THE IMPACT OF LEARNING STYLES ON ACADEMIC ACHIEVEMENT IN WEB-BASED PRINCIPLES OF ACCOUNTING COURSES

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ABSTRACT

This study investigates university-level students enrolled in Web-based Principles of Accounting I classes, with a focus on student learning style as defined by Dunn and Dunn's Learning Style Inventory. The results of this study may help administrators better understand the online learning experience by providing more insight into academic success in Web-based accounting classes according to student learning style preferences. Results will also offer professors insights into helping students attain their learning goals through appropriate course design. Finally, students will be able to assess their personal academic success capability in the online learning environment.

BACKGROUND

Educational research is laden with studies related to learning styles. Learning style is used in education to describe various constructs that run the gamut from instructional preferences to cognitive styles (Bahar, 2009). Research has revealed that students' approaches to learning influence academic performance (Tiwari, Chan, Wong, Wong, Chui, Wong, & Patil, 2006; Zeegers, 2001), particularly in online education (Chen & Toh, 2005; Garland & Martin, 2005; Lu, Jia, Gong, & Clark, 2007). For this reason, it is imperative to gain a better understanding of the characteristics of online students and to integrate this understanding into designing student-centered collaborative learning environments that foster successful learning experiences in online education (Bahar, 2009).

The need to acquaint one's self with learning styles is also critical in the area of accounting. Specifically, in the area of accounting education, student enrollment in the accounting major has been declining. This decline has the potential to adversely impact undergraduate business programs, as well as the viability of accounting programs (Albrecht & Sack, 2000; Russell, Kulesza, Albrecht, & Sack, 2000). The 150-hour requirement that calls for accounting majors to have taken 150 hours of college credit in order to sit for the CPA exam, new accreditation standards, and the call from academic and professional accounting groups for a curriculum that better aligns education and practice have together resulted in making an already rigorous major even more challenging (Nelson, Bailey, & Nelson, 1998).

These challenges go beyond affecting the accounting major; all business majors must take introductory accounting courses in order to complete the BSBA requirements. To combat this decline, accounting faculty must implement strategies to keep the accounting major competitive? Students would be better equipped to handle the rigors associated with the accounting major if faculty members integrated learning style elements while designing their course materials.

PURPOSE OF STUDY

Current research concerning the relationship between learning style and academic achievement comprises many studies that discuss the influence of learning style in the online learning environment (Clow, 1999; Federico, 2000; Larsen, 1992; Sein & Robey, 1991; Terrell, 2002; Wang, Wang, Wang, & Huang, 2006; Webster & Hackley, 1997). The literature is silent,

however, in specifically discussing how student learning style is related to academic success in the area of accounting. The current study will further the learning style and academic achievement research and aid in instructional design by examining the relationship between student learning style and academic achievement in accounting through the online learning environment. Specifically, the question of what is the impact of learning style elements on academic achievement in Principles of Accounting I courses offered in an online learning environment is the underlying question.

Reviewing the literature on the subject of online education has indicated "a need to shift from investigating different delivery formats to a more sophisticated understanding of the relationships between the characteristics of students, the design of the delivery system and the social context in which students learn" (Ahern, Shaw, & Liu, 2006, p. 99). Online course instructors use multiple tools in creating courses that integrate numerous types of instructional strategies. These varying strategies are meant to appeal to a variety of learning styles and preferences. The hope of this instructional design is to provide all learners with a course that appeals to the way in which the student learns.

However, research suggests that online learning environments may be more advantageous for some learners than for others (Arbaugh & Stelzer, 2003). Generally, universities and colleges provide standardized teaching materials to all students. This material tends to benefit students whose learning style and background knowledge fit well within the teaching material (Lu & Chiou, 2010). Although open issues exist related to learning styles and learning style models, many educational theorists and educational researchers consider learning style elements to be important factors in the learning process and agree that these elements should be incorporated into teaching materials (Graf, Kinshuk, & Liu 2009). Supportive educational theories have been described by Coffield, Moseley, Hall, and Eccelstone (2004), and supportive results of this theory are provided by Bajraktarevic, Hall, and Fullick (2003) and Graf, Kinshuk, and Liu (2009).

Students' individual learning styles should therefore be considered when designing courses in the online learning environment. Further, differences in learning styles could possibly explain students' academic success, or lack thereof, when taking courses in the online learning environment. This raises the question, what is a learning style and how can it be identified and used in the process of online course development?

Learning Style Defined

Confucius, one of China's best-known teachers, believed that students should be taught according to their individual aptitudes and personal characteristics. Improving the effectiveness of instruction requires the analyzing and matching of course instruction with student's favored learning style elements (Lu & Chiou, 2010).

This study uses Dunn and Dunn's (1993) definition of learning style as being the approach most used by individuals to concentrate on, process, internalize, and retain new and difficult information. More specifically, these authors have defined learning style as being an individual's reaction to 20 elements, which can be characterized into five major groups: the

classroom environment, emotionality, sociological preferences, physiological strengths, and processing inclinations.

An accurate measure of an individual's learning style cannot be assessed through mere observation (Beaty, 1986). Researchers must use measures that are both valid and reliable to assess learning styles. Much like for the definitions of learning style, there are numerous models that attempt to measure and classify individual learning styles. During the 1970s, Dunn, Dunn, and Price (1975, 1978, 1979), Canfield and Lafferty (1976), Hunt (1979), Kolb (1971, 1984), Ramirez and Castaneda (1974), and Schmeck, Ribich, and Ramanaiah (1977) all proposed models to measure learning style. Many more models have been introduced with varying levels of validity and reliability.

In Hawk and Shaw's (2007) review of six of the most well-known instruments (Kolb, 1971; Gregorc, 1979, 1985; Gregorc & Ward, 1977; Felder-Silverman, 1988; Fleming, 2001; Dunn & Dunn, 1998; Entwistle & Tait, 1995), they found that a composite of these models would yield 10 measurable learning style dimensions. Dunn and Dunn's PEPS was the only model that covered all these dimensions. Hawk and Shaw (2007) also found that the PEPS had solid support for instrument validity and reliability.

Theoretical Overview of the PEPS

The PEPS has its roots in cognitive-style theory and brain-lateralization theory. Cognitive style theory states that all individuals process information differently based on both inherent and learned traits (Dunn & Milgram, 1993). Research conducted prior to Dunn's was focused on cognitive variables on a continuum scale, such as field dependence/independence, global/analytic, simultaneous/successive, and/or right/left preference processing. Dunn and Dunn extended cognitive-style theory by looking for possible relationships among cognitive dimensions and students' environmental, sociological, and physiological characteristics. Results suggested that relationships existed among certain variables, as demonstrated by variables clustering together. As a result of these findings, brain-lateralization theory evolved, based largely on the works of Paul Broca (Finger, 2004).

Brain-lateralization theory proposes that the two hemispheres of the human brain have very different functions (Dunn, Bruno, Sklar, & Beaudry, 1990; Dunn, Cavanaugh, Eberle, & Zenhausern, 1982). The left hemisphere is used for verbal, sequential abilities, and the right hemisphere is used for emotions and spatial, holistic processing (Kirby & Das, 1977; Luria, 1973). This finding, although it has been challenged, indicates that the way in which people concentrate, process, and remember new and difficult information happens under different conditions (Dunn, Beaudry, & Klavas, 1989).

Conceptual Overview

The PEPS, which grew out of cognitive-style theory and brain-lateralization theory, is grounded in the idea that each individual has a unique set of biological and developmental learning characteristics (Price, 1996). The productivity theory grounds itself in several basic principles. These philosophical assumptions are the following:

- Most individuals are capable of learning.
- Instructional environments, resources, and approaches respond to diverse learning style strengths.
- Everyone has strengths, but different people have very different strengths.
- Instructional preferences of individuals exist and can be measured reliably (Burke, 1999; Guastello, 2000).
- Students behave better in style-responsive environments (Oberer, 1999).
- Teachers can integrate learning styles into their instruction (Dunn & DeBello, 1999).
- New and difficult information can be better understood if a student capitalizes on his/her learning style strengths (Roberts, 1999; Dunn & Milgram, 1993).

Dunn, Dunn, and Price's research in learning styles has had the strongest impact on the literature concerning learning styles; researchers at more than 120 institutions of higher education have reported on the model (Boyle, 2005). The PEPS does not measure "underlying psychological motivation, value systems, or the quality of attitudes" (Price, 1996). Rather, the survey focuses on the patterns that occur during the highest levels of productivity. Consequently, the PEPS focus is on *how* adults prefer to learn or produce, rather than *why*.

Learning Style and Academic Achievement

Previous studies have shown positive results concerning the relationship between various learning style elements and student academic success. Multiple studies spanning across disciplines have indicated that student performance is statistically significantly higher when learning style is taken into consideration. For example, Cafferty's (1980) study of a group of 1,689 teacher–student pairs, which were paired together based on learning style preference, found that the greater the match between the student's and teacher's learning styles, the higher the student's grade point average (Cafferty, 1980). The study also indicated that the reverse relationship also existed, meaning that when a mismatch occurred, the student's grade point average was lower than when matched correctly.

Copenhaver's 1979 study of 76 high school students found a large range of learning styles, as well as evidence that students demonstrated significantly more positive attitudes when teacher–student learning style matched. Furthermore, the same study demonstrated that learning styles remained unchanged regardless of subject area studied, meaning that learning styles appeared to be constant across disciplines (Copenhaver, 1979).

In 1970, Domino administered the PEPS to 100 college students, spanning multiple class levels, at a public university. Domino found that students who were taught using their preferred learning style scored higher on tests, fact knowledge, attitude, and efficiency compared to students who were not taught using their preferred learning style (Domino, 1970). In earlier research with a sample of 72 college students, Farr (1971) had also found that students were advantaged when being taught, as well as tested, using their preferred learning style.

Pizzo (1981) applied the use of learning style preferences to 64 fourth graders in the discipline of reading. Results indicated that, at the .01 level, matched students had significantly higher reading scores and attitude scores.

Abar and Loken (2010) sampled 205 high school students to study the multi-dimensional construct of self-regulated learning (SRL). Using latent profile analysis on self-reports of seven aspects of SRL—meta-cognition, effort management, time and environment, academic efficacy, test anxiety, self-handicapping, and academic skepticism—they found that students who were highly self-regulated reported the highest level of information mastery. The conclusion drawn was that SRL aspects, which can be likened to learning style elements, influenced academic achievement.

Several studies have addressed motivation, and specifically its relationship to academic achievement. Studies show that motivation is a key determinant of academic performance (Green, Nelson, Martin, & Marsh, 2006; Linnenbrink & Pintrich, 2002). Relationships between learning style and academic motivation were examined using 451 first-year college students. The results of multiple regressions indicated that students who lacked the learning style element of Motivation tended to be careless and consequently were lower in academic achievement (Clark & Schroth, 2010).

Learning Style and Academic Achievement in the Online Learning Environment

The online learning environment adds a layer of complexity when distinguishing what impact learning style elements have on student academic achievement. Students are forced into the role of active participant, rather than the passive spectator role that some students assume in traditional classrooms (Gemeinhardt, 2002). This shift in role affects a student's ability to be academically successful in online courses compared to traditional classroom courses. For students to be successful, therefore, learning style elements must be considered in designing online courses (Carter, 2002). Learning style preference patterns from traditional classroom studies cannot be assumed to apply to online course offerings.

Initial research regarding the impact of learning style elements on achievement in the online learning environment found a significant correlation between student learning styles and achievement (Whyte, Karolick, Nielsen, Elder, & Hawley, 1995). Terrell (2005) found in his research that students with particular learning styles and preferences were more inclined to fail in an online learning environment. While examining the learning styles and attrition rates in doctoral students enrolled in a distance education program, he found that students with a specific learning type had a doubled rate for degree completion (Terrall, 2005). The difference in rate was attributed to the goodness-of-fit between the online course and students' learning styles. This indicates that a mismatch between distance education instruction and learning style can have a very real negative consequence for students. More specifically, Ford and Chen (2000) found that learning styles were valid predictors for successful student interaction in the online environment.

Learning Style and Academic Achievement in the Accounting Discipline
Some studies have focused on whether learning style elements are linked differently to academic disciplines. In their study of 105 college students, Jones, Reichard, and Mokhtari (2003) looked at the preferences of approaches to learning in English, mathematics, science, and social studies; they found that students significantly varied their learning approaches depending

on the discipline studied. Biggs (1987) has also demonstrated differing learning approaches when comparing students enrolled in art and science courses. While looking at the learning styles of 248 students enrolled in either business or psychology courses, Smith and Miller (2005) found significant differences between disciplines. Also, Watkins and Hattie (1981) found an interaction effect between discipline area and learning style elements when studying Australian university students. These results suggest that learning style may be discipline specific. Consequently, learning style elements must be studied within discipline.

Technology is fast becoming a favored component of the delivery system for business courses in both online courses and traditional face-to-face courses (Dillon, 2000). Virtual learning environments can enhance the traditional classroom course, as well as change the delivery of knowledge in online courses (Salmon, 2000). In fact, business programs are viewed as conspicuous if they lack simulation games, Internet-based assignments and exams, and the use of Internet chat rooms to communicate across distances (Gorha & Mohan, 2010). Expanding course technologies have been met with both disappointment and acceptance from business students' use of the resources.

Research has yet to distinguish the impact that the virtual learning environment has on academic achievement in business courses (DuFrene, Lehman, Kellermanns, & Pearson, 2009). More specific to the current study, research on the impacts of learning style elements on academic achievement in the online environment remains silent in the area of accounting education.

RESEARCH DESIGN AND PROCEDURES

Quantitative measures were used to determine the impact of learning style on student academic achievement. The sample for this study included students in ACT2291 Principles of Accounting I, which is offered during the fourth academic quarter at Troy University. The study used the Productivity Environmental Preference Survey (PEPS) to assess and categorize student learning style preference. The CengageNOW grade book within the Blackboard academic course shell, which is linked to the Troy University website, was used to derive student academic success. The source of information extracted from the grade book to measure academic success was final overall course grade. Descriptive and analytic statistics were used to analyze the data.

Instrumentation

The results of the PEPS provide each individual with a Learning Style Inventory Profile. Each profile includes the individual's identification number, gender, group identification, date scored, raw scores, and standard scores (Price, 1996). The raw score is the sum of an individual's responses to each of the 20 items (elements) within an area (Price, 1996). The standard score ranges from 20 to 80, with a mean of 50 and a standard deviation of 10 (Price, 1996). The standard score is based on a random sample of 1,000 subjects from the national database of people who have taken the PEPS.

The PEPS uses multiple attributes to classify an individual's learning style, as opposed to other learning preference models that measure learning style based on bipolar continuum

variables (DeBello, 1990; Dunn, Honigsfeld, Doolan, Bostrom, Russo, Schiering, Suh, & Tenedero, 2009). The learning style variables used in varying models do not affect each learner equally. Some learners are influenced by between one and six variables, but the majority are influenced by between six and 14 (Dunn et al., 2009). Consequently, if a two-variable scale is used to classify student learning style, the variables that affect a particular individual might not be one of the two variables administered. The resultant learner classification would be inaccurate.

The PEPS was developed as the result of identifying variables that describe the ways in which individuals prefer to learn and work (Price, 1996). "Developed through content and factor analysis, the LSI is a comprehensive approach to the identification of an individual's learning style and has established impressive reliability and validity" (Kirby, 1979). After factor and content analyses were complete, the results were analyzed and changes were made to the PEPS. The revised model was then administered to a non-random sample of 589 adults (Price, 1996). The sample spanned multiple states and academic and industrial settings. The new results were then factor analyzed using principal components with unrelated factors as the basis for the analysis. This analysis yielded 31 factors that had eigenvalues greater than 1.00. These factors explained 65% of the cumulative proportion of total variance on the PEPS (Price, 1996).

Sources of Data

Surveys were administered to consenting subjects in all ACT2291: Principles of Accounting I courses being taught online at Troy University. The survey was used to identify each student's preferred learning style elements, and students' standard scores on learning style elements were taken from individual student PEPS profiles. Standard score was used as the basis for the discriminant analysis.

Students were offered a nominal amount of extra credit that was applied according to instructor discretion in each section. Extra credit was given to students in the following ways: (a) points towards the discussion portion of the grade, (b) points factored into the homework portion of the grade, and (c) 5 points added to the overall grade of 1,000 points. In all cases, the extra credit was a minimal amount of points. The points derived from this extra credit comprised approximately 1% or less of the final grade. The extra credit was intended to motivate students in each section to complete the PEPS, thereby increasing the return rate within the courses, as opposed to having a significant role in student grade determination.

While information was being collected from students to determine student learning style, the measure of academic achievement was taken from the online grade book in CengageNOW in the Blackboard course shell. Thirteen assignment scores, five quiz scores, four discussion post scores, three exam scores, and one final exam score submitted by students throughout the 9-week course were collected. Due to standardization procedures at Troy University Ecampus, students in all course sections complete and submit identical homework. Also, final exam questions are selected from an ACT2291 pool of questions that must be used in final exam creation.

Standardization calls for specific weighting of each grade category in determining final grade: 25% for the final exam, 5% for participation, 45% for the average of exams 1–3, 15% for

the average of all assignments, and 10% for the average of all quizzes. This weighted average per student was used as the measure of academic achievement. Grade categorizations were as follows: 100–90 percentage points equal a letter grade of A, 89–80 percentage points equal a letter grade of B, 79–70 percentage points equal a letter grade of C, 69–60 percentage points equal a letter grade of D, and 59–0 percentage points equal a letter grade of F.

After final grades were determined, academic achievement was defined on an ordinal scale. Grades of A, B, and C were included in the category of successful academic achievement and were coded as 1, whereas grades of D and E were included in the category of unsuccessful academic achievement and were coded as 2.

Discriminant analysis was conducted to determine the impact of learning style elements on academic success. Descriptive discriminant analysis allows for the identification of elements that best discriminate students from one another in the groups of successful academic achievement and unsuccessful academic achievement. By using discriminant analysis, the groups for academic achievement must be mutually exclusive and collectively exhaustive. The groups must also be well defined. The groups of successful academic achievement and unsuccessful academic achievement were partitioned using the natural and easily identifiable gaps at the points of percentage scores of the grade-point scale. The groups were defined before data collection took place and it is believed that the 20 learning style elements, and in particular Motivation, Alone/Peer, Authority, and Visual, provide a complete and accurate description of the variable academic achievement.

The analysis began by testing whether the learning style elements reveal statistically significant differences between groups. If the difference was found using Wilks's lambda, canonical analysis would be conducted. Canonical discriminant analysis identifies the linear combinations of PEPS elements that contribute maximally to group separation. The ordering of the 20 elements for data analysis took place using a forward stepwise discriminant analysis variable selection. The forward stepwise technique began with the inclusion of zero variables. Variables were then added and deleted based on the p-value of the F-statistic that determines if including or deleting more variables will add to the significance in separating the academic achievement groups.

The analysis transformed the 20 elements into one or more new variables that were ordered by their contribution to group separation. This technique can be viewed as a dimension-reduction technique (Silva & Stam, 2000). The discriminant power of all the canonical variables was tested using Wilks's lambda. A second Wilks's lambda was used to test if any of the remaining elements contribute to the discriminatory power. This process continued until all significant elements were identified. Significant elements were those canonical variables that have large enough F values to be kept in the analysis, with the predetermined type I alpha error rate for hypothesis testing of 0.10. A loading matrix is presented in the results section.

The total sample consisted of 32 active students from section one, 16 active students from section two, 34 active students from section three, and 34 active students in section four. All of the 116 students were offered the opportunity to participate in the research study through the use of email and announcement/post communication tools. Students who did not initially fill out the

PEPS and send it back to the principal investigator were contacted by email an additional two times, in order to promote participation and thereby increase response rate. During the duration of the term, 90 students completed the PEPS, which corresponds to a 78% rate of return.

Table 8 shows the overall response rate and the per-section response rates. Although 90 students were considered active during term 4, the final sample consisted of 85 active students. These 85 active students received a letter grade in the course and completed the PEPS survey. The difference in active students as compared to the final sample of students was a consequence of two students dropping the course before the end of the term and three students filling out the incorrect Productivity Environmental Preferences Survey (they chose the PEPS in a language other than English).

Table 8

ACT2291 Response Rates by Section

Section	Active	PEPS	Response Rate (%)
1	32	30	.94
2	16	14	.88
3	34	20	.59
4	34	26	.76
Total	116	90	.78

SUMMARY OF FINDINGS AND RESULTS

The research shows that specific learning style elements can discriminate between successful and unsuccessful academic achievement in online ACT2291: Principles of Accounting courses. There was a statistically significant relationship between learning style elements and successful academic achievement in online principles of accounting courses. There was a relationship between learning style elements and academic achievement (Table 16).This is confirmed by the initial MANOVA, which resulted in significance, as seen in Table 16.The sample of ACT2291 (introduction to accounting) students supported the hypothesis that a relationship exists between student learning style element scores and academic achievement. This finding supported past research that found a significant correlation between student learning styles and achievement (Whyte et al., 1995). ACT students with varying learning styles had differing degrees of academic success in the online learning environment, much like the doctoral students who participated in Terrall's 2005 study. This sample supported the idea that the difference in success rate can be attributed to the fit between the online course format and the students' learning styles. A mismatch of learning style and online education instruction resulted in a negative impact on the academic success of these accounting students.

Table 16

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Wilks's Lambda

Step	No. of Variables	Wilks's Lambda	df1	df2	df3	Exact F Statistic	df1	df2	Sig.
1	1	.927	1	1	83	6.507	1	83.000	.013
2	2	.861	2	1	83	6.600	2	82.000	.002

The population of online students in these ACT courses will likely also demonstrate the above-noted significant difference. Students will have differing levels of learning style elements that will contribute to their success or failure when taking an accounting course in the online learning environment. As more and more students enter the population of online accounting learners, greater attention must be paid to what learning style elements are manifest in each enrolled student, in order to promote academic achievement in principles of accounting courses.

It was noted that the learning style element of Auditory (element 12, oral directions and instructions versus written information) significantly discriminated between successful and unsuccessful academic achievement. This verity is evidenced by the canonical discriminant analysis. Students in the sample with a score of 60 or more for the learning style element of Auditory tended to be less successful in academic achievement. These students learn new or difficult material more successfully in environments that place heavy emphasis on auditory learning, using, for example, recordings, radio, television, precise oral directions in assignments, or lectures. Students who favor lectures, as opposed to reading materials, related negatively to successful academic achievement.

Auditory infers that a student is more able to learn when auditory aids are incorporated in the learning activities. In other words, if a student learns best by listening to lectures, learning in an online environment will be challenging. This information can be extrapolated to the online learning community as a whole, where lectures are not the favored mode of communication or of presentation of course materials. This is true in the field of accounting as well. Students are often told to look at financial statements and read the information contained in the annual report's notes in order to derive understanding of the accounting process. Reading financial statements is the key to success, not only in the study of accounting but also in the field of business. Listening to someone explain a balance sheet is not nearly as helpful as studying it oneself.

The auditory preference appears to be of even greater importance at the principles level of accounting. Oftentimes, a student's first exposure to accounting is in the introductory principles of accounting course, where they must identify financial statements and read them for quite possibly the first time. This is true for both online learning and the traditional classroom environment. Students who learn more through listening will be disadvantaged in online accounting environments when striving for successful academic achievement.

Surprisingly, it was also found that students reporting the element of *Motivation* as 60 or above, using the PEPS, did not have significantly higher academic achievement scores, as measured by final course grade. Past research has suggested that motivation is a key determinant in academic performance (Green, Nelson, Martin, & Marsh, 2006; Linnenbrink & Pintrich, 2002). Clark and Schroth's (2010) findings that students who lacked the learning style element of Motivation tended to be lower in academic achievement were not supported in this sample of online accounting students. The online learning environment is often thought of as an environment that provides freedom to students. Students must have a high level of accountability in online courses in order to complete the work successfully due to the independent nature of the environment. This did not hold true for the current sample, as Motivation scores did not discriminate between successful and unsuccessful academic achieving students.

RECOMMENDATIONS

Recommendations for Practice

Research from this study may assist accounting educators in identifying learning style elements that lead to academic success in the online learning environment. Data from this research indicate that specific learning style elements are statistically significant for academic success, but it is not evident as to why these learning style elements are significant. Prior research also suggests that learning style elements influence academic achievement (Abar & Loken, 2010). This research therefore adds to the growing body of evidence that students are advantaged when they are taught and tested using their preferred learning style (Farr, 1971).

This foundation of knowledge establishing the importance of learning style elements and their influence on successful academic achievement should lead to increased implementation of learning style element awareness for instructors as well as students in the online environment. As previous research has shown, students who are aware of their own strengths and weaknesses in the learning environment are more able to successfully progress through online courses (Lu & Chiou, 2010).

As students become more aware of their own learning styles, the dynamic and unique set of characteristics presented by the online learning environment must be studied in greater detail. An awareness of the resources and tools available in the online environment should lead to a teaching modality that offers the most benefit to modern online learners.

Online tools such as Blackboard, Canvas, D2L, WebCT, and Live Classroom are changing the face of the classroom. As courses become live online, instructors should continue to actively evaluate what these new course tools can do to aid in teaching accounting concepts. Tools that specifically contribute to fostering the learning element of Visual may be especially significant in contributing to successful academic achievement.

Recommendations for Future Research

Past research does not specifically address the impact of the online learning environment on academic achievement within the discipline of business (DuFrene et al., 2009), and learning style studies within the online principles of accounting population were nonexistent. The current study has begun to look at the relationship between academic achievement and learning style elements within this important population. The data from this study support the leading hypothesis. The focus was to investigate whether learning style elements could statistically discriminate between successful and unsuccessful academic achievement in the online learning environment within principles of accounting courses. Future research should address why student auditory preferences discriminate significantly between successful and unsuccessful academic achievement. It was postulated that students who have a high need for auditory-type learning suffer in online learning environments because of the extreme absence of auditory material. This is a topic that should be investigated further. This research did not find that Motivation discriminated between successful and unsuccessful academic achievement. This finding is not in line with previous research or with the researcher's own conjecture as to student motivation. This raises questions that could be addressed in future research.

One of the contributions of this study was the examination of the influence of learning style elements in the specific learning environment of principles of accounting courses in the online environment; prior research has focused on various disciplines. Research has suggested that varying learning style elements are found to have influence in different disciplines. This study is unique as the design specifically focused on a principles of accounting course. Concepts from this research add to the data in support of specific learning style attributes being used in the particular discipline of accounting.

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