Students’ Learning Styles in Two Classes

Online Distance Learning and Equivalent On-Campus

David P. Diaz and Ryan B. Cartnal

The idea that people learn differently is venerable and probably has its origin with the ancient Greeks (Wright et al. 1997). Educators have, for many years, noticed that some students prefer certain methods of learning more than others. These dispositions, referred to as learning styles, form a student’s unique learning preference and aid teachers in the planning of small-group and individualized instruction (Kemp, Morrison and Ross 1998, 40). Grasha (1996) has defined learning styles as “personal qualities that influence a student’s ability to acquire information, to interact with peers and the teacher, and otherwise to participate in learning experiences” (41).

Blackmore (1996) suggested that one of the first things we teachers can do to aid the learning process is simply to be aware that there are diverse learning styles in the student population:

There are probably as many ways to “teach” as there are to learn. Perhaps the most important thing is to be aware that people do not all see the world in the same way. They may have very different preferences than you for how, when, where and how often to learn. [online]

Although many of us are aware that different learning styles exist, the application of this knowledge is often inconsequential. Some faculty simply opt to use a wide variety of teaching activities, hoping that they will cover most student learning preferences along the way. This method, though expedient, may not be the most effective way to address student learning preferences. Further, many teachers think that the same teaching methods that work in their traditional classes will also work for distance learning. The underlying assumption is that students who enroll in distance education classes will have the same learning preferences as those in traditional classes. Faculty often assume that teaching styles, and accompanying classroom processes, are like a “master key” and thus appropriate for any setting.

There is not an overabundance of research on learning styles and distance education. Most of the studies focus on the discovery of relationships between learning styles and specific student achievement outcomes: drop rate, completion rate, attitudes about learning, and predictors of high risk.

One of the most popular learning style inventories, which is often used in distance learning research, is the Kolb Learning Style Inventory (LSI) (Kolb 1986). Kolb’s LSI measures student learning style preference in two bipolar dimensions. Over time, learners develop a preference for either concrete experiences when learning or a preference for engaging in abstract or conceptual analyses when acquiring skills and knowledge. They also may emphasize interest in turning theory into practice by active experimentation, or they may prefer to think about their experiences by reflective observation (Dille and Mezack 1991, 27).

James and Gardner (1995) described Kolb’s LSI as a cognitive learning style mode. Cognitive processes include storage and retrieval of information in the brain and represent the learner’s ways of perceiving, thinking, problem solving, and remembering (20).

Dille and Mezack (1991) used Kolb’s LSI to identify predictors of high risk among community college telecourse students. Successful students had lower scores on their preferences for concrete experiences than did the unsuccessful students. Thus, because distance learning courses often lead to social isolation and require greater reliance on independent learning skills, students with less need for concrete experience in learning may be expected to be better suited to the distance format. People with higher scores on concrete experience tend to exhibit a greater sensitivity to feelings and thus would be expected to require more interactions with peers and the teacher.

Successful telecourse students also preferred to look for abstract concepts to help explain the concrete experiences associated with their learning. That is, they wanted to know “why” certain things happened in conceptual or theoretical terms. This more abstract approach clearly favored success in the telecourse.

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Dille and Mezack concluded that students who needed concrete experience and were not able to think abstractly were more high-risk in a telecourse.

Gee (1990) studied the impact of learning style variables in a live teleconference distance education class. The study examined the influence of learning style preferences of students in an on-campus or remote classroom on their achievement in the following: course content, course completion rates, and attitudes about learning. Both distance and on-campus groups were taught simultaneously by the same teacher, received identical course content, and met weekly. Gee administered the Canfield Learning Styles Inventory (CLSI) (Canfield 1980).

Students in the distance learning class who possessed a more independent and conceptual learning style had the highest average scores in all of the student achievement areas. People with the lowest scores in the distance learning course had a more social and conceptual learning style. Students with both a social and applied learning style performed much better in the on-campus class. The outcomes of the Gee study suggested that successful distance education students favored an independent learning environment, and successful on-campus students preferred working with others. The relatively small sample of twenty-six students suggested that additional research is needed.

An important question, however, is raised by such research: Are there differences in learning styles between students who enroll in a distance education class and their on-campus counterparts? That question, no matter how it is answered, is vital for anyone interested in students’ success. If there are no differences in learning styles, it is likely that faculty can transfer the same types of teaching/learning activities that have worked in the traditional environment into the distance setting with similar success. That is probably true, if enough sensitivity and thought have been given to learning styles and to how these methods will be transferred to the distance education environment using current communications technologies.

On the other hand, if there are differences in learning styles between groups of students, then faculty must use learning style information to aid their planning and preparation for distance education activities. Sarasin (1998) noted that professors should be willing to change their teaching strategies and techniques based on an appreciation of the variety of student learning styles. “[Teachers] should try to ensure that their methods, materials, and resources fit the ways in which their students learn and maximize the learning potential of each student” (2).

If optimal learning is dependent on learning styles, and these styles vary between distance and equivalent on-campus students, then faculty should be aware of these differences and alter their preparation and instructional methods accordingly. In any case, the first step in using learning style information in distance education is to determine students’ learning styles.

Selecting a Learning Style Instrument

As educators consider transplanting their traditional courses into distance learning, they should assess the learning styles of the students who enroll. With a variety of learning style instruments in use, it is important to select one according to the unique requirements of the distance learning context. Three important factors to consider when selecting a learning style instrument are defining the intended use of the data to be collected, matching the instrument to the intended use, and finally, selecting the most appropriate instrument (James and Gardner 1995). Other concerns include the underlying concepts and design of the instrument, validity and reliability issues, administration difficulties, and cost (22).

One of the distinguishing features of most distance education classes is the absence of face-to-face social interaction between students and teacher. Thus, an inventory used in that setting should address the impact of different social dynamics on the learning preferences of the students. An example of this can be seen in Gee (1990), who employed the Canfield Learning Styles Inventory (CLSI). The CLSI demonstrated merit in distance learning studies because it attempted to measure students’ preferences in environmental conditions, such as the need for affiliation with other students and instructor, and for independence or structure.

Those varied social dynamics are one of the main differences between distance learning and equivalent on-campus environments. However, in our opinion, both the Canfield Inventory and Kolb’s LSI create a narrow range of applicability for learning styles by limiting learning preferences to one or two dimensions. Although this learning style “stereotyping” may be convenient for statistical analysis, it is less helpful in terms of teaching students about weaker or unused learning preferences. Further, the Kolb LSI, which has been widely used, is primarily a cognitive learning preference instrument, which does not specifically take into account social preferences that are the key distinction between distance and traditional classrooms.

Of the different learning style instruments, the Grasha-Reichmann Student Learning Style Scales (GRSLSS) seem ideal for assessing student learning preferences in a college-level distance learning setting. The GRSLSS (Hruska-Riechmann and Grasha 1982; Grasha 1996) was chosen as the tool for determining student learning styles in the present study based on criteria suggested by James and Gardner (1995). First, the GRSLSS is one of the few instruments designed specifically to be used with senior high school and college students (Hruska-Riechmann and Grasha, 1982). Second, the GRSLSS focuses on how students interact with the instructor, other students, and with learning in general. Thus, the scales address one of the key distinguishing features of a distance class, the relative absence of social interaction between instructor and student and among students. Third, the GRSLSS promotes an optimal teaching/learning environment by helping faculty design courses and develop sensitivity to students’ needs.

Finally, the GRSLSS promotes understanding of learning styles in a broad context, spanning six categories. Students possess all six learning styles, to a greater or lesser extent. This type of understanding prevents simplistic views of learning styles and provides a rationale for teachers to encourage students to pursue per-
sonal growth and development in their underused learning styles.

Only a brief definition of each is provided here in order to assist the reader with the interpretation of the information from this study.

1. Independent students prefer independent study and self-paced instruction and would prefer to work alone rather than with other students on course projects.

2. Dependent learners look to the teacher and to peers as a source of structure and guidance and prefer an authority figure to tell them what to do.

3. Competitive students learn in order to perform better than their peers and to receive recognition for their academic accomplishments.

4. Collaborative learners acquire information by sharing and cooperating with teacher and peers. They prefer lectures with small-group discussions and group projects.

5. Avoidant learners are not enthusiastic about attending class or acquiring class content. They are typically uninterested and are sometimes overwhelmed by class activities.

6. Participant learners are interested in class activities and discussion and are eager to do as much class work as possible. They are keenly aware of, and have a desire to meet, the teacher’s expectations.

The styles described by the GRSLSS refer to a blend of characteristics that apply to all students (Grasha 1996, 127). Each person possesses some of each of the learning styles. Ideally, one would have a balance of all the learning styles; however, most people gravitate toward one or two styles. Learning preferences are likely to change as one matures and encounters new educational experiences. Dowdall (1991) and Grasha (1996) also have suggested that particular teaching styles might encourage students to adopt certain learning styles.

Problem and Purpose

Students’ performance may be related to their learning preferences or styles. Students may also self-select into or away from distance learning classes. As a result, success in distance learning class-

If optimal learning depends on learning styles, and the styles vary between distance and on-campus students, faculty should alter their preparation and teaching accordingly.

mat (N = 68). The comparison class was selected from four equivalent on-campus sections of health education (N = 40) taught by the lead author.

The online distance students were taught according to the same course outline, used the same textbook, covered the same lecture material, and took the same tests as the on-campus students. Three main differences between on-campus and online groups were the delivery mode for the lectures, the mode of teacher/student and student/student communication, and the mode for the assignments.

The distance classes reviewed multimedia slides (Power Point presentations converted to HTML) and lecture notes online, while the equivalent classes heard the teacher’s lectures and participated in face-to-face discussion. The distance class made heavy use of a class Web site and used a listserv and e-mail for communication/discussion with other students and the instructor. Assignments for the distance class were almost entirely Internet-based and independent, while the equivalent class completed some online assignments but participated most frequently in classroom discussions and other traditional assignments.

All 108 participants first reviewed the student cover letter that explained the nature of the research and provided opportunity for informed consent. Next, the authors distributed the GRSLSS and reviewed the instructions for completion of the inventory. The GRSLSS was administered in a group setting during the second week of classes. Thus, we used the General Class Form to assess the initial learning styles of the students. Students self-scored the inventory, and we obtained raw scores for each of the learning style categories. Inventories were reviewed by the researchers for compliance with directions and for accuracy of scoring.

Research Outcomes

The present study compared social learning styles between distance education and equivalent on-campus classes using the GRSLSS. The average or mean scores of the distance learning class and the equivalent health education class on each of the six categories are shown in Figure 1. Relatively larger differences in the average scores of the two classrooms
occurred for the independent and the dependent learning styles. Compared with those students enrolled in the traditional classroom, the students in the distance class had higher scores on the independent learning style scale and lower scores on the dependent scale. A statistical test (a t test) was used to determine if the differences in the scores between the independent and dependent learning styles were due to chance.

The variations in average scores between the two styles were found to be statistically significant and thus not likely due to chance (p < .01). The variations in average scores between the two classrooms on the avoidant, competitive, collaborative, and participant learning styles were relatively small, and a statistical analysis using a t test revealed that they were not statistically significant.

To ascertain the patterns in the relationships among the learning styles within each class, we examined the associations among different combinations of styles. This was done by calculating the correlation coefficients associated with the combinations of the six learning styles. The outcomes of this analysis are shown in table 1 for the distance learning and traditional classroom groups. For reading this table, we remind the reader that a correlation coefficient varies from -1, 0, to +1, and that the degree to which it deviates from zero in either direction reflects the strength of the relationship between the two variables. The asterisks with some of the values indicate that the size of the correlation was statistically significant and thus not due to chance.

Correlational analysis within the online group showed a negative relationship between the independent learning style and the collaborative and dependent styles. In other words, people who were more independent in their learning styles also tended to be less collaborative and dependent. A second important relationship (positive correlation) was found between the collaborative learning style and the dependent and participant learning styles. That is, students who were more collaborative in their learning styles also were more dependent and participatory in their approach to learning.

In the equivalent on-campus group, significant positive correlations were found between the collaborative learning style and the competitive and participant styles. That is, on-campus students who were collaborative also tended to be competitive and participatory in the classroom. Finally, a positive correlation between the competitive and participant styles of learning also was observed. Students who tended to compete also were “good classroom citizens” and were more willing to do what the teacher wanted them to do.

### Table 1.—Intercorrelations between Learning Style Scales for Online and Equivalent On-Campus Students

<table>
<thead>
<tr>
<th>Scale</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<tbody>
<tr>
<td><strong>Online students (N = 68)</strong></td>
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<tr>
<td>1. Independent</td>
<td>—</td>
<td>-.08</td>
<td>-.36**</td>
<td>-.37**</td>
<td>.07</td>
<td>-.12</td>
</tr>
<tr>
<td>2. Avoidant</td>
<td>—</td>
<td>—</td>
<td>-.03</td>
<td>.12</td>
<td>-.02</td>
<td>-.58**</td>
</tr>
<tr>
<td>3. Collaborative</td>
<td>—</td>
<td>—</td>
<td>.37**</td>
<td>-.04</td>
<td>.28*</td>
<td>.24</td>
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<tr>
<td>4. Dependent</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.08</td>
<td>—</td>
<td>.12</td>
</tr>
<tr>
<td>5. Competitive</td>
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<td>6. Participant</td>
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**Equivalent on-campus students (N = 40)**

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<th>Scale</th>
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<th>3</th>
<th>4</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Independent</td>
<td>—</td>
<td>-.20</td>
<td>.10</td>
<td>-.12</td>
<td>.13</td>
<td>.09</td>
</tr>
<tr>
<td>2. Avoidant</td>
<td>—</td>
<td>—</td>
<td>-.37*</td>
<td>-.12</td>
<td>-.01</td>
<td>-.67**</td>
</tr>
<tr>
<td>3. Collaborative</td>
<td>—</td>
<td>—</td>
<td>.27</td>
<td>.51**</td>
<td>.52**</td>
<td></td>
</tr>
<tr>
<td>4. Dependent</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.15</td>
<td>.31</td>
<td>.46**</td>
</tr>
<tr>
<td>5. Competitive</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6. Participant</td>
<td>—</td>
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</tr>
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Note: *p < .05, two-tailed. **p < .01, two-tailed.
Discussion

Gibson (1998) has challenged distance education instructors to “know the learner” (140). She noted that distance learners are a heterogeneous group and that instructors should design learning activities to capitalize on this diversity (141). Because the dynamic nature of the distance population precludes a “typical” student profile (Thompson 1998, 9), we should continually assess students’ characteristics.

A professor using the present data could plan learning opportunities that would emphasize the learning preferences with each of the commonly preferred learning styles (independent, dependent, collaborative, and participant), thus matching teaching strategies with learning styles.

Of particular interest were the significant differences between the groups in the independent and dependent categories. The distance students more strongly favored independent learning styles. It is not surprising that students who prefer independent, self-paced instruction would self-select into an online class. It may be that they are well suited to the relative isolation of the distance learning environment. In his research, Gee (1990) noted that successful telecourse students favored an independent learning style. James and Gardner (1995) suggested that students who favored reliance on independent learning skills would be more suited to a distance format.

As a result of these significant differences, teaching strategies in the distance class should emphasize relatively more independent and fewer dependent learning opportunities. This approach has practical significance given that professors often complain of too little class time to devote to learning objectives. Armed with learning style data, we can more efficiently allocate instructional time to various learning types.

Not only were online students more independent than the on-campus students, but their independent learning preferences were displayed in a way that was negatively related to how dependent and collaborative they were. That is, the independence of online learners was not tied to needs for external structure and guidance from their teacher (dependence) or a need to collaborate with their classmates. The online students can be described as “strongly independent,” in that they match the stereotype of the independent learner in terms of autonomy and the ability to be self-directed.

Self-direction and independence were facilitated in the online course by offering students flexible options to shape their learning environment. The lead author, Diaz, used self-paced, independent learning activities that allowed students to choose from a menu of online “cyber assignments” based on their personal interests and the relevance of the assignments. Students completed their chosen assignments by deadlines posted at the class Web site.

In contrast, students in the equivalent on-campus class were significantly more dependent learners than the distance group. Because dependent learners prefer structure and guidance, it is not difficult to understand why they might view the isolation and need for self-reliance in a distance education environment with some apprehension. The low level of independence displayed by on-campus students was not related to any other aspects of their styles as learners. Thus, independence was clearly a weaker learning preference for traditional class students.

The online students also displayed collaborative qualities related to their need for structure (dependence) and their willingness to participate as good class citizens (participant dimension). Thus, although online students prefer independent learning situations, they are willing and able to participate in collaborative work if they have structure from the teacher to initiate it. In his online class, Diaz has used listservs and “threaded discussion” areas to promote collaboration among distance students.

In the past, he designed collaborative activities that required students to initiate peer contact and conduct the collaboration with a minimum of structure and support from him. Based on the findings of the current study, it is apparent why this strategy failed: Online students will apparently respond well to collaborative activities, but only if the teacher provides enough structure and guidance. Diaz’s mistake was that he assumed that online students would be self-directed, and autonomous, regardless of the type of learning activity.

In contrast, the traditional class students had collaborative tendencies related to their needs to be competitive, and good class citizens. In other words, they were interested in collaboration to the extent that it helped them to compete favorably in the class and to meet the expectations of their teachers. Thus, collaboration was tied to obtaining the rewards of the class, not to an inherent interest in collaboration.

Average avoidant and competitive learning style scores indicated that these learning preferences were favored to a lesser degree by both groups. It was interesting that, though we live in a highly competitive society, neither the online or equivalent on-campus students really preferred a competitive learning environment. However, the on-campus students appeared to favor competitiveness if it was clear that it was expected (i.e., thus the relationship of competitive and participant styles).

We can also use learning style data to help design “creative mismatches” in which students can experience their less-dominant learning style characteristics in

Strengthening students’ less-preferred learning styles helps them become more versatile learners and adapt to the requisites of the real world.
a less-threatening environment (Grasha 1996, 172). Designing collaborative assignments for independent learners, or independent assignments for dependent or collaborative learners, is appropriate and even necessary. Strengthening less-preferred learning styles helps students to expand the scope of their learning, become more versatile learners, and adapt to the requisites of the real world (Sarasin 1998, 38).

Learning styles were not the only differences between the distance and comparison groups in this study. Demographic data indicated that the distance group had a higher percentage of females (59 percent, 49 percent), students currently enrolled in under 12 units (66 percent, 50 percent), students who had completed 60 or more college units (12 percent, 1 percent), students who had completed a degree (12 percent, 7 percent), and students above 26 years of age (36 percent, 6 percent). These characteristics agree with the general profile of distance students as reported by Thompson (1998). Although it is tempting to identify and depend on a “typical” distance student profile, it is likely that the dynamic nature of distance education in general will keep student characteristics fluid. Thus, distance education instructors should continually monitor students’ characteristics.

Conclusions

We have concluded that local health education students enrolled in an online class are likely to have different learning styles than equivalent on-campus students. We found that online students were more independent, and on-campus students were more dependent, in their styles as learners. The on-campus students seemed to match the profile of traditional students who are willing to work in class provided they can obtain rewards for working with others and for meeting teacher expectations. Online students appeared to be driven more by intrinsic motives and clearly not by the reward structure of the class.

One of the limitations of this study was the use of a non-probability (convenience) sampling technique. Non-probability sampling is used when it is impossible or impractical to use random sampling techniques. That is the case in a large portion of educational research. Although still valid, the results should not be overgeneralized. We have demonstrated a real and substantial difference in learning styles between distance and equivalent on-campus health education students at our college.

Before faculty rush to find out the effects of learning styles on student outcomes, they should first address the issue of whether learning style differences exist at all. The results of this study should send an important notice to faculty who are teaching their traditional courses in a distance mode, that there may be drastic differences in learning styles, as well as other characteristic differences, between distance and traditional students.

As the World Wide Web becomes an important medium for education delivery, more and more courses will be offered in an online format. Though faculty may attempt to use the same teaching methods in a distance environment that they would employ in an on-campus class, the data from the current study suggest that faculty will encounter significantly different learning preferences as well as other different student characteristics. Professors may want to employ learning style inventories, as well as collect relevant demographic data, to better prepare for distance classes and to adapt their teaching methods to the preferences of the learners.

Faculty should use social learning style inventories and resulting data for help in class preparation, designing class delivery methods, choosing educational technologies, and developing sensitivity to differing student learning preferences within the distance education environment. Future field-based research should replicate the current study in different institutions and disciplines.

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REFERENCES


