THE ASSOCIATION BETWEEN STUDENTS' STYLE OF LEARNING PREFERENCES, SOCIAL PRESENCE, COLLABORATIVE LEARNING AND LEARNING OUTCOMES

Clement Chen, University of Michigan-Flint
Keith T. Jones, University of North Alabama
Shawn Xu, University of Wyoming

ABSTRACT

Differences in styles of learning have become important considerations at all levels of education over the last several years. Examining college students' preferred style of learning is useful for course design and effective instructional methods. Using the Felder-Silverman Index of Learning Styles (ILS), we investigate how students' styles of learning preferences differ in accounting courses delivered in traditional and online formats. We further investigate the interactions between students' learning style preferences and collaborative learning with regard to perceived learning effectiveness and satisfaction. The results indicate some differences between genders and between accounting vs. nonaccounting majors. For instance, females lean more toward a verbal and sequential learning approach than do males, who lean more toward a visual approach. Perhaps consistent with the reputation of accounting as "rule-based," accounting majors are somewhat more likely than are nonaccounting majors in general to prefer a sequential learning approach, and they are less likely to prefer a more "global" look at a problem. We also find that the dimensions of learning styles interact with the extent of collaborative learning in affecting the students learning outcomes. The findings have implications for both full-time educators and practitioners because firms also provide considerable amounts of continuing education for their professionals in either a classroom or online setting.

Keywords: Styles of learning, learning outcomes, collaborative learning, social presence, accounting education, Felder-Silverman Index of Learning Styles

INTRODUCTION

A number of research studies have examined the various contextual and individual factors that can influence students' learning outcomes, especially given the ever-growing proliferation of online education. Differences in learning styles have come to the forefront at all levels of education over the last several years and have led many to call for teachers to respect diversity among learners in course design (Hou, 2015; Kumar, Smriti, Pratap, & Krishnee, 2012) and even in leadership development (Silverman, 2015). Given the recognized importance of the topic, others have called for researchers to examine learning styles more closely in different learning contexts and institutions (Halili, Naimie, Sira, AhmedAbuzaid & Leng, 2015).

Another feature often regarded as important in contemporary education is the extent to which a course offers a collaborative learning environment, which refers to a context that is conducive to interactions among learners for knowledge

acquisition and accomplishing tasks (Dewiyanti, Brand-Gruwel, Jochems, & Broers, 2007). Features such as the nature of the course, the delivery method (online vs. face-to-face), and the particular approach by the instructor may affect whether the environment lends itself to collaborative learning and, to the extent that a course provides such an environment, student perceptions and/or learning outcomes may be affected. For instance, studies have found that the extent of social presence in online environments can influence students' learning (Delfino & Manca, 2007; Joyce & Brown, 2011; So & Brush, 2008). Given trends such as the emphasis on student retention at many schools, it is potentially instructive to examine the interplay between learning styles and environments that may or may not be compatible with those styles (Pearson, 2012).

Many of the aforementioned studies in learning styles have been conducted using various measures that have offered mixed results and have focused on disciplines quite different from accounting. This leads to the question of whether such differences extend to such technical and quantitative academic disciplines as accounting. One study finds, for instance, that students in an introductory managerial accounting class had a learning style profile similar to that of engineering students (Henry, 2004). Further, few studies have examined how students' learning styles interact with their learning environment (e.g., collaborative learning), leading to different course outcomes in accounting education. Using the Felder-Silverman Index of Learning Styles (ILS), the current study seeks to examine whether there are differences in learning style preferences between genders, between delivery methods, and between accounting and nonaccounting majors across four different learning style dimensions. We further examine whether the four dimensions are associated with learning effectiveness and satisfaction, and whether the dimensions interact with the level of social presence and collaborative learning perceived by students in the course.

Among the 166 students we surveyed in six different classes, we find that male students tend to be more visual than verbal. Females are more likely to be sequential learners while males are more balanced between sequential and global. To our surprise, we do not find significant learning style differences between traditional-age students versus adult students, except that adult students are slightly more likely to be global learners. With respect to accounting majors versus nonaccounting majors, the most marked differences are in the sensing vs. intuitive and visual vs. verbal dimensions. In particular, accounting majors are more sensing. In addition, they are less likely to be visual learners. Interestingly, we do not find major learning style differences between students in face-to-face courses versus online courses. The latter finding was surprising because one might expect students to select online or traditional education at least partly based on their level of comfort with a particular method of delivery. The results underscore the notion that, controlling for other potentially important variables, both collaborative learning and learning style play an important role in students' learning experience and their course satisfaction. However, the results also suggest that two of the learning style dimensions are relatively more important, while the other two are partially subsumed in the two that rise to the surface in this study. The results of our study provide implications to instructional designers who can develop and delivery course content in ways students with different styles of learning can enhance their learning.

The next section discusses the possibility for demographic differences in learning styles, followed by a discussion of the literature on social presence and collaborative learning and the possibility of interactive effects. Finally, we present our methods and measures, the statistical results, and a discussion of the results.

LITERATURE REVIEW

Learning Styles

Research shows that learning styles, and perhaps variations in courses that tap into the various styles, may have an impact on such course outcomes as satisfaction and performance, and that different generations may indeed have different tendencies. As an example of the latter, Bush and Walsh (2014) found that millennials in a financial accounting principles course performed better when required to do daily assessments than when doing homework assignments. Using two learning style measures, Islam, Rahman, & Boland, (2011) found that undergraduate students in accounting

were more satisfied and performed better when they adopted a variety of learning styles, suggesting that student flexibility matters.

In 1988, Richard Felder and Linda Silverman formulated the Felder-Silverman Index of Learning Styles (ILS). They break down learning styles into four different dimensions, each with extremes at either end. Many are likely to fall somewhere within the extremes, while others have strong preferences on one end or the other. These four dimensions are summarized below.

1. *Sensing* vs. *Intuitive* —Those who have favor a "sensing" learning style prefer concrete and practical examples and are more comfortable when provided with facts and procedures. Those on the "intuitive" extreme would be comfortable with conceptual and theoretical analyses where issues are less well-defined.

2. *Visual* vs. *Verbal* —Visual learners prefer visual aids such as flowcharts to provide a "picture" of the concept being presented, while verbal learners prefer words, whether written or spoken.

3. *Active* vs. *Reflective* —Active learners prefer "hands on" examples that allow them to work through something themselves. They are likely to prefer working in groups, while reflective learners prefer to work alone or with a very small, but familiar, group. Reflective learners prefer to think through a new concept rather than actively trying something first.

4. *Sequential* vs. *global* —Sequential learners prefer to think through a problem in a linear, step-by-step fashion. Global learners, on the other hand, prefer to step back first and look at the "big picture" before proceeding through the detailed steps.

We use the ILS scale because it is a perceptually based theory that has been extensively used in research on styles of learning (Salkind & Rasmussen, 2008). This type of theory differs from a cognitive processing model in that the latter attempts to explain how information is processed rather than what processing methods are preferred by students. The ILS scale has been used for studying the learning preferences of various groups of students, including language arts students, business students, and engineering students (Bacon, 2004; Felder & Spurling, 2005). Although there are a number of other models, Shuib and Azizan (2015) note that the ILS is often used in technology-based learning, though it was designed for traditional learning. Our study uses online vs. traditional learning as one of our bases of comparison, among others. Finally, Shuib and Azizan (2015, based on Graf, Kinshuk, & Liu, 2009) note that the ILS models learning styles as "tendencies" (p. 111) rather than forcing respondents into a particular category. The construct and discriminant validity of the model have been found to be strong (Felder & Spurlin, 2005; Litzinger, Lee, Wise, & Felder, 2007; Platsidou & Metallidou, 2009).

What Learning Styles are Preferred?

We first present descriptive information on whether learning styles differ based on certain demographic breakdowns. Specifically, it is possible that males and females will differ in the way they prefer to initiate and carry out the learning process (Arroyo, Burleson, Tai, Muldner, & Woolf, 2013; Nieminen, Savinainen, & Viiri, 2013). Halili et al. (2015), for example, find female students to favor more participative and collaborative learning styles and males to be more "avoidant" learners. Somewhat similarly, Nuzhat, Salem, Al Hamdan, and Ashour (2013) find that female medical students have more diverse learning style preferences than do their male counterparts. On the other hand, using the same model as that in the current study, Shuib and Azizan (2015) find no significant gender differences in Malaysian students studying English as a Second Language. Inal, Buyukyavuz, and Tekin (2015), however, find that Turkish students are mostly group-oriented and prefer interacting with other students during the learning process, which suggests that culture could play an important role in learning style preference.

It is further possible that online and in-class students will differ in how they gather information and process course topics. Unless online students are selecting that delivery method strictly due to such factors as convenience (Bryant, Kahle, & Schafer, 2005), then it is perhaps reasonable to expect that there is something about an online learning environment that matches well with their preferences. For instance, Ku and Chang (2011) find that "visual" learners are the most dominant type among web learners, regardless of academic discipline or gender, and that "sensing" learners are not comfortable in a web-based learning environment. Nuzhat et al. (2013) call for research examining whether learning style predicts academic success in such different environments as online

and traditional classes, among other distinctions.

Finally, the stereotypical view of those who choose accounting is that they prefer order and concreteness and might lean relatively more toward a sensing and sequential learning style than will their counterparts in other majors. Loo (2002), using another learning style measure, found considerable diversity among business students and within majors. Engel (2015) notes, however, that most research on learning styles has been performed with students in such areas as physiology and engineering and that little is known about learning styles of accounting students. Such demographic differences may be interesting on their own, but if they exist, then perhaps any empirical analysis should include appropriate controls for them. Therefore, our subsequent analyses will provide indicator variables for each of these demographic breakdowns.

Based on the preceding discussion, the first set of research questions is simply aimed at examining demographic differences:

RQ1a: Do males and females differ in learning style preferences?

RQ1b: Do online and in-class students differ in learning style preferences?

RQ1c: Do accounting and nonaccounting majors differ in learning style preferences?

Social Presence and Collaborative Learning

Social Presence is defined as the degree of salience of the other person in an interpersonal interaction (Delfino & Manca, 2007; Short, Williams, & Christie, 1976). Studies have examined social presence as a predictor of satisfaction and learning (Delfino & Manca, 2007; Gunawardena & Zittle, 1997; Zhao, Sullivan, & Mellenius, 2014). They generally find social presence to have a positive influence on students' learning outcomes. We assume that an in-class environment offers social presence more naturally because of the face-to-face presence of the communicators. However, online learning employs predominately mediated communication, which is essentially any communication that is not face-to-face and, therefore, requires the use of a technical medium to communicate (Crowley & Mitchell, 1994). The media may include such "older" forms of communications as letters, but it now often consists of various computer-assisted communications such as Skype, e-learning, or mobile phones (Crowley & Mitchell, 1994; Waldeck, Kinney, & Plax, 2013). In today's environment, face-to-face classes also often use mediated communication as well, but the extent varies among schools and individual instructors. In contrast, as noted, online learning relies predominately on these types of communications. As a result, it is particularly critical to see how social presence is associated with the learning outcomes of distance learners in the context of a mediated communication.

Collaborative Learning is the extent to which the environment allows for interactions among the learners to acquire knowledge and skills and complete the tasks (Alavi, 1994; Dewiyanti et al., 2007). Studies have examined factors that can influence collaborative learning in an online environment (Capdeferro & Romero, 2012; Kuboni, 2013; Xu, Du, & Fan, 2015). Other studies have investigated collaborative learning in group work and find positive associations between collaborative learning and course outcomes (Francis-Poscente & Jacobsen, 2013; Lee & Bonk, 2014).

It is possible that the association between learning style preferences and important course outcomes depends upon the extent to which the environment offers the opportunity (or requires students) to interact with others. If a student is an active learner and prefers to work in groups, for instance, they may sense that a lack of opportunity to interact with others impedes their performance and/or course satisfaction and that the plentiful presence of such opportunities helps them. Conversely, if reflective learners prefer to think through a problem on their own first, a requirement to work with others may frustrate them. Group work has certainly met with mixed reviews based on prior research (Alavi, 1994).

As discussed in the previous definitions, sensing and sequential learners seem to prefer concreteness and thinking in terms of step-by-step processes. An environment that fosters interaction with others may facilitate their understanding and enhance their experience when the problem is more complex. Alternatively, it is possible that working with others will only cause a sense of frustration. Of course, it is possible that such interactive effects depend on either of the strength of their preferences, the specific others with whom they are interacting, and/or whether they are forced to work with others because of a course requirement.

Similarly, global learners may find that interaction with others facilitates their ability to identify the key issues of the problem, or they may find that working with others only impedes their ability to work through the problem.

Based on the definitions of visual vs. verbal learners, the latter seems more likely to enjoy an environment that they view as offering verbal interaction with others. In the case of a visual learner, the expectation is somewhat less predictable. On the one hand, visual learners may prefer to study a picture or graph and grasp the meaning on their own. On the other hand, they may prefer the input of others even in the presence of a visual aid, particularly if the problem is difficult. For instance, examining a flowchart of a company's revenue cycle to identify strengths or weaknesses tends to be challenging. Whether the preference is visual or verbal, the attempt to solve these types of problems may benefit from the interaction of others.

In sum, we expect that learning styles could be associated with course outcomes. Black and Kassaye (2014) find that student learning styles moderated the influence of experiential, participative, and traditional course designs upon student outcomes in a marketing course, which suggests possible interactions between learning styles and other factors. Because different learning style preferences seem to be associated with different preferences for interaction, we expect the association between learning styles and course outcomes to depend upon the extent to which they view the environment as offering or requiring interaction with others. The above arguments lead to the following hypotheses:

H1: The association between learning style preference and students' perceived effectiveness of learning depends on the levels of social presence and collaborative learning.

H2: The association between learning style preference and students' course satisfaction depends on the levels of social presence and collaborative learning.

METHODS AND DATA

Upon obtaining appropriate Institutional Research Board approval, we surveyed a cross-section of 166 students from two different universities and in different courses. Students from seven accounting courses participated in this study. Some of the courses were face-to-face and some were purely online. Table 1 shows demographic information for the participants. As shown in Panel A, almost 52% of the participants are male students. Panel B shows that about 71% of them are undergraduate students, and Panel C shows that just under 45% are accounting majors, while Panel D shows that 65% of participants are enrolled in an online course. Panel E shows that the average age is close to 29 with a range of 19 to 58 but a mode of 22. An analysis of variance (ANOVA) indicates no significant difference for age between males and females ($p > .4$) and between accounting and nonaccounting majors ($p > .1$). A chi-square test reveals no disproportionate distribution of males and females across accounting vs. nonaccounting major groupings (Pearson Chi-square > .1) and course type (in class vs. online, Pearson Chi-square > .7). In testing for interactive effects among the key variables of interest, we included age and gender as covariates, along with a variable to indicate whether the student was enrolled in an online or face-to-face course and another indicator variable for undergraduate vs. graduate. Because different instructors' course designs, topics, course demographics, and other factors may affect levels of interaction, student engagement, and interest, thereby potentially affecting perceived outcomes, we also controlled for courses by creating a dummy variable for each course.

Social Presence was measured using 17 items adopted from Tu (2002), and Collaborative Learning was measured using an 8-item instrument from So and Brush (2008). The dependent variables are Satisfaction (11 items) and Perceived Learning Effectiveness (six items). These two variables were measured using instruments from So and Brush (2008) and Alavi (1994). We used a five-point scale from 1 (strongly disagree) to 5 (strongly agree) and summed the relevant items for each multi-item variable to create a score for each respondent. Therefore, the possible ranges of the variables were 8–40 for Collaborative Learning, 17–85 for Social Presence, 11–55 for Satisfaction and 6–30 for Learning Effectiveness. Panel E of Table 1 shows descriptive statistics for these variables. Appendix A shows the items comprising the multi-item variables. As shown, the reliabilities are appropriate, with Cronbach Alpha statistics all above .70.

Table 1. Demographic Statistics

Panel A. Gender

	Frequency	Percent
Male	86	51.8
Female	80	48.2
Total	166	100

Panel B. Undergraduates vs. Graduate Students

	Frequency	Percent
Graduate	49	29.5
Undergraduate	117	70.5
Total	166	100

Panel C. Accounting vs. Non Accounting Majors

	Frequency	Percent
Non Accounting	92	55.4
Acccounting	74	44.6
Total	166	100

Part D. Course Type

	Frequency	Percent
Online	108	55.4
Traditional	58	44.6
Total	166	100

Panel E. Numerical Variables—Age, Interacting Variables, and Dependent Variables

Variable	N	Mean	Median	Mode	Standard Deviation	Minimum	Maximum
Social Presence	166	53.5	54	51	9.4	21	81
Collaborative Learning	166	26.4	27	30	5.9	8	39
Perceived Satisfaction	166	38.4	39	38	6.4	14	55
Learning Effectiveness	166	24.1	24	24	3.1	13	30
Age	166	28.9	26	22	8.5	19	58

RESULTS

Differences in Learning Styles

Table 2 shows the percentages of students falling into the various categories of learning styles. As shown in the table, there is considerable balance in learning styles when considering the respondents taken as a whole. For instance, on the reflective-active scale, the majority of students prefer a "balance," with a slight swing toward reflective. The most visible differences appear to be between sensing and intuitive and verbal-visual. Slightly over 50% show a preference for sensing over intuitive, indicating a preference for concrete examples and facts over concept-focused material. Another 42% indicate a more "balanced" approach, while only slightly over 7% favor an approach requiring them to make judgments and draw inferences (intuitive). In terms of the global-sequential distinction, apart from a fairly large percentage falling into the "balanced" category, there is a preference for sequential learning. Therefore, where there is a preference on this dimension, those in this study are more likely to favor a step-by-step, ordered approach over one requiring a "big picture" look. This preference seems somewhat consistent with the results on the intuitive-sensing dimension and perhaps indicates a preference for learning facts and processes that can be memorized without the deeper learning required in further application for judgment and decision making. Not surprisingly, there is also a much greater preference for visual learning over verbal learning. The adage "a picture is worth a thousand words" seems to apply to learning preferences as well.

Table 3 shows a comparison of male and female responses. According to these results, there are not extreme gender differences. The most marked gender differences appear to be in the verbal-visual dimension. Males in this group tend to move much more toward visual than verbal. While

Table 2. Percentages of Students with Various Learning Style Preferences—Whole Sample			
	-1	0	1
Reflective-Active	19.3	66.3	14.5
Intuitive-Sensing	7.2	42.2	50.6
Verbal-Visual	12.7	42.8	44.6
Global-Sequential	9.6	63.3	27.1
Legend: -1 signifies reflective, intuitive, verbal, or global; 1 signifies active, sensing, visual, or sequential; zero signifies a balance between the two extremes.			

Table 3. Percentages of Learning Style Preferences by Gender						
	Male			Female		
	-1	0	1	-1	0	1
Reflective-Active	16.3	68.6	15.1	22.5	63.8	13.8
Intuitive-Sensing	9.3	41.9	48.8	5	42.5	52.5
Verbal-Visual	5.8	38.4	55.8	20	47.5	32.5
Global-Sequential	10.5	68.6	20.9	8.8	57.5	33.8
Legend: -1 signifies reflective, intuitive, verbal, or global; 1 signifies active, sensing, visual, or sequential; zero signifies a balance between the two extremes.						

Table 4. Learning Style Preferences of Accounting vs. Non Accounting Majors (in %)						
	Accounting			Non Accounting		
	-1	0	1	-1	0	1
Verbal-Visual	13.5	50	36.5	12	37	51.1
Intuitive-Sensing	4.1	36.5	59.5	9.8	46.8	43.5
Verbal-Visual	13.5	50.0	36.5	12.0	37.0	51.1
Global-Sequential	6.8	62.2	31.1	12.0	64.1	23.9
Lengend: -1 signifies reflective, intuitive, verbal, or global; 1 signifies active, sensing, visual, or sequential; zero signifies a balance between the two extremes.						

a bit more balance is indicated for females, they tend considerably more toward verbal and away from visual than do males. To a lesser extent, males and females also appear to approach things differently in terms of the global-sequential scale. Both are somewhat "balanced" on this dimension, but males tend slightly more toward looking at a problem globally, while females are considerably more likely to favor a sequential approach. Neither gender has a strong preference for an intuitive approach; although males have nearly twice the percentage leaning that direction than do females, we would not conclude from these results that either gender is comfortable with scenarios in which the issues are not well-defined. Instead, it would appear that both prefer concrete, "how to" instruction. In a separate analysis (not tabulated), we divided the sample into those below and above age 24. We did find the older group to have a slightly greater leaning toward a global approach, although still less than 13% exhibited that preference. On a positive note, the "balance" continues to show.

Table 4 shows a breakdown of the responses between accounting and nonaccounting majors. The two groups appear to differ in at least three of the four primary breakdowns. Accounting majors tend more toward "sensing" than do nonaccounting majors, although neither group leans strongly

Table 5. Test of Interactions. (DV = Learning Effectiveness)			
Variable	**Parameter Estimate**	**t Value**	**p Value**
Intercept	10.36	1.88	0.06
Social presence (SP)	0.16	1.70	0.09
Collaborative learning (CL)	0.02	0.15	0.88
Active	0.13	0.04	0.97
Sensing	4.14	0.91	0.36
Visual	-2.07	-0.56	0.58
Sequential	3.00	0.78	0.44
SP * active	0	0.06	0.95
SP * sensing	-0.07	-0.58	0.30
SP * visual	-0.05	-0.77	0.44
SP * sequential	0	-0.03	0.98
CL * active	-0.01	-0.13	0.90
CL * sensing	0	0.03	0.98
CL * visual	0.20	2.15	0.03
CL * sequential	-0.07	-.0.76	0.45
Age	0.05	1.58	0.12
Gender	0.30	0.59	0.55
Delivery mode (FTF vs. Online)	1.20	1.36	0.18
Undergraduate (yes or no)	0.84	0.79	0.43
Accounting Major (yes or no)	1.20	1.53	0.13
Course 2	-3.74	-1.95	0.05
Course 3	-1.35	-1.03	0.31
Course 4	-3.28	-1.90	0.16
Course 5	-2.65	-1.64	0.10
Course 6	-2.07	-1.55	0.12
Course 7	0.38	0.43	0.67

toward intuitive. Nonaccounting majors appear much more visually-oriented in their learning preferences than do accounting majors, suggesting a possible greater preference for visual aids. Finally, although the differences are somewhat less dramatic, accounting majors tend more toward sequential learning and are somewhat more likely to shy away from a global approach. These results are somewhat consistent with Hung, Chang, & Lin, (2015), who found that most accounting students in their study were sensing and sequential in their learning approaches, but they differ somewhat in that students in the other study also tended more toward a visual approach than did accounting students in this study.

We also divided our sample into those enrolled in face-to-face courses and in online courses. However, we did not observe major differences between the two groups in their learning styles.

We now turn to our multiple regression analyses to draw our main conclusion on the relationship between learning styles, social presence, collaborative learning, and their interactions and students' learning outcome.

Table 6. Tests of Interactions (DV = Satisfaction)			
Variable	**Parameter Estimate**	**t Value**	**p Value**
Intercept	9.00	0.91	0.37
Social presence (SP)	0.12	0.66	0.51
Collaborative learning (CL)	0.81	3.07	0.00
Active	2.23	0.34	0.74
Sensing	13.94	1.70	0.09
Visual	-7.04	-1.06	0.29
Sequential	0.80	0.12	0.91
SP * active	-0.01	-0.08	0.94
SP * sensing	0.06	0.47	0.64
SP * visual	0.07	0.58	0.56
SP * sequential	0.02	0.19	0.85
CL * active	-0.05	-0.30	0.76
CL * sensing	-0.56	-2.66	0.01
CL * visual	0.15	0.90	0.37
CL * sequential	-0.06	-0.37	0.71
Age	-0.06	-1.10	0.27
Gender	-0.50	-0.56	0.58
Delivery mode (FTF vs. Online)	0.02	0.01	0.99
Undergraduate (yes or no)	1.64	0.86	0.39
Accounting Major (yes or no)	1.24	0.88	0.38
Course 2	0.43	0.13	0.90
Course 3	-1.63	-0.69	0.49
Course 4	0.37	0.12	0.90
Course 5	-0.96	-0.33	0.74
Course 6	-0.76	-0.31	0.76
Course 7	2.42	1.50	0.14

Learning Styles, Social Presence, Collaborative Learning, and Their Association with Students' Learning Outcomes

In order to test for interactions, we dichotomized the learning scales for the four learning styles into values (0 and 1). Although not separately tabulated, we tested the reliability of the variables using the Cronbach Alpha, modified for dichotomous variables as noted in Litzinger et al. (2007). The reliabilities were quite high for all four scales, with Cronbach Alpha of .84, .86, .75, and .73 for sensing-intuitive, visual-verbal, sequential-global, and active-reflective, respectively.

We adopted multiple regression analyses to test our two hypotheses. Our dependent variables are learning effectiveness and course satisfaction. Our main explanatory variables are learning styles, collaborative learning, social presence, and their interactions. In our analyses, we control for a series of other factors (age, gender, course types, etc.) that may impact the dependent variables and confound the relationships between the dependent variables and the main independent variables.

As shown in Table 5, there is a positive interaction between collaborative learning and the "visual" variable when the dependent variable is learning effectiveness. None of the other learning style dimensions have a main effect, nor do they interact with social presence or collaborative learning. The significant positive interaction between collaborative learning and the visual-verbal indicator variable suggests that visual learners have a greater perceived learning experience through collaborative learning than do verbal learners. There is an association between one of the courses and learning effectiveness; as stated previously, the dummy variables were included to control for the potential for instructor/course design differences.

As shown in Table 6, collaborative learning interacts with "sensing" when the dependent variable is course satisfaction, indicating that the effect of the sensing dimension depends upon the level of collaborative learning. In this case, none of the covariates is significant. Likewise, none of the indicator variables for the different courses is significant. Although collaborative learning on average has a significant positive association with satisfaction, the significant negative interaction suggests that sensing people derive lower satisfaction through collaborative learning than do their intuitive counterparts.

DISCUSSION

Our results overall suggest that students tend to be balanced in their learning styles. We do find some differences in genders and in accounting vs. nonaccounting majors in their preferences. Interestingly, we do not find any marked differences between online and face-to-face students in their preferences. We expected that students would self-select into either an online or face-to-face course at least partly because they had a strong preference for certain types of learning. A potential explanation of this finding is that students might not have the freedom to choose between the two delivery modes (i.e., a given semester might have only one type of course available). It is also highly possible that the relative convenience of online education "trumps" any other considerations for some, although we are unable to measure such a tendency based on our data.

The finding that accounting majors favor a sequential approach and are less comfortable than their counterparts in taking a "global" look at a problem is not particularly surprising for a profession often referred to as "rule-based." However, as accounting students move toward higher course levels and toward demanding practitioner positions that require judgments on unclear matters, the world becomes less concrete and a global approach would seem to be increasingly necessary. It is perhaps desirable for principles- and intermediate-level courses in accounting to ease students into more integrative types of analyses, where they have not already done so. As a practical matter, class sizes and other factors may make it difficult to administer such activities. At a minimum, however, it would seem that students need to be aware early in their program that the world is not concrete and is not always "step-by-step." In reality, their professional lives will often require them to look at the big picture first, identify the relevant issues, and select or recommend a course of action.

The indication that there is a range of preferences suggests that a balance of approaches is desirable within any course, because likely no specific approach will be effective for an entire class of students. The fact that today's classrooms represent a diversity of cultures further suggests the need to understand differences and adapt, where possible. While active learning is generally regarded as highly effective, students from some cultures might feel as if they are being offensive in asking "too many" questions. Where possible and practical, perhaps the experience of both student and professor would be enhanced by varying approaches to help with the level of engagement and retention.

On the other hand, many courses and/or academic programs cannot practically be tailored to specific students as is found in, for instance, Montessori education. To suggest otherwise would be naïve. In addition, students' preferences do not necessarily constitute the "right" way to administer a college or university class. Everyone must step out of their comfort zone and adapt sometimes, including students, professors, and practitioners. Fortunately, Sandman (2014) finds that business students indeed adapt their learning style to the course subject rather than having a consistent preference.

Of course, some courses or topics within courses lend themselves better to creating or

finding visual aids. Moreover, our results suggest a greater need perhaps in introductory accounting courses. These courses often consist predominately of nonaccounting majors, who appear to have a somewhat greater preference for a visual approach. One advantage that educators in virtually any discipline have in the Internet age is that we can find relevant, sometimes entertaining, aids more quickly using a search engine. Depending on our computer acumen, we can smoothly insert pictures, videos, and other engaging aids into presentations or other documents. Another aid that has become popular at many schools is the "clicker," which students are sometimes required to purchase and can use in more than one class to participate in answering questions posed by the instructor, for instance, in a PowerPoint presentation. They can then immediately see the results and the instructor can then show the correct answer. Such approaches are engaging and provide immediate feedback to both the instructor and student. Many educators intentionally vary their approaches within a class session by lecturing for a limited time (e.g., ten minutes) and then switching to a hands-on exercise, a video, or a short case appropriate for illustrating the importance of what was just discussed. They will then continue with another ten minutes of lecture time and offer another exercise following that short period. Such approaches not only help with students' short attention spans, but they offer "something for everyone" by providing opportunities for those across the spectrum of learning styles.

The findings further suggest that the sensing vs. intuitive and visual vs. verbal dimensions carry more weight in students' experiences with a course than do the other two dimensions studied. It is quite possible that the other two dimensions are at least partially captured in the two dimensions that do show up as significant. For instance, "active" and "sequential" are similar to "sensing" in their basic description. The finding that the sensing vs. intuitive dimension interacts in a negative way with collaborative learning for course satisfaction is potentially instructive. With their relatively greater focus on concepts and theories, perhaps intuitive learners can exchange more ideas through collaborative learning, thus enhancing their satisfaction. In other words, a collaborative learning environment may facilitate their satisfaction by offering the opportunity to "bounce ideas off" of others and crystallize the solution for them, particularly if they like to communicate with others verbally. On the other hand, for a student who leans strongly toward being a sensing learner with a preference for concrete examples, a collaborative learning environment may not be enough to offset their frustration with a situation that presents unclear issues and offers less clear paths for defining and solving them. If they prefer to work alone, a collaborative learning environment may actually decrease their satisfaction in such a situation, especially since many students do not wish to have group projects (McConnell, 2002).

The finding that visual learners have a better perceived learning experience in a collaborative learning environment than do verbal learners is somewhat surprising. One might expect a collaborative learning environment to offer a relatively greater opportunity to learn through words, thereby leading to a stronger experience for verbal learners. Perhaps this finding goes hand-in-hand with the finding on the sensing vs. intuitive dimension discussed earlier. If the previously mentioned old adage "A picture is worth a thousand words" is true, then perhaps visual aids further help to enhance the experience for intuitive learners; they may just need a "boost" to help them solidify their thoughts on the concepts.

We were surprised by the lack of significance for our covariates, with age being marginally significant for learning experience and no other covariates approaching significance. One might expect the type of course (online vs. FTF) to be significant because the two types of delivery will likely differ in terms of student perceptions of how much collaborative learning is really present and in their overall experience in general. This study examines style preferences, but a potentially important determinant in a student's experience is the extent to which he/she is able to use their preferred style in a given class. Any differences in atmosphere due to the delivery format did not seem to be sufficient to make a difference for the dependent variables in this study.

LIMITATIONS AND FUTURE RESEARCH

As is the case with any empirical study, the results of the current study must be interpreted in light of its inherent limitations. First, the study

is based on survey results and the responses are therefore based on how a student "feels" at the moment, or they may fill out the survey quickly without regard to the truthfulness of their response. Giovannella (2012) found, for example, that responses to these learning styles instruments may vary widely after one or two years. In addition, as noted previously, Henry (2004) surveyed the learning styles of students in an introductory managerial accounting course and concluded that their learning style profile is similar to the profile of engineering students. However, there are very few studies examining how students' learning styles interact with their learning environment (e.g., collaborative learning), leading to different learning results in accounting education. Our study attempts to partially fill the gap. Because we focus on accounting courses only, further studies might be needed to see if our results can be generalized to students in other courses.

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APPENDIX A. COMPOSITION OF MULTI-ITEM MEASURES

COLLABORATIVE LEARNING (CRONBACH ALPHA = .79)

Collaborative learning experience with the use of various communication media is better than in a face-to-face learning environment.

I felt part of a learning community in my group.

I actively exchanged my ideas with group members.

I was able to develop new skills and knowledge from other members in my group.

I was able to develop problem solving skills through peer collaboration.

Collaborative learning in my group was effective.

Collaborative learning in my group was time consuming.

Overall, I am satisfied with my collaborative learning experience in this course.

SOCIAL PRESENCE (CRONBACH ALPHA = .84)

Communication media (CM) messages are social forms of communication.

CM messages convey feeling and emotion.

CM is private/confidential.

CM messages are impersonal.

Using CM is a pleasant way to communicate with others.

The language people use to express themselves in online communication is stimulating.

It is easy to express what I want to communicate through CM.

The language used to express oneself in online communication is easily understood.

I am comfortable participating, even though I am not familiar with the topics.

CM is technically reliable (e.g., free of system or software errors that might compromise the reliability of your online messages reaching ONLY the target destination).

CM allows relationships to be established based upon sharing and exchanging information.

CM allows me to build more caring social relationship with others.

It is unlikely that someone might obtain personal information about you from the CM messages.

Where I access CM (home, office, computer labs, public areas, etc.) does not affect my ability/desire to participate.

CM permits the building of trust relationships.

The large amounts of CM messages (numbers of messages and length of messages) do not inhibit my ability to communicate.

It is unlikely that someone else might redirect your messages.

SATISFACTION (CRONBACH ALPHA = .84)

I was able to learn from my preferred communication media (for example, Instant Messenger, Facebook)

I was stimulated to do additional reading or research on topics discussed in this course.

I learned to value other points of view.

APPENDIX A. COMPOSITION OF MULTI-ITEM MEASURES CONTINUED

As a result of my experience with this course, I would like to take another accounting course in the future.

This course was a useful learning experience.

As a result of my participation in this course, I made acquaintances electronically in other majors, departments, or schools.

The diversity of topics in this course prompted me to participate in the discussions.

I put in a great deal of effort to learn various methods of communication to participate in this course.

My level of learning that took place in this course was of the highest quality.

Overall, the learning activities and assignments of this course met my learning expectations.

Overall, this course met my learning expectations.

OVERALL LEARNING EFFECTIVENESS (CRONBACH ALPHA = .90)

I gained a good understanding of the basic concepts of the material.

I developed an ability to communicate clearly about the subject.

I learned to interrelate the important issues in the course materials.

I learned a great deal of factual material in this course.

I learned to identify the central issues of the course.

I improved my ability to integrate facts and develop generalizations from the course material.