Learning Style Differences Between Students and Faculty

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ABSTRACT

Learning styles refers to the different ways that people process and retain information. Our interest is in discerning differences in learning styles between faculty and students. Just as students vary in learning styles, instructors differ in the methods they use to convey information. Any disconnect between the learning styles of instructors (and hence the methods used to teach material) and the predominant learning styles of the students may result in greater learning difficulties for students. We test the learning styles of three groups: students in the introductory finance course, finance majors, and finance faculty. Significant differences are found between each group with the greatest differences between the faculty and the introductory students.

INTRODUCTION

Determining the effectiveness of instruction is a critical quest for all teachers. While examinations and other forms of assessment provide feedback on instructional progress they also tend to show a variance in performance that is often hard to explain based on aptitude alone. Indeed, we know that learning depends on many factors in addition to aptitude including, but not limited to: motivation, instructional methods, environment, background, studying strategies, and learning styles. Learning styles refers to the different ways that people process and retain information. More formally, Keefe (1979) defines learning styles as "the characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment". Our interest is in discerning differences in learning styles between faculty and students. Just as students vary in learning styles, instructors differ in the methods they use to convey information. It is natural to assume that instructors develop teaching styles based on what has worked for them, i.e. methods that match their own learning styles, and evidence suggests that instructors are, in fact, more comfortable teaching in styles that match their learning style (Gregorc 1984). Any disconnect between the learning styles of instructors (and hence the methods used to teach material) and the predominant learning styles of the students may result in greater learning difficulties for students. Previous work has shown that a serious mismatch between the learning styles of faculty and students can have a host of negative consequences, including poor attention and performance in students (Felder and Silverman 1988; Felder 1996). In a subject such as finance where the complexity of the material alone proves a challenge to many students the added burden of disparate learning styles may exacerbate the problem.

Our hypothesis is that differences in learning styles between finance faculty and students may be a contributing factor in performance variance, particularly at the introductory level where there is the greatest diversity of student interest. If this is true then we would also suspect that students who excel in finance may have learning styles more similar to the finance faculty. To

this end we test the learning-style preferences of three groups; students from the introductory finance course (non-finance majors), honors finance majors, and finance faculty. We find that the introductory students differ significantly from faculty on all dimensions while the finance majors and faculty are only significantly different on one of four dimensions. The two student populations differ on three of four dimensions. These differences may be compounded since the average student learning style profile is virtually the opposite of a student who would benefit most from a lecture-based presentation. Given that the primary delivery mode as listed on the syllabus for the introductory courses used in this study is lecture, it may be that part of the difficulties students have learning finance are a function of the teaching style and learning style differences rather than simply the complexity of the material.

THE MODEL

People vary in the ways they process and retain information. These differences have been explored and modeled and instruments developed to measure these learning styles. In addition to the well known Myers-Briggs model there are the Herrmann Brain Dominance Instrument, the Kolb model, the Gregorc model, and the Felder-Silverman Model among others. Three previous studies of finance students used the Gregorc model (Gentry and Helgesen 1998), the Kolb model (Mayall 2005), and the Myers-Briggs model (Filbeck and Smith 1996). All the models are similar in that they attempt to categorize learning styles, and tests of the models find that they produce similar results and lead to essentially equivalent conclusions (Felder 1996).

The model used here is the Felder-Silverman (1988) model. This model has been tested extensively and found to be reliable and valid (Felder and Spurlin 2005). The Felder-Silverman model is directed at four main attributes; the preferred type of information to be perceived (sensory or intuitive), the type of sensory input most effectively perceived (visual or verbal), the preferred processing of information (actively or reflectively), and the type of progression toward understanding (sequentially or globally). It is easily operationalized by the Felder-Soloman Index of Learning Styles (1991), a straightforward questionnaire instrument.

The Index of Learning Styles (ILS) questionnaire measures an individual's relative preference along each dimension. The questions are a series of 44 true-false questions designed to elicit preferences. A scoring matrix allows for the responses to be tabulated into a total for each dimension. The scale is from one, a mild preference for one side of the dimension and eleven, the maximum for the dimension. So for example, a visual score of one is someone with a mild preference for visual while someone with a visual of eleven has a strong (total) preference for visual. It should be noted that even someone with a total preference for one aspect of a dimension is capable of learning in the other, i.e. a visual learner can learn with verbal instructions; it is simply a personal preference for a learning style.

As Felder and Spurlin indicate, it is important to keep several things in mind when dealing with learning styles. First, the learning style dimensions on the ILS (and other similar instruments) are continua, not discrete categories, and students may have a mild, moderate, or strong preference for a certain dimension characterized by the instrument (Felder and Spurlin 2005). Learning-style preferences should not be used to predict learning strengths and weaknesses (Felder and Spurlin 2005), but instead as an indicator of what type of learning the student prefers. Finally, and most important for this work, learning styles can be affected by a student's educational experiences (Felder and Spurlin 2005). For example, a student with a

preference for sensing can be taught intuitive skills through a course that provides guidance in that area, and the student's learning preferences may change as a result. Learning styles should not be seen as dictating how students should be taught since students learning styles can change based on their circumstances and experience.

The ILS instrument has been tested for reliability in engineering student populations (Felder and Brent 2005). It has also been shown that the ILS correlates with preferences for sensing and extraversion measured on the Myers-Briggs Type Indicator (Felder and Brent 2005). The ILS instrument was chosen for this study because of the similarity between engineering and finance student populations. Both groups study subjects that are highly analytical and require great rigor. Previous work on learning styles of finance students have chosen other instruments, although it should be noted that the ILS has been shown to produce similar results as other learning-styles instruments (Felder 1996).

Although the ILS questionnaire is available online from Felder and Silverman's web site, we chose to create an online implementation of the survey on our own servers. In addition to the 44 true-false questions from the instrument, a few demographic questions were added. There were also two versions of the survey created: one to be taken by students and one to be taken by faculty, differing only in the added demographic questions. The student survey included questions asking the respondent's gender, race, and level in school (freshman, sophomore, etc.). Unfortunately due to an administrative issue, not all students completed the survey that included the demographic questions so additional demographics are not addressed in this paper. Because the faculty population is smaller, including demographic information on the faculty survey would have potentially identified the faculty in question. Survey responses were solicited from courses in the Winter and Spring quarters of 2009.

All responses were kept anonymous, with no identifying information associated with the data beyond the distinction between faculty and student responders. Two types of student populations were surveyed: students in the introductory finance course, which is taken by all business students, and students in the honors finance program. Due to the honors admission process there is no overlap between the two groups. There were 59 students who responded to the survey from the honors sections and 121 students in the introductory course. The faculty solicited were all from the Finance department, and 14 faculty completed the survey.

RESULTS

Results collected from the questionnaire given to the three populations are presented in Figures 1 – 12. The figures provide distributions of the results along each dimension. A symmetric distribution would balance between the two ends of a dimension and any skewness would indicate a preference for one mode of the dimension (learning style) over the other. Figures 1-4 show the results for the introductory students (non-majors), Figures 5-8 are for the honors students and Figures 9-12 show the distributions for the faculty sample. While the distributions are revealing it is easier to get a sense of the overall characteristics by constructing a summary statistic.

[Figures 1 – 12]

A summary statistic, essentially a mean, was derived from each distribution by calculating a weighted average of the scores and assigning the contrasting dimension a negative value. One side of each dimension is given negative values (here the 'B' mode from the Figures), so positive means would represent Active, Sensory, Visual, and Sequential while negative means represent Reflective, Intuitive, Verbal, and Global. With this statistic a symmetric distribution would have mean of zero. The mean values for each dimension and each sample are given in Table 1. Also reported in Table 1 are the raw percentages of each sample that scored along the dominant dimension. The data in Table 1 show that the non-majors are Active, Sensory, Visual, and Sequential. Essentially the same pattern can be seen for the finance honors students although the distributions apparently differ, however the faculty are Reflective, Intuitive, Visual, and Global. So both student samples on average have similar learning profiles. The faculty differs considerably, matching the student profile on the visual dimension; even there the score is much 'weaker' (more toward verbal). Since the distributions vary and the means differ we need to test for significant differences across dimensions.

[Table 1]

Unfortunately there is no reason to think that the true distribution of learning styles would be normal or even a symmetric distribution. In fact, based on tests of the general United States population research using the Myers-Briggs Type Indicator shows that only one of the four main dimensions is a symmetric distribution (Filbert, Hatfield, and Horvath 2005). Thus, in order to test whether the distributions are significantly different non-parametric methods must be used. We first test whether the distributions are the same using the Wilcoxen sign rank test. The calculated Z values and associated probabilities are given in Table 2. All the paired comparisons for each group and each dimension are significantly different.

[Table 2]

To test the central tendency of the distributions the medians for each group are tested with a binomial sign test. The results are presented in Table 2. The medians of the distributions of the introductory students are significantly different from the faculty on all dimensions and different from the honors students on all dimensions except Sensory-Intuitive. The medians for the honors students relative to the faculty are only significantly different on one dimension, the visual-verbal dimension.

DISCUSSION

We compared the learning styles of three groups, students in the introductory finance course, honors finance majors, and finance faculty and found significant differences in learning styles As suspected, students drawn to finance and excelling in it share learning styles more similar to the finance faculty. Most significant were differences between the students in the introductory course relative to faculty which creates a potential problem – instructors may think they are presenting material in the clearest manner yet it may be a manner that is in the least preferred learning style of the majority of students. The problem is aggravated by the fact that traditional lectures are predominantly reflective, intuitive, verbal, and sequential – virtually the opposite of the preferred student learning styles. To help students faculty can consider adding in

class problems and discussions for active learners, linking materials to real world examples for sensors, visual learners can be aided by increasing the use of charts, graphs, and other visual representations of material, and global learners need to be reminded about how the material fits into the broader field of finance. Additional ideas can be found in a variety of sources, see for example, Felder and Brent (2005) and Filbeck and Smith (1996).

It is important to note that while people have preferences for learning styles learning is possible regardless of the style of presentation and no one learning style is 'better' than another. We are not advocating that a particular style be adopted or that students be somehow given instruction in styles that match their preferences. We do think that incorporating a variety of teaching styles will allow for the greatest comfort of students in learning the material and faculty can help alleviate potential learning style conflicts by incorporating a diversity of material and exercises to reflect varying learning styles. Greater student comfort in learning could result in the ultimate goal of improved performance.

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Figure 1
Non- Finance Majors
Active (A) Reflective (B)

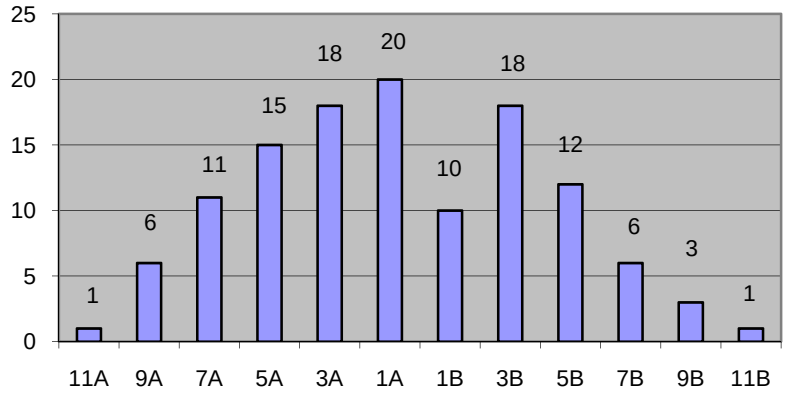

Figure 2
Non-Finance Majors
Sensory (A) Intuitive (B)

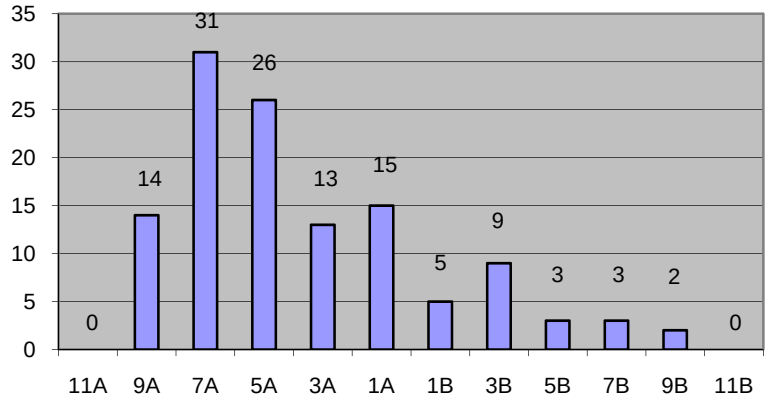

Figure 3
Non-Finance Majors
Visual (A) Verbal (B)

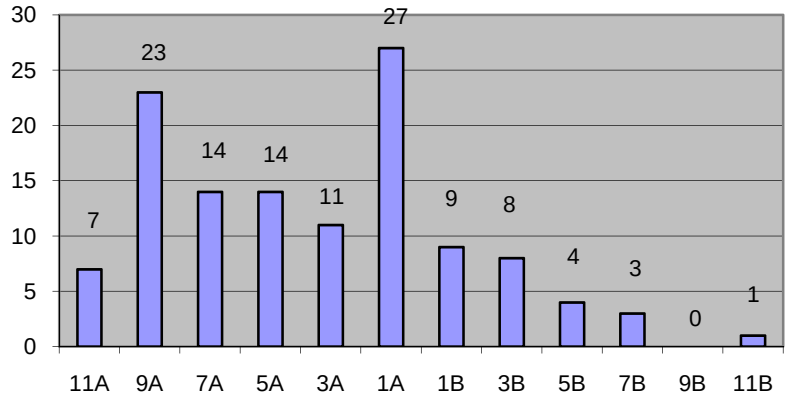

Figure 4
Non- Financial Majors
Sequential (A) Global (B)

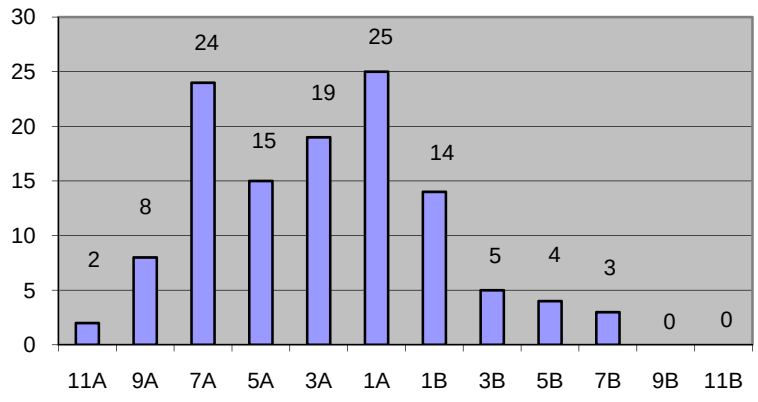

Figure 5
Finance Honors
Active (A) Reflective (B)

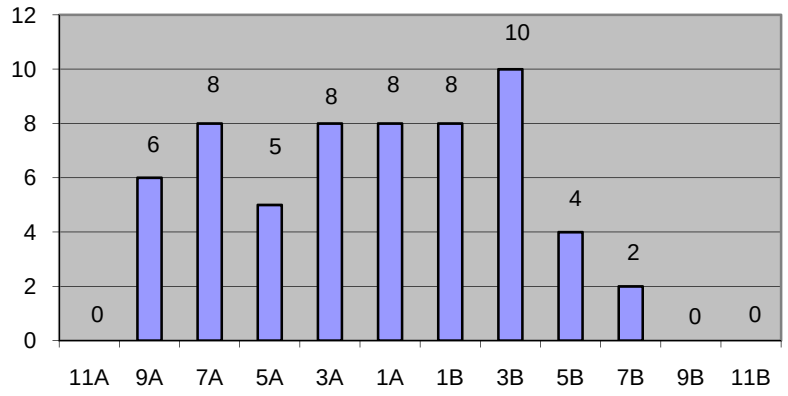

Figure 6
Finance Honors
Sensory (A) Intuitive (B)

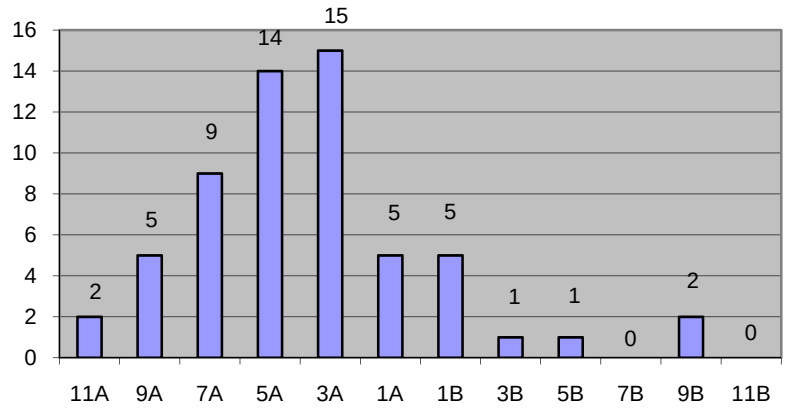

Figure 7
Finance Honors
Visual (A) Verbal (B)

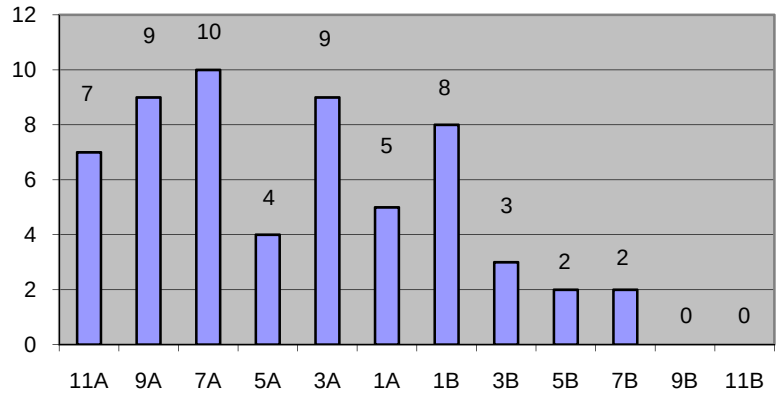

Figure 8
Finance Honors
Sequential (A) Global (B)

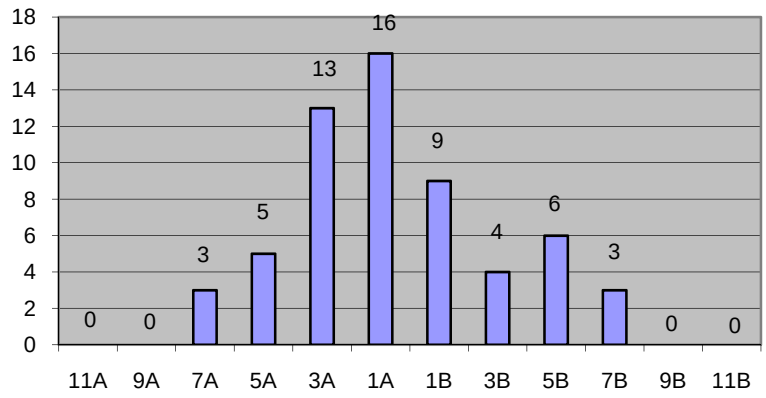

Figure 9
Finance Faculty
Active(A) Reflective (B)

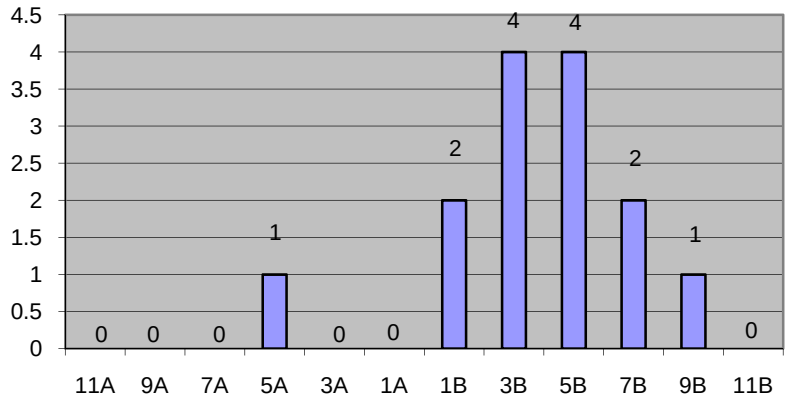

Figure 10
Finance Faculty
Sensory (A) Intuitive (B)

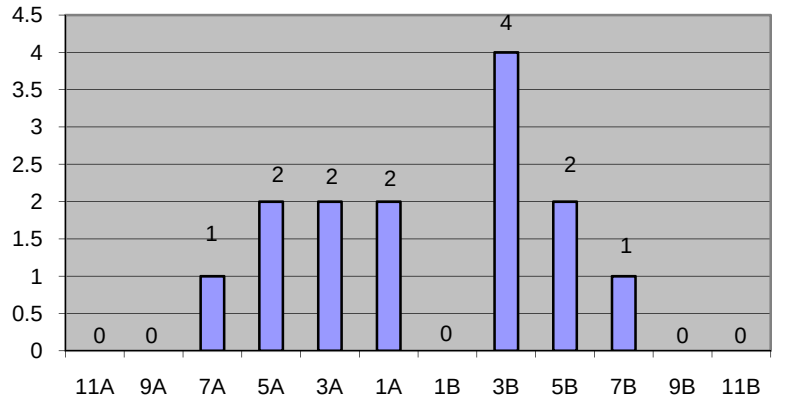

Figure 11
Finance Faculty
Visual (A) Verbal (B)

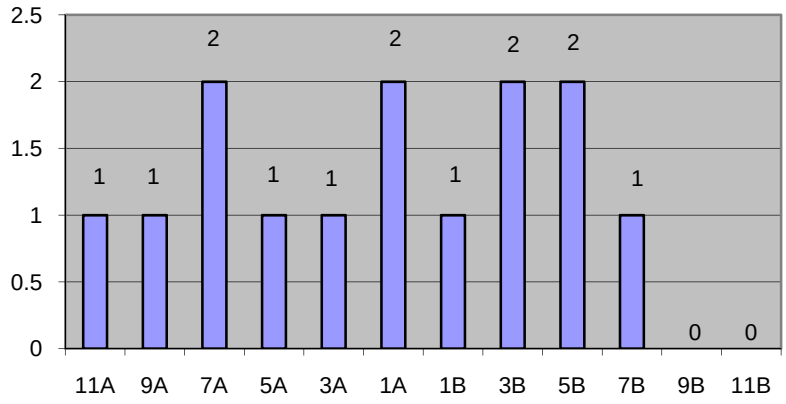

Figure 12
Finance Faculty
Sequential (A) Global (B)

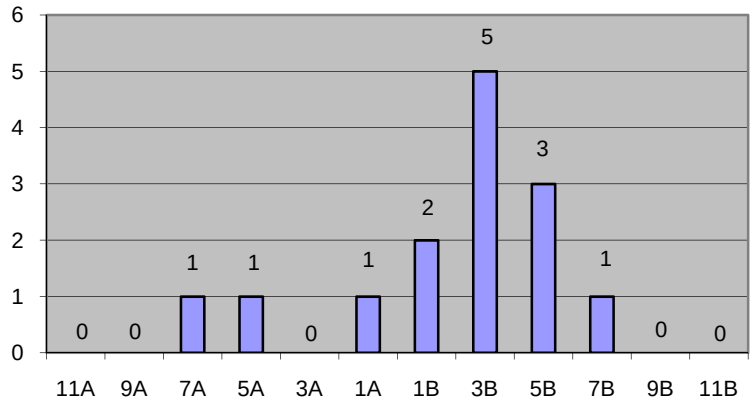

Table 1

Dimension	Non-majors	Honors	Faculty
Active-Reflective	.719	1.61	-3.71
Percent of Respondents	59%	59%	93%
Sensory-Intuitive	3.64	3.71	-.285
Percent of Respondents	82%	85%	57%
Visual-Verbal	3.52	4.05	1.43
Percent of Respondents	79%	75%	57%
Sequential-Global	2.93	.491	-1.85
Percent of Respondents	77%	63%	79%

The weighted average means representing each mode of each dimension are presented. A positive mean indicates Active, Sensory, Visual, and Sequential. A negative mean indicates Reflective, Intuitive, Verbal, and Global. The percentages represent the percentage of the respondents in the sample which scored that mode on that dimension, e.g. 93% of the faculty are Reflective.

Table 2

Z scores for Wilcoxen-signed rank tests and binomial tests of equality of matched pairs. The null hypothesis for the Wilcoxen tests is that the pair-wise distributions are equivalent. The null hypothesis for the binomial tests is that the difference in the pair-wise medians is zero (p-values are reported).

Active-Reflective Dimension	**Z value**	**p-value for test of Medians**
Non-majors versus Honors	3.027**	.001**
Non-majors versus Faculty	3.063**	.000**
Honors versus Faculty	2.337*	.070
Sensory-Intuitive Dimension	**Z value**	**p-value**
Non-majors versus Honors	2.065*	.180
Non-majors versus Faculty	2.955**	.002**
Honors versus Faculty	2.123*	.227
Visual-Verbal Dimension	**Z value**	**p-value**
Non-majors versus Honors	2.959**	.002**
Non-majors versus Faculty	3.025**	.001**
Honors versus Faculty	2.862**	.004**
Sequential-Global Dimension	**Z value**	**p-value**
Non-majors versus Honors	2.420*	.039*
Non-majors versus Faculty	2.856**	.030*
Honors versus Faculty	2.330*	.070

* Significant at 5%
** Significant at 1%