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An Exploratory Investigation of the Learning Styles of Students in an On-Line Degree Program

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ABSTRACT

This study is an exploratory investigation into whether different learning styles predict performance in an online course. Students enrolled in several cohorts of an accredited MBA program were surveyed with regard to their learning styles and those styles were correlated with the grades earned in the course. The program is unique in that the entire program could be completed online.

INTRODUCTION

In the 1970’s the concept of learning styles replaced cognitive styles as a focus for researchers interested in how the learner responds to the learning environment (Riding, Cheema, 1991; Loo, 2002). The concept of “learning styles” refers to the way in which the learner interacts with stimuli in the learning context (Riding & Cheema, 1991). The basic premise behind learning styles is that individuals learn differently; they perceive and process information using different approaches (Kolb, 1984). Consequently, a knowledge of the predominate learning styles of students in a particular class might be of benefit to a professor who is willing to change his style of teaching to accommodate those styles, and it might enhance student performance and learning outcomes. Given the recent foray of various universities into online education this study investigated that relationship between learning style and performance in an online course.

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Various researchers have sought to investigate whether environmental conditions might influence an individual’s learning style, with the assumption being that learning style might itself affect a wide variety of choices that students make, from the choice of university to the choice of major. For instance Clump and Skosbergboise (2003) report that researchers have examined learning style differences in external conditions such as gender, majors, upper or lower divisional standing, and they postulated that conflicting results among the studies might be explained by inter-university differences in the samples. Other researchers have used different measures of leaning styles to examine whether learning styles might explain variation in a variety of variables such as academic performance, academic interests (i.e. choice of major), and academic performance within those majors, with the idea being that certain professions such as engineering (Felder, 1988a; 1988b) and business (Hallock, Satava, and LeSage, 2003), with their consequent quantitative bents, might attract students with a preference for particular learning styles. In the business discipline, while there has been some investigation of various majors, the most researched has been accounting (Loo, 2002).

Online education is becoming a growing trend. Indeed online courses have gained in popularity in recent years and the trend is projected to continue. Recently the Chronicle of Higher Education reported that 1.6 million students took at least 1 course online in fall of 2002 and that number is expected to increase to 1.9 million in Fall 2003 (Online, 2003).

In addition to online courses, some universities are offering online degrees. That is, students can take the entire body of coursework for a degree without having to attend on-site classes. In the same issue of the Chronicle, it was reported that, of the students who took at least one course online, 33% took their entire course offerings via the internet. Indeed, currently 48.9% of public institutions offer online programs for a degree and the most popular online degree was the MBA. (Kiernan, 2003; Online, 2003)

In contrast to the traditional classroom environment, on-line education is a new environment and there has not been the time yet to thoroughly investigate relationships in this new environment. Thus while there has been a significant amount of research considering the interaction of learning styles and the classroom, there has been relatively little similar investigation of the relationship between learning styles and online education. Indeed, recently Hallock, Satava, and LeSage (2003) suggested that one or more learning styles may be particularly suited for on-line courses.

Given that the on-line environment is a new venue for education and taking Hallock et. al’s suggestion, this exploratory empirical study investigated whether a preference for a particular learning style might be correlated with performance in an online course.
In the year 2000 the state of Georgia began to offer an MBA program conducted entirely online. Part of the uniqueness of the program is that it is offered by coalition of traditional schools which pooled faculty resources to be able to offer a degree, which would be completed entirely on-line. In contrast to a "for profit" online enterprise, this endeavor was started by traditional universities and using traditional faculty. The environment chosen for the online instruction was WebCT. Students were required to attend an orientation session, but after that weekend the rest of the education for the degree was conducted solely in an online environment. Students were recruited to the program on the premise that it was an online degree program for professionals. Materials indicated that, "Unlike an on-campus MBA program, this interaction takes place online rather than within the classroom walls. Students interact via e-mail questions to the professor, threaded discussions online, or a chat session. Teaching also takes place via the online content, which may be a PowerPoint presentation, an article, or an assignment to read a selection in a textbook."

The first class to be taught for each cohort consisted of an Organizational Behavior course. Since 2000 three cohorts/classes have completed this course. As a part of the Organizational Behavior course each of the students completed a learning styles inventory. A requirement for all courses in the degree program was that all relevant materials must be available on-line. Consequently the particular learning styles inventory that was chosen for the course was Richard Felder's Index of Learning Styles (Felder, Silverman; 1988) which is available on-line. The scale has been used by Felder to investigate the learning style preferences of engineering students (Felder, Silverman; 1988; Felder, 1993) and unlike some learning styles inventories its psychometric properties have been investigated and validated (Zywno, 2003).

Felder's scale is, in his words, "a self-scoring instrument that assesses preferences on the Sensing/Intuiting, Visual/Verbal, Active/Reflective, and Sequential/Global dimensions" (Felder & Henriques, 1995). Felder describes these four learning styles as 1) the type of information that students preferentially perceive: sensory--sights, sounds, and physical sensations, or intuitive--memories, ideas, and insights; 2) the sensory channel through which external information is most effectively perceived: visual--pictures, diagrams, graphs, and demonstrations, or verbal--sounds, written and spoken words and formulas; 3) how students prefer to process information: actively--through engagement in physical activity or discussion, or reflectively--through introspection; and 4) how students progress toward understanding: sequentially--in continual steps, or globally--holistically, and in large jumps. (Felder, 1993).

The learning style preferences for the students in the Organizational Behavior course were collected and their scores for each of the styles were coded between one and twelve. On the Active/Reflective scale, a score of 1-2 indicates a strong preference for processing information actively while a score of 3-4 shows a moderate preference for this method of information processing; a score of 11-12 would be indicative of a strong preference for processing information reflectively, with a score of 9-10 suggesting a moderate preference for this dimension. A score of 5-8 indicates that the student is relatively well-balanced on the two dimensions of this scale. Scores for the other three styles were coded in the same manner, with
1-2 indicating strong preferences for the sensing, visual, and sequential dimensions and 11-12 suggesting strong preferences for the intuitive, verbal, and global dimensions, respectively.

Subjects were 53 students enrolled an organizational behavior course which was a required component of the course work for the online degree. Students accessed the website, completed the instrument, received their results, and then forwarded the results using the email function in WebCT. The researchers obtained the results of the learning style inventory and correlated this information with the final course average (grade) of the students.

RESULTS

Summary statistics for the four dimensions of learning styles are contained in Table 1, while Table 2 contains Spearman’s correlation coefficients. As can be seen, both the median score and the mode for the Active/Reflective scale was 7, so these students who chose to pursue their degree in a totally online environment appear to be very well balanced, on average, between active experimentation and reflective observation in the way in which they process information. Converting information into knowledge can be accomplished by doing something in the external world with the information—such as discussing it or explaining it—or by introspectively examining the information. Active learners will not do well in situations in which they must be passive while reflective learners must have an opportunity to think about information in order to do well (Felder and Silverman, 1988). This dimension of learning style was not correlated with performance in the course, but online courses can provide opportunities for both active and reflective learning experiences. Students can engage in chats with each other and with the instructor to discuss and debate concepts and can take part in a variety of interactive exercises; however, at the same time, this medium can also allow for plenty of time for students to mull over concepts, exercises, etc. and their potential contributions before submitting these contributions or answering questions, etc. Thus students who exhibit a balance in regard to this particular learning style should be able to function well in an online environment.

<table>
<thead>
<tr>
<th>Active/Sensing/ Reflective</th>
<th>Visual/Sequential/ Intuition</th>
<th>Verbal</th>
<th>Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>7.0</td>
<td>5.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Mode</td>
<td>7.0</td>
<td>4.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Maximum</td>
<td>2.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Minimum</td>
<td>12.0</td>
<td>11.0</td>
<td>11.0</td>
</tr>
</tbody>
</table>

Table 1: Summary Statistics for the Four Learning Style Dimensions
<table>
<thead>
<tr>
<th>Styles</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Active/Reflective</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Sensing/Intuitive</td>
<td>.216</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Visual/Verbal</td>
<td>.205</td>
<td>.052</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Sequential/Global</td>
<td>-.351**</td>
<td>.656**</td>
<td>.045</td>
<td></td>
</tr>
<tr>
<td>5. Course</td>
<td>-.075</td>
<td>.275*</td>
<td>-.205</td>
<td>-.048</td>
</tr>
</tbody>
</table>

**p<.01, *p<.05 (two-tailed)**

Table 2: Spearman’s Correlations

The median score on the Sensing/Intuitive scale was 5, while the modal response was 4. Thus, these online students tend to have a moderate to slightly moderate preference for perceiving the world and gathering information through the senses (sensing), as opposed to indirect perception through speculation, imagination, and hunches (intuition). According to Felder and Silverman, “‘s’ensors like facts, data, and experimentation; intuitors prefer principles and theories. Sensors like solving problems by standard methods and dislike “surprises”; intuitors like innovation and dislike repetition. Sensors are patient with detail but do not like complications; intuitors are bored by detail and welcome complications; sensors are good at memorizing facts; intuitors are good at grasping new concepts. Sensors are careful but may be slow; intuitors are quick but may be careless.” (1988) One other important difference is that sensors may be more uncomfortable with symbols, such as words, than intuitors.

As noted, these on-line students, tended to prefer, on average, gathering information through sensing rather than through intuition. Sensors like experimentation so pursuing a graduate degree online, a relatively new experience in education, may have had an appeal to them. Sensors are also more careful and patient with detail and these students may have been more willing to take on the tasks of navigating websites and carefully reading and following the directions for assignments that normally would be discussed face-to-face in class. Thus the predominance of sensors in the program may have been a result of unconscious self-selection.

On the other hand, while the preference for these online students was for learning through sensing rather than through intuition, it is interesting to note, that students who favored intuitive perception tended to do better academically in the course than those who had a preference for sensing. Table 2 shows there was a statistically significant positive correlation between course scores and scores on this continuum (with high scores on the scale indicating a preference for intuition).
This result is not surprising, considering the nature of the course. Principles and theories are an important part of an Organizational Behavior course; students are exposed to topics such as motivation, satisfaction, leadership, group functions, power and politics in organizations. If they are to perform well, they must be able to grasp and apply these somewhat abstract concepts. Felder notes that students who favor intuitive perception over sensory perception respond well to abstract content as opposed to concrete content (Felder, 1988) and it may be that their comfort with the concepts led them to perform at a higher level. While the online environment itself may be suited for sensors, the content of the course may be better suited for those with a preference for intuitive learning.

On the third scale, Visual/Verbal, the median score was 6 and the mode was 8, so, as with Active/Reflective learning, these online students tended to, on average, be balanced in regard to the sensory modality through which information is most effectively perceived. Visual learners have an easier time remembering what they have seen, such as pictures, plots, charts, diagrams and animation. If they just hear something said to them, or simply read it, they are less likely to remember it. Verbal learners, on the other hand, remember much of what they hear and read, especially if they repeat it, discuss it, or explain it. They prefer verbal explanation of a concept, rather than the visual demonstration that would appeal to visual learners (Felder and Silverman, 1988). This dimension of learning style was not correlated with performance in the course, but online courses, like traditional courses, can offer a mix of these two modalities of information transfer. Charts, graphs, and pictures can easily be transmitted over the internet, as can words and other symbols, just as can they be read in books or drawn on a chalkboard. Animation and movies can now be transmitted electronically quite easily and efficiently, just as films can be shown and computer images projected in the classroom.

The final learning style investigated was the Sequential/Global continuum, and the on-line students exhibited a balance between the two dimensions of this style, with a median score of 6.0 and a mode of 6.5. Sequential learners can best absorb and comprehend material that is presented to them in an orderly fashion. They employ linear reasoning when attempting to solve problems, and are comfortable with having the pace of learning dictated to them chronologically. The educational system in the United States generally follows this sequential pattern, with students mastering material in stages and then moving forward to the next stage. Global learners can not function well in this type of system. They do not learn in a sequential manner, but rather in sudden jumps. After possibly being completely lost, global learners have seemingly instant intuitive insights in which everything comes together for them. Global learners may learn better by moving directly to more complex material, rather than progressing systematically through the material as sequential learners do, and global learners may have an easier time synthesizing material (Felder and Silverman, 1988).

This dimension of learning style was not correlated with performance in this particular course, but instructors may want to take this dimension into account as they create their courses. It is possible to structure online courses in such a way that both sequential and global learners could thrive. Having the course completely available in its entirety would allow global learners to move forward as quickly as they wish and skip around in order to be able to view the “big picture,” while sequential learners could progress at a pace more suitable to their learning style. This is of course also possible in a traditional course, but seemingly to a much lesser extent.
Global learners can read ahead in the textbook if they desire, but they will not have access to the instructor's insights, etc. until the instructor progresses through the material; in an online environment, however, everything the instructor has available at his or her disposal to facilitate learning can be made more readily accessible from the very beginning of the course.

CONCLUSIONS

Overall the learning preferences for the students in this online course were balanced. With the exception of the dimension of sensing and intuition, those preferences were uncorrelated with student success. Faculty who design courses for online delivery should be aware of the concept of learning styles and structure their courses so as to facilitate learning.

It is interesting to note that the subject matter of the course interacting with learning style preference may have more effect on performance that the delivery method. It would appear from the literature that the online delivery method would have favored sensors over intuitors and yet those who preferred intuition fared better in the course. We attribute this result to the subject matter of the course itself. Organizational Behavior as a subject area is somewhat abstract and intuitive. In contrast to a course which may be more mathematically based and therefore more "cut and dry," Organizational Behavior is more concerned with teaching students how to deal with ambiguity. A recognition that the content of the course itself may interact with student performance more than the delivery method may explain why sensors did not perform as well as intuitors even though the literature would suggest that the online environment would favor sensors. In other words, although sensors should have performed better in the online environment, intuitors did better in this particular course and it may be because the content of the course, as a subject area, is more abstract and therefore favors an intuitive approach. Certainly this observation is tenuous because of the exploratory nature of this study, but it needs further investigation. Perhaps future research could focus on the performance differences of students in different subject areas while using the same delivery methods and/or the differences that present themselves as students self-select into online courses vs traditional courses.

As online courses appear to show no signs of slowing down their proliferation, more opportunities to investigate these results will present themselves. We do not yet know how the online environment will interact with learning preference and we ourselves are learning how to use it to facilitate learning. Investigating how learning styles affect learning in the online environment can help us to design more effective learning experiences for our students.

REFERENCES


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