; and is chiefly concerned with the institution's academic offerings (especially courses, certification, and degrees)." Horn (in Spellman 2007) defined NT students as those having any of the following characteristics: (a) those who delayed enrollment into college, (b) part-time students enrolled in less than 12 credits a semester, (c) financially independent students, (d) those who work full-time, defined as more than 35 hours per week, (e) those with dependents other than a spouse, including children or other relatives, (f) single parents, or those responsible for more than 50% of their child's upbringing, and (g) those who did not receive a standard high school diploma. Horn suggests that students falling into one category are minimally non-traditional, students with two or three characteristics are moderately non-traditional, and those possessing four or more of the non-traditional characteristics are considered to be highly non-traditional.

The U.S. National Postsecondary Student Aid Study used seven traits to define NT students: first generation status (those whose parents' highest level of education attainment is a high school diploma or less), delayed entry (students < 24 years of age who delayed entering a post secondary institution for one or more years following high school graduation), part-time attendance (those enrolled in less than full-time or 12 credits), having off-campus employment, having financial independence, having dependents/single parenthood (students having at least one child or parent dependent), and the absence of a high school diploma (U.S. Dept. of Education 1999). This National Center for Educational Statistics (NCES)-sponsored study used these traits to compute a Risk Factor Index (RFI) for non-traditionality. Based on the absence or presence of these factors, a score was created and students were categorized as:

traditional (0 risk factors), minimally non-traditional (1 risk factor), moderately non-traditional (2-3 risk factors), and highly non-traditional (4 or more risk factors). The NCES study found that increased non-traditionality was associated with lower student persistence and attainment.

The Attrition Model of NT Students

Bean and Metzner (1985) first proposed a conceptual model for NT undergraduate student attrition; and they subsequently tested the model (Metzner & Bean, 1987). In the model, they examined the relationships between background and defining variables, academic variables, academic outcome, environmental variables, social integration variables (peer-group interactions and faculty interactions), psychological outcomes (including education utility, role satisfaction of being a student, and goal commitment), intent to leave, and dropout rates. Their findings indicate that the chief difference between the attrition process of traditional and NT students was that NT students were more affected by the external environment than by the social integration variables that typically affect traditional student attrition. The results showed that NT students' dropout and persistence intentions were unrelated to social factors. However, the environmental variables were not found to directly affect dropout rates but were found to indirectly affect dropout rates with psychological outcomes and intent to leave as mediators.

Metzner and Bean's empirical results revealed that academic variables and academic outcome did not directly affect intent to leave; and that academic variables affect intent to leave with psychological outcomes as a mediator. Their study suggests that academic integration (academic performance and intellectual development) affects NT student persistence intentions with psychological outcomes as a mediator. That is, better academic performance and intellectual development will tend to increase NT students' sense of education utility, increase their satisfaction with being a student, and increase their desire to complete a university degree. Subsequently, these positive psychological outcomes will eventually enhance NT students' persistence intentions. This relationship is reproduced in the research model of this study as the dashed arrow lines shown in Fig. 1.

Informal Faculty-Student Interaction

The faculty are one of the most obvious and important resources universities have to offer students. In addition to formal classroom interaction, students may engage faculty in informal interaction outside of the classroom. Some examples of this include seeking help with a specific problem, seeking help with a specific course or seeking help or advice with a specific need (Cotton & Wilson, 2006). The existing research suggests that student-faculty informal interactions are important to a student's college experience. Pascarella et al. (1978) found that informal student-faculty interaction has a significant influence on students' academic performance as measured by SAT scores and cumulative GPA. The literature also reveals that the frequency and quality of student-faculty informal interactions significantly predict freshman academic outcomes such as college satisfaction and attrition and that informal interactions were related to gains in intellectual development as well as student persistence (Endo & Harpel 1982; Pascarella & Terenzini, 1976; Pascarella & Terenzini 1980a). In addition, "those students who have developed interpersonal relationships with faculty members tend to reveal higher degrees of academic skills development. They were also more satisfied with their institutional experience (Thompson 2001 p.35-36). "

However, unlike traditional students, NT students are constrained by work demands and family responsibilities. These constraints impact the type and effectiveness of their informal interactions with faculty. In addition, the faculty involvement and the role faculty play in student retention is more limited than it could be (Tinto 2006). In order to promote the benefits students gain from informal faculty-student interaction, the faculty should be encouraged to develop better relationships with students, especially NT students. One position is that a more active faculty role in the informal faculty-student interactions with NT students should improve NT students' academic integration (including academic performance and intellectual development), psychological outcomes (including utility, role satisfaction, and goal commitment), and persistence intention (Thompson 2001). Thus, this study proposes the following hypotheses:

H1: Informal faculty-student interaction will positively affect NT students' academic integration
H2: Informal faculty-student interaction will positively affect NT students' psychological outcomes
H3: Informal faculty-student interaction will positively affect NT students' persistence intention

Information Technology

The educational benefits of utilizing information technology (IT), including keeping in touch via email, keeping up to date on assignments, fostering more frequent faculty-student contact and encouraging collaboration among students, have been well documented in the literature (Laird & Kuh 2005; Paul & Mukhopadhyay 2001). The use of IT has been shown to help students achieve several important educational outcomes. Laird and Kuh (2005) reported that the incorporation of IT into a course resulted in greater learning and Kuh and Hu (2001) found that use of IT positively affected student gains in general education, personal development, and intellectual development. Laird and Kuh's (2005) study revealed that students enrolled in the 'best wired campus' reported having more frequent contact with faculty and participating more in active learning activities. Thus, this study proposes the following hypothesis:

H4: NT students' use of IT will positively affect their academic integration

Previous researchers have examined the moderating effect of IT on promoting organization / service performance. Deweet and Jones (2001) discussed how the relationship between organizational characteristics and outcomes may be moderated by IT. Búrca et al. (2006) examined the moderating effect of IT sophistication on service practice and performance; and Ravichandran et al. (2009) explored the moderating effect of IT spending on diversification and firm performance. However, it remains to be seen if these results can be duplicated in the academic environment. That is, how well can the service provided by a university to NT students be improved through the use of IT?

The improved interaction due to IT is expected to enhance the academic integration of NT students. IT can be used to mitigate the time constraints that NT students have due to work and family responsibilities. However, this may only be true if the NT students are apt to use the technology. If there is a learning curve involved, the NT student may not ever get to the point where they are effectively using the IT. This results in the following hypothesis:

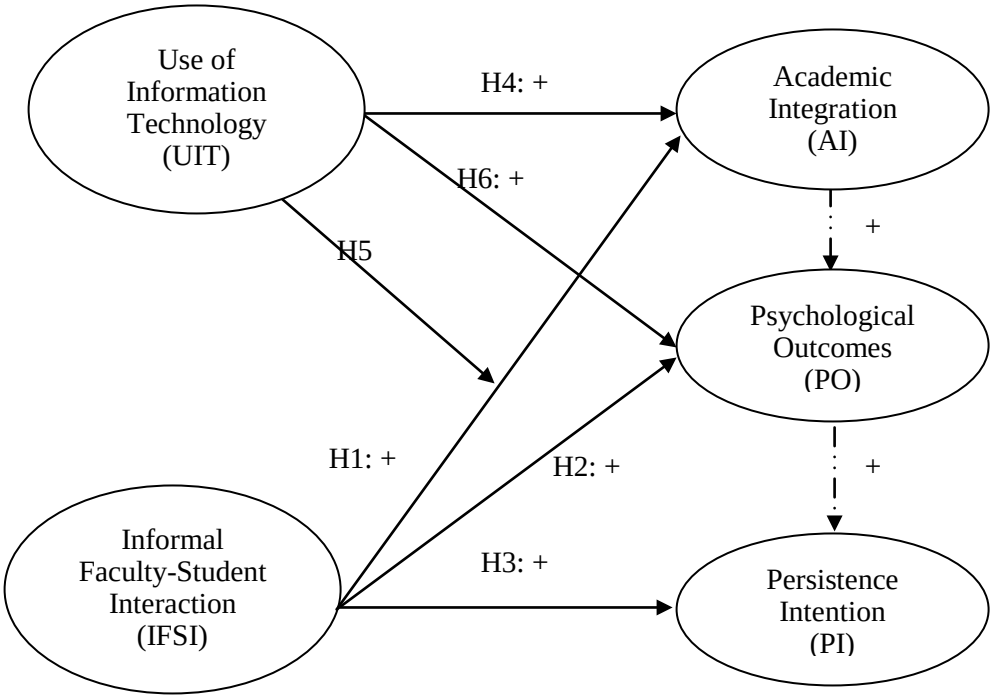
H5: The effect of informal faculty-student interaction on NT students' academic integration will be more positive for NT students who are apt to use IT than for NT students who are not apt to use IT

Finally, this study tries to verify whether use of IT as an external environmental construct also affects psychological outcomes just like the relationship between the environmental variable and psychological outcomes in Metzner and Bean's (1987) attrition model. That is, this study hopes to examine whether the use of IT will stimulate NT students' sense of education utility, role satisfaction of being a student, and goal commitment. This leads to the final hypothesis:

H6: NT students' use of IT will positively affect their psychological outcomes

The proposed theoretical relationships among constructs are summarized in the research model presented in Fig. 1.

FIGURE 1
THE RESEARCH MODEL



METHODOLOGY

Instrument

Three types of informal interaction measurements were developed; please refer to the appendix for a description of the measurement items. They were "Informal Student-Faculty Interaction," "Perception of Informal Faculty-Student Interaction," and "Informal Faculty-Student Interaction". All three measurements were adopted and modified from the dimension of Informal Student-Faculty Interaction of Friedlander et al.'s Community College Student Experiences Questionnaire (Thompson 2001). The "Informal Student-Faculty Interaction" and "Perception of Informal Faculty-Student Interaction" measurements were used for comparison purposes. The "Informal Faculty-Student Interaction" was used for the research model construction and testing.

Informal Student-Faculty Interaction (ISFI) – NT students were asked to indicate the extent to which they had contact with faculty on a 4-point Likert-scale ranging from 1 = "never" to 4 = "very often."

Perception of Informal Faculty-Student Interaction (PIFSI) – NT students were asked to indicate their perceptions on the extent to which faculty had contact with them on a 4-point Likert-scale ranging from 1 = "never" to 4 = "very often."

Informal Faculty-Student Interaction (IFSI) – NT students were asked to rate the helpfulness of their faculty contacts on a 5-point Likert-scale ranging from 1 = "not very helpful" to 5 = "very helpful."

Academic Integration (AI) – Academic integration comprises two dimensions: the cognitive component consisting of the student's academic achievement and the non-cognitive component

reflecting the academic and intellectual development of the student (Cabrera et al. 1992). Students were asked to rank their academic achievement on a 5-point Likert-scale ranging from 1 = "bottom 20%" to 5 = "top 20%." Seven other items were borrowed from Pascarella and Terenzini (1980b) to measure the academic and intellectual development on a 5-point Likert-scale ranging from 1 = "strongly disagree" to 5 = "strongly agree."

Psychological Outcomes (PO) – There were two items for the measurement of education utility, role satisfaction of being a student, and goal commitment respectively. Each used a 5-point Likert-scale ranging from 1 = "strongly disagree" to 5 = "strongly agree." These six items were adopted and modified from Metzner (1983), and Matzner and Bean (1987).

Persistence Intention (PI) – Four items were modified from Metzner (1983) to measure persistence intention on a 5-point Likert-scale ranging from 1 = "strongly disagree" to 5 = "strongly agree."

Use of IT Technology (UIT) – Seven items were modified from Laird and Kuh (2005) to measure classroom engagement with IT (the first three items), using campus IT for academics (the second three items), and academic use of the WWW (the last item) on a 4-point Likert-scale ranging from 1 = "never" to 4 = "very often."

Non-traditionality – A 7-item questionnaire was devised based on the traits identified in the literature and their definitions. For example, one question was "I am employed full-time." and the choices were yes or no. The respondents were asked to indicate if they met each specific trait and the non-traditionality of each was determined by their answers.

Sample

A pretest of the questionnaires was conducted to check the Cronbach α value of latent constructs, with 150 questionnaires distributed to students in classes of a university located in central Taiwan. One hundred thirty-six questionnaires were valid. From the results, measurement items 28, 33 and 56 were deleted, resulting in all α values falling in the acceptable range 0.72 ~ 0.96 (Hair et al. 2006). After validating the instrument, another 288 questionnaires were distributed to students in classes at the same university. This resulted in 279 valid responses. These were combined with the 136 valid responses from the pretest surveys to produce a total of 415 valid responses. Among the valid responses, 12 responses were found to be from traditional students and were further deleted. Hence, this study had 403 valid responses from NT students. The breakdown of the responses was: 27 were minimally non-traditional, 115 were moderately non-traditional, and 261 were highly non-traditional. The demographics show that 80 students were from a junior college, 303 were undergraduate students in a four year university, 17 were graduate students, and 3 students did not respond on their demographics.

Analysis

This study used a confirmatory factor analysis via Lisrel 8.7 to assess the measurement model and structural model. The analytical results revealed that some observable items had low factor loadings which caused the AVEs (average variance extracted) of UIT, PO and PI to be lower than the acceptable cutoff value of 0.5 (Fornell & Larcker 1981). Five additional items were deleted (items 32, 53, 54, 65 and 66) to bring the AVEs up to acceptable levels.

TABLE 1
CONVERGENT VALIDITY STATISTICS AND DESCRIPTIVE STATISTICS

Constructs	Items	λ	δ or ε	SMC	CR	AVE	α
IFSI	11	0.79	0.37	0.63	0.93	0.61	0.93
	12	0.80	0.37	0.63			
	13	0.74	0.45	0.55			
	14	0.82	0.33	0.67			
	15	0.81	0.34	0.66			
	16	0.80	0.36	0.64			
	17	0.80	0.36	0.64			
	18	0.70	0.52	0.48			
AI	21	0.77	0.40	0.60	0.90	0.58	0.90
	22	0.72	0.48	0.52			
	23	0.82	0.32	0.68			
	24	0.83	0.31	0.69			
	25	0.78	0.39	0.61			
	26	0.67	0.55	0.45			
	27	0.71	0.50	0.50			
PI	31	0.67	0.50	0.45	0.71	0.55	0.70
	34	0.81	0.55	0.65			
PO	51	0.88	0.22	0.78	0.78	0.56	0.77
	52	0.84	0.30	0.70			
	55	0.48	0.77	0.23			
UIT	61	0.72	0.49	0.51	0.83	0.50	0.81
	62	0.82	0.33	0.67			
	63	0.84	0.30	0.70			
	64	0.47	0.78	0.22			
	67	0.62	0.62	0.38			

Measurement Model Validation

Table 1 shows that the final Cronbach α value of the constructs falls in the range 0.70 ~ 0.93, which is above the cutoff value of 0.7 (Hair et al., 2006). Table 1 also shows the convergent validity statistics for the purified measurement model, including the standardized factor loadings (λ), error variances (δ or ε), square multiple correlations (SMC), composite reliability (CR) and AVE. All λs were significant at the 0.01 level (t >2.575) and reached the cutoff value of 0.5 (Anderson & Gerbing, 1988) or 0.45 (Bentler & Wu, 1993; Joreskog & Sorbom, 1989); the SMCs were greater than the cutoff value of 0.5 (Bollen, 1989) or 0.2 (Bentler & Wu, 1993; Joreskog & Sorbom, 1989); the CRs were greater than the cutoff value of 0.6 and the AVEs all exceeded the cutoff value of 0.5 (Fornell & Larcker, 1981). In conclusion, all the provided statistics assured the convergent validity of the measurement model.

Discriminant validity was assessed by calculating the AVE for all pairs of constructs and comparing this value to the squared correlation between the two constructs of interest. Discriminant validity is satisfied when the squared correlation between any pair of constructs is less than the respective AVE of each of the constructs in the pair (Fornell & Larcker, 1981). Taking Table 2 into account, all AVEs were greater than the squared correlation between the two constructs of interest.

TABLE 2
DISCRIMINANT VALIDITY STATISTICS*

	AI	PI	PO	IFSI	UIT
AI	0.58				
PI	0.36	0.55			
PO	0.55	0.55	0.56		
IFSI	0.29	0.32	0.22	0.61	
UIT	0.22	0.15	0.20	0.16	0.50

*The figures in the diagonal are AVEs of constructs and the ones in the off-diagonal are squared correlations.

The analysis also subjected the purified measurement items to a CFA. Although the resulted chi-square value was significant ($\chi 2$ (265) = 847.51, p = 0), the key indexes were satisfactory, including NNFI = 0.97 (> 0.9), CFI = 0.97 (> 0.9), RMR = 0.037 (< 0.05), and RMSEA = 0.074 (< 0.08, fair fit). On the basis of Cronbach α values, convergent and discriminant validity tests, and CFA results, the analysis shows that the measurement model satisfied all of the psychometric property requirements and the measurement model suggested a good fit to the data.

Structure Model Validation

The structural relationship among constructs also suggested a good fit to the data. Although the resulting chi-square value was significant ($\chi^2_{(267)}$ = 874.31, p = 0), the key indexes were satisfactory, including NNFI = 0.96 (> 0.9), CFI = 0.97 (> 0.9), RMR = 0.039 (< 0.05), and RMSEA = 0.075 (< 0.08, fair fit). Fig. 2 showed the path coefficients between constructs. Although the path coefficient between IFSI and PO (Hypothesis 2) was insignificant, all other path coefficients were significant. Further, three endogenous constructs were highly explained by other constructs; 37% of AI variability (R^2 = 0.37) was explained by IFSI and UIT, 56% of PO variability (R^2 = 0.56) was explained by AI, IFSI and UIT, and 62% of PI variability (R^2 = 0.62) was explained by IFSI and PO.

RESULTS

The Descriptive Statistics

The upper part of Table 3 shows the grand means and standard deviations of the latent constructs. The grand construct mean (μ) was calculated by averaging the construct means of the responses and each construct mean was calculated by averaging the measurement item scores. The grand standard deviation of construct was calculated from the data set of construct means of responses. The grand means (μs) were then subjected to statistical hypotheses, and the results are presented in the lower part of Table 3.

TABLE 3
THE DESCRIPTIVE STATISTICS OF CONSTRUCTS

	IFSI (5-point)	AI (5-point)	PI (5-point)	PO (5-point)	UIT (4-point)	PIFSI (4-point)	ISFI (4-point)
Mean (μ)	3.60	3.67	3.84	3.67	2.94	2.32	2.27
Standard deviation	0.69	0.63	0.77	0.72	0.54	0.73	0.69
Hypothesis	H_0: $\mu \leq 3$ H_1: $\mu > 3$				H_0: $\mu \geq 3$ H_1: $\mu < 3$		
z	17.46*	21.35*	21.90*	18.68*	-2.2**	-21.24*	-18.70*
p	* $p < 0.01$, ** $p < 0.05$						

For those constructs measured with a 5-point Likert-scale such as IFSI, AI, PI and PO, this study tested the null hypotheses $\mu \leq 3$ (3 represents the "neutral" response). The analytical results rejected the null hypotheses. Thus the results indicate that NT students agree that informal faculty-student interaction is helpful, that their academic integration in campus is improved, that they have more positive psychological outcomes, and that they have more positive persistence intentions. Additionally, for those constructs measured with a 4-point Likert-scale such as UIT, ISFI, and PIFSI, this study tested the null hypotheses $\mu \geq 3$ (3 represents the "often" response). Again, the analytical results rejected the null hypotheses. Thus the results indicate that NT students did not often use IT; did not often contact faculty, and they did not perceive that faculty often had informal contact with them.

The Direct Effect Tests

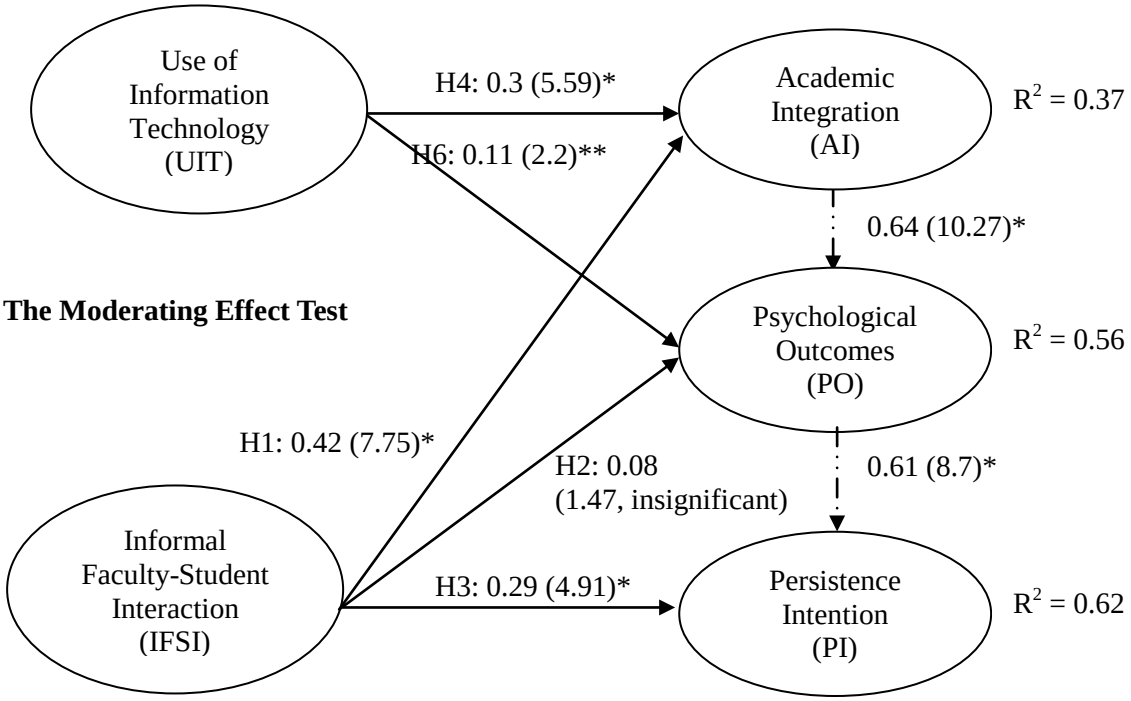
Fig. 2 depicts the hypotheses testing results. First, the empirical results re-verified the relationship proposed in the attrition model for NT students (Metzner & Bean, 1987) that AI affects NT student's PI with PO as a mediator (the relationships indicated with the dashed arrow lines in the research model). Secondly, except hypothesis 2, all the other hypotheses were supported.

The results indicate that active faculty informal interaction will promote NT students' PI directly and indirectly with AI and PO as mediators. The support of hypotheses 1 and 3 refutes the traditional paradigm that social integration is not influential in NT students' educational outcomes and is similar to the previous literature which indicates that there is a positive relationship between informal student-faculty interaction and educational outcomes for traditional students (Cotton & Wilson, 2006; Kim & Sax, 2009). However, PO was not directly induced by IFSI (H2 was not supported) as expected. This could be because NT students do not attend the university mainly for socialization (Metzner & Bean, 1987). The acceptance of hypotheses 4 and 6 supports the positive effect of IT use on AI and PO.

The moderating effect predicted in H5 was tested by multigroup analysis in structural equation modeling. The full sample was divided into two groups using a median split of the UIT scale, which is a common procedure in the literature (de Matos et al., 2009; Evanschitzky & Wunderlich, 2006). These two groups include those NT students less apt at using IT (low UIT, $n = 182$) and those more predisposed to use IT (high UIT, $n = 221$). The results showed a significantly positive effect of IFSI on AI for both groups (the standardized coefficients equal 0.32 ($t = 4.48$) for high UIT, and 0.69 ($t = 4.80$) for low UIT). The chi-square difference test for restricted (the equality constraint of the IFSI → AI path coefficient for both groups) and unrestricted models produced significant results ($\Delta\chi^2 = 5.75$, $\Delta df = 1$, $p < 0.025$). This shows that the relationship between IFST and AI was significantly different between the two groups. Thus, the moderating effect of UIT was supported although it was in the opposite direction. The moderating direction was contrary to the hypothesized direction because the IFSI → AI path coefficient for the low UIT group was greater than the coefficient for the high UIT group. In summary, H5 was

partially supported. The unexpected moderating direction suggests a practical implication, which will be discussed later in the section.

FIGURE 2
THE ANALYTICAL RESULTS



* $p < 0.01$; ** $p < 0.05$; Value in parenthesis is the *t*-value

The Effects of the Constructs on Persistence Intention (PI)

Constructs IFSI, UIT, AI and PO had their respective direct and/or indirect effects on PI; and the direct and indirect effects were then summed up to be the total effect. Table 4 shows the effects. The analytical results revealed that PO had the largest total effect on PI with the IFSI having the second largest effect, AI the third largest effect and UIT the least effect on PI.

TABLE 4
THE EFFECTS OF CONSTRUCTS ON PERSISTENCE INTENTION

	PI			
	direct effect	indirect effect		total effect
IFSI	0.29	IFSI→AI→PO→PI	0.16	0.45
UIT	-	UIT→AI→PO→PI	0.12	0.19
		UIT→PO→PI	0.07	
AI	-	AI→PO→PI	0.39	0.39
PO	0.61	-	-	0.61

DISCUSSION

Theoretical Implications

Social Integration is Influential in Affecting NT Students' Campus Experiences

The empirical results of this study refute the traditional paradigm of the attrition model of NT students (Metzner and Bean 1987) that social integration is not influential in affecting NT students' educational outcomes. NT students were thought to be too constrained by their family and work responsibilities to develop social relationships, especially with faculty. However, the empirical results from this study show that NT students believed that the active informal interaction from faculty was helpful, and that this informal faculty-student interaction had a positive influence on NT students' educational outcomes, such as AI, PO and PI.

The results suggest that NT students can receive the same benefits from faculty-student interaction as traditional students if faculty are willing to devote more time to the informal interaction outside of the classroom. This confirms the purpose of the first part of the study.

Part of the Structural Relationship of the Attrition Model of NT Students is Validated

The results supported some of the relationships proposed by the Metzner and Bean attrition model for NT students (1987). AI was found to influence PI through PO. The results also supported the effect of UIT, as an environmental variable, on NT students' educational outcomes. Similar to other environmental variables examined by Cabrera et al. (1992), such as finance and the support of significant others, UIT was found to have a positive effect on NT students' AI, PO and PI as well. Thus the second purpose of this study, exploring the environmental effect of UIT is confirmed.

Practical Implications

Informal Faculty-student Interaction and Use of Information Technology Predict a Large Proportion of NT Students' Persistence Intention

Two exogenous latent constructs, IFSI and UIT, make up sixty-two percent of the NT student PI explanation. This shows the importance of having active faculty involvement in the informal faculty-student interactions and the use of information technology in keeping NT students on campus. IFSI has the larger total effect on PI than does UIT (0.45 vs. 0.19). This further highlights the significant role that active faculty involvement has on the informal faculty-student interactions. Social integration does play an influential role in NT students' PI.

Informal Faculty-student Interaction is Influential in Affecting NT Students' Educational Outcomes; However, Neither Faculty Nor NT Students Are Active Enough in Promoting the Informal Interaction Relationship With Each Other

As the previous literature indicated (Cotton & Wilson, 2006; Thompson, 2001), NT students and faculty may not have put enough effort into the informal faculty-student interactions for NT students to gain anything from it. This research indicates that faculty must adjust their mindset and become more actively involved in the informal interaction with NT students, especially in today's competitive education environment where universities seek to retain students. Further, universities need to ensure that there is an adequate IT system to facilitate the informal interaction between faculty and NT students. This study also showed that NT students get more out of the interactions when they use the IT systems.

Use of Information Technology is Influential in Affecting NT Students' Persistence Intention; However, More Can Be Done to Promote the Use of Information Technology

As expected from the previous literature the benefits of IT were confirmed in the context of NT students' education (Kuh & Hu, 2001; Laird & Kuh, 2005; Paul & Mukhopadhyay, 2001). The use of IT enhanced NT students' academic integration, their psychological outcomes and increased their persistence intention. Not all NT students used IT enough, and therefore efforts are needed to induce NT students to

increase their use of IT. Such efforts may include the construction of a complete IT system and environment, the training in the use of the IT, and providing some type of motivation for using IT.

Informal Faculty-student Interaction Had More Influence on Academic Integration for NT Students with Low UIT Than for Those with High UIT.

Contrary to the position of H5, the effect of IFSI on AI was found to be greater for NT students less apt to use IT than for NT students who were more apt to use IT. The thought is that the time constraints that NT students face from work and family life would limit their informal interactions with faculty and may affect their AI. Those students who were more apt to use IT did see an improvement to their AI. Here, IT is a channel to achieve AI, which mitigates the positive contribution of IFSI on AI. However, those students who were less predisposed to use IT saw the majority of their AI improvement coming from IFSI. For these students IFSI had the dominant effect on their AI. In summary, the additional active informal interaction from faculty will have more of an effect on AI for NT students with low UIT.

Limitations and Future Research

This study has a number of limitations. First, cross-sectional surveys have limitations in attributing and substantiating affirmative causality. Future studies should collect longitudinal data to assess causal relationships. Second, since the data was collected from NT students from Taiwan, generalization of the findings due to cultural influences will be limited. Future studies can investigate the potential differences for other cultures. Lastly, this study confirmed the structural relationship proposed in the attrition model of NT students that AI influences PI with PO as a mediator. However, it is believed that the AI will also directly influence NT students' PI. A supplement test was conducted to see the direct effect of AI on PI if PO was removed from the research model, and the result supported the speculation. More research is needed to confirm this.

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APPENDIX

THE MEASUREMENT INSTRUMENT

Construct	Pre-test α	Note
1. Informal Faculty-Student Interaction (IFSI) 11. Discussed information about grades, make-up work, assignments, etc. 12. Talked briefly after class about course content. 13. Made an appointment in faculty office. 14. Discussed ideas for a term paper or other class project. 15. Discussed career plans and/or educational plans, interests, and ambitions. 16. Discussed comments an instructor made on a test or paper student wrote. 17. Talked informally about current events, campus activities, or other common interests. 18. Discussed school performance, difficulties, or student's personal problems.	0.95	
2. Academic Integration (AI) 21. I am satisfied with the extent of my intellectual development since enrolling in this university. 22. My academic experience has had a positive influence on my intellectual growth and interest in ideas. 23. I am satisfied with my academic experience at this university. 24. Many of my courses have been intellectually stimulating. 25. My interest in ideas and intellectual matters has increased since coming to this university. 26. I am more likely to attend a cultural event now than I was before coming to this college. 27. I have performed academically as well as I anticipated I would. 28. My academic achievement is in the range of	0.92 if item 28 was deleted	
3. Persistence Intention (PI) 31. I expect to return this university next semester. 32. I expect to graduate from this university. 33. I seldom discussed leaving this university with people outside the college.	0.72 if item 33 was deleted	item 32 was further deleted to enhance AVE

34. I expect to re-enroll this university someday in the future in need of training program and/or education.		
4. Perception of Informal Faculty-Student Interaction 41. ~ 48. Repeat 11. ~ 18.	0.96	
5. Psychological Outcomes (PO) 51. The education here will be useful for gaining future employment I really like. 52. The education here will be useful for gaining a well paying job. 53. I find real enjoyment in being a student. 54. I consider being a student rather pleasant. 55. It is important for me to attend university. 56. It is important for me to complete a university degree.	0.82 if item 56 was deleted	Items 53 and 54 were further deleted to enhance AVE
6. Use of IT Technology (UIT) 61. Worked in teams using information technology. 62. Communicated with classmates online to complete academic work. 63. Used computer and information technology when making class presentations. 64. Used library website to obtain resources for academic work. 65. Expressed ideas to a professor via e-mail that you did not feel comfortable saying in class. 66. Used e-mail to ask an instructor to clarify an assignment. 67. Used the WWW to obtain resources for academic work.	0.88	Items 65 and 66 were further deleted to enhance AVE
7. Informal Student-Faculty Interaction 71. ~ 78. Repeat 11. ~ 18.	0.94	
8. Non-traditionality 81. Delayed entering at a post secondary education. 82. A part-time student enrolled in less than 12 credits a semester. 83. Full-time employment (more than 35 hours per week). 84. Dependent / single parenthood. 85. Financial independence. 86. A commuter. 87. Chiefly concerned with academic offerings and not greatly influenced by the social environment of the institution.		

Fairness in Peer Evaluations: Ensuring Organizational Justice in the Classroom

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In an effort to promote teamwork, instructors have embraced the use of team-based assignments. Peer evaluations are often utilized to achieve fairness when grading these assignments. However, to ensure organizational justice, the peer evaluation process must demonstrate distributive, procedural and interactional justice. This paper recommends steps that instructors can take to achieve organizational justice when utilizing peer evaluations including stating the rules for outcome allocation up front, providing students with training on the evaluation process, assuring all parties that they will be treated with respect and dignity, and ensuring the reasons for the peer ratings are clearly, truthfully and adequately explained.

INTRODUCTION

Within every societal context individuals are both decision makers and subject to the decisions made by others. As a decision maker one must make every effort to ensure that decisions are objective and not subject to arbitrary or capricious factors. Decisions must be perceived by those subject to them to be reasonable and fair. The notion of fairness or organizational justice has gained importance as it has been linked to critical success factors such as commitment, citizenship, job satisfaction and performance (Patrick, 2012). Greenberg (1990b, p. 400) described the organizational justice literature as "…attempts to describe and explain the role of fairness as a consideration in the workplace". DeConinck and Johnson (2009) recognize the subjective interpretation of this construct in their description of organizational justice as "…employees' perceived fairness in the workplace" (p. 334). Gillespie and Parry (2006) state that simply because a particular workplace practice is defined as legal, it does not mean that it will be perceived as fair by those impacted by it. They add that while it is clear that legality is determined judicially, it is also evident that fairness is based on a subjective, individual interpretation (p. 535).

However the concept of organizational justice exists well beyond the workplace. University professors strive to ensure that there is justice in the classroom by implementing policies and procedures that will promote equity and fairness. But what the professor may see as an equitable solution may not be viewed as such by the students in the classroom. This is particularly evident in the grading process. In an effort to promote teamwork skills, many business schools in particular, have embraced the use of teams to meet instructional goals. Bowes-Sperry, Kidder, Foley and Chelte (2005) identify a perceived lack of fairness or sense of justice surrounding team projects as a significant barrier to their effectiveness in the learning process. In an attempt to instill a level of fairness into the evaluation of team assignments, many professors utilize peer evaluations of team members as one element in assigning student grades. This

paper will examine the use of student peer evaluations in relation to the four-factor view of justice (Colquitt, 2001) to determine if justice is being served in the classroom.

ORGANIZATIONAL JUSTICE

Distributive Justice

Distributive justice refers to the perceived fairness of rewards or outcomes that individuals receive within the organization (Byrne & Cropanzano, 2001; Folger & Cropanzano, 1998). It evolved from Adams (1965) work on equity theory. Adams stated that individuals were less concerned with their absolute outcomes than they were with their relative rewards in order to determine fairness. Adams proposed that individuals calculate the ratio of their work inputs (education, skills, experience) to their outputs (salary, benefits, promotions) and then compare that ratio to a comparison other. If the ratios are perceived to be inequitable then the individual is likely to perceive a level of unfairness or injustice.

Procedural Justice

Procedural justice refers to the perceived fairness of the process and methods used to distribute outcomes (Moorman, 1991). Thibaut and Walker (1975) introduced the concept of procedural justice in relation to legal proceedings. They found that dispute resolution occurs in two stages: a process stage and a decision stage. According to Colquitt, Conlon, Wesson, Porter, & Ng (2001, p. 426), their research "…suggested that disputants were willing to give up control in the decision stage as long as they retained control in the process stage". The procedure was viewed as more fair by the participants if they perceived that they had process control (e.g. input into the arguments that were presented). This is referred to as the "fair process effect" or "voice" effect (Colquitt et al., 2001, p. 426). However it was Leventhal (1980) who is credited with applying this concept in the organizational setting. He and his colleagues (Leventhal, Karuzu & Fry, 1980) introduced six criteria which procedures should satisfy in order to be evaluated as fair. These are outlined by Folger and Greenberg (1985, p. 146):

1. Consistency rule – allocation procedures should be consistent across persons and over time
2. Bias suppression rule – personal self-interest in the allocation process should be prevented
3. Accuracy rule – decisions must be based on accurate information
4. Correctability rule – opportunities must exist to enable decisions to be modified
5. Representativeness rule – the allocation process must represent the concerns of all recipients
6. Ethicality rule – allocations must be based on prevailing moral and ethical standards

Interactional Justice

Bies and Moag (1986) introduced the concept of interactional justice which examines the social side of justice (Jawahar, 2007). It is defined as the quality of interpersonal treatment that individuals receive when organizational policies and procedures are implemented (Colquitt et al., 2001; Jawahar, 2007; Nurse, 2005). Bies and Moag (1986) identified four criteria used in assessing the quality of interpersonal treatment including truthfulness (authority figure does not engage in deception), justification (explaining the basis for decisions), respect (being polite) and propriety (avoiding improper or prejudicial statements) (Colquitt, 2001; DeConnick & Johnson, 2009). Jawahar (2007) states that Bies and Moag perceived that there were in fact two elements impacting perceptions of interactional justice. The first suggests that the underlying reasons for any decision must be clear, truthful and adequately explained, and the second suggests that those implementing the decision treat those impacted by it with dignity and respect. Greenberg (1990a) suggested that the first dimension reflected explanations and the second sensitivity, and he designated them as informational justice (reflecting truthfulness and justification) and interpersonal justice (reflecting respect and propriety) (Greenberg, 1993). Subsequent research, including Colquitt's study in 2001 confirms that these two dimensions have independent effects on the individual's perception of justice.

MULTISOURCE FEEDBACK

More and more modern businesses are structuring their organizations in order to utilize teamwork to manage the flow of work (Brooks & Ammons, 2003; Brutus & Donia, 2010). As a result, the use of multisource or 360 degree feedback systems has become more widespread (Atkins & Wood, 2002; Conway & Huffcutt, 1997; Paswan & Gollakota, 2004). Gillespie and Parry (2006) report that approximately 10 percent of organizations use multisource feedback in some capacity and Conway, Lombardo and Sanders (2001) state that nearly all of Fortune 500 firms use 360 degree feedback for both individual development and administrative functions. Ward (as cited in Morgan, Cannan, & Cullinane, 2005) defines 360-degree feedback as "the systematic collection and feedback of performance data on an individual or group, derived from a number of the stakeholders in their performance…the data is then fed back to the participant, in a way that is intended to result in acceptance of the information and the formulation of a development plan" (p. 664). Gillespie and Parry (2006) suggest that feedback from multiple constituencies assists the recipient of that feedback to improve performance. By collecting data from multiple sources or stakeholders, a more complete picture of employees' performance is developed thereby reducing the likelihood of unfair or unjust outcomes (Sillup & Klimberg, 2010). If the inclusion of 360-degree feedback results in perceptions of higher reliability, credibility and lower deficiency (by including multiple perspectives instead of just one), it may in turn improve perceptions of fairness (Rynes, Gerhart, & Parks, 2005). However the quantity of data collected from multiple sources in and of itself does not produce quality, accurate data. It is essential that those providing the feedback, whether peers, customers, or subordinates, are adequately trained to understand the performance standards, the performance measures, common perception errors, and the appraisal process in general, to ensure that the feedback is meaningful and useful. This analysis will focus on the role peer feedback (one component of multi-source feedback) plays in ensuring justice (or the perception of it) in students' grades on team projects.

PEER ASSESSMENTS ON STUDENT TEAMS

In order to prepare students to meet the needs of organizations, universities and colleges are increasingly utilizing team projects in the classroom (Falchikov & Goldfinch, 2000; Friedman, Cox, & Maher, 2008). It seems particularly relevant for business schools to organize students into teams to complete projects, analyze cases or develop presentations (Brutus & Donia, 2010). It is expected that teamwork will enhance the development of skills and knowledge particularly relevant to the real world, provide an excellent forum for experiential learning, promote collaborative learning and also allow professors to manage and instruct larger class sizes (Fellenz, 2006, p. 570). However, with the increased use of student teams the evaluation of student performance presents a new challenge to professors (Malone, 2011). One solution adopted by college professors is the inclusion of peer feedback tools which are expected to contribute to a more comprehensive assessment of both the work of student teams as a whole, and the contributions of individual team members (Falchikov & Goldfinch, 2000).

However, even while the benefits of team-based learning are lauded, it remains a fact that many students have a very negative perception of team assignments (Brooks & Ammons, 2003). Complaints of free-riders (also known as social loafers) within the team are among the most common concerns (Brooks & Ammons, 2003; Fellenz, 2006; Friedman et al., 2008). Bowes-Sperry et al. (2005) indicate that there is a perceived lack of fairness or justice surrounding team projects, including aspects such as grades, evaluative feedback, and distribution of workload. Social loafing is more likely when teams are evaluated using traditional methods (the professor providing one overall evaluation of the team effort) as individual contributions are not identified (Fellenz, 2006; Ghorpade & Lackritz, 2001). Bowes-Sperry et al., (2005) support this supposition stating that as the percentage of the grade determined by peer evaluation decreases, the rate of social loafing would be expected to increase. However utilizing peer evaluations can instill individual accountability and encourage all team members to contribute their fair share of the work (Bowes-Sperry et al., 2005; Brooks & Ammons, 2003; Friedman et al., 2008).

Topping (1998) found that peer assessment has a positive impact of student achievement and is also a reliable and valid assessment method. At the same time however, Topping (1998) also stressed that students must recognize that they are accountable for the feedback that they provide to their peers and must accept responsibility for it. These will be important factors in students' perceptions of the fairness of peer evaluations. Peer evaluation is a form of student voice (Bowes-Sperry et al., 2005), which is recognized as an important element in establishing procedural justice.

Collecting feedback from multiple sources is only worthwhile if each group is contributing a unique perspective to the evaluation process. In other words, if we are simply collecting more data from the same point of view we are not adding value to the evaluation process (Hannay, 2012, p. 63). Conway et al. (2001) determined that peer ratings do provide incremental validity over the evaluation of the supervisor providing support for the proposition that peers and supervisors (and by logical extension student-peers and professors) contribute unique information to the evaluation.

APPLICATION OF ORGANIZATIONAL JUSTICE TO PEER EVALUATIONS

In order for a peer evaluation system in the classroom to be judged as fair and promoting organizational justice, it must demonstrate distributive justice, procedural justice and interactional justice. This section of the paper will recommend steps that can be taken to promote justice in the peer review process in the classroom.

Application of Distributive Justice

Greenberg (1990b) indicated that people may be sensitive to several different norms of distributive justice. Colquitt et al. (2001) stated that while Adams' (1965) research on equity theory advocated the use of the equity rule to determine fairness, other rules for allocating outcomes, such as equality or need, may also be applied. For example, Greenberg (1990b) indicates that social harmony is promoted by equal reward allocations while performance is maximized by reward allocations based on equity (in other words, distributed based on relative performance). Colquitt et al. (2001) purport that differing contexts, organizational goals, and different personal motives can determine which allocation rule the individual will follow. With respect to peer evaluations, this would lead one to expect that, for example, if the rater must justify high or low ratings to the individual being evaluated or to another party, the rater would be more likely to rely on equity in allocating outcomes. However if the team must continue to work together in the future, it is possible that raters would rely more on equality to distribute outcomes in an effort to promote goodwill in the team. If there is a team member in great need of a high grade in order to successfully complete the course, it is possible that team members would rely upon need when distributing outcomes. Therefore, as individuals are sensitive to different norms of distributive justice and have preferences for using these different norms, (Greenberg, 1993), the professor must clearly state the rule that students must follow when distributing their evaluations.

While all of the allocation standards seek to achieve distributive justice, if each student uses a different standard when allocating outcomes (in this case grades), it is unlikely that just outcomes will be achieved. Personal experience informs this research that many student teams distribute grades equally rather than equitably. In order to ensure consistency and to encourage students to achieve their maximum performance level (while minimizing the impact of social loafing), the professor must stress the need to utilize the equity rule when distributing grades. By requiring a justification of the scores assigned with detailed comments, it is more likely that the students will follow the equity rule and distribute ratings based on performance rather than need, likeability, or the desire for group harmony.

Application of Procedural Justice

One essential element used to establish procedural justice is the use of voice (Bowes-Sperry et al., 2005). Further, Bowes-Sperry et al. (2005) provide research to support the premise that when people receive unfavorable outcomes, they perceive the allocation as fairer when they are allowed voice or input into the decision than when they are not. They conclude therefore, that peer evaluation is a form of

student voice. Allowing students input into the process that will eventually determine their grades on a project should increase perceptions of fairness.

As previously discussed, Folger and Greenberg (1985) summarized six procedural rules introduced by Leventhal (1980) and Leventhal, Karuza, and Fry (1980) against which organizational procedures should be evaluated to determine fairness. The first three rules include consistency, bias suppression, and accuracy. Ensuring that peer evaluations conform to these standards will require professors to provide students with training on how to conduct an effective, fair and meaningful performance review. Just as we would expect managers to be trained on how to conduct performance evaluations of their employees, so would we expect students to need similar training. Vasset, Marnbur, and Furunes (2010) state that training in evaluation procedures can be considered a form of procedural justice in and of itself.

It is essential to make students aware of their own potential biases and common rater errors. Students, just like evaluators in any other organizational setting, must be trained to minimize discriminatory comments or ratings (Gillespie & Parry, 2006). Students, just like those engaging in performance evaluations in any organization, must be provided with a detailed evaluation form that clearly lays out the performance standards against which they will assess their teammates along with behavioral anchors that provide guidelines for those evaluations. They must be trained on how to interpret those performance standards and behavioral anchors so that they apply them consistently. The evaluation form should only reflect items that students would reasonably be expected to observe during the course of the team project. As much as possible they should focus on concrete behaviors to avoid opinions and subjective evaluations. Bowes-Sperry et al. (2005) state that team leaders (in this case, professors) can foster a more favorable justice climate by providing preparation and training on conducting peer evaluations.

Leventhal (1980) and Leventhal, Karuza, and Fry (1980) identify three remaining procedural rules that must be considered when evaluating procedural fairness. The correctability rule implies that if students do not agree with their peer evaluations they should have a means to appeal. Logically, it would appear that the appeal would be in the hands of the professor. Requiring students to provide detailed narratives along with their numeric grades (as discussed in the distributive justice section) provides the professor with a basis for the decision. The professor could then request a rebuttal from the student who is appealing, and also compare the grade and the narrative to those provided by other team members. If it appears that perhaps a personal grudge is being played out in the peer evaluation it would be up to the professor to make the final decision.

Leventhal's criteria also require an assessment of the representativeness of the procedure. This means that the professor must ensure that the opinions of various groups affected by the decision are taken into account (Colquitt et al., 2001). Including a self-evaluation along with the peer evaluation allows the student to have input into the ultimate grading decision. Ensuring that all team members contribute to the peer evaluation process is also necessary.

The last of the Leventhal criteria includes an assessment of ethicality, meaning that the decision must conform to moral and ethical standards. Allowing the team members who are most intimately acquainted with the work being produced to have input into the evaluation process seems to have both a moral and ethical imperative. Performance should be evaluated by those who have access to observe it. However, if team members are not provided with effective, comprehensive training on how to conduct a fair, equitable and meaningful evaluation, both the morality and ethicality of doing so may be in question. Ultimately, however Colquitt et al. (2001) state that research by Lind and Tyler (1988) and Thibault & Walker (1975) indicates that people judge procedures as being fairer when they result in fair or favorable outcomes. Therefore ensuring distributive justice in the peer evaluation process may be an essential step in establishing a perception of procedural justice.

Application of Interpersonal Justice

Colquitt et al. (2001) state that interpersonal justice reflects the degree to which people are treated with politeness, dignity and respect. Greenberg (1993) suggests that interpersonal justice can even alter reactions to decision outcomes, as being treated with respect can make people feel better about outcomes that are less favorable to them. In other words, the way in which information, whether negative or

positive, is conveyed to others can impact their perceptions of fairness and justice. In most cases, peer feedback is provided to professors who then deliver it to students. They may choose to provide the actual narrative directly to the student, or they may, in the interest of interpersonal justice, take the time to summarize the comments from the other students in a way that preserves the student's sense of dignity (if the reviews are less than favorable) but still conveys the need to improve. Specific behavioral feedback, eliminating subjective comments, will likely be perceived more favorably and lead to a greater likelihood that students will act upon that feedback to improve future performance.

Another issue to be considered when assessing interpersonal justice in the peer feedback process is the matter of anonymity. Gillespie and Parry (2006) state that "Rater anonymity is a common feature of multisource feedback processes with quantitative results reported at the group level" (p. 539). This is common practice in student team evaluations. Students receive aggregated ratings and thus individual ratings are anonymous. Gillespie and Parry (2006) express concern that this lack of accountability could transform the peer evaluation process into a "roasting session" (p. 539). However, if the professor takes the time to package the narratives in a way that focuses on the task at hand, the assigned objectives, and task-related behaviors, these concerns may be minimized. It will likely not be in the interest of justice to assign student names to comments as this may pit one student against another and fail to serve its purpose of developing student skills, abilities, and competencies.

Application of Informational Justice

Jawahar (2007) states that informational justice requires that the reasons for underlying resource allocation decisions are clearly, truthfully and adequately explained. Colquitt (2001) further states that the decisions must be justified, which includes explaining the basis for the decisions, and they must be truthful, meaning that those delivering the information must be seen as candid and not engaging in deception. Team members must therefore be viewed as legitimate sources of information, and any feedback that they provide must be detailed and clearly address the issues at hand. Any peer feedback evaluations that are submitted without adequate explanations should be discarded if they fail to justify the ratings provided. If the professor ultimately delivers the peer feedback results to the students he or she must take care to convey enough detail so that students understand why their teammates made the decisions that they did. If the professor does not provide an adequate explanation he or she may appear to be holding back vital information and thus lose credibility with the students.

CONCLUSION

Evidence suggests that business schools are increasingly utilizing student project teams within their curricula in order to better prepare students for the workplace which is more frequently adopting team-based structures to control the flow of work. In order to more fully assess student contributions within the team, and in an attempt to avoid social loafing by team members, professors are adding a peer evaluation component to the assessment process. However, as with any evaluation technique, it is important that it delivers a fair, accurate and just assessment. This paper suggests that peer assessments can meet the standards for distributive, procedural, interpersonal, and informational justice. However, the professor must take the time to prepare students to effectively provide feedback. Students must be educated regarding the standard they should use when allocating rewards, they must be trained on how to conduct evaluations, particularly in the areas of performance dimensions and expectations, and the professor must take the time to review all student feedback to ensure that it is meaningful, accurate and delivered with an element of respect. If peer feedback does not satisfy the standards of organizational justice then any decisions based on it will not likely be accepted by the students. Efforts must be made early in the project lifespan to provide students with the training and awareness that they need in order to provide their team members with meaningful feedback that will enhance the learning experience and student performance in the classroom and beyond.

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Identification of Lower-Level Courses to Predict Accounting Students' Success in Upper-Level Courses: A Structural Equation Model

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We examine how lower-level courses can contribute to students' success in upper-level courses in the accounting curriculum, using the structural equation modeling technique. We identify math-related courses, Managerial Accounting, and Intermediate Accounting I as key predictors of student success in upper-level accounting courses. As Managerial Accounting is the last accounting course in the business curriculum, academic advisors and administrators could focus on students in this course to promote professional careers in accounting and help them to make informed decisions regarding the accounting major in the business program.

INTRODUCTION

The purpose of this project is to identify lower-level courses that could serve as predictors of accounting students' academic success in upper-level accounting courses. The typical accounting curriculum at higher education institutions in Texas is comprised of three sequential groups: general education, including supplemental courses (around 60 semester credit hours); business core courses (around 30 semester credit hours); and major (accounting) courses (around 30 semester hours). The successful completion of these courses leads to a bachelor's degree in accounting. Thus, it is important for accounting faculty and administrators to understand (1) how contents and material in lower-level courses could help accounting students to achieve success in upper-level courses and (2) which lower-level courses are primarily accountable for students' success in upper-level accounting courses.

Accounting graduates are in high demand in the job market, especially after the enactment of the Sarbanes-Oxley law (2002) that has raised the accountability of U.S. public firm boards, managers, and auditors in response to a number of major financial scandals. Educators need to produce a great number of competent accountants in order to satisfy the increase in industry demand. For example, Certified Public

Accountant (CPA) firms have increased their new hires from 20,951 in 2000 to 33,321 in 2010 (American Institute of Certified Public Accountants, 2011). In particular, there is a strong impetus for universities to produce a greater number of knowledgeable African American accountants. Mitchell and Flintall (1990) discussed the shortage of black CPAs in the late 1980s. At that time, African Americans represented less than 1% of professionals in the accounting profession, compared to 3.3% in medicine and 2% in law. The number of African Americans in the accounting profession has gradually increased; for example, in 2010, they represented 3% of all accounting employees at CPA firms. However, only 1% of the AICPA membership is African American. As a result, African Americans continue to be underrepresented in the accounting profession, even though they constitute more than 10% of the U.S. population. The low representation of minorities—in particular, African Americans in the accounting profession—has concerned educators and accounting practitioners for several decades. This concern has produced research projects (Williams et al., 1988) and established scholarship programs that assist minorities successfully to complete their accounting education (Flesher & Gabre, 2009).

Academic studies have attempted to identify the key cognitive skills needed for students' success in accounting courses. In general, math skills were found to be the key cognitive knowledge required for successful accounting students (Roy & MacNeill, 1967; Clark & Sweeney, 1985; Booker, 1991; Ward et al., 1993; Gist et al., 1996). Similar findings are reported for African American students (Booker, 1991; Ward et al., 1993; Gist et al., 1996). Verbal skills are another cognitive measurement highly correlated with math skills (Murnane et al., 2000). However, no study has examined how fundamental cognitive skills acquired in lower-level courses are associated with the academic performance of students in upper-level courses in the accounting curriculum. Thus, this study extends the findings of prior studies by analyzing the accounting curriculum at one historically black university in the southwestern region of Texas to understand how students' academic performance in upper-level accounting courses is associated with their performance in lower-level courses.

We analyzed transcripts of 149 accounting graduates from 2002 to 2011, using the structural equation modeling technique; we identified math-related courses, Managerial Accounting, and Intermediate Accounting I as important predictors of student success in upper-level accounting courses. We cannot emphasize enough the importance of math skills in accounting as reported by prior studies. Managerial Accounting appears to be a crucial course for administrators and academic advisors to identify business students with good potential in accounting, as this is the second accounting principles course in the business curriculum. Finally, Intermediate Accounting I, "gatekeeper" in the accounting program, shows a positive correlation with other upper-level accounting courses.

This study contributes to the accounting pedagogical literature by identifying the varying relevance of lower-level courses in the accounting curriculum to students' academic achievements in upper-level courses. Thus, the findings of this study could help administrators and faculty to revise the accounting curriculum for improved educational outcomes and to offer relevant academic advising to students. Academic advisors and administrators need to provide high achievers in Managerial Accounting with information about their future career opportunities in accounting. This information could help students make informed decisions about their future careers, and contribute to raising, in particular, the number of competent African American accountants in the future.

The remainder of this paper is organized as follows: Section 2 provides a literature review and model development, Section 3 includes empirical results, and Section 4 concludes the study.

LITERATURE REVIEW AND MODEL DEVELOPMENT

In the education field, extensive studies have been conducted to identify factors that contribute to student academic success at the college level. In general, most findings confirm that math and English language are the most important cognitive skills that determine student academic success (Adelman, 1999; Trusty & Niles, 2003; Murnane et al., 2000). Furthermore, a number of studies have focused on the association between math skills and student performance in accounting courses (Roy & MacNeill, 1967; Clark & Sweeney, 1985; Booker, 1991; Ward et al., 1993; Gist et al., 1996). Booker (1991), Ward et al.

(1993), and Gist et al. (1996) focused on African American students and reported that math skills were one of the primary determinants of their success in accounting courses. Verbal skills are another cognitive measurement highly correlated with math skills (Murnane et al., 2000). Accounting is a process that collects business transactions and transforms them into a structured business language by following prescribed rules and regulations. Thus, successful accounting students should possess strong verbal skills that facilitate comprehension of the accounting issues they face and help them devise appropriate solutions by referring to relevant legal sources. The new credit hour requirements for a communication course for CPA examination candidates, enacted by the Texas State Board of Public Accountancy, reflect the increase in demand for accountants' strong communication skills. They should complete at least two semester hours in accounting or business communication before taking the uniform CPA examination. However, not much research has been done on how verbal skills affect accounting students' academic success. Further, Brown et al. (2002) considered the principles of macroeconomics course to be the single most important indicator related to student success in business education. Ballard and Johnson (2004), on the other hand, reported a positive association between students' math skills and their performance in economics courses.

Most prior studies have focused on pieces of academic knowledge and skills that are considered relevant to student success in accounting; these skills are mostly learned in secondary education. However, researchers are yet to examine the accounting curriculum for how lower-level courses contribute to learning the fundamental skills needed for their success in upper-level accounting courses. Understanding the influence lower-level courses have on student performance in upper-level courses can help faculty and administrators justify the sequential prerequisites in the accounting curriculum. In addition, such knowledge can continuously improve the accounting curriculum and enable stronger academic advising to students.

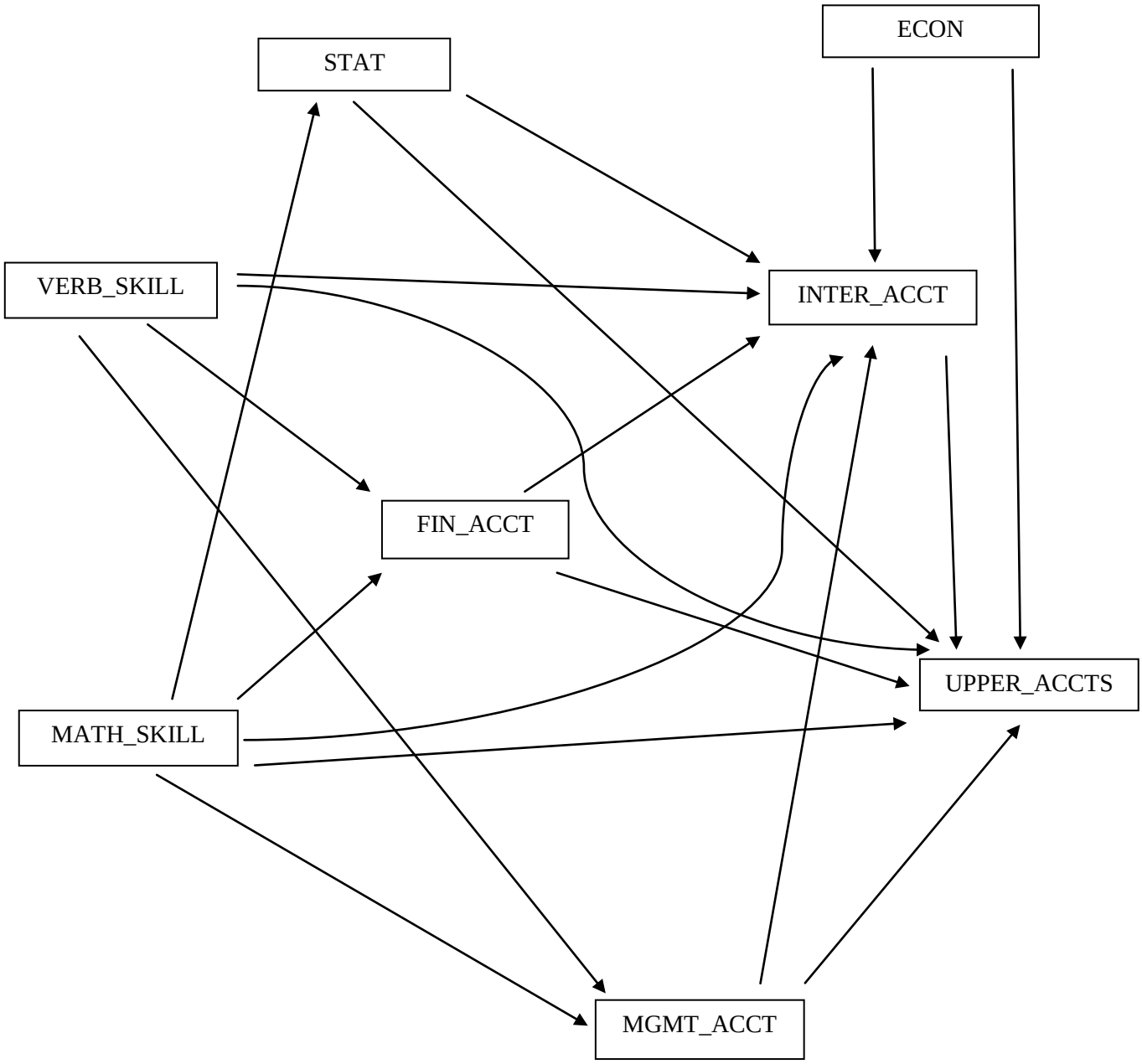
We collected the transcripts of alumni accounting students from one university in the southwestern region of Texas. The School of Business at the university offers a Bachelor of Business Administration (BBA) and two graduate programs, a Master of Business Administration (MBA) and a Master of Science in Accounting (MSA). The undergraduate accounting major is one of the five disciplinary majors in the BBA. The BBA's curriculum requires two courses in English composition, one speech course, and three courses in mathematics, such as College Algebra, Finite Math, and Calculus. These courses are intended to strengthen business students' abilities of analytical and critical thinking. Furthermore, all business majors are required to complete two courses in economics, two courses in accounting, one business statistics course, and several principle courses in other business disciplines. Upon completing the lower-level courses, accounting majors advance to upper-level courses in accounting, including Intermediate Accounting I and II, Cost Accounting, Federal Income Tax I, Business Law, Accounting Information Systems, Auditing, Advanced Accounting, and two accounting-related electives.

Since most courses are academically correlated, no single regression model can evaluate the effect of lower-level courses on student academic success in the presence of multiple causal relationships. Thus, we chose structural equation modeling (SEM) to analyze the relationships that exist between courses in the accounting curriculum. SEM consists of a measurement component and a structural component. In the measurement component, the relationships between a set of observable variables and their latent variables are analyzed and established. A researcher can collect observable variables, but latent variables are beyond human measurement; thus, a latent variable is extracted from a set of observable variables for further analysis. The structural component specifies the causal relationships between variables, much like the regression model. In SEM, however, multiple causal relationships are constructed simultaneously in one comprehensive model; SEM is also known as the path model (Hoyle, 1995). Thus, SEM is an effective research methodology for simultaneously constructing a set of multiple independent and dependent variables. It is then possible to produce empirical interpretations through the analysis of these variables (Gefen et al., 2000).

SEM follows three steps: specification, estimation, and evaluation. The relationships between the variables are determined in the specification phase, followed by the estimation phase, which evaluates a

hypothesized model against the data set. Finally, the researcher evaluates the goodness-of-fit pertaining to the model to ensure rigorous empirical implications (Stephenson et al., 2006).

FIGURE 1
THE RESULTANT PATH MODEL



Notes:
VERT_SKILL: three courses in English composition and speech; MATH_SKILL: three math courses; FIN_ACCT: Financial Accounting; MGMT_ACCT: Managerial Accounting; STAT: Business Statistics; ECON: Microeconomics and Macroeconomics; INTER_ACCT1: Intermediate Accounting I; UPPER_ACCTS: upper-level accounting courses.

In Figure 1, we illustrate accounting students' academic success through their performance in five major categories: verbal skills (three courses in English), analytical skills (three courses in mathematics), comprehension in social science concepts (two courses in economics), statistics (one business statistics course), and basic knowledge in accounting (Financial Accounting and Managerial Accounting). Since Intermediate Accounting I (INTER_ACCT1) is the gatekeeper course, this course is separated from other upper-level accounting courses (UPPER_ACCTS).

Verbal skills (VERB_SKILL) are measured as the grade point average (GPA) of two English composition courses and one speech course; math skills (MATH_SKILL) are measured as the GPA of three math courses; social science knowledge (ECON) is measured as the GPA of two economics courses: macro and micro. Knowledge of basic accounting concepts is measured with financial accounting (FIN_ACCT) and managerial accounting (MGMT_ACCT) courses. Grades in Business Statistics are used as a proxy for knowledge of business statistics (STAT), and INTER_ACCT1 is measured with the Intermediate Accounting I grades. Success in accounting courses is measured by the GPA of upper-level accounting courses (UPPER_ACCTS), such as Intermediate Accounting II, Cost Accounting, Federal Tax I, Advanced Accounting, Accounting Information Systems, Auditing, and Business Law.

Figure 1 includes paths among the variables described above. Both VERB_SKILL and MATH_SKILL are assumed to directly and indirectly affect students' academic success in FIN_ACCT, MGMT_ACCT, INTER_ACCT1, and UPPER_ACCTS. Furthermore, MATH_ACCT would affect students' academic success in STAT. STAT, FIN_ACCT, MGMT_ACCT, and ECON are designed to influence students' performance in INTER_ACCT1 and UPPER_ACCTS either directly or indirectly. Finally, INTER_ACCT1 directly influences UPPER_ACCTS.

EMPIRICAL RESULTS

We used SEM to estimate how the academic skills and knowledge that students earned in lower-level courses affected the academic performance of students in upper-level courses. We collected the required data from graduation evaluation forms completed by academic advisors for those who had graduated between 2002 and 2011. Normally, this form is completed during the last semester to ensure that graduate students finished all of the required courses.

We originally collected 203 graduation evaluation forms, but deleted 54 forms that lacked grade points for the courses required for the SEM analysis. Thus, we were left with 149 useable forms. Table 1 includes fit summary statistics of the path model. The Root Mean Square Residual (RMSR) measures the absolute model fit by computing an average of the discrepancies between observed and estimated covariance matrices. RMSR values are expected to be lower than 0.08 (Hu & Bentler, 1999). Table 1 shows .071 as the value of RMSR, which is lower than the benchmark. However, the Goodness-of-Fit Index (GFI) value, at 0.868, and Bentler's Comparative Fit Index value, at .788, are lower than the benchmark value (greater than .90), as indicative of a good model fit (Hair et al., 2006). Nonetheless, Browne and Cudeck (1993) noted that "[F]it indices should not be regarded as measures of usefulness of a model. They contain some information about the lack of fit of a model, but none about plausibility" (p. 157); this path model still provides viable empirical results.

Table 2 measures each independent variable's effect on a dependent variable in three ways: direct, indirect, and total. All independent variables have a direct effect on a dependent variable. For example, MATH_SKILL affects MGMT_ACCT, INTER_ACCT1, and others. The effect of MATH_SKILL on MGMT_ACCT is straightforward and can be measured directly. In addition, its direct effect value is equal to the total effect value in the absence of indirect effect. The effect of MATH_SKILL on INTER_ACCT1 is twofold: direct and indirect. For example, through FIN_ACCT and MGMT_ACCT, MATH_SKILL directly and indirectly influences INTER_ACCT1. As a result, the total effect (.337) of MATH_SKILL on INTER_ACCT1 is measured as a sum of direct (.086) and indirect effects (.251).

TABLE 1
FIT INDICES OF THE PATH MODEL WITH RESPECT TO UPPER_ACCTS

Index	Value
Root Mean Square Residual (RMSR)	0.071
Goodness of Fit Index	0.868
Bentler's Comparative Fit Index	0.788

Notes:
We collected 203 graduation evaluation forms of alumni accounting students who had graduated from 2002 to 2011. As 54 forms lacked grade points for the courses required for the SEM analysis, the final sample included 149 usable graduation evaluation forms.

MATH_SKILL influences all of the accounting courses, including FIN_ACCT and MGMT_ACCT. Its total effects are statistically significant at the .01 level. On the other hand, VERB_SKILL's effect on accounting courses is limited. The effect of VERB_SKILL on FIN_ACCT is statistically insignificant. Further, VERB_SKILL indirectly influences UPPER_ACCTS and INTER_ACCT1. In addition, total effect (.133) VERB_SKILL has on UPPER_ACCTS is much smaller than the effect MATH_SKILL has on UPPER_ACCTS (.418). Thus, as reported in prior studies (Booker, 1991; Ward et al., 1993; Gist et al., 1996), our results confirm the importance of math skills for success in upper-level accounting courses. Because of the similar contents in math and statistics courses, STAT and MATH_SKILL show a high level of influence. The total effects of STAT on INTER_ACCT1 and UPPER_ACCTS are statistically significant at the .05 and .01 levels, respectively.

ECON's effects on upper-level courses in accounting were not statistically significant. These results are inconsistent with Brown et al. (2002), which considered the principles of macroeconomics courses as the single most influential course for business students' academic success. Since this study only focuses on upper-level courses in accounting, unlike Brown et al.'s (2002) examination of business courses in general, the discrepancies in the two studies' findings can be attributed to the different sets of courses that were examined.

The next question is whether the grades earned in accounting principles courses are indicators of students' academic success in upper-level courses. Surprisingly, FIN_ACCT had no influence on students' academic performance in upper-level courses, while MGMT_ACCT served as a main indicator for students' grades in future accounting courses. For example, the direct effects of MGMT_ACCT on both INTER_ACCT1 and UPPER_ACCTS are statistically significant at the .01 level. The total effects of MGMT_ACCT on both INTER_ACCT1 and UPPER_ACCTS follow suit.

It is not clear why FIN_ACCT had no significant effect on INTER_ACCT1 and UPPER_ACCTS, even though its contents and topics are extended in upper-level courses. Here are some plausible explanations: FIN_ACCT is the first accounting course for students at the College of Business in which a substantial number of students fail to earn a passing grade. In addition, a number of students from other colleges take FIN_ACCT as their required accounting course. The high failing rate and the presence of non-business majors in FIN_ACCT might lower its power to serve as a predictor of accounting students' future academic success. In contrast, the failing rate in MGMT_ACCT is not as high as in FIN_ACCT, which is a prerequisite for MGMT_ACCT. Thus, students in MGMT_ACCT are expected to possess basic accounting knowledge from their prior accounting course, FIN_ACCT. Further, there are few non-business students in MGMT_ACCT. As a result, grade points in MGMT_ACCT serve as a relevant proxy for students' grades in upper-level accounting courses.

Table 2 provides the R-squared values of dependent variables. Students' grades in INTER_ACCT1 are explained up to 32.6% by the lower-level courses employed in the model. Three variables, VERB_SKILL, MATH_SKILL, and MGMT_ACCT have significant coefficients in the model (e.g., greater than .2)—a significant explanation for the grade distribution in INTER_ACCT1. The variables employed in the model explain the grade distribution in UPPER_ACCTS up to 71.2%. The coefficients of

MATH_SKILL, MGMT_ACCT, and INTER_ACCT1 are large (e.g., greater than .2), and thus these variables serve as major proxies for the grade distribution in UPPER_ACCTS.

TABLE 2
EFFECTS OF INDEPENDENT VARIABLES ON A DEPENDENT VARIABLE

Path[&]	Total Effect	Direct Effect	Indirect Effect	R-Squared
VERB_SKILL -> FIN_ACCT	0.120 (1.220)	0.120 (1.220)		0.093
MATH_SKILL -> FIN_ACCT	0.290 (2.914)***	0.290 (2.914)***		
VERB_SKILL -> MGMT ACCT	0.244 (2.910)***	0.244 (2.910)***		0.246
MATH_SKILL -> MGMT ACCT	0.393 (4.645)***	0.393 (4.645)***		
MATH_SKILL -> STAT	0.649 (6.610)***	0.649 (6.610)***		0.228
VERB_SKILL -> INTER_ACCT1	0.233 (2.530)**	0.146 (1.606)	0.088 (2.454)**	0.326
MATH_SKILL -> INTER_ACCT1	0.337 (3.223)***	0.086 (.745)	0.251 (3.770)***	
ECON -> INTER_ACCT1	0.102 (1.308)	0.102 (1.308)		
STAT -> INTER_ACCT1	0.157 (2.350)**	0.157 (2.350)**		
FIN_ACCT -> INTER_ACCT1	0.084 (1.171)	0.084 (1.171)		
MGMT_ACCT -> INTER_ACCT1	0.318 (3.770)***	0.318 (3.770)***		
VERB_SKILL -> UPPER_ACCTS	0.133 (2.705)***	0.028 (.708)	0.105 (3.202)***	0.712
MATH_SKILL -> UPPER_ACCTS	0.418 (7.380)***	0.181 (3.569)***	0.237 (5.345)***	
ECON -> UPPER_ACCTS	0.068 (1.764)	0.045 (1.300)	0.023 (1.281)	
STAT -> UPPER_ACCTS	0.151 (4.575)***	0.115 (3.863)***	0.036 (2.203)**	
FIN_ACCT -> UPPER_ACCTS	0.034 (.972)	0.015 (0.484)	0.019 (1.152)	
MGMT_ACCT -> UPPER_ACCTS	0.278 (6.689)***	0.206 (5.328)***	0.072 (3.239)***	
INTER_ACCTI1 -> UPPER_ACCTS	0.228 (6.331)***	0.228 (6.331)***		

Notes:

1. VERB_SKILL: Verbal skills as the grade point average (GPA) of three courses in English composition and speech.
2. MATH_SKILL: Math skills as the GPA of three courses in math.
3. FIN_ACCT: Grade points in Financial Accounting.
4. MGMT_ACCT: Grade points in Managerial Accounting.

5. STAT: Grade points in Business Statistics.
6. INTER_ACCT1: Grade points in Intermediate Accounting 1.
7. ECON: The GPA of two economics courses: macro and micro.
8. UPPER_ACCTS: The GPA of upper-level accounting courses, including Intermediate Accounting II, Cost Accounting, Federal Tax I, Advanced Accounting, Accounting Information Systems, Auditing, and Business Law.

[&] -> indicates the direction of influence between two variables in the path model.
***statistical significance at the 0.01 level;
**statistical significance at the 0.05 level;
*statistical significance at the 0.1 level.

CONCLUSIONS

One of college educators' paramount tasks is to identify students with potential and nurture them as they gain the required knowledge and skills for their chosen fields. According to a recent study, half of the African American accountants surveyed did not know a CPA before they started college (Ross, 2009). For several decades, the underrepresentation of competent African-American accountants has been of social concern. Therefore, this study examined accounting graduates' transcripts from one historically black university in the southwestern region of Texas in order to identify courses that could serve as predictors of accounting students' success.

As shown in the findings, educator must emphasize math skills in the accounting program, as they are the most influential factor for predicting student success in upper-level accounting courses. The Managerial Accounting course serves as an effective predictor of student success in future accounting courses. Furthermore, Intermediate Accounting I—the gatekeeper to upper-level accounting courses—is an important predictor of future success.

This study's findings have a couple of implications for producing successful accounting graduates. First, because of the heavy workload of math courses, a number of students could not pass them on a timely basis. Accordingly, it is not unusual for students to take math courses in conjunction with upper-level accounting courses. Thus, student advisors should ensure that students complete their math courses as scheduled. Alternatively, upper-level accounting courses could specify math courses as prerequisites. Second, most non-accounting majors take Managerial Accounting as their last accounting course in the business curriculum. Given the strong association between grades in Managerial Accounting and success in upper-level accounting courses, this course may provide an opportunity for academic advisors or administrators to promote professional careers in accounting and to let students make informed decisions regarding their major in the business program. This may be crucial to promoting diversity within the accounting profession.

Any conclusions in this paper should be interpreted in light of concerns about the path model fit, which varies depending on how the fit indices are computed. The path model's instability may have arisen from the small sample size, as there were only 149 usable observations for seven parameters in the model. Furthermore, the results were obtained from one sample at one university; therefore, generalizations should be restricted. Future studies should use larger sample sizes for a more thorough and representative analysis of this issue.

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Practitioners' Views of the Requirements for CPA Licensure: An Exploratory Study of CPAs in Colorado, Florida, Maine, Oklahoma, and Vermont

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The purpose of this survey study was to assess the opinions of CPAs in Colorado, Florida, Maine, Oklahoma, and Vermont on the education and experience requirements for CPA licensure. The results indicate that there is substantial but not overwhelming support among practitioners to require 150 credit-hours as a minimum education requirement for licensure. Practitioners support setting national uniform education and experience requirements, and requiring specific college coursework in business disciplines and ethics. Practitioners are divided as to whether the minimum work experience for licensure should be one or two years and if the experience should be exclusively in public accounting.

INTRODUCTION

The question of what should be the appropriate requirements for entering the accounting profession has been debated over the years. The discussion has focused on what should be the standards for education, examination, and experience, the three Es, to ensure that the public interest is served properly, and to elevate the stature of accountancy as a profession. The purpose of this survey study was to assess the opinions of accounting practitioners concerning the education and experience requirements for CPA licensure. This exploratory study is based on the responses of CPAs in Colorado, Florida, Maine, Oklahoma, and Vermont. Our objective was not to seek the opinions of practitioners concerning the licensure requirements presently in effect in the states where they are licensed. Instead, we wished to assess, in a broader sense, what practitioners think should be the minimum requirements for licensure, and if such requirements should be applied uniformly across all jurisdictions.

This study extends the scope of our prior study on licensure requirements in which we surveyed practitioners in South Dakota and North Dakota (Demagalhaes & Wilde, 2013). The results of that study did not reveal overwhelming support for 150 credit-hours of education which is a requirement for licensure in North Dakota and South Dakota and nearly all other jurisdictions today. Slightly more than half of respondents, 51.2% favored either a bachelor degree with 150 credit-hours or a master degree (5.6% preferred a master degree). However, a sizable proportion of respondents (44.8%) indicated that a bachelor degree without 150 credit-hours is sufficient. Consequently, we decided to broaden the scope of our survey to assess the views of practitioners beyond the northern plains region. The remainder of this paper is organized as follows. The next section presents a historical perspective on the entry-level

requirements for CPAs, followed by a review of prior studies, a discussion of the research questions, an explanation of the research methods, and a presentation of the survey results. Finally, the conclusions and suggestions for further studies are discussed.

HISTORICAL PERSPECTIVE

Regulation of the accounting profession began in the United States with the passage of CPA laws in the late 1800s that required candidates to pass a written examination. The earliest legislation regulating CPAs was passed in New York in 1896 and the first CPA examination was administered in December of the same year. Other states then followed New York in passing CPA laws: Pennsylvania in 1899, Maryland in 1900, California in 1901, Washington and Illinois in 1903, New Jersey in 1904, Florida in 1905, Colorado in 1907, Vermont in 1912, Maine in 1913, and Oklahoma in 1917. The District of Columbia passed its CPA law in 1923; by then all 48 states in existence at the time had passed CPA laws. (Previts & Merino, 1998, pp. 141-148). A college degree was not a requirement for certification until the 1920s. Prior to siting for the CPA exam, individuals entering the profession typically possessed a high-school equivalent education, work experience as a bookkeeper or clerk, and work experience in public accountancy.

A college degree became a requirement for CPA licensure in some states soon after CPA laws were enacted in the 1920s. New York first established the requirement for a bachelor's degree in 1920s. Other states gradually began to require the bachelor's degree but some states were late in adopting this entry-level requirement. Ohio, for example, did not require a bachelor's degree to sit for the CPA exam until 1963 (Previts & Merino, 1998, p. 259). In the early 1900s there were no institutions of higher education offering degrees in accounting. By 1930 more than 300 institutions granted undergraduate and graduate degrees in accounting (Allen, 1927, p. 256). Many of the degree programs, however, were small and had a specialized scope; some offered courses that reviewed questions from prior CPA examinations. At the time, accountancy was perceived as a technical skill and accounting educators were considered to be less scholarly than educators in other academic disciplines (Marshall, 1926, p. 256).

The first professional accounting organization to recommend education beyond the four-year degree was the American Institute of Accountants (AIA), a predecessor of the American Institute of Certified Public Accountants (AICPA). In 1937 the AIA's council proposed that accountants receive an undergraduate education in the liberal arts followed by graduate-level training in public accountancy (Carey, 1969, p. 260). Since its early history, the AICPA has been a strong proponent of extending the education requirement beyond a four-year degree. In 1974 the AICPA formed a 12 member Board on Standards for Programs and Schools of Professional Accountancy whose purpose was to create a proposal for accrediting five-year accounting programs. The Board included representatives from the AICPA, the American Accounting Association (AAA), the National Association of State Boards of Accountancy (NASBA), and the American Assembly of Collegiate Schools of Business (AACSB), an accreditor of business programs. The Board's final report was issued in 1977 and called for a curriculum lasting at least 5 years that would include pre-professional and professional education. The pre-professional stage would include courses in the liberal arts. The professional stage would include accounting and other professionally relevant topics such as ethics. The final recommendations of the Board were consistent with those made by the AIA in 1937.

In 1978 the AACSB made a significant move in academic accreditation by announcing that it would begin accrediting four-year undergraduate accounting programs and MBA programs with accounting concentrations, not just five-year accounting programs as the AICPA would have preferred. The AICPA's response was to back away from its accreditation efforts, but it certainly did not stop advocating a five-year education requirement. The AICPA has always been influential because states have sought its guidance when setting the requirements for sitting for the CPA exam. Some states responded favorably in the 1970s and 1980s to the AICPA's call for increasing the education requirement. In 1977 Hawaii and Colorado passed laws requiring 150 credit-hours of higher education. In 1979 Florida decided to require 150 credit-hours beginning in August of 1983. In 1981 Utah decided to require 150 credit-hours effective

in 1986. It is important to note that at the time Utah passed the 150 credit-hour requirement it did not even require a four-year degree.

A landmark vote by the AICPA's membership in 1988 accelerated the adoption of the 150 credit-hour requirement by state legislatures. The AICPA voted to amend its bylaws to require 150 credit-hours of education for new members after the year 2000. By 1993 some thirty states had passed laws requiring 150 credit-hours to become effective by various dates. The AICPA's 150 credit-hour rule gained the support of influential stakeholders such as the AAA, the NASBA, and the Federation of Schools of Accountancy (FSA). Proponents assert that the 150 credit-hour requirement promotes a broad education of the student ensuring the development of communication and critical thinking skills, as well as technical competence in accounting. The 150 credit-hour requirement is incorporated in the Uniform Accountancy Act (UAA), which is used by state legislatures to model their CPA laws, as one of three criteria for licensure as a CPA. The UAA calls for the following basic criteria for licensure: 1) 150 semester hours of education, including a bachelor degree, 2) passing the uniform CPA exam, and 3) one year of general experience, broadly defined to include experience in public accounting, industry, education, or government.

At present, 54 out of 55 jurisdictions have adopted the 150 credit-hour requirement; only the U.S. Virgin Islands has not done so. The requirement is effective in nearly all jurisdictions except for California, New Hampshire and Vermont where it will effective in 2014, and Colorado where it will be effective in 2015. The AICPA asserts that the best way to gain the knowledge and skills necessary to be a successful CPA today is to pursue graduate education. Nonetheless, the AICPA expressly states that students do not have to get a master's degree to fulfill the 150 credit-hour requirement. Students can meet the requirement by taking additional undergraduate courses, by enrolling in an integrated five-year program in accountancy leading to a master's degree, by earning a master degree in business administration (MBA), or by earning a master of accountancy degree (MAC).

It is important to keep in mind that the requirements for examination and licensure are set by individual states and not by the AICPA. Consequently the profession has not achieved national uniformity in its entry-level requirements. Even though the 150 credit-hour requirement has been widely adopted, the specific requirements for sitting for the exam and licensure vary greatly among the states (Shelton, Thompson, & Serrett, 2012). For example, the following five states that require 150 credit-hours for licensure do not formally require a bachelor degree: Florida, Kansas, Ohio, South Carolina, and Vermont. Delaware accepted associates degree until July 1, 2012. The number of required credit-hours in accounting varies from 12 to 36 as do the number of required credit-hours in business areas other than accounting, from none to 42. Not all states specify the content of accounting and business credit-hours required: fifteen states do not specify the content of accounting courses; 27 states do not specify the content of business courses (Shelton et al., 2012). Since little direction and structure have been provided by the 150 credit-hour requirement, jurisdictions should work to come to a consensus on education requirements (Taylor & Rudnick, 2005).

Over the years, the AACSB became firmly established as the leading accreditor of business programs in higher education. The organization has been influential in shaping business curricula through, among other means, its assurance of learning (AoL) standards for business programs in general and for accounting programs that are accredited separately. For instance, AoL standards for business programs in effect in the year 2000 required that 50% of the coursework in a business degree had to be in non-business courses. Because of the rule, the number of accounting hours in some bachelors of accounting programs that required from 120 to 125 semester hours for graduation were reduced so as to make space for non-business courses. For programs *with separate accounting accreditation*, the AACSB required, until recently, that a minimum of 90 credit-hours be directed to studies outside of the accounting area. The AACSB dropped the requirement of a minimum of non-business hours in its revised assurance of learning standards that became effective in 2003.

The experience requirement for licensure has existed since the early days of the profession and has remained in effect even as a college education became an entry-level requirement in many jurisdictions. The experience requirement enabled established CPAs to prevent individuals who lacked integrity and professional competence from entering the profession. This was especially important early on when the

requirements for licensure differed across jurisdictions more so than they do today. The profession concluded that the best way to protect the public interest was through a combination of education, examination and experience. Merino (1977) noted that "experience completed the process of professional preparation."

Experience continues to be considered by many as essential to the development of professional judgment and maturity. Although all jurisdictions have an experience requirement for licensure, there are differences among jurisdictions as to the type of experience required. Only half of the states set the requirement as one year of general accounting experience, as called for in the UAA. States vary from the UAA by requiring: more than one year of experience, experience specifically in the attestation area, or by linking the experience requirement to educational achievement (AICPA, 2013).

LITERATURE REVIEW

Accounting scholars have attempted to assess whether increasing the education requirement for CPAs is cost-beneficial. Economists assert that increasing the barriers to entry leads to a reduction in the supply of services and to higher prices for such services. (Chi-Wen Jevons, Chiawen Liu, & Taychang, 1999; Peltzman, 1989; Stigler, 1975). Miller (2003), who studied the demand for master's degree in accounting, concluded that mandated five-year programs could not be justified by changes in the demand for graduates. Miller noted that from 1971 to 2001 there was only a slight increase in the supply of and demand for master's degrees in accountancy. During that period there was a large decrease in the supply of and demand for bachelor's degrees in accounting. A survey study of AICPA members revealed the following: 75% did not consider the 150 credit-hour requirement an improvement, 71.3% thought the requirement reduced the number of qualified job applicants, and 62.7 % said the requirement did not improve the ability of graduates to perform (Dresnack & Strieter, 2005). Some have questioned whether the costs associated with the 150 credit-hour requirement are greater than the benefits (Van Wyhe, 2007).

Numerous studies have investigated whether the 150 credit-hour requirement and postgraduate education have been beneficial to those pursuing careers in accountancy. With respect to graduate education, both the MAC and the MBA degrees were found to contribute to professional success throughout one's career. A survey study revealed that 64.5% of accounting practitioners somewhat or strongly agreed that the MBA is more valuable that the MAC (Russell, Kulesza, Albrecht, & Sack, 2000). Another study concluded that the MAC provides greater benefit in the early and middle years of a career whereas the MBA does so later (Hunton, Stone, & Wier, 2005). Fuller and Hargadon (2008) recommended the MBA over the MAC degree since it provides a broader educational experience. In addition, the authors proposed a 150 credit-hour plan leading to an MBA or a MAC with proper coursework to prepare candidates for the CPA or CMA exams. Under Fuller and Hargadon's plan, students would prepare for these professional examinations more efficiently by taking parts of either professional exam, beginning in their junior year, as they completed relevant parts of coursework.

Studies focusing on the effect of the 150 credit-hour requirement on CPA exam pass rates have reported mixed results. A study of CPA exam results from 1996 to 1998 assessed whether the additional courses required by the 150 credit-hour rule could prepare candidates efficiently for passing the CPA exam. The authors concluded that scholastic aptitude and CPA exam review courses have the most impact on CPA exam success. Furthermore, they assert that extra coursework represents a relatively inefficient input in the preparation for the CPA exam and that few candidates would voluntarily seek the additional credit-hours (Grant, Ciccotello, & Dickie, 2002). A study based on information collected by the NASBA, investigated 116,000 candidates who took the CPA exam for the first time during the years 1996 to 1998 and reported that 33 percent of candidates possessed 150 credit-hours or more and 67% had less than 150 credit-hours. Candidates who had 150 credit-hours or more were more successful than those who did not. Only 13% of those with less than 150 credit-hours passed the exam on their first attempt whereas 21% of those with 150 credit-hours or more passed the exam (Read, Raghunandan, & Brown, 2001).

By contrast, Briggs and He (2012) investigated the effect of the 150 credit-hour requirement on the CPA examination pass rates from 2004 to 2007. Their study revisited the effect of the 150 credit-hour

requirement to include a period of time when the CPA exam had changed to a computer-based test (CBT) format. The authors concluded that CPA candidates from jurisdictions requiring 150 credit-hours had higher than pass rates in Auditing and Regulation but not in Financial Accounting and Reporting, or Business Environment Concepts. The study also noted that some jurisdictions that did not require the 150 credit-hours had pass rates on individual sections of the exam that were above the national average.

The impact of the 150 credit-hour rule on minority groups has also been the focus of several studies. Bierstaker *et al.* (2005) studied 600 students and concluded that the 150 credit-hour requirement would not deter minorities from pursuing CPA licensure although it might deter some women. Booker *et al.* (2009) surveyed 152 African American students at two colleges concerning the 150 credit-hour requirement. Students at one of the colleges supported the 150 credit-hour requirement because, in their opinion, it improved the quality of CPAs and helped prepare CPA candidates.

RESEARCH QUESTIONS

The history of the education requirement for CPAs has been shaped by professional organizations such as the AICPA, the AACSB, the AAA, and the NASBA. Although the requirements of a written examination and a college degree have been in effect many years, the 150 credit-hour requirement has been adopted more recently by nearly all jurisdictions. The 150 credit-hour requirement is a fait accompli and most likely it will not be reversed despite the debate as to whether more education is cost beneficial. Despite the efforts of the AICPA to promote uniformity in licensing requirement, there continues to be significant differences in licensing requirements among jurisdictions. Consequently, we wished to assess whether there is a consensus among practitioners on the education and experience requirements for CPA licensure. We first assessed the views of practitioners regarding the education requirement for CPAs first by pursuing the following research questions:

- Should there be national uniform education requirements for candidates to sit for the CPA exam?
- What should be the minimum education requirements for CPA exam candidacy?
- Should candidates be required to take an ethics course? If so, what type of ethics (general, business, professional accounting ethics)?
- Should accounting principles count as credit hours in accounting or in business related hours?
- Should jurisdictions specify courses in specific areas of accounting? If so, what courses should the accountancy boards mandate?
- Should jurisdictions specify courses in business-related areas other than accounting? If so, what courses should the accountancy boards mandate?
- Should jurisdictions that require 150 credit-hours for licensure permit candidates to sit for the CPA exam before the candidates have earned 150-credit hours?

Second, we assessed the views of practitioners concerning the experience requirement by pursuing the following research questions:

- Should there be a national uniform experience requirement for candidates to be licensed as CPAs?
- What should be the minimum experience requirement for licensure as CPAs?

RESEARCH METHODS

We selected random samples of 150 CPAs licensed in each of the following states: Colorado, Florida, Maine, Oklahoma, and Vermont. We selected Florida, Maine and Oklahoma because, unlike Colorado and Vermont, these states are not currently transitioning to new licensing requirements (Tables 1 and 2 present the education and experience requirements). We considered it important to obtain the views of

practitioners in states where the licensing requirements have been stable over the recent past and in states where the requirements are changing. Our samples were drawn from lists of licensees obtained from the boards of accountancy in each state. We received a total of 200 responses to the 750 surveys sent by postal mail in 2012: 22.5% from Colorado, 18% from Florida, 19% from Maine, 18.5% from Oklahoma, and 22% from Vermont; the overall response rate was 27%. The respondents are employed in the following areas: public accounting (53%), industry (34.4%), government (8.6%), and education (4%). Seventy-four percent of respondents are members of the AICPA. Although 68.2% of respondents work in organizations employing less than 10 CPAs, many work in organizations employing a larger number of CPAs: from 11 to 50 CPAs (15.4%), from 50 to 100 CPAs (4.6%), and more than 100 CPAs (11.8%). Fifty-seven percent of respondents are male and 43% are female. The number of years that respondents have been working as CPAs vary as follows: fewer than 10 years (16%), 10 to 20 years (26%), and over 20 years (58%).

RESULTS

An overwhelming majority, 91 % of respondents, believe that there should be national uniform educational requirements for permission to sit for the CPA exam. Table 3 summarizes the practitioners' views on what should be the minimum education requirements for the exam. About half of respondents (49.5%) favor either a bachelor degree with 150 credit-hours or a master degree (40.4% favor a bachelor degree with 150 credit-hours and 9.1 % favor a master degree). A sizable number of respondents (38.9%), however, indicated that a bachelor degree without 150 credit-hours is sufficient. Considering that the states surveyed have passed legislation requiring 150 credit-hours for licensure, we did not expect that a sizable proportion of respondents (38.9%) would recommend setting a bachelor degree without 150 credit-hours as the minimum education requirement. Support for requiring, at a minimum, a bachelor degree with 150 credit hours or a master degree was strongest among practitioners in Florida and Oklahoma.

Currently only six states require completion of a college ethics course to sit for the CPA exam. In some states ethics content is required to be covered in upper-level accounting courses. Our results reveal substantial support for a college ethics course, with 80.5% stating that a college course (or courses) should be required for candidates to be eligible to sit for the CPA exam. When asked what ethics content should be required, 71.5 % of respondents indicated that professional accounting ethics should be covered. Fifty-nine percent of respondents suggested that the course(s) include business ethics and 40% suggested that it include general/society ethics.

Credit hours in principles of accounting are not always counted as accounting hours in all jurisdictions. Our survey shows strong support for considering accounting principles as accounting credit-hours: 81.7% of respondents were in favor of counting principles courses as accounting credit-hours; 15.7% were in favor of counting principles courses only as non-accounting business credit-hours.

As we noted previously, not all states specify the content of the credit-hours required in accounting and other business disciplines. Eighty-five percent of respondents, however, indicated that licensing jurisdictions should require candidates to have courses in specific areas of accounting. As shown in Table 4, respondents strongly favored requiring courses intermediate accounting, auditing, and business law. In addition, sixty-seven percent of respondents indicated that jurisdictions should require courses in specific business-related areas other than accounting. As shown in Table 5, respondents expressed the most support for requiring courses in corporate finance, information systems, general management, and investments.

Our survey asked whether jurisdictions that require 150 credit hours for licensure should permit candidates who have earned 120 credit-hours to sit for the exam and become licensed when they earn 150 credit-hours. The purpose of this question was to gauge the level of support among practitioners for a two-tiered education requirement: 150 credit-hours for licensing and a lesser number of credit-hours for permission to sit for the CPA exam. Slightly more than half of respondents (50.8%) answered that candidates who have earned 120 credit-hours should not be allowed to sit for the CPA exam.

Eighty-one percent of respondents believe that there should be a national uniform experience requirement for CPA licensure. Table 6 presents the opinions of practitioners regarding the minimum experience requirement for CPA licensure. The results reveal that 34% of respondents considered two years of experience *public* accounting to be an adequate minimum requirement. Respondents in Maine and Vermont were the strongest proponents of a minimum of two years of experience in public accounting. Nineteen and one half percent of all respondents, however, indicated that the minimum experience should be two years of experience in public or private accounting. About 10.5% of respondents preferred a minimum experience of one year in public accounting; 21% preferred one year of experience in public or private accounting. We were surprised that only 21% of respondents preferred a requirement of one year of general accounting experience. Since 53% of respondents work in public accountancy and 74% are members of the AICPA, we expected a larger proportion of respondents to prefer the requirement set forth by the AICPA and adopted by many jurisdictions: a minimum of one-year general accounting experience.

CONCLUSIONS

This study attempted to assess practitioners' views on the minimum education and experience requirements for CPAs. Our survey reveals that practitioners support the following: setting national uniform requirements for education and job experience, requiring college-level course(s) in ethics, and requiring candidates to have courses in specific areas of accounting and non-accounting business disciplines.

Our results reveal that there is substantial but not overwhelming support for the 150 credit-hour requirement. While 40.4% of respondents favor requiring the bachelor degree with 150 credit-hours as the minimum education requirement, we should keep in mind that 38.9% prefer requiring the bachelor degree without 150 credit-hours. It is also important to note that although the AICPA recommends graduate education as the best way to fulfill the 150 credit-hour requirement, only 9.1% of respondents favor setting the master degree as the minimum education requirement. With regard to the experience requirement, many practitioners (44.5%) indicated a preference for one or two years of experience specifically in public accounting. Forty and a half percent indicated that experience in either public or private accounting would be acceptable, although 21% prefer one year of experience while 19.5% prefer two years of experience.

Our study was designed to assess the views of practitioners in five states. Consequently, the results may not be generalizable to a broader population. The scope of future studies on this topic should be expanded to include states where education and experience requirements evolved differently, and especially where legislation requiring 150 credit-hours has been adopted recently.

TABLE 1
EDUCATION REQUIREMENTS FOR CPA LICENSURE

Colorado	Prior to July 1, 2015: B.A. degree with a concentration in accounting or a B.A. degree with a non-accounting concentration with supplemental courses that the Board approves an accounting concentration. On or after July 1, 2015: B.A. degree and 150 hours.
Florida	B.A. degree and 150 hours.
Maine	B.A. degree and 150 hours.
Oklahoma	B.A. degree and 150 hours.
Vermont	Prior to July 1, 2014: B.A. degree. On or after July 1, 2014: B.A. degree and 150 hours.

TABLE 2
EXPERIENCE REQUIREMENTS FOR CPA LICENSURE

Colorado	Prior to July 1, 2015: In lieu of the one year of experience described below, one can satisfy the experience requirement with a B.A. degree plus 30 semester hours; total coursework must include at least 45 hours in accounting subjects, 6 hours of which must be in auditing. On or after July 1, 2015: One year of employment for one or more employers as an employee of a CPA. The experience may be gained through public accounting, industry, government, or academia.
Florida	One year of employment that may be gained through employment in public accounting, industry, government, or academia.
Maine	Two years of public accounting experience which must include the use of accounting or auditing skills including the issuance of reports on financial statements and at least one of the following: the provision of management advisory services, financial advisory services or consulting services, the preparation of tax returns, the furnishing of advice on tax matters.
Oklahoma	One year of employment that may be gained through employment in public accounting, industry, government, or academia.
Vermont	Prior to July 1, 2014: Two years of experience which shall include public accounting experience, with 500 hours in attestation services, of which no less than 200 hours must be related to audit services. On or after July 1, 2014: One year of experience which shall include public accounting experience, with 500 hours in attestation services, of which no less than 200 hours must be related to audit services.

TABLE 3
PRACTITIONERS' PREFERENCES FOR MINIMUM EDUCATION REQUIREMENTS FOR CPA EXAM CANDIDACY

Education requirement:	CO	FL	ME	OK	VT	Five states
1) Baccalaureate degree without specified requirements for courses in accounting.	4.4%	0 %	7.9 %	2.8 %	11.4 %	5.6 %
2) Master degree without specified requirements of courses in accounting and business.	0 %	8.6%	0 %	0 %	2.3 %	2%
3) Baccalaureate degree which would include accounting and business credit hours specified by the jurisdiction.	46.7 %	28.6%	42.1%	36.1 %	38.6 %	38.9 %
4) Baccalaureate degree and a minimum of 150 credit hours which would include accounting and business credit hours specified by the jurisdiction.	42.3 %	42.8 %	31.6%	52.8 %	34%	40.4 %
5) Master degree which would include accounting and business credit hours specified by the jurisdiction.	4.4 %	20%	15.8%	5.5 %	2.3 %	9.1 %
6) Other.	2.2 %	0 %	2.6 %	2.8 %	11.4 %	4.0 %

TABLE 4
ACCOUNTING COURSES THAT SHOULD BE MANDATED BY ACCOUNTANCY BOARDS

Accounting courses:	Percent of responses:
1) Auditing.	81.5 %
2) Intermediate Accounting.	81 %
3) Business Law.	76 %
4) Individual Tax Accounting.	70.5%
5) Corporate Tax Accounting.	67 %
6) Advanced Accounting.	66 %
7) Cost Accounting.	64.5 %
8) Accounting Information Systems.	64.5 %
9) Governmental / Not-for-Profit Accounting.	50 %
6) Other.	8.5 %

TABLE 5
NON-ACCOUNTING COURSES THAT SHOULD BE MANDATED BY ACCOUNTANCY BOARDS

Non-accounting courses:	Percent of responses:
1) Corporate Finance.	58 %
2) Information Systems.	49.5 %
3) General management.	41 %
4) Investments.	36.5 %
5) Strategic Management.	19.5 %
6) Marketing.	17.5 %
7) Production management.	10.5 %
8) Other.	7.5 %

TABLE 6
MINIMUM JOB EXPERIENCE THAT SHOULD BE REQUIRED FOR CPA LICENSURE

Job experience:	CO	FL	ME	OK	VT	Five states
1) One year of experience in public or private accounting regardless of educational achievement.	26.7%	16.7%	0%	59.5%	4.5%	21%
2) Two years of job experience in public or private accounting regardless of educational achievement.	26.7%	16.7%	15.8%	16.2%	20.4%	19.5%
3) One year of experience in a public accounting firm.	15.5%	16.7%	13.2%	5.4%	2.3%	10.5%
4) Two years of experience in a public accounting firm.	22.2%	8.3 %	60.5%	5.4%	68.2%	34%
5) Other.	6.7%	2.7%	7.9%	0%	4.6%	4.5%
6) No job experience should be required.	2.2%	38.9%	2.6%	13.5%	0%	10.5%

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Shaping Student Behaviors Through Reward Systems: Lessons From Beaver Trapping?

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This study examines preferences college students have for various class-related rewards and whether varying the type and schedule of student rewards is effective in shaping desired student behaviors. In an effort to improve on-time arrival in class and performance on course exams, students were offered continuous (piece-rate) rewards, a lottery system for winning extra points, and no rewards. Extra points on examinations were the most preferred rewards. The continuous reward schedule was more effective in improving student performance than the other two reward systems.

INTRODUCTION

The issues of student motivation and rewards have long been of interest to those who spend much of their working lives in the classroom. These topics are of special interest in the case of college classes where students who are presumably committed to learning and broadening their horizons may actually be more interested in merely earning a degree to help them secure a good job. The purpose of this paper is to present the results of a study in which rewards were used to shape desired student behaviors. The study had two parts. The first part looked at student reports on what motivates them so that the specific type of reward desired could be ascertained for use in the second study. The second part examined the effectiveness of varying the schedule of student rewards in an attempt to shape specific performance behaviors.

The quasi-experiment developed from an instructor's attempt to improve student performance in two ways. First, students had a habit of coming to class late or taking a long time to settle down and focus on the class. Socializing and tardiness were disruptive to other students and the instructor, and valuable time was lost in instruction as students took significant time to bring themselves up to speed on the subject matter and begin thinking about the course. A motivator was needed to encourage on-time performance and fast attention to the subject matter. Although negative outcomes such as locking the door to latecomers, embarrassing tardy students, or counting off points for minutes late were all available, they were frowned upon by the college and a more constructive solution was sought which would contribute to learning.

A second performance concern was that students had an overwhelming desire for multiple-choice examinations, but when they received the exams back there was much complaining that "I don't do well on multiple-choice tests." Since multiple-choice tests are so common across one's life (e.g., department-

wide exams, pilot licenses, LSAT, graduate entrance exams, even drivers' license tests), a mechanism was needed which would not only give students a check on whether they were understanding the material but also might provide some practice and feedback on how to better master multiple-choice tests.

LITERATURE REVIEW

Motivation and Reinforcement

We turned to the literature on motivation and reinforcement to guide us in considering variables associated with effective systems. We then examined the research focusing on classroom motivation to identify more specific considerations. Motivation, which we define here as the act of increasing the likelihood of desired behaviors, is closely related to reinforcement theory, which involves the use of rewards and punishments to shape behaviors. Motivation may be extrinsic (based on external and usually tangible rewards) or intrinsic (usually based on internal factors such as recognition, feelings of achievement, or simply the satisfaction of completing a task) (Pinder, 1984).

The implementation and success of rewarding desired behaviors is a complex one depending on a number of variables such as the size of the reward, schedule of reward, contingencies in the environment, and other factors such as gender and environmental factors, according to Lee, Sturmey, and Fields (2007). In a comprehensive review of research on reinforcement, those authors examined the research on various reinforcement conditions; they also pointed out the practical difficulties of using reinforcement in applied settings. Reinforcement requires not only the cost of the reward, but the time and attention of the monitor who must observe and administer the rewards. Some research has found that employees from different countries have different preferences on incentives and that what works in one country may not work in another (Rehu, Lusk, and Wolff, 2005), further complicating relationships among variables.

Some basic issues in motivation involve the choice of rewards themselves, usually grouped as tangibles versus recognition or intangibles. Besides the rewards themselves, the size of the reward seems to matter. For instance, offering lower quantity of rewards may actually be associated with higher performance than offering greater quantity of rewards (Ryan, Orton, & Pimm, 1968). Certain rewards may be associated with diminishing marginal returns, such that the life of the reward is limited (Rehu, et al., 2005). Similarly, Pierce, Cameron, Banko, and So (2003) found the sequencing of rewards to have an effect on motivation, such that when rewards are based on increasingly difficult standards of performance, motivation improves.

Research has also focused on the frequency and scheduling of rewards and their relation to motivation and results (Reed, 2001; Yukl, Latham, & Pursell, 1976). Rewards may be given in a continuous fashion (on a pre-determined schedule) or on a variable schedule (Skinner, 1938). The frequency with which rewards are given has been found in a number of studies to affect the probability that desired behaviors will be repeated. Yukl, Wexley, and Seymour (1972) found that workers paid on a continuous schedule of reinforcement outperformed workers on a variable schedule and that the size of the reward was of little consequence. In two subsequent studies, a continuous reinforcement schedule was found to be superior to an intermittent schedule (Yukl & Latham, 1975; Yukl, et al., 1976).

One interesting experiment looked at the conditions under which rewards were earned and the resulting productivity. Latham and Dossett (1978) looked at unionized beaver trappers in a Northeastern paper company. The beaver trappers worked first under a continuous reinforcement (straight piece-rate) system in which trappers earned a set amount for each beaver trapped and then under a variable rate system in which workers received an average (but variable) reward. These authors found that the level of experience of workers had an effect on productivity: Inexperienced workers had higher productivity under the continuous reinforcement schedule and more experienced workers had higher productivity under the variable schedule. Their results emphasize two important variables to consider when dealing with motivation: the personal characteristics of the subjects and the costs of varying reward schedules. Their research study found that employers' costs were reduced under both conditions, suggesting that the benefits of offering incentives exceed the cost of the rewards themselves and their administration.

Deslauriers and Everett (1977) extended the research on continuous versus intermittent reinforcement schedules by introducing the use of tokens as a reward for campus personnel who chose to take the campus bus in an effort to encourage use of mass transit. The tokens, granted at each occurrence in the continuous reward scenario and granted at random intervals in the variable scenario, could be redeemed for additional bus rides or for small snack items. Those authors found that this intermittent scheme was as effective as continuous scheme, and at a much lower cost. They also proposed that use of tokens (as a tangible reward) could be valuable and cost-effective as a reward to shape behavior.

Motivation in Education

Motivation research has been applied to the educational setting in a number of studies. Much has been written in the education literature about student goals and motivation. The studies suggest that student motivation may come from the students themselves or from the quality of the instructors or design of the delivery. Covington (2000) reviews the literature on this topic and divides student goals into academic goals and prosocial goals. The academic goals may be further differentiated as learning goals (loosely defined as high student involvement in managing his/her cognitive development by taking responsibility for learning) and performance goals (e.g., outperforming others in the classroom). Prosocial goals, in contrast, are based on feelings of being accepted and respected by others, not whether they have learned course content. Similarly, Hiller and Hietapelto (2001) stated that students often assume an orientation toward their studies that will allow them to achieve a level of performance (based on grades in the course) rather than mastery of the material. Thus, the motivation for students becomes whether or not they have earned a grade high enough to maintain their view of themselves as capable students.

The timing of performance feedback to students as well as the type of feedback (positive or negative) was found to affect student motivation for attending class and participating in extra-credit opportunities (Love, Love, & Northcraft, 2010). Later feedback (closer to the end of the semester) and more positive feedback were both found to be associated with stronger student efforts to improve their grades by taking advantage of extra credit opportunities, although the relationships were somewhat complex. Casern (2006) found that more frequent feedback (from more frequent tests and grade feedback) was more effective in boosting student performance in biology classes.

Student motivation may be based on the design and delivery of the course content as well. Sass (1989) found the most important factor for student motivation was enthusiasm of the teacher, followed in order by relevance of the material, the degree of organization and structure of the class, appropriate difficulty level, active involvement, variety, rapport between teacher and students, and use of appropriate examples. Among high school students, three core instructor behaviors for motivating students and increasing classroom success were identified. Those instructors who supported understanding, built rapport with students, and managed the classroom effectively were perceived by students to be the most motivating (Anderman, Andrzejewski, & Allen, 2011).

Other research looks at whether motivation is intrinsic (driven from within by factors such as strong desire to learn, to master the material, etc.) or extrinsic (driven by external factors such as desire to earn a degree, make more money, earn a scholarship, etc.). In a study by McEvoy (2011) M.B.A. students were found to be more extrinsically-motivated than M.S. students. Perhaps M.B.A. students are more interested in earnings potential compared with M.S. students who are more interested in the subject matter and material.

In a study concerning young math students, Freeland and Noell (1999) found that using a schedule of delayed reinforcement could motivate students to retain math concepts to almost the same degree as using a continuous reinforcement schedule. The authors pointed out that delayed reinforcement lends itself to practical advantages, in that educators may grade at convenient times and provide lean rewards.

The research on usage of rewards to reinforce desired behaviors cited above examined the effectiveness of various rewards and the schedule of those rewards. A number of those studies, however, point out the need for reinforcement that is efficient as well; that is, systems that work but also use minimal rewards and allow minimal effort to implement and sustain. Our goal in the present study was to

investigate several techniques of student motivation in hopes of identifying ways to shape student behavior at the lowest cost in terms of time and effort.

STUDY 1: WHAT REWARDS DO STUDENTS DESIRE?

Our literature review suggested that the association between reward systems and behavior change is a complex one involving a number of factors. We attempted to put the best practices from research and theory into effect in the present study to develop and test a reward system that would be effective in shaping student behavior and performance, but would also minimize the costs of administration and contribute to learning. The overall aim was to discover a way to help students master course material and to encourage them to develop good work habits, specifically arriving on time for class.
The present study had two research questions:

1. What motivates students in college classes? Grades? Prizes? Recognition? Fear?
2. What schedule of rewards best motivates students in college classes? Is there value in a lottery-type reward system beyond a straight incentive system?

The first phase of the study was to examine specific rewards desired by students so that an effective reward choice could be made.

Method for Study 1

Our first study was a simple descriptive analysis of tastes and preferences of students. We asked 143 undergraduate students at a large university to complete a survey during class time. All students were at least at the junior level of college and most were seniors. The students were first presented a list of 16 factors that might play a part in student motivation. Students could write in additional motivators if they desired. The items in the survey were drawn from several sources. First, literature reviews identified 10 factors that appeared in previous research about student motivation. Second, students in previous classes were asked to list as many things as they could which motivated them to study and do well in class. These were compiled and incorporated into the survey instrument. Students were asked first to rate each potential motivator on a scale from 1 = does not motivate me at all to 5 = motivates me extremely well. As a further check to differential potential motivators, students were then asked to rate the list from 1 = most important to 16 = least important, with no ties allowed, and using alternate ranking.

The second part of the survey asked the student participants to both rate and rank their preferences in a list of 12 possible incentives related to classroom performance. The purpose was to try to identify which specific classroom rewards are of most value to students.

Results of Study 1

The results of the survey concerning what motivates students to put forth effort in a class are shown in Table 1. The findings across both rating and ranking by students were generally consistent (although not identical), so we present only the ratings here. The top three motivators all concerned grades and are examples of what Covington (2001) termed performance goals: a chance to have 10 points added to the final grade, a good grade for the course, and fear of getting a bad grade. These results indicate that students are motivated by grades and seem to be pragmatic about putting forth effort and generally support the findings of Hiller and Hietapelto (2001), who found students more interested in grades than mastery of the material. The fact that the fear of getting a bad grade was rated in the top three suggests that negative types of motivators may be almost as important as positive ones.

The next two highest-rated factors were of an intangible nature: being interested in the material and satisfaction of doing well. The factors rated lowest all concern examples of Covington's (2001) prosocial goals: fear of looking bad to the instructor, competing with other students for doing well, and fear of looking bad to other students.

The incentives they most preferred are shown in Table 2. Again, the ratings and rankings results were very similar, so we included only the rating results in Table 2. The top three again related to grades and

grading: the chance to have 5 points added to the final course grade, being allowed to exempt the final, and having 5 points added to the final examination grade. The rewards that were of least importance seemed to all relate to prosocial goals (praise from the instructor and recognition and praise from other students) or to group instead of individual rewards (pizza and snacks for the entire class).

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Discussion of Study 1 Results

The results of Study 1 suggest that grades do get students' attention and are rated highly by students both as motivators and as preferred rewards. Sass (1989) and Anderman, Andrzejewski, & Allen (2011) had found that variables such as student/instructor rapport and the instructor's course and content delivery played important roles in motivating students. Although we did not include those specific variables in the present study, our findings indicate that grades could still be the most important consideration for most students. Future research should examine whether grade considerations trump course design and instructor relationship factors as rapport and teaching style. Another possible avenue for future study is the linkage between preferences for rewards and motivation and grade point averages. Do the best-performing students have different preferences than poorer-performing students? If there are differences, it could be useful to see if there are simple and cost-effective ways to adjust rewards to target weaker students while maintaining motivators for more capable students

TABLE 1
MEANS OF CLASSROOM MOTIVATION RATINGS

Motivation Factor	No Reward Group N = 37	5% Reward Group N = 26	Lottery Group N = 80	Overall N = 143
Chance to have 10 Points added to my final grade	5.00 (1)	4.82 (1)	4.77 (1)	4.82 (1)
A good grade for the course	4.57 (2)	4.82 (1)	4.73 (2)	4.74 (2)
Fear of getting a bad grade	4.39 (3)	4.14 (5)	4.23 (3)	4.30 (3)
Being interested in the material	4.13 (5)	4.23 (4)	3.81 (7)	4.00 (4)
Satisfaction of doing well	3.81 (10)	4.10 (7)	3.86 (5)	3.92 (5)
Fear of failure or performing poorly	4.00 (8)	3.45 (13)	3.67 (8)	3.90 (6)
Pride in myself	3.58 (14)	4.32 (3)	3.83 (6)	3.89 (7)
Sense of achievement or accomplishment	3.66 (12)	3.70 (11)	3.88 (4)	3.87 (8)
Needing the material in the class for my career	4.23 (4)	4.39 (2)	3.81 (7)	3.83 (9)
Liking the instructor	3.45 (15)	3.87 (9)	3.81 (7)	3.76 (10)
Material is relevant to the 'real world'	3.70 (11)	4.14 (5)	3.58 (9)	3.76 (11)
My strong work ethic: I work hard at everything	3.42 (16)	4.05 (8)	3.50 (10)	3.61 (12)
Fear of losing financial aid	3.81 (10)	3.41 (15)	3.22 (11)	3.50 (13)
Fear of disappointing my family or friends	4.09 (6)	3.81 (10)	3.17 (12)	3.31 (14)
Love of learning	2.94 (17)	3.81 (10)	2.88 (14)	2.83 (15)
Fear of looking bad to the instructor	4.06 (7)	3.58 (12)	2.63 (15)	2.80 (16)
Competing with other students for doing well	3.94 (9)	4.13 (6)	2.95 (13)	2.78 (17)
Fear of looking bad to fellow students	3.60 (13)	3.42 (14)	2.26 (16)	2.21 (18)

TABLE 2
MEANS OF STANDARD RATINGS OF PREFERENCES FOR INCENTIVES

Incentive	No Reward Group N = 37	5% Reward Group N = 26	Lottery Group N = 80	Overall N = 143
Chance to have 5 points added to my final grade	4.69 (1)	4.59 (2)	4.34 (3)	4.43 (1)
Being allowed to exempt the final exam	4.00 (5)	4.64 (1)	4.41 (1)	4.37 (2)
5 points added to my final grade	4.38 (2)	4.27 (3)	4.17 (4)	4.23 (3)
Extra credit points	4.00 (5)	4.27 (3)	4.36 (2)	4.22 (4)
Chance to win a larger prize ($75.00 value)	4.06 (4)	3.91 (4)	3.80 (5)	3.86 (5)
Certificate of recognition I could attach to my resume	4.13 (3)	3.73 (5)	3.76 (6)	3.61 (6)
Chance to win a small prize ($25.00 value)	3.05 (8)	3.05 (9)	3.11 (7)	3.08 (7)
Extra points for everyone in the class	3.50 (6)	3.41 (6)	2.84 (9)	3.03 (8)
A day off from class	3.19 (7)	3.14 (8)	2.86 (8)	3.02 (9)
Praise from the instructor	2.75 (9)	3.23 (7)	2.61 (10)	2.73 (10)
Pizza and snacks for everyone in the class	2.38 (10)	2.23 (10)	2.11 (11)	2.22 (11)
Recognition and praise from other students	2.38 (10)	2.09 (11)	2.00 (12)	2.05 (12)

STUDY 2: WHAT REWARD SCHEDULE WORKS BEST?

Once we identified the specific rewards most valued by students, we turned to the question of which reward schedule is most effective in shaping student behavior: no reward, a continuous reward, or a lottery or token-based reward system with an element of chance built into the system. Student learning of the material was the more important desired outcome. In every college class, it is hoped that students know more about the subject when the class is over than when they started. But the instructor also hoped to encourage on-time attendance and a quick focus on class materials. Thus, the two dependent variables where good results were desired were (1) On-time arrival in class, as evidenced by participation on a 4-item practice quiz administered at exactly the time class would start, and (2) Improvement on a pre-post assessment of knowledge of the course materials.

Research cited earlier such as the beaver trapping experiment by Latham and Dossett (1978) and Deslauriers and Everett (1977) investigated the timing of rewards and the use of tokens and delayed reinforcement. Based on inferences from these and other studies discussed in our literature review, our propositions are:

> *Proposition 1: Students in the no reward group will have the lowest rate of on-time class arrival followed by students in the lottery schedule. The highest rate of on-time arrival will be in the continuous reward (5% of class grade) group.*
>
> *Proposition 2: Students in the no reward group will have the lowest level of performance, followed by students in the lottery schedule. The highest level of performance will be in the continuous reward (5% of class grade) group.*

Sample and Data Collection

To address our research questions, a quasi- experimental design was used to examine outcomes under several conditions of rewards and schedules. The scenario involved three different classes over three different semesters, each under a different reinforcement arrangement. Since the same students were not involved in all three experimental conditions and since students were not randomly assigned to different conditions, this was not a true experiment. Every effort was made, however, to hold conditions as constant as possible across the three classes. The class was the same in each case (undergraduate compensation management) and the time and day were the same each semester (one day per week at 4:30). The classes were all conducted the same way with the same format and activities. The assignments and grading criteria were identical across all three groups, and the same examinations were used in all three classes. Additionally, the class sizes were very similar. Two sections had 37 and 26 students each and a third large class was split into two sections, with 40 students in each. For analysis, the two large sections were treated as one class.

Dependent Variables in Study 2

A four-item multiple choice practice quiz was used as a proxy for on-time class arrival. The quiz was offered to students at exactly the start time of every class. Students who were in their seats at exactly the time class was scheduled to begin were allowed to take the exam. Those arriving later were not allowed to take the quiz that day. The quiz covered material from the previous class. None of the items on the practice quiz were used in the regular tests in the class, although much of the general content was the same. Students were given exactly five minutes to complete the exam, and immediate feedback was given on correct answers. Since each item had a high point value, a very lenient grading system was used to prevent students from being discouraged: instead of 25 points each, each question was worth only 10 points, such that the lowest possible score was a 60.

The mastery of course content was measured with pre- and post-test assessment scores obtained from a different short exam. On the first day of class, a ten-item pretest was administered to all students in attendance. The ten items covered material across the whole course content. On the last day of class, the same exam was administered to all students in attendance. In both cases, the students were told that the exam grades would not count toward their actual course grades, but that they should try as hard as they could to do well. The post-test was given prior to the final examination; the correct answers to the pretest/post-test were not given to students and the exam was not discussed. The average scores on the pre-test for various classes ranged from a class average of 19.2 (out of 100 points) to a class average of 24.3. The average class score for the post-test ranged from 73.6 to 78.1.

Independent Variables in Study 2

The independent variables (including control variables) were: (1) The schedule and type of reward under three conditions (no tangible reward (baseline), piece-rate reward, lottery system) and (2) Grades on practice quizzes, (3) Overall GPA to date, and (4) Average grade on regular exams in the class.

The schedule and type of reward consisted of three conditions: no reward, continuous schedule, and lottery situation. Much of the research cited in our literature review found continuous rewards best in most cases, although there were exceptions (e.g., Latham & Dossett, 1978). Since the students reported in our first study that grade rewards were generally very important, we used extra points as the reward in our study. The three reward schedules are discussed in the Method section below.

The grades on practice quizzes were included as a control to examine whether student conscientious-ness as to on-time arrival had an effect on our dependent variables. It could be argued that students who are already conscientious (come to class on time, study the material, etc.) will exhibit that behavior regardless of rewards. These are most likely the intrinsically-motivated students discussed by McEvoy (2011). To control for those highly conscientious students we included the grades on the practice quizzes in our analysis.

Since some students may be better at taking multiple-choice tests than others, and since (as mentioned above) some may be much more conscientious about their studies in general, we controlled for overall

grade point average to date. Our thinking is that the more capable students will do better on the pre-post assessment anyway. GPA data were derived from official University student records, so bias from self-report information was eliminated.

Students' performance on the regular exams in the class were included as another control variable to examine whether the more capable students would do well on the pre-post assessment and are conscientious about arriving on time for class. Since both practice and regular course exams were multiple-choice format, including the average grades on the practice exams was a check on students' general ability to manage multiple choice testing.

Method for Study 2

In the first semester of the experiment (the baseline condition) students were told on the first day of the class that they could participate in a practice quiz at exactly the time class starts, but that those entering the classroom after the class start time would not be allowed to complete the quiz. No further information or instructions were given other than "This quiz doesn't count toward your grade, and there is no reward or punishment for taking it or not; it is up to you." We avoided using the term "practice quiz" or "practice problems" to avoid biasing students in the choice of participation. After students who wanted to participate took the quiz, the practice quizzes were collected and correct answers were given. No discussion of test taking was undertaken.

In the second semester, a continuous reinforcement schedule was used in which the practice quizzes counted 5% of the total grade in the class. The 5% was posted on the syllabus and on the first day of classes students were told about the quizzes orally and it was emphasized that they would not be able to begin the quiz if they were not in their seats at the class start time. In this case, when the graded quizzes were returned to students, the instructor discussed with the class how the multiple-choice exam questions could have been approached to enhance their probability of a good score.

In the third and last semester, a lottery-type reinforcement schedule was used. The lottery scheme was investigated in an attempt to find a reward schedule which would motivate students but one in which administration (grading, recording and tabulating grades, giving feedback) costs would be low. Of greater concern was a desire to keep from giving excessive rewards, in this case extra credit points simply for participation. In this case, students were told that the practice quizzes would not necessarily help or hurt them on the regular exams, that the practice quizzes did not count toward their final grades in the class, but that if they got two of the four practice quiz questions correct they would receive a token that would be placed into a drawing at the end of the semester for 10 points that would be added to the final course grade. Students were reminded that they could earn a token each time they were on time for the class and had 50% correct answers, so the more quizzes they took the greater their chances for earning 10 points. There would be only one drawing, so only one student would earn the extra points. It was hoped that the lottery scenario would lend some fun to the class as well. As in the case with continuous reinforcement, when the graded quizzes were returned to students, a discussion of test-taking tactics was covered as well.

Results for Study 2

The means and standard deviations of the variables for each group of students and the overall scores are found in Table 3. The results indicate that the highest participation rate in the quizzes (our dependent variable and a proxy for on-time arrival) was in the class where the quizzes counted 5% of the final grade (continuous reward group). While the participation rate for the combined groups was just over 70%, the rate for the continuous reward group was almost 85%. Not only were the participation rates in the quizzes higher for the continuous reward class, but their grades on the quizzes were significantly higher than those of the other groups by about 5 points, and their post-semester test score was almost 10 points higher than the other two groups.

Our results are consistent with studies we presented earlier. Like Reed (2001), Yukl, et al. (1972), and Latham and Dossett (1978), our results indicate that continuous rewards are superior to intermittent schedules and to no rewards at all.

The correlations of the variables for the combined groups are found in Table 4. Some interesting findings emerge upon examining these results. First, there is a strong positive correlation between the pretest grade and the posttest grade, as well as between the pretest and posttest scores and the final course grade. These findings suggest that strong students will do well on most any kind of test, regardless of the reward conditions. There was no significant correlation, however, between the participation on the quizzes and the final grade in the course, suggesting that good students would have done well without taking the practice quizzes. There was a significant association between participation on the quizzes and the posttest score, which suggests that the quizzes contributed somewhat to the content learning of students in the class. One possible explanation is that students became more interested in the material as the semester progressed and applied themselves to a great extent on the post-test than the pre-test.

It is interesting to note the associations of GPA with other variables. There were significant correlations between students' GPAs and participation rates on the practice quizzes. This could indicate that strong students are grade-oriented and take advantage of learning experiences and opportunities to increase their grades. There was also a strong correlation between students' GPAs and their final grade in the course, suggesting (not surprisingly) that strong students are consistent in their performance from one course to another, and that past performance is a strong predictor of future performance.

Our final analysis involved the regression of the two dependent variables on the full set of independent variables. The results for on-time arrival in class are shown in Table 5.

The analysis supported our proposition that the schedule and type of reward would vary across the quasi-experimental conditions. The effects of the grades students earned on the practice quizzes, the students' GPAs and the reward conditions were all statistically significant and positive. Thus, those with the highest GPAs also tended to be on time and make higher grades on the practice quiz.

TABLE 3
MEANS AND (STANDARD DEVIATIONS) OF VARIABLES IN STUDY

Variable	No Reward Group	5% Reward Group	Lottery Group	Overall
Quiz Participation	69.44% (25.1)	**84.52% (21.4) (F = 4.36	67.3% (25.3)	70.72% 25.3
Pretest score	26.3 (10.9)	30.7 (17.0)	28.4 (13.8)	28.3 (13.7)
Posttest score	63.3 (16.1)	*75.5 (15.2) (F = 3.35)	65.8 (18.6)	67.0 (17.7)
Difference pre/post	37.7 (17.2)	46.8 (15.4)	38.7 (11.3)	40.6 19.2
Quiz Grades	88.2 (4.1)	**92.3 (3.9) F = 4.44	86.0 (4.0)	87.7 (9.0)
Final course grade	79.1 (6.93)	81.1 (7.1)	81.3 (6.9)	80.0 (6.8)
GPA	2.98 (0.28)	3.11 (0.41)	3.06 (0.35)	3.05 (0.35)

*p<0.05 **P<0.01

TABLE 4
CORRELATIONS OF VARIABLES FOR COMBINED GROUPS

Variable	(1)	92)	(3)	(4)	(5)	(6)
Pretest grade	---					
Posttest grade	0.31**	---				
Difference score	-0.41**	0.74**	---			
% Quizzes taken	0.04	0.21*	0.06	---		
Course grade	0.17*	0.37**	0.19*	0.13	---	
GPA	0.04	0.17	0.09	0.18*	0.30**	---

N = 137 ** p <0.01 *p< 0.05

The results for improvement on the pretest-posttest assessments were generally not supportive of our proposition that students who participated in the practice quizzes (and thus arrived on time) would have the greatest difference in the pre- and post-test scores (improvement). These results are shown in Table 6.

The students' GPAs were again significantly related to improvement and in a positive direction. Of lesser significance were the grades on the practice quizzes. Did the practice quizzes (and on-time arrival) improve content learning in the classes? The results in Table 6 indicate that there were no significant differences in pre and post-test improvement, but that (consistent with the results in Table 5) the students with higher GPA's learned more than those with lower GPA's.

Discussion for Study 2

Our research studies have examined some relationships and conditions that have practical value for those in the classroom. Some conclusions are clear from both studies and are consistent with each other. First, college students are very grade-oriented, and they are motivated perhaps more strongly by grades than any other factor. They value grades as rewards and do not seem care much for social or team rewards. And using grades to shape their behaviors (as in the case of making the practice quizzes part of the final course grade) is highly effective. Second, additional opportunities are effective in increasing content learning, but the students most likely to take advantage of them will be students who do well in all their classes, regardless of rewards or schedules.

We had hoped to shed some light on ways to increase student learning by introducing a lottery approach to classroom rewards that would inject some fun into the class, shape on-time behavior in a positive way, and provide a low-cost way to reward students. Our results, however, indicated that the lottery option was no better than the control group (no reward) in increasing mastery of course content and shaping on-time behavior. This is in contrast to the study of bus riders by Deslauriers and Everett (1977) who had found the use of tokens in an intermittent reward scenario to be effective. Apparently the results from bus ridership do not generalize well to classrooms

TABLE 5
REGRESSION RESULTS FOR COMBINED CLASSES

Independent variable	Unstandardized B	Standard error	Beta	t	Significance
Grade on quizzes	0.561	0.23	0.22	2.49	0.014
Course grade	0.08	0.32	0.02	0.25	0.802
GPA	12.48	6.10	0.18	2.05	0.043
Reward group	-5.4	2.61	-0.18	-2.07	0.040
(Constant)	-8.58	30.20		-0.28	0.78

N = 132
Dependent variable: On-time arrival in class
R-square = 0.146 (Adjusted R-square = 0.120)
F = 5.484 (P < 0.000)

TABLE 6
REGRESSION RESULTS FOR COMBINED CLASSES

Independent variable	Unstandardized B	Standard error	Beta	t	Significance
Grade on quizzes	0.364	0.20	0.19	1.86	0.066
Course grade	0.49	0.31	0.17	1.573	0.119
GPA	12.48	6.10	0.18	2.05	0.043
Reward group	-0.054	5.77	-0.01	-0.09	0.926
(Constant)	-28.14	27.77		-0.87	0.387

N = 132
Dependent variable: Improvement in pretest-posttest scores
R-square = 0.087 (Adjusted R-square = 0.051)
F = 2.385 (P < 0.056)

The strong associations among on-time arrival, performance on the practice quizzes, and GPA indicates that there may be a "type" of student who is conscientious and will do well regardless of grading or classroom practices. The fact that students with high GPAs significantly improved their knowledge of course content is especially interesting. The findings suggest that students with higher GPAs enter the class with about the same level of knowledge about the course content as students with lower GPAs, but that over the course of the semester they outperform lower-GPA students. They also were more likely to arrive on time and take the practice quiz, but it was not possible in the present study to determine whether their superior class performance was due to effects of personality type (conscientiousness) or to taking the quizzes. Our findings may indicate that student capability and intrinsic motivation may be more important than classroom conditions or reward systems.

What are the practical lessons for instructors? Our findings suggest that concentrating on using grades to shape behavior and motivate learning may be the most efficient use of instructors' time and effort. Extrinsic rewards beyond grades had little effect on student learning and may have been a poor use of the instructor's time and effort. Although no formal measures of student satisfaction with the practice tests were obtained, informal feedback from classes showed tepid student interest in the practice.

LIMITATIONS

This study had among-subject variances since the same students were not in all three experiment conditions. This is a major problem. But the day and time of the class was the same each semester, so hopefully we addressed possibilities such as evening students being more motivated than day students, more seniors taking the class (and thus simply eager to finish college, since at this point the overall GPA was unlikely to change much), or fewer majors taking the course.

It could be argued that 5% is not much of a reward for the continuous schedule group. Future research could vary the grade criteria to investigate whether the size of the reward has an impact on behavior change. We also did not examine the timing of the rewards. In the lottery scenario, the reward did not come until the end of the semester, although the receipt of tokens throughout the semester could be seen as continuous rewards. One interesting variation might be to hold tokens or credits for the lottery until the end of the semester to see whether behavior is affected.

It would be interesting to see if the results generalize to other schools. Our university is highly diverse with about one-third of students white, one-third African-American, and one-third others (primarily Asian). While about 50% of students live on campus and more in the local area, many are full-time employees (many with families) who commute to campus on a part-time or full-time basis. The results could well be different for colleges where more traditional students are the norm.

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Enhancing Entrepreneurship Education Through Memletic Learning Theory

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This paper describes the role of Memletic learning style theory in the curriculum design of an undergraduate entrepreneurship course. The seven Memletic categories classify learning propensities based upon the theory of multiple intelligences whereby substructures to individual's intelligences may be identified, providing insight into behavior and learning preferences. Activities, assignments and teaching strategies in this highly experiential course were designed to address each learning style preference. This paper illustrates a curriculum design strategy that encourages the development of entrepreneurial orientation and behaviors by applying Memletic learning style theory. Detailed class exercises, term projects, and imagination development tools are highlighted.

INTRODUCTION

Educators and theorists in the learning arena have promoted the matching of teaching strategies with student learning preferences to enhance learning processes (Kassab, Al-Shboul, Abu-Hijleh, & Hamdy, 2006; Burrows-Horton & Oakland, 1997). Lively debate regarding the validity and impact of numerous learning style inventories developed through the lens of varied learning classification theories has ensued over the past 25 years.

Learning styles have been defined as filters for individual perceptions of their world (O' Connor,1997), the manner in which people process information styles (Dececco & Crawford, 1974), the qualities that influence the ability to acquire information and take part in learning experiences Grasha (1996), and the learning material preference (Peirce, 2000). Felder (1996) referenced Carl Jung's theory of personality types in classifying sixteen learning styles which can be measured by inventories such as the Meyers-Briggs Type Indicator. Kolb (1984, 2000), and Kolb and Kolb (2005) defined learning styles as the process through which people produce concepts and principles which guides their behavior in new situations (Noogabi, 1997). He postulates their learning style has been influenced by experiential learning, as categorized by the following processes: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Kolb's research provided the framework for widely known learning style indexes (Deed, 2009) including: Dunn and Price Learning Styles Inventory, Kolb's Learning Styles Inventory, Sternberg's Thinking Styles Inventory, and the Memletic Learning Style.

We discuss how one of the authors has developed an entrepreneurship course that employs Memletic Learning style theory throughout the curriculum to enhance student engagement and understanding. The remainder of this paper provides a deeper explanation of Memletic Learning Style theory, a review of

entrepreneurship education literature, detailed description of the method by which each Memletic Learning Style has been embedded into the curriculum, and a discussion of the potential impact and significance of the Memletic model. This paper discusses the adoption of Memletic learning theory as a teaching strategy by structuring teaching materials for each style within the context of an undergraduate entrepreneurship course.

LITERATURE REVIEW

Memletic Theory

Empirical evidence suggests that learning styles provide a good predictor for the preferred learning behavior of individuals (Bostrom, Olfman, & Sein, 1993). Learning capabilities are enhanced when students are familiar with their learning style and adopt a process that reflects their orientation (O'Connor, 1997). An understanding of their own learning styles is acquired through experience (Seif, 2001) and through the completion of learning styles inventories which are available on-line or through coursework.

Educators perceive learning styles to be influential factors with varied approaches and materials required to effectively reach individual learners (Anderson & Elloumi, 2004). Golubtchik (2009) asserts that educators and students should engage in a dyadic learning process whereby teachers initiate learning by presenting curriculum through multiple modalities, and that students take control of their learning by employing not only their favored learning modes, but also by experimenting and building competence in less familiar learning modes.

The influential book Frames of Mind (1983) by psychologist Howard Gardner introduced the theory of multiple intelligences by which he defined criteria for intelligence based upon individual biological and psychological potential to solve problems in varied contexts. Seven intellectual capacities were identified: linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, interpersonal, and intrapersonal. His work led to the expansion of the definition of intelligence, and has been adopted by educators as a modality for classifying learning propensities. The Memletics learning theory (Memletics, 2012) identifies learning styles based upon the brain function classifications as developed by Gardner (1983). Most people have one to three prominent styles (Davis, 2007; Shelton, 2009). The styles are as follows:

1. Visual learners benefit from seeing demonstrations, and prefer visual stimuli such as videos, images, and spatial understanding,
2. Aural learners absorb concepts through music and sound, and are typically strong listeners,
3. Verbal learners prefer engagement through words, both in speech and writing,
4. Physical learners prefer whole body movement to facilitate concentration and learn through using their body, hands, and sense of touch,
5. Logical learners prefer reasoning and systems,
6. Social learners prefer group activities and learn through interaction including question and answering,
7. Solitary learners prefer to work alone and use self-study; they structure their efforts and are intrinsically motivated.

A recent empirical study by Shelton (2009) examining the learning styles of students confirmed that there are marked differences in learning style preferences. Results indicated that if students were taught as a group rather than individually, the preferred learning styles became blended, thereby limiting learning opportunities for students. This research raises the question of the potential impact of designing curriculum for group instruction by conveying the material through the entire range of learning styles to facilitate individual learning styles. This would entail structuring the learning experience to reach multiple learning styles, allowing students with one style to absorb the material through one method, and other learners to experience the material in their preferred learning modality.

Scholars have applied the analysis of Memletic learning theory to a wide range of academic disciplines. A study regarding the impact of learning styles within the context of second language programs determined that students with different learning styles displayed significant variance in

capability for four skills, listening, writing, structure, and reading (Moenikia & Zhed-Babelan, 2010). The authors recommend the designing of learning experiences be developed according to the Memletic Learning Styles to enable student success. Learning preferences according to Memletic theory for gender differences, as well as distance versus classroom users (Moeni, Aliapour & Ghaderi, 2009) have also been examined. Findings indicated that students with visual learning style had the greatest academic achievement, and students with logical and physical styles demonstrated the lowest academic grades. A gender difference was identified with males preferring the following styles in order of descending importance: verbal, solitary, social, logical, physical, aural, and visual. Females demonstrated a different order of learning preference: aural, verbal, visual, logical, solitary, physical, and social styles in declining order of preference. While literature pertaining to entrepreneurship education recognizes experiential learning as effective, references pertaining to Memletic Learning Styles and entrepreneurship education were not identified.

Entrepreneurship Education

The importance of entrepreneurship to economic expansion and job creation has long been recognized with government organizations encouraging academic institutions to develop programs to promote entrepreneurial behavior in graduates (European Commission, 2006). The United Nations Conference for Trade and Industry (UNCTAD, 2010) promotes programming that facilitates students acquiring entrepreneurial competencies such as creativity, initiative and persuasion. Enterprise and entrepreneurship education Guidance for UK higher education providers (2012) defines entrepreneurship education as equipping students with the knowledge and capabilities required to set up a new venture, typically demonstrating innovation, ability to transfer knowledge, address intellectual property, and operate in a trans-disciplinary manner.

Entrepreneurship education is fraught with controversy regarding the successfulness of academic versus practitioner approaches (Honig, 2004). Proponents of the 'real world school of learning' advocate that entrepreneurship is complex and chaotic requiring creativity and drive, in conjunction with skills and reasoning. Three common approaches to entrepreneurship curriculum design include: entrepreneurial capacity, the process method, and the cognitive method (Neck & Greene, 2011). The entrepreneurial capacity approach was popular in the 1980s and 1990s, and entailed educators structuring the curriculum to expose students to current and historic entrepreneurs, and emphasizing that without innate characteristics the evolution of students into entrepreneurs would not be feasible. Educators employing this approach are not engaged in developing entrepreneurial capability, but rather allowing students to explore their suitability to becoming entrepreneurs by starting a business after they graduate.

The process approach to entrepreneurship education emphasizes skills which are required for stages of venture development and typically includes both skill-building courses and exposure to innovation and product development (McMullan & Long, 1987; Vesper & McMullan, 1988; Plaschka &Welsch, 1990). Business plan writing which entails primary and secondary research skills and cases illustrating business examples form the core teaching methods for this approach. The process approach curriculum is commonly structured with an introductory course, supplemented by classes with an entrepreneurship emphasis regarding opportunity analysis, marketing, finance, growth management and harvesting (Neck & Green, 2011). Process oriented entrepreneurship coursework would typically be more experientially oriented than other business school coursework (Hills, 1998; Calvert 2009), with students conducting primary research, and developing business proposals.

The cognitive approach to entrepreneurship education emerged in the early 1990's, with widespread adoption occurring during the past few years. This approach focuses on the transformation of the student both in their potential to think entrepreneurially and in the skills and motivation to launch an enterprise. Curriculum for this methodology focuses on students developing the knowledge structures necessary to assess decisions involving opportunity evaluation, creation, and growth (Mitchell, Smith, Seawright, & Morse, 2000). The cognitive method is based upon the premise that entrepreneurs may be developed through structured curriculum that encourages students to observe and interpret the world through a lens which emphasizes opportunity identification. The approach is action oriented, with curriculum including

frequent reflection exercises and a portfolio of techniques to practice entrepreneurship such as games and simulations, reflective practice, and venture start-up. Typically faculty incorporate exercises to promote creativity and idea generation to enhance cognitive capabilities for venture creation.

The study of entrepreneurial learning can be traced to Deakins and Freel's (1998) paper which considered entrepreneurial learning within the context of small firms. The focus for many researchers emphasizes the development of the individual's cognitive ability to facilitate moving from a potential entrepreneur to a nascent entrepreneur (Rae, 2000; Erikson, 2003) which may occur at the beginning of a career or after work experience and capital for venture start-up has been acquired (Rae, 2006). Tell (2008), suggests networking activities in conjunction with structured reflection exercises will build both entrepreneurial skills and the social capital necessary to launch ventures. Nahapiet and Ghoshal (1998) discuss the concept of entrepreneurship as both the capability of recognizing opportunities, and having the capability to act upon the opportunity by organizing external resources.

Memletic Theory as the Core Pedagogy in an Entrepreneurship Course

The curriculum in the Idea to Opportunity course is based upon the cognitive approach to entrepreneurship education. Students engage in trend spotting, idea generation, creative problem solving and anti-conventional thinking to expand their knowledge base and identify new venture ideas. Through a process of problem and customer discovery, students 'get out of the building' (Blank & Dorf, 2012) to test their ideas on potential customers and experts as they build their concepts from the idea stage to a business opportunity. A network of investors, innovators, and experts provide insights and feedback throughout the process. After teaching the course for several semesters one of the authors adopted Memletic Learning Theory in an effort to reach students, as there was typically a portion of the class who did not evolve in their capabilities as much as other students.

There are usually 25 students in a class, typically in their second or third year of an undergraduate program. The class is comprised of students from a variety of disciplines including business, communications, computer information systems, psychology and anthropology. The course is required for a minor in Entrepreneurship and requires an introductory entrepreneurship course as a prerequisite. Students complete the Memletic Learning Style questionnaire at the beginning of term to become familiar with their preferred learning styles, and also to understand their potential challenges with some learning environments. The types of exercises and the author's logic in employing various learning style methods are also discussed at the beginning of the term.

Memletic Learning Styles have been employed to facilitate a richer learning environment for the full range of learner categories. Whereas many courses employ pedagogies that speak to one or two learning types, typically visual and social learners, this course has components to appeal to each of the learning styles addressed in Memletic theory. Activities are structured throughout the term so that students will be exposed to at least two key activities or assignments in their preferred style. Projects and events are experiential in nature, but structured in such a manner that students from varied learning styles may mold the experience to 'fit' their style. The methods employed to embed the Memletic Learning Styles throughout the course curriculum and the class experiences are provided below (See Table 1), with a detailed explanation of the major events provided in Appendix 1.

TABLE 1
COURSE ACTIVITIES MAPPED TO MEMLETIC LEARNING STYLES

Learning Style and Learning Activities	Visual	Aural	Verbal	Physical	Logical	Social	Solitary
Frameworks and Worksheets	X		X		X	X	X
Networking and Connecting			X	X		X	
Storytelling and Pitching			X	X	X	X	
Inspiration Logs and Idea Generation	X		X	X		X	X
Research and Interviewing		X	X				X
Expert Panels		X	X			X	
Website and Blogging			X		X		X
Play and Music	X	X	X	X		X	

Each course activity is sufficiently flexible to accommodate at least two learning styles. Although one style may be emphasized, students have the opportunity to practice the activity in more than one style in order to enhance their learning. Detailed examples for each style explain the connection between activities and learning styles.

Visual Learners

Aside from notes provided to students, visual images are used in exercises and assignments in each class. Visualizations are a powerful tool in the development of creativity capability, and the use of visualization exercises enhances the learning potential for visual learners as well as promoting the development of visual conceptualization for students with alternative learning styles.

- In the first class students are provided with large sheets of paper and colorful pens. They are asked to draw caricatures of themselves and identify their key passions and fascinations. These posters are then hung up around the room for everyone to browse and to reference when forming teams for the day's activities.
- The Business Model Canvas framework developed by Osterwalder and Pigneur (2009), which provides a visual framework for developing business model alternatives, is printed on large sheets of paper. Students then use sticky notes to collaboratively explore and capture a variety of ideas and hypotheses easily making adjustments as they evolve their concepts. The visual depiction helps students explore a variety of scenarios and allows them to explore a conceptualization process not typically employed in business education.
- Mind Maps are used in the idea generation process. Students break into creativity teams to brainstorm and identify consumer issues or unmet desires and potential solutions. Mind maps are built over the course of several classes with students building upon a single concept, or by exploring multiple concepts. A variety of other idea generation models are also utilized.

- Crude prototypes and sketches of offerings are prepared for customer testing, with students approaching potential consumers for feedback. Prototypes are then refined based on potential customer feedback.

Aural Learners

Aural learning style students were reached through music as a background to set the tone and encourage creativity in the class. Students with this preference style tend to become more relaxed and willing to participate during classroom interaction, and express appreciation for the positive atmosphere when music is provided as a backdrop to class activity. Empirical studies have confirmed a positive correlation between exposure to varied music and the development of cognitive functioning that are strongly related to auditory information processing (Roden, Grube, Bongard & Kreutz, 2014). A wide range of music is provided, including the use of Binaural Beats and Isochronic Tones, which are purported to encourage brain wave activity that might enhance learning capabilities.

The informality of a class where music is present also signals a break from traditional learning, and reinforces that the class is formative and focused on developing creativity and knowledge processes rather than traditional academic models. Aural learners are often very good listeners and therefore benefit when expert panels and potential customer interviewees provide feedback on their specific venture ideas. When working in teams, verbal learners often do the interviewing with aural learners capturing the thoughts and insights from the interviewees.

Verbal Learners

Verbal learners are reached through a range of both writing and speaking during class time through exercises, team projects, blogs, presentations, and multiple reporting methodologies including:

- During the first class students must list their passions, fascinations, and provide a three word self-description as a way to break down barriers, meet, and remember their classmates. Students also post a profile online that is shared with the rest of the class which includes their caricature, as well as 'A little about me', 'an Interesting Tidbit', and 'What I can contribute to a team'.
- In the Sweat Box Challenge, students are challenged to pitch their venture concepts to innovators from the community. They pitch several times in an evening to a variety of people and have the opportunity to refine their pitches as the evening progresses. The goal is to engage the audience and obtain 'investment' in self, and in their venture concepts. In preparation for this activity, a theater director works with the students on storytelling. They distill their ideas down to six word stories to capture the essence of their ventures, and practice their ability to communicate effectively in a time-pressured environment.
- The final team concept is summarized via a 'Business Model Canvas' (Osterwalder et al, 2009) which is presented in class in a 2 minute scrum format to help students identify and communicate the key elements of their process and activities. The verbal engagement of the entire class in providing feedback for each concept is formative, as well as providing an additional experience for verbal learners. The evolution of their concepts is presented in a ten minute Discovery Pitch at the end of the term.
- Traditional power point lectures are sometimes used to communicate foundational concepts.

Physical Learners

To accommodate physical learners in the classroom a number of opportunities for movement are incorporated throughout the term and in each class as follows:

- Most classes begin with play. Board games, puzzles, nerf balls, and barrel of monkeys are employed to move students into a relaxed state with a focus on the here and now. Play stimulates curiosity and imagination and is useful for preparing the students to participate in class activities encouraging adaptability and enhancing problem solving capabilities.

- The story telling class with the theatre director incorporates lots of movement and physical interaction among students through role-play and warm-up activities. A pitch coach also works with students on voice projection and modulation, body language and networking strategies.
- A variety of objects are brought into class to spark activity and discussion. Student teams identify a problem, they then choose objects that they play with and examine by considering the function, texture, and movement of the objects. The objects are used to inspire the development of a product that solves the problem.

Logical Learners

For students who prefer reasoning and systems, a series of frameworks and worksheets are offered to help organize their thinking in a logical process. Once students have identified a venture idea, they conduct further primary research to test their business model hypotheses. In order to provide context and a big picture understanding, students are provided with a broad framework and then asked to focus on three or four key elements, with an understanding of the interrelationships of the elements being emphasized.

- Frameworks such as the Business Model Canvas (Osterwalder et al, 2009) and Value Proposition Canvas (Osterwalder et al, 2012) are used to help students track their opportunity development process. Students are required to move through a logical process, providing rationale at each pivot point in their analysis. The focus is on learning and reflecting on a process of problem and customer discovery, with students posting regularly on team blogs to track their process and progress.
- The final requirement of the class is a Discovery Pitch in which teams present their process of discovery and rationale for a final go/no go venture decision to an industry panel.
- Additional frameworks used include mind maps and empathy maps (Osterwalder et al., 2009), which emphasize value creation and problem solving though creative applications.

Social Learning Style

The course strongly supports students with a social learning style. There are many opportunities and requirements for students to learn in groups as well as to network with others when seeking feedback from consumers, panels, teammates, judges, or other students. The goal is to gain a variety of perspectives which could then lead to more innovative venture ideas. Social learning opportunities are provided through:

- Play and learning activities mainly done in small teams. Initially students form creativity teams to assist in idea generation and brainstorming. Once ideas are selected, students self-select new team members for the next stage where they engage in further research regarding customer problems or needs in order to develop final business models.
- The 'Sweat Box Challenge' provides social learning opportunities where students interact with community innovators in a networking format learning to make meaningful connections and persuasive pitches.
- Little Black Book assignment – students are required to attend at least two networking events, set goals, begin to develop relationships and capture contact information. This activity stretches students who prefer a more solitary style of learning and encourage students who prefer social interaction to further hone their skills. The Little Black Book is the beginning of a student's contact base that they will continue to build and nurture throughout the entrepreneurship minor, and ideally, as graduates.

Solitary Learning Style

For solitary learners, creativity often comes from individual effort and reflection. Opportunities for self reflection and individual idea generation have been incorporated into the class through the following:

- Students are encouraged to build mind maps outside of class on their own in addition to the maps developed with their creativity teams.
- One element of the team blog assignment is individual reflections by each of the team members on their personal learning process. Students are provided with an on-line survey regarding Memletics Learning Styles so that they can identify their own style. They are then encouraged to expand their learning orientation through full engagement in all of the class exercises, recognizing that many are not structured for their optimal style.
- Students are challenged to expand their horizons by identifying a 'day in their lives' and then making a plan to undertake new experiences. They develop weekly individual idea logs that capture their activities and the ideas that result from their new way of seeing things.

IMPACT UPON STUDENT LEARNING

The primary goal of employing Memletic learning theory has been to reach students through their preferred learning style as well as encouraging them to explore alternative learning styles, thereby facilitating their greater comprehension and enjoyment of the classroom experience and projects. The coursework is constructed to build creativity and capabilities with the range of learning styles allowing easier acceptance of the materials and processes. Many of the class activities are beyond the student's previous classroom experiences and are developed to move them out of their traditional learning patterns.

The impact of employing Memletic learning theory throughout the course was apparent for some students during the term however, other students have indicated the benefits only became apparent in later classes or post-graduation in the workplace. The range of learning methods were not fully appreciated until the next entrepreneurship class when students are required to further demonstrate their skills and creative capabilities. One of the most evident impacts has been helping more solitary learners develop their social skills, confidence and abilities. For example, connecting and building a broad network of resources is an important part of venture creation. Designing curriculum that requires students to build and practice these skills in a supportive environment may lead to greater retention and learning.

Success has been measured by the author observing visible change in behaviors during the term, with students gaining a visibly greater competency in opportunity identification, idea evolution, networking, enhanced creativity, and personal engagement than in the classes that did not employ Memletic Learning Theory. Further, many students have indicated to the author that they now look at the world differently, they are more open to trying new things, meeting new people, perceiving problems, and to exploring possible solutions. The behaviors adopted by students in the course evolved during the term. Judges participating in multiple events indicated that they had been impressed with the development of confidence and communication skills demonstrated by students during the term. Numerous students advised the author that they were offered jobs or were asked to follow up regarding potential employment upon graduating by event judges.

Feedback provided by students indicates enhanced confidence both in social interactions and idea creation. Students recognize the impact of the exercises; sample comments are provided as follows:

- "Learning different techniques, that came out of the sweatbox challenge about when to exchange information and how to approach networking events has also given me more confidence to go into these events, knowing my business idea and feeling comfortable with creating my own approach to expressing my idea in 30 seconds or less if I need to."
- "I now know that I don't network enough. From now on I have set a goal to go to at least one networking event every month. Networking is key, because of this class I went to three networking events and met some incredible people that were insightful and willing to help. Just by sharing my idea with others has made the proposal stronger, everyone's perception and experience does help the idea come to reality."

- "Moving forward I want to keep developing my idea-spotting skills and constantly be on the look- out for something that can be sitting right under my nose. I want to think what have I done today, how I can improve on what I did today, and has anything really stood out?"
- "My approach to venture development has definitely changed. Before this class, I would have the mindset of thinking I have a great offering in front of me and it is as good as it's going to get, with or without any research. I have also learned a better order to do things in - problem discovery, customer discovery and solution testing, first reality check, create a value proposition, and technical feasibility. I found that these worksheets were very helpful in our process, and I would definitely try to follow a similar process in future venture development."

Students indicated the range and varied nature of the teaching tools, such as the Business Model Canvas and the Empathy Map, were useful as it allowed them to identify gaps or inconsistencies in their business model. They also liked the iterative nature of the exercises as it forced them to hypothesize, test through research and then alter their strategies. Using visual frameworks where students repeat a process adding incremental improvements, then regularly reporting on their findings, then receiving verbal feedback from a broad group of people, provided deeper understanding of the material as well as capability development. The few students who expressed disappointment in the course indicated the lack of structure was difficult for them. The flexibility and ambiguity of some assignments is frustrating for students who are focused on grades rather than on learning the process. The author encourages students who are frustrated during class to consider the reasons for their frustration, and to develop methods by which they can create the structure they feel necessary. The development of coping skills for unstructured situations is core to entrepreneurial thinking; as such providing too much structure defeats the opportunity to facilitate the development of creativity. The authors will continue to explore methods to move the students who are challenged by the process through the materials.

CONCLUSION

The authors suggest that curriculum structured to recognize student learning styles as defined by Memletic Learning Theory enhanced student engagement and facilitated greater understanding of the entrepreneurship skills, processes and materials. Each of the seven types of learning styles was addressed through lesson strategies and the structuring of both physical and virtual environments with multiple opportunities throughout the term for students to engage with the material in their preferred style. While some students expressed frustration with the multiple modes of learning, by the end of the term all of the students demonstrated, albeit at different levels of adaptation, greater creativity and decision-making capacity, and well as the ability to adapt to unstructured and challenging classroom experiences.

The authors note that this experience is limited to one course in an undergraduate university, and that the assessment of impact has been limited to observation and student expressions. A survey is being developed to empirically test the impact of embedding the Memletic Learning Styles in the curriculum on a pre and post course basis. It would also be useful to test the impact in graduate courses, as well as a range of disciplines to verify the significance regarding cognitive development.

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APPENDIX 1: DETAILED DESCRIPTION OF PROJECTS AND EVENTS

Sweat Box Challenge

Based on development of the mind maps, research and feedback from their creativity team, each student comes up with a new venture concept. Each student creates a 90 second pitch to present at a networking event where innovators from a variety of industries are given "investment dollars" to invest in the top student innovator and the top venture idea. Students mingle throughout the night, pitching their ventures in an effort to gain investment. Students pitch, receive feedback and then have the option to revise their pitches prior to approaching another innovator. Learning comes from receiving feedback and having the opportunity to continually revise and hone their pitches. By the end of the evening, innovators commit their investment dollars to their top candidates. The event typically has 40-50 innovators from the community representing a variety of industries, 10-20 former students, and faculty from across campus. The event runs approximately two hours, and is worth 10% of student's final grades.

Team Venture Development Process

After the Sweat Box Challenge, students form teams and select the ventures they would like to explore. Teams undertake a detailed process of problem discovery, customer discovery, environmental assessment, and technical feasibility to determine the potential of their idea to become a feasible venture opportunity. Each component of the product development process is articulated on a team blog or website. Hypotheses identifying the assumptions students make about their offering, value proposition, customer segments, channels, and potential revenue streams are tested in the marketplace and evolved based on the feedback. By the end of the course students are able to provide rationale for a go/no go decision on their venture idea.

Discovery Pitch

The culmination of the team project is a ten minute story pitch to a panel of entrepreneurs and angel investors from the community that traces the evolution of their venture concept. Teams receive detailed feedback regarding their concept, with a focus on the student's discovery process. Although the actual idea is considered by the judges, the majority of the assessment pertains to the process, recognizing that a key deliverable for the course is the development and evolution of both a venture idea and the student mindset, with creativity, process awareness, team capability, and self management identifiable outcomes. Judges evaluate the quality of primary research, and the validity of the student interpretation of research in the evolution of the venture idea. Judges also assess the student's pitch style, and their ability to respond confidently to questions that demonstrate their knowledge and thoughtfulness around the decision making process.

Inspiration Logs

A key outcome of this course is to help students develop new habits of mind, expand their knowledge base and ignite their curiosity and creativity. Building an Inspiration Plan and posting regularly in a log helps students develop the habit of continually scanning the environment, questioning what they see and recognizing potential opportunities. Students are asked to write about "A Day in the Life of…" and then to build a plan for doing different things. They are encouraged to get out of their comfort zone and engage in new physical, social, and mental challenges. Students are required to do at least one new activity every week and reflect on their learning in an Inspiration Log.

The Effect of Application-Based Training on the Emotional Intelligence of Criminal Justice Students

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This study assessed whether undergraduate students in an application based criminal justice program would exhibit higher levels of emotional intelligence as a result of their training in comparison to non-criminal justice students. Participants were 192 undergraduate students: 43 Criminal justice majors, 46 human service majors, 57 nursing majors, and 46 general education majors. These participants were given the 33 item Schutte, Malouff, Hall, Haggerty, Cooper, Golden and Dornheim (1998) Emotional Intelligence Scale to measure levels of emotional intelligence. The findings indicate that there was a significant difference in emotional intelligence only among criminal justice students and general education students.

INTRODUCTION

The field of law enforcement can be filled with professional and personal challenges along with a variety of specific occupational stressors (Ellison, 2004; Deschamps, Paganon-Badinier, Marchand & Merele, 2003; Greene & del Carmen, 2002; He, Zhao, & Archbold, 2002). Law enforcement personnel are frequently involved in situations that can be extremely stressful and dangerous. In addition, changes in the economic and technological landscape have increased the work related demands imposed upon law enforcement related professionals (Deschamps, et. al., 2003). In order to perform well in the field, law enforcement personnel must have a skill set that is not limited to tactical interventions but also includes the ability to successfully handle confrontation, exhibit good judgment and create healthy relationships (Prazno & Prazno, 1999; Turner, 2006).

Over the past few years, interest in the role of emotional intelligence has grown across a variety of settings. Emotional intelligence (EI) was initially introduced by Salovey and Mayer (1990) who defined it as having the capacity to observe one's own, as well as others', emotions and to use this information to direct one's thoughts and behavior. The role of observing emotion and processing the observed information has been shown to be an important component in the ability to self-regulate emotion (Zeidner, Matthews, & Roberts, 2004). Mayer and Salovey (1997) further state that EI is the ability to perceive and appraise emotion, to utilize emotion in assisting one's thinking, to understand emotions along with the information that derives from them and to manage emotions in a manner that fosters

personal growth. Goleman (1995) defines EI as the ability to manage one's emotions in the areas of self-awareness, self-regulation, self-motivation, empathy and social skills.

After the appearance of the bestselling book on EI by Goleman (1995), the popularity of EI has increased to the point where further research has linked the role of EI to such areas as job performance (O'Boyle, Humphrey, Pollock, Hawver & Story, 2011), job related stress (Nikolaou & Tsaousis, 2002), and to adaptive leadership qualities (Brown, Bryant, & Reilly, 2006) (Mandell & Pherwani, 2003). Many proponents of EI assert that success in the work place is often linked to the ability to effectively manage interpersonal relationships and that EI is fundamental to the capacity to succeed in interpersonal behavior, communication, negotiation, networking, and leadership (Goleman, 1998; Weisinger, 1998).

Research suggests the emotions of law enforcement personnel may affect the quality of their work, particularly in the areas of communication and interaction with the general public. Law enforcement personnel's expected professional conduct often includes the limitation of emotional expressions and appearing calm and in control in even the most distressing situations (Pogrebin & Polle, 1991). Some have argued that what will assist the selection and development of future leaders within the law enforcement community will be the recognition of those who display effective skills in the area of emotional intelligence (Turner, 2006). Bar-On, Brown, Kirkcaldy and Thome' (2000) found that in comparison to other helping profession groups, "police officers were more aware of themselves and of others, were more adaptable in general, coped better and positively enjoyed their work more" (p.1114). It comes as no surprise then that having higher levels of EI is extremely important for success in the realm of law enforcement where daily stressors can take their toll on officers' mental well-being. In addition to mental and emotional aspects, Al Ali, Garner and Magadley (2012) found significant correlations between higher EI levels and police officer job performance. Aremu, Pakes and Johnston (2011) found that emotional intelligence even had an effect on the attitudes of police officers toward police corruption.

Further research suggests a person's level of EI can influence his or her career decisions (Brown, George-Curran, and Smith, 2003). Some researchers propose people may be intrinsically more drawn to a specific type of career or work climates in which EI is actively cultivated (Morehouse, 2007). Gertis, Derksen and Verbruggen (2004) report employees in human services related positions who showed higher levels of EI reported less occasions of experiencing burnout. In addition, it has been shown that having an EI component in employee training programs can yield increases in employee levels of EI from a variety of professions (Zijlmans. Embregts, Gertis, Bosman & Derksen, 2011). Since emotional intelligence is associated to the ability to regulate one's own emotions while also being aware of the emotions of others, it is not unreasonable to propose that this ability would be helpful to those working in the criminal justice field.

In this study we examined if students who had chosen to major in an applied undergraduate degree criminal justice program would exhibit higher levels of EI in comparison to students in other degree programs. Due to the nature of the training and education needed for working in the law enforcement field in which one has to be able to effectively identify and control emotions, we expected criminal justice students in an application based program would exhibit higher levels of EI when compared with non-criminal justice general education. In addition, this study explored if there are differences in EI between age, gender or ethnicity groups.

METHODS

Participants in this study included 192 undergraduate students enrolled in criminal justice, human services, nursing, and general education programs at a small, rural community college. Data was collected from students who were readily available and who voluntarily agreed to take the survey. The students self-identified their age (range = 17 – 65 years), sex (129 females, 63 males), ethnicity (114 Caucasian, 61 African-American, 10 Hispanic, 2 Asian and 5 other), and their chosen college degree program (43 Criminal justice, 46 human service, 57 nursing, 46 general education).

Participants were presented with a 33 question survey to measure emotional intelligence in order to determine whether or not there was a significant correlation between the levels of EI among participants

and their chosen college degree program. In addition to the 33 questions, demographic information was collected on which degree program the participant was enrolled, age, sex, and ethnicity. Linear regression was used to assess the relationship between age and EI and that one-way ANOVA would be used to assess the difference in EI among each categorical variable.

Instrument

For this study, participants completed the Schutte, Malouff, Hall, Haggerty, Cooper, Golden and Dornheim (1998) Emotional Intelligence Scale (See Table 1). The scale has 33 questions, and contains

TABLE 1
THE 33-ITEM EMOTIONAL INTELLIGENCE SCALE (SCHUTTE, ET. AL., 1998)

1. I know when to speak about my personal problems to others
2. When I am faced with obstacles, I remember times I faced similar obstacles and overcame them
3. I expect that I will do well on most things I try
4. Other people find it easy to confide in me
5. I find it hard to understand the non-verbal messages of other people*
6. Some of the major events in my life have led me to re-evaluate what is important and not important
7. When my mood changes, I see new possibilities
8. Emotions are one of the things that make life worth living
9. I am aware of my emotions as I experience them
10. I expect good things to happen
11. I like to share my emotions as I experience them
12. When I experience a positive emotion, I know how to make it last
13. I arrange events others enjoy
14. I seek out activities that make me happy
15. I am aware of the non-verbal messages I send to others
16. I present myself in a way that makes a good impression on others
17. When I am in a positive mood, solving problems is easy for me
18. By looking at their facial expressions, I recognize the emotions people are experiencing
19. I know why my emotions change
20. When I am in a positive mood, I am able to come up with new ideas
21. I have control over my emotions
22. I easily recognize my emotion as I experience them
23. I motivate myself by imagining a good outcome to tasks I take on
24. I compliment others when they have done something well
25. I am aware of the non-verbal signals other people send
26. When another person tells me about an important event in his or her life, I almost feel as though I have experienced this event myself
27. When I feel a change in emotions, I tend to come up with new ideas
28. When I am faced with a challenge, I give up because I believe I will fail*
29. I know what other people are feeling just by looking at them
30. I help other people feel better when they are down
31. I use good moods to help myself keep trying in the face of obstacles
32. I can tell how people are feeling by listening to the tone of their voice
33. It is difficult for me to understand why people feel the way they do*

*These items were reversed scored.

three subscales: appraisal and expression of emotion in self and others (e.g., I am aware of the nonverbal messages I send to others), regulation of emotion in self and others (e.g., I have control over my emotions.), and utilization of emotions in solving problems (e.g., I compliment others when they have done something well). For each item on the measure, a rating of one 1 indicated "strongly disagree" and a rating of 5 indicated "strongly agree" (1988). After three responses on the survey were reverse-scored, the total score was calculated by summing the total points on the 33 items. The higher the participant's total score, the greater is the individual's emotional intelligence. The instrument has shown an average score of 131 for females and 125 for males (maximum score = 33 x 5 = 165). The scale has an internal consistency analysis of Cronbach's alpha of .90 and .87; a test-retest reliability score of .78 and the instrument demonstrated discriminant and convergent validity when compared to the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) and convergent validity when compared to the Trait Meta-Mood Scale. The Emotional Intelligence Scale has also shown predictive validity by showing a significant relationship to first year college student's grade point average (Schutte, et.al, 1998).

Results

The emotional intelligence scores were measured for all 192 participants. The total sample mean was 129.4 (SD = 13.9) with a mean of 130.4 for females (SD = 13.7) and 127.4 for males (SD = 14.1). Multiple analyses were conducted to determine what factors, if any, influence emotional intelligence. The relationship between age and EI was examined using linear regression analysis, and one-way ANOVA was used to examine any difference in EI among the different categorical variables. Linear regression analyses indicate that the residual error terms in this sample are normally distributed and the ANOVA analyses indicate that the samples representing each group are derived from populations of equal variances. A simple linear regression was conducted to determine if the age of a student could predict EI, $F(1, 190) = .032$, $p = .859$. The null hypothesis stated that there is no relationship between age and EI. The regression equation used to predict EI based on age was determined to be as follows: emotional intelligence = 128.946 + .017 (age), R2 = .000. The results of simple linear regression suggest that there was no significant relationship between student age and EI and that age is a poor predictor to describe the levels of EI.

One-way analysis of variance was conducted to determine if there was a difference in emotional intelligence between males and females, between different ethnicity groups, and between different college degree programs. The one-way analysis of variance showed that neither gender nor ethnicity provided a reliable effect on EI, gender: $F(1, 190) = 1.968$, $p = .162$, MS *error* = 191.376, $\alpha = .05$, ethnicity: $F(4, 187) = .362$, $p = .836$, MS *error* = 194.952, $\alpha = .05$. However, there was a significant difference between EI and participant's choice of college degree programs, $F(3, 188) = 3.426$, $p = .018$, MS *error* = 185.285, $\alpha = .05$. A follow-up Bonferroni Post-hoc analysis indicated that there was a significant difference in emotional intelligence only among criminal justice students (M = 134.37, SD = 10.599) and general education students (M = 125.13, SD = 15.235). There was no significant difference between participants in any other programs (see Table 2).

TABLE 2
BONFERRONI POST-HOC ANALYSIS OF EMOTIONAL INTELLIGENCE AND COLLEGE DEGREE PROGRAM

Dependent Variable: Emotional Intelligence

College Degree Program (I)	College Degree Program (II)	Mean Difference	Standard Error	p	95% Confidence Interval Lower Bound	Upper Bound
Criminal Justice	Human Services	5.133	2.887	.462	-2.57	12.83
	Nursing	5.144	2.749	.377	-2.19	12.48
	General Education	9.242*	2.887	.010	1.54	16.94
Human Services	Criminal Justice	-5.133	2.887	.462	-12.83	2.57
	Nursing	.011	2.698	1.000	-7.18	7.20
	General Education	4.109	2.838	.896	-3.46	11.68
Nursing	Criminal Justice	-5.144	2.749	.377	-12.48	2.19
	Human Services	-.011	2.698	1.000	-7.20	7.18
	General Education	4.098	2.698	.783	-3.10	11.29
General Education	Criminal Justice	-9.242*	2.887	.010	-16.94	-1.54
	Human Services	-4.109	2.838	.896	-11.68	3.46
	Nursing	-4.098	2.698	.783	-11.29	3.10

*significant at p<.05

Discussion

The findings indicate that, in this sample, age, sex nor are ethnicity related to EI. Although Schutte, et.al. (1998) has shown that the average score for females (131) is higher than males (125), and the current study also the average score for females (130.4) is higher than males (127.4), this difference does not register as significant. However, it does indicate that the instrument performed as expected. The findings of this study did suggest that there is a significant difference between EI and participants' chosen college degree programs.

Although criminal justice students, nursing students, and human services students are considered a part of the greater public service fields, the students in criminal justice have more classes that specifically train students to read body language, to communicate verbally, to perform their job objectively (e.g., to

control their emotions), to perform their jobs professionally (e.g., making a good impressions to others), and to methodology investigate problems (e.g., to overcome barriers and contradicting information). Each of these factors was assessed on the Emotional Intelligence Scale and may explain the study's test results. In short, it may be that the training criminal justice students have is enough to distinguish their level of EI from the general education students. Thus, a practical implication is that emotional intelligence can be purposively reinforced via training.

LIMITATIONS

There are also several limitations in the study. First, because the sample was convenient, purposive, and non-random, there was a possibility that the participants who chose to participate may be different in meaningful ways from those individuals who chose not to participate. As a result, the findings cannot be generalized to other population groups that do not match the sample's characteristics. Second, Likert-type scales were used and there is the possibility that a) the participants engaged in central tendency bias by simply selecting the middle option rather than the best option, b) the participants engaged in acquiescence bias by simply selecting positive responses over negative responses, and c) due to limited options, the participants were forced to select options that did not accurately represent their perspectives.

RECOMMENDATIONS FOR FUTURE RESEARCH

As this was a preliminary study, further studies should be conducted to conclude whether or not higher levels of EI are developed during the completion of criminal justice coursework or if it is an inherent difference in individuals that chose criminal justice as a major. If coursework taken while preparing for a career in criminal justice develops higher levels of EI as compared to individuals enrolled in other degree programs, then the EI of criminal justice students who are entering the program should be compared to the EI of criminal justice students who are graduating from the degree program. Longitudinal studies could also be conducted to assess the relationship between emotional intelligence and job performance. If relationships do exist, then perhaps an emotional intelligence assessment tool can be used by police departments as a pre-hire screen.

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Does Authenticity Predict Sense of Community of Turkish University Students?

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The aim of this study is to investigate the predictive role of authenticity on sense of community. The study was conducted with 402 graduate students (237 women, 165 men; M age= 20.6 yr.). Participants completed the Authenticity Scale and the Sense of Community Scale. Sense of community was correlated negatively with two sub-factors of authenticity: accepting external influence and self-alienation and positively with the authentic living factor of authenticity. In regression analysis, self-alienation and accepting external influence predicted negatively and authentic living predicted positively to sense of community, accounting for 14% of the variance collectively.

INTRODUCTION

To be able to behave according to feelings and thoughts and "to be oneself" has been perceived as a social norm in most of the cultures (Bialystok, 2009), which is called often as authenticity. Roots of the concept of the authenticity can be found in the recommendations of the ancient Greek philosophy; such as "Know thyself" and "To thine own self be true" (Harter, 2002). Similarly, from an Anatolian perspective a well-known Islamic scholar Mevlana Celaleddin Rumi, has emphasized the importance of to be an authentic individual by his the most eminent words; "Either appear as you are or be as you appear". Authenticity was defined by various authors in different ways such as "accordance between how someone presents himself and what he actually is" (Bialystok, 2009) and "being emotionally sincere, having self-attunement, and psychological depth, and treating candidly and without having hidden intentions" (Sheldon, 2009). Snyder and Lopez (2007) considered authenticity from a broader point view and described it as expressing one's true beliefs, values, and behaviors to oneself and others sincerely, treating faithfully, and taking responsibility for one's own emotions and actions (Peterson & Park, 2004).

Recently, Wood and his colleagues developed a three-dimensional authenticity model; Self-alienation, authentic living, and accepting external influence. The first dimension contains an inadequate sense of identity because of not knowing oneself accurately and a discrepancy between the conscious awareness and real experience. The second dimension involves being true to oneself and behaving consistent with one's own beliefs and values. And the third dimension, includes a belief that the individual must adjust to the expectations of others. These three components of authenticity have been experienced differently at the phenomenological level, while they interact mutually each other. For example individuals who don't tend to accept external influence are more likely to behave more authentically whereas people who accept external influence are more likely to be self-alienated. In Wood's model authentic living is an indicator of authenticity whereas self-alienation and accepting external influences show inauthenticity (Pinto, Maltby, Wood, & Day, 2012; Wood et al., 2008).

Research on authenticity generally demonstrated that it is a positive indicator of psychological health. In these studies it was found that authenticity is related positively to extraversion, conscientiousness, agreeableness, openness (Sheldon, Ryan, Rawsthorne, & Ilardi, 1997), self-esteem, subjective well-being, psychological well-being (Wood et al., 2008), and well-being at work (Ménard & Brunet, 2011). On the other hand authenticity was found negatively associated with psychological symptoms such as anxiety, stress, depression, and neuroticism (Sheldon et al., 1997; Wood et al., 2008).

Sense of Community

Sense of community was first conceptualized by Sarason (1974) to refer to the crucial role of the belonging to and being an integral part of a larger society. As it reflects interrelationships and membership with a greater range of people (Hombrados-Mendieta, Gomez-Jacinto, Dominguez-Fuentes, & Garcia-Leiva, 2013; Townley, Kloos, & Wright, 2009), Sarason suggested that sense of community is central to well-being. Later Mc Millan and Chavis (1986) have described sense of community as "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (p. 9). They proposed a four-dimensional sense of community model: Membership, influence, integration and fulfillment of needs, and shared emotional connection.

Membership indicates the feeling of belonging and identification with the group (which includes perception of shared boundaries, history and symbols; feeling of emotional safety and personal investment in the community). Influence represents the opportunity of individuals to participate to community life through their own contributions in mutual relationships (perceived effect that a person has over the decisions and actions of the community). Integration and fulfillment of needs places importance on common needs, goals, and beliefs among group members and refers to the benefits that people derive from their membership to a community. And shared emotional connection reflects the sharing of a common history and the bonds developed over time between group members (Albanesi, Cicognani, & Zani, 2007; Elvira, et al., 2008; Townley et al., 2013).

Sense of community is a catalyst for social involvement and participation in the community (Obst et al., 2002; Townley et al., 2009), is an indicative of social engagement and it has also been linked to social attachment, perceptions of belonging, social well-being, civic engagement, community connectedness (Sonn & Fisher, 1996), group membership (Albanesi et al., 2007), and companionship (Oh, Ozkaya, & LaRose, 2014). Studies proved that sense of community is related positively to psychological health indicators such as sense of efficacy, life satisfaction, happiness (Farrell & Coulombe, 2004), subjective well-being (Davidson & Cotter, 1991), social support (Li, Sun, He, & Chan, 2011), positive affect (Kenyon, Jessica, & Carter, 2011; Oh et al., 2014), and quality of life (Gattino, Piccoli, Fassio, & Rollero, 2013). On the contrary feelings of alienation, loneliness (Prezza & Pacilli, 2007), suicide (Farrell & Coulombe, 2004), depressive symptoms (Li et al., 2011), and negative effect (Oh et al., 2014) were inversely related to sense of community.

Present Study

Although research conducted with the authenticity is encouraging, to date, however, no empirical research has examined whether authenticity predicts sense of community. Therefore the goal of the present research is to do this. Authenticity is a basic human property which has important impacts both on psychological and social health. Since authentic people treat honestly, openly, and according to their innate feelings and intentions authenticity is accepted as a key characteristic of healthy functioning and psychological well-being (Harter, 2002; Wood et al., 2008). Also because authenticity provides the feeling of trust to the self and others it may facilitate sense of social self-efficacy and protects individual against social problems. This also may facilitate connection of the people with their community; therefore authenticity appears to enhance interpersonal well-being. In addition individuals who have higher levels of sense of community seem to have more positive thoughts and emotions and quality of life (Gattino et al., 2013). They are also less likely to have psychological symptoms and more likely to have a healthy social life. Moreover previous evidence suggests that both authenticity and sense of community are

strongly and negatively related to negative affect (Li et al., 2011; Oh et al., 2014; Sheldon et al., 1997; Wood et al., 2008) and positively related to positive affect (Chavis & Wandersman, 1990; Davidson & Cotter, 1991; Farrell & Coulombe, 2004; Wood et al., 2008). Therefore there may be a positive association between authenticity and sense of community. Based on the above relationships of authenticity and sense of community, in the current research the following hypothesis was proposed:

Hypothesis 1. Accepting external influence will be negatively associated with sense of community.
Hypothesis 2. Self-alienation will be negatively associated with sense of community.
Hypothesis 3. Authentic living will be positively associated with sense of community.

METHOD

Participants

Participants were 402 graduate students (237 women, 165 men). Of the participants, 87 were first-year students, 96 were second-year students, 106 were third-year students, and 113 were fourth-year student. Their ages ranged from 17 to 29 years old (M = 20.6, SD = 1.02). Convenience sampling was used for the selection of participants.

Measures

Authenticity Scale. Authenticity was measured using the Authenticity Scale (Wood et al., 2008). This scale is a 12-item self-report inventory. Items were rated on a 7-point scale with anchors 1: Does not describe me at all and 7: Describes me very well. The scale has three sub-dimensions: Accepting external influence (e.g., "Other people influence me greatly"), Self-alienating (e.g., "I don't know how I really feel inside"), and Authentic living (e.g., "I live in accordance with my values and beliefs"). A Turkish adaptation of this scale by Akın and Dönmezogullari (2010) with 528 Turkish university students (288 women, 242 men), has three factors explaining 57% of the total variance. Internal consistencies were .73, .72, and .75 and three-week test-retest reliability estimates were .89, .86, and .79 for the three factors, respectively.

Sense of Community Scale (Chiessi, Cicognani, & Sonn, 2010). The scale was used to measure sense of community and consists of 20 items 5-point Likert (0= not at all true to 4= completely true). Ratings were summed for a total score (possible range 0 to 80). Turkish adaptation of this scale had been done by Akın, Eroğlu, and Kocaman (2012). The goodness of fit index values of the model were x^2= 637.53, df= 161, RMSEA=.087, CFI=.91, IFI=.91, SRMR=.076. The overall internal consistency reliability coefficient of the scale was .87 and the three-week interval test-retest reliability coefficient was .84. The corrected item-total correlations of the scale ranged from .35 to .62.

Procedure

Permission for participation of students was obtained from related chief departments and students voluntarily participated in research. Completion of the scales was anonymous and there was a guarantee of confidentiality. The scales were administered to the students in groups in the classrooms. The measures were counterbalanced in administration. Prior to administration of measures, all participants were told about purposes of the study.

Statistical Analysis

In this research, multiple linear regression analysis and Pearson correlation coefficient were used to investigate the relationships between authenticity and sense of community. The variables which were entered in multiple regression analysis were measured by summing the items of each scale. These analyses were carried out via SPSS 11.5.

RESULTS

Descriptive Data and Correlations

Table 1 shows descriptive statistics and correlations among the variables. Preliminary correlation analysis showed that authentic living (r= .28) was related positively to sense of community. Self-alienation (r= -.13) and accepting external influence (r= -.18) were negatively associated with sense of community. Independent samples t tests indicated no statistically significant sex differences for scores on authenticity and sense of community.

TABLE 1
DESCRIPTIVE STATISTICS AND PEARSON CORRELATIONS AMONG VARIABLES

Variable	*M*	*SD*	1	2	3
1. Sense of community	44.83	12.27			
2. Accepting external influence	14.95	5.98	-.18**		
3. Self-alienation	12.80	5.78	-.13**	.41**	
4. Authentic living	22.44	5.84	.28**	-.12*	-.11*

*p<.05, **p<.01.

Multiple Regression Analysis

Before applying regression, assumptions of multiple regression were checked. The data were examined for normality by the Kolmogorov-Smirnov test. The Kolmogorov-Smirnov test indicated normality of distributions of test scores for all tests in the current study. Outliers are cases that have data values that are very different from the data values for the majority of cases in the data set. Outliers were investigated using Mahalanobis distance. A case is outlier if the probability associated with its D^2 is .001 or less (Tabachnick & Fidell, 2001). Based on this criterion, thirteen data were labeled as outliers and they were deleted. Multi-collinearity was checked by the variance inflation factors (VIF). All the VIF values were less than 10 (Tabachnick & Fidell, 2001), which indicated that there was no multi-collinearity.

Multiple regression analysis was performed in which the dependent variable was sense of community and the independent variables were dimensions of authenticity (Table 2). As many of those predictor variables were dependent on each other, forward stepwise procedure, which includes one new explanatory variable at each step, specifically the most associated with the dependent variable while being, at the same time, independent of the explanatory variables already included in the model. The criteria to include the variables from the regression model were: criterion probability-of-F-to enter <=.05.

Three stepwise multiple regression analysis has applied to assess which dimensions of authenticity were the best predictors of sense of community. Table 2 shows the results of multiple regression analysis where the independent variables were authenticity scores and the dependent variable was sense of community. Authentic living entered the equation first, accounting for 08% of the variance in predicting sense of community (R^2=.08, adjusted R^2=.08, F(1, 400)= 34.060, p<.01). Accepting external influence entered on the second step accounting for an additional 2% of the variance (R^2=.10, $\underline{\Delta}R^2$=.02, adjusted R^2=.10, F(2, 399)= 22.502, p<.01). Self-alienation entered on the third step accounting for an additional 4% of the variance (R^2=.14, $\underline{\Delta}R^2$=.04, adjusted R^2=.13, F(3, 398)= 20.926, p<.01). The standardized beta coefficients indicated the relative influence of the variables in last model with self-alienation (β= -.21, p<.01), accepting external influence (β= -.24, p<.01), and authentic living (β= .23, p<.01) all significantly influencing sense of community and accepting external influence was strongest predictor.

TABLE 2
SUMMARY OF STEPWISE MULTIPLE REGRESSION ANALYSIS FOR VARIABLE PREDICTING SENSE OF COMMUNITY

Variables	Unstandardized coefficients		Standardized Coefficents	t	R	R^2	F
	B	SE_B	β				
Step 1							
Authentic living	.59	.10	.28	5.84	.28	.08	34.060*
Step 2							
Authentic living	.55	.10	.26	5.47	.32	.10	22.502*
Accepting external influence	-.31	.10	-.15	3.19			
Step 3							
Authentic living	.48	.10	.23	4.81			
Accepting external influence	-.50	.11	-.24	-4.66	.37	.14	20.926*
Self-alienation	-.44	.11	-.21	-4.01			

*p<.001

DISCUSSION

The aim of the present study was to investigate the predictive role of authenticity on sense of community. To my knowledge, this is the first study investigating these relationships. As predicted, results demonstrated that sense of community related to accepting external influence and self-alienation negatively and to authentic living positively. In interpreting the results of the present findings, several plausible explanations exist. First of all these findings are in line with the research that has shown that authenticity is closely associated with the indices of social adjustment such extraversion, conscientiousness, agreeableness, and openness (Sheldon et al., 1997). Thus authenticity may increase the feeling of sense of community. Second since people with sense of community pay attention to well-being rather than failure and helplessness behaviors, they are more likely to have higher level of social attachment and social well-being (Sonn & Fisher, 1996), life satisfaction (Farrell & Coulombe, 2004), and quality of life (Gattino et al., 2013) which may ultimately provide a sense of extraversion that people experience when they are authentic. Therefore authenticity and sense of community may share the same properties in nature and people who high in sense of community can behave more authentic.

This study has some limitations. Firstly, it was correlational and based on a convenience sample. Secondly, the present sample's results are limited to high school students so generality is restricted and more population-representative samples need to be used in future studies to examine the relationships between authenticity and sense of community. Also explicit investigation of mediating or latent variables is important.

Consequently, the present research provides important information about the predictors of sense of community. The implication is that tendency to accept external influence and self-alienation may indicate a risk for low sense of community. Nonetheless it is important to note that scientific research on authenticity is still in its nascent phases and more research will need to be done before any implications can be drawn. Also there are enough positive indicators to suggest that more research on authenticity would be a worthwhile.

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