



# Ed at a Distance

Magazine and Ed Journal

August 2001

Vol. 15 : No. 80

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**Editor's Note:** Learning style preferences play a role in success in distance learning and in the educational process in general. Diaz and Bontenbal use a short assessment instrument to check skill levels, study habits, and personal characteristics to appraise how successful the individual student would be in a distance-learning environment. This paper shares their theoretical constructs, implementation and research data.

## Learner Preferences: Developing a Learner-Centered Environment in the Online or Mediated Classroom

*David P. Diaz and Kevin F. Bontenbal*

### Abstract

Changes in learning theory have precipitated changes in the way we view students and the learning process in general. Constructivist learning theory provides a rationale for understanding and assessing student learning preferences.

Research has underscored the differences in student characteristics, especially between online and traditional student groups. Since students are likely to have different learning styles as well as other characteristic differences, teachers should assess their students and use the resulting data to help them design and implement instruction. Teachers can use a variety of tools to assess student learning preferences in the traditional and distant classrooms. Several Web-based communication technologies can be used to design learner-centered class assignments and activities. These tools can accommodate a variety of learning styles and even accommodate those learning objectives that require collaboration and discussion.

### 1. Introduction

For many years, educators have noticed that some students prefer certain methods of learning over others. These traits, referred to as learning styles by some, or learning preferences by others, form a student's unique preference for learning and aid teachers in the planning of group and individualized instruction.

According to Blackmore [1]:

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.

MacKinnon [2] has noted the implications of differing student learning preferences. He states, "The wide range of individual differences surely must mean that there is no single method for nurturing creativity; ideally the experiences we provide should be tailor-made, if not for individual students, at least for different types of students.

The following article will describe how changes in learning theory have provided an important rationale for assessing student learning preferences. The authors hope to underscore that learners are indeed different, especially in the online classroom and, thus, have differing needs in the learning environment. The authors will describe these differences with special focus on the differences



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between traditional and online students. Finally, various examples of how teachers might assess learning preferences and other student characteristics and how online class assignments and activities might be focused toward student learning preferences will be demonstrated.

## 2. Learning Theory

Traditional education has historically been dominated by what we will generically term as "instructivist" learning theory [3].

Instructivism asserts that knowledge—besides being independent of, and external to, the learner—flows in a mostly unidirectional path, proceeding from the knowledgeable authority (teacher), or from instructional content, to the passive learner. Instructivism favors a teacher-centered, lecture-based (or other uni-directional) mode of instructional delivery and entails the assumption that learning takes place passively.

Educational learning theory changed markedly throughout the 20th century [4]. Dewey, in the early 1900s noticed that students who were interested in their subjects applied more effort to their studies. Similarly, the "curriculum experiments" of the 1930s, which promoted a curriculum designed to meet the future work needs of post-Depression-era students, also promoted a focus on student-centered learning. Subsequently, Thorndike encouraged "transfer training" that is, training that could be transferred to real-world workplace environments. These ideas, and others, helped to shape the concept of student learning preferences and paved the way to current learning theory.

At the present time, the adult learning theory paradigm is shifting from a teaching towards a learning focus [5, 6]. The "constructivist" learning theory asserts that the learner constructs new knowledge through a process of relating new information to prior knowledge and experience [7]. According to the constructivist approach, teachers become guides rather than dispensers of knowledge, and instructional practice places more importance on the role of the student in constructing knowledge. Thus, constructivist practice demands more active forms of classroom instruction that engage the student in the process of learning and that rely on student input for shaping instructional objectives.

## 3. Learner Differences

As teachers begin to take their traditional courses online, they often transfer their traditional experiences and methodologies, untouched, into the online environment. The underlying (and often unspoken) assumption is that the students must be the same, thus, methodologies that are successful in the traditional environment should also be successful online. This common notion also entails the assumption that classroom methods and activities must be appropriate for all students in all environments. The authors of this article challenge both of these propositions.

**3.1 Learning Styles:** A recent study by Diaz [8] demonstrated that online students exhibit significantly different learning styles when compared to their traditional classroom counterparts. The average or mean learning style scores of online (n = 94) and traditional (n = 40) health education students on each of six categories of the Grasha-Riechmann Student Learning Style Scales (GRSLSS) are shown in Table 1. More information about this learning style instrument can be found in Grasha's text, Teaching With Style [9].

Table 1. Comparison of Learning Style Means by Category

| Class  | n  | Independent | Avoidant | Collaborative | Dependent | Competitive | Participant |
|--|----|-------------|----------|---------------|-----------|-------------|-------------|
| Online   | 94 | 3.57**      | 2.53     | 3.57          | 3.55**    | 2.36        | 3.74        |
| Traditional  | 40 | 3.26        | 2.46     | 3.81*         | 3.82      | 2.48        | 3.79        |
| <p><b>Note.</b> Learning style scores are based on a five-point rating scale that ranges from strongly disagree (rating of 1) to strongly agree (rating of 5).</p> <p>*p &lt; .05. **p &lt; .01.</p> |    |             |          |               |           |             |             |

Compared to those students enrolled in the traditional classroom, the students in the online class had higher scores on the Independent learning style scale and lower scores on the Collaborative and Dependent learning style scales. A statistical test (i.e., t test) revealed that these differences between

the two classrooms could not be attributed to chance; that is, they were statistically significant. The variations in average scores between the two classrooms on the Avoidant, Competitive, and Participant learning styles were relatively small and were not statistically significant.

The broad range of learning style scores across categories demonstrated the variety of learning styles in both groups and illustrated the diversity of the distant student as noted by Thompson [10]. An instructor, acknowledging these learning style differences, could plan learning opportunities that would emphasize the learning preferences of each of the commonly preferred learning styles (i.e., Independent, Dependent, Collaborative), thus matching teaching strategies with learning styles. Instructors could also design class activities that creatively mismatch learning preferences, thereby helping students develop weaker or underused learning styles.

Further, instructional strategies in the online class should emphasize relatively more independent and fewer dependent learning opportunities. This approach has practical significance given that instructors often complain of too little "class time" to devote to learning objectives. Armed with learning style data, instructors can more efficiently allocate instructional time to various learning activities.

Table 2 shows the values of the correlation coefficients for each possible combination of learning styles within the groups. Correlational analysis within the online group indicated that a higher Independent learning style score was significantly associated (negatively) with lower Collaborative and Dependent scores. Thus, not only were online students more independent than the on-campus students, but this independence was not tied to needs for external organization and direction from their teacher (i.e., dependence), or for a need to collaborate with their classmates. These findings suggest that online students can be described as "strongly independent," in that they match the archetype of the independent learner in terms of autonomy and the ability to be self-directed.

A second important relationship (positive correlation) was found between the Collaborative and the Dependent learning styles. That is, higher Collaborative scores were generally associated with corresponding high scores in the Dependent style. This correlation demonstrated that, though online students, in general, 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 other words, independent learners, in this case, were not as strongly independent when functioning in collaborative learning environments. This suggests that teachers should provide sufficient guidance when facilitating collaborative assignments/activities for these students.

Table 2. Intercorrelations Between Learning Styles Online and On-Campus Students

| Scale   | 1  | 2     | 3       | 4       | 5      | 6       |
|---|----|-------|---------|---------|--------|---------|
| Online Students (N = 94)  |    |       |         |         |        |         |
| 1. Independent  | -- | -0.13 | -0.37** | -0.38** | 0.16   | 0.10    |
| 2. Avoidant   |    | --    | -0.05   | 0.10    | -0.01  | -0.67** |
| 3. Collaborative  |    |       | --      |         |        |         |
| 4. Dependent  |    |       |         | --      |        |         |
| 5. Competitive  |    |       |         |         | --     |         |
| 6. Participant  |    |       |         |         |        | --      |
| Traditional Students (N = 40)   |    |       |         |         |        |         |
| 1. Independent  | -- | -0.20 | 0.1-    | -0.12   | 0.13   | 0.09    |
| 2. Avoidant   |    | --    | -0.37*  | -0.12   | -0.01  | -0.67** |
| 3. Collaborative  |    |       | --      | 0.27    | 0.51** | 0.52**  |
| 4. Dependent  |    |       |         | --      | 0.15   | 0.31    |
| 5. Competitive  |    |       |         |         | --     | 0.46**  |
| 6. Participant  |    |       |         |         |        | --      |
| Note. A correlation coefficient varies from -1, 0, to +1. The degree to which it varies in either direction reflects the strength of the relationship of the two variables. |    |       |         |         |        |         |
| *p < .05, two-tailed. **p < .01, two-tailed.  |    |       |         |         |        |         |

In the traditional group, significant positive relationships were found between the Collaborative

learning style and the Competitive and Participant style. That is, traditional students were more apt to be eager class participants and willing collaborators if it helped them to compete favorably in the class. 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.

**3.2 Demographic Differences:** Besides differences in learning styles, there were other differences between online and traditional students that underscored the diversity between these two groups. Table 3 illustrates some of these differences.

Table 3. Demographic differences: Traditional vs. Online

|                             | Traditional | Online |
|-----------------------------|-------------|--------|
| Older Students: 22-50 years | 49.3%       | 61.4%  |
| White students              | 76.1%       | 81.3%  |
| Completed over 60 units     | 8.5%        | 36.5%  |
| Earned degrees              | 2.2%        | 7.3%   |

Demographic data in the Diaz study revealed that online students exhibited different characteristics when compared to traditional students. The White ethnic group was disproportionately represented in online classes (81.3%) compared to traditional classes (76.1%). The online students were decidedly older than the traditional group. Nearly 62% of the online students were between 22-50 years, compared to 49.3% for the traditional class. These results support the literature, which indicates that distance education students are older than their on-campus counterparts [10]. Further, online students were more academically experienced as evidenced by the fact that over 36% of the online students had already completed more than 60 college units, compared to only 8.5% of the traditional students. Online students were also about 3 times as likely to have already completed a college degree.

Thus, there seems to be sufficient evidence that distance education students will display different characteristics than their traditional counterparts. Given this assumption, it is important to understand how student characteristics might be assessed and how this information might impact instructional design and implementation.

#### 4. Student Assessments

Assessment instruments are an important way of determining different learning characteristics and of gathering other pertinent information about students. These instruments can reveal information valuable to both the instructor and student and can be found in the form of questionnaires, readiness surveys or learning style inventories. For an instructor, information gathered from these assessments is particularly useful in designing assignments that meet different student learning styles. If optimal student learning is dependent on learner preferences, and these vary between distance and traditional students, then instructors should be aware of these differences and alter their preparation and instructional methods accordingly. Students can also benefit from these assessments by discovering their preferred learning mode, and by determining the types of learning situations in which they would be most successful, given their particular learning preferences.

In a constructivist-learning model, assessment tools are essential. If students are to play an important role in learning, the instructor must seek to understand the students and their preferences for learning. Learning is facilitated by helping students to understand their learning preferences and by providing them sufficient opportunities to meet those preferences. It is important to use assessments at the onset of a learning situation so the instructor is better prepared to guide the student through the learning process and the student is better prepared to make decisions that will lead to successful outcomes.

**4.1 General Questionnaires/Surveys:** One way of gathering information about students is through the use of general questionnaires and surveys. Questionnaires can be designed in several Web-based formats for easy delivery. An instructor may use a questionnaire to garner student perceptions on assignments, learning situations, or self-perceived expertise with various technologies. They might also collect data regarding

hardware, software, or ISPs used by the students. This information might help instructors to author their educational products to the "lowest common denominator" and/or to set class minimum technology standards.

**4.2 Student Readiness Surveys:** Student readiness surveys can be a powerful tool in assessing student readiness for a particular learning modality. With the proliferation of learning environments on the Internet today and the increased use of technology-mediated instruction, readiness surveys provide a good way of determining if a student has the necessary characteristics to be successful in these new learning situations. For example, surveys can check for technical skill levels and comfort with technologies, study habits, and other personal characteristics that are germane to learning situations.

An example of a distance education self-assessment survey designed by Bontenbal and Diaz (<http://library.cuesta.cc.ca.us/distance/survey.htm>), demonstrates how a readiness survey can be used to help students determine if they would be successful in a distance education setting. Upon completion of this short ten-question survey a window is displayed giving the results of the survey and an appraisal of how successful the individual would be in a distance education environment (Figure 1).

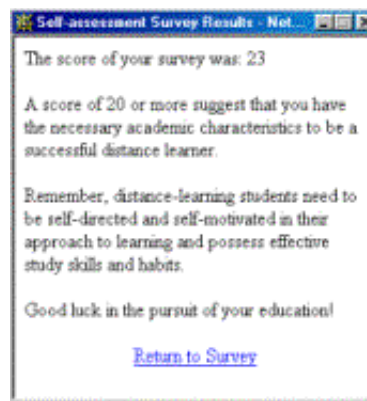


Figure 1. Distance Education Self-assessment Survey Results

Readiness assessments can inform students of their strengths and weaknesses in particular learning situations. They can also help instructors guide students through different learning modalities.

**4.3 Learning Styles Surveys:** Of the different types of student assessments described, learning style surveys could arguably be the most valuable to student success and the educational process in general. Tony Grasha 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 participate in learning experiences" [11]. There are several different kinds of learning style inventories available and each can help in understanding the different aspects of a student's preference for learning. The Grasha-Riechmann Student Learning Style Scales (GRSLSS) is ideal for assessing student learning preferences in a college-level distance (or mediated) education setting. First, the GRSLSS is one of the few instruments designed specifically to be used with senior high school and college/university students. Second, the GRSLSS is a relevant scale to use in a distance education setting since it addresses one of the key distinguishing features of a distance class: the relative absence of social interaction between instructor/student and student/student. Third, the GRSLSS promotes an optimal teaching/learning environment by helping faculty design courses and develop sensitivity to student/learner needs. Finally, the GRSLSS promotes understanding of learning styles in a broad context by spanning six categories. Since students possess all of six learning styles to a greater or lesser extent, this system of classification prevents learning style stereotyping and provides incentive for growth in underused learning style areas.

An online JavaScript-based application of the GRSLSS developed by Diaz and Bontenbal can be found at <http://library.cuesta.cc.ca.us/distance/new/lrnstyle.htm>. This particular version of the GRSLSS is useful because it gives the student immediate scoring of his/her survey and provides extensive feedback and interpretation of the various learning styles (Figure 2).

Further, this survey's ability to submit results to an instructors e-mail, or store results in a database,

make it a valuable tool for course design and management.



Figure 2. Online Display of GRSLSS Results

## 5. Assignments/Activities

The type of assignments/activities that are used by an instructor, and thus, the technologies selected to support them, are ultimately based on the preferred learning theory of the teacher. As we have stated elsewhere [3]:

...we view learning theory as a continuum between instructivism on the one hand, and constructivism on the other. The extent to which teachers see themselves as instructivist versus constructivist, implicitly determines the extent to which classroom activities are based on teacher or student preferences, and guides the selection of instructional technologies.

In turn, the preferred learning theory of the instructor may be based on several factors, including: learning style, teaching style, personality type, teaching discipline, etc. Whether teachers choose instructivist or constructivist activities for the classroom, there are appropriate technologies to assist them. An instructivist approach to teaching/learning promotes two predominate types of communication in the classroom: teacher-to-student, and content-to-student. The activities and assignments generated by instructivist approaches usually are unidirectional and typically place students in a passive learning role. Instructivist delivery modes can include posting online lecture notes and creating independent study assignments using the Web. Teachers can make these activities more compelling and interactive by including hypermedia such as audio, video and graphics, Flash, and/or Virtual Reality Modeling Language (VRML). Multimedia presentation software, like PowerPoint, allows the user to export a presentation as a series of HTML files (Figure 3), including notes and/or narrative. One can also export the presentation as a video file.



Figure 3. Screen shot of PowerPoint exported as HTML

Constructivist learning theory, on the other hand, places a premium on the students' active role in the learning process.

Constructivist practice facilitates reciprocal communication and a more balanced participation between educational participants.

Several technologies within the realm of the Web can facilitate self-directed, active, and collaborative learning as well as meet the challenges of educational delivery to the online learner. Several forms of synchronous (real time) and asynchronous (delayed time) technology can provide interaction between teacher and learner that is stimulating and that meets the needs of the learner.

Information can be delivered in a variety of forms. Synchronous technologies (e.g., "chat") can create and maintain a sense of 'community' that is crucial for many college students. They can be effectively used for small groups and for office hours but can be difficult to manage when attempting to facilitate larger group discussions. As a result, we do not recommend that you employ synchronous technologies as the mainstay of your class collaborative or discussion activities. Further, synchronous technologies require students to be at the same virtual place at the same time. This offsets one of the main desirable features of an online class: namely that students can access the class at any time they choose. As synchronous technologies become more commonplace, cheaper, and as the Web infrastructure grows to better support them, they may become worthwhile tools for facilitating collaboration in the virtual class. Until that time, it would be advisable to limit their use to options for virtual office hours and small, optional study groups.

Listservs and threaded discussion boards are asynchronous forms of communication. That is, students need not be present at any particular time to use these technologies. A listserv is useful because it employs a metaphor that is readily understood by most students: e-mail. Thus, listservs keep students in a familiar environment and, in many cases, obviate the need for technical support.

By simply checking their e-mail, your students will receive notifications from the class. This makes the listserv useful for sending class announcements (especially those that must be acted on immediately) and for addressing questions that might apply to all students. Teachers can set up mini listservs for facilitating small group discussions. By including yourself as a member on these mini-lists, it is possible to keep track of the discussion for each group. Listservs tend to be more difficult to manage as the group grows. Since every message to the list goes to everyone on the list, as more students send messages the messages will tend to backlog. This makes it difficult to ferret out topic threads and for archiving. If a listserv is used for discussion and collaborative activities, be sure to keep the groups small and teach students how to archive messages (i.e., using "mail rules") in their e-mail client software.

Threaded discussion or message boards allow students to post a response to a topic or question that is then viewable by all students immediately after it is posted. This is a simple and effective way of visualizing topic threads and for having access to archives of different threads. As with listservs, students have time to consider their posts, and correct spelling and grammar errors before contributing their posts.

Real-time "chat," "instant messaging," "threaded" discussion and listservs are interactive and bi-directional modes of communication. These technologies can be used to facilitate learning activities that are active and that address collaborative learning styles. Together, these technologies represent an innovative and potent force for educational delivery over the Web [12].

## 6. Summary/Conclusions

Changes in learning theory have created the need to learn more about our students and to put that knowledge to work in the design and implementation of our classes. There are likely to be a variety of differences between traditional and technology-mediated, or distance education, students. These differences should be accounted for and addressed in designing and implementing traditional or distance education. By using Web-based surveys, questionnaires and inventories, an instructor can discover a wealth of information with respect to student learning preferences and other student characteristics.

New communications technologies can accommodate all student learning preferences including those whose objectives require discussion and collaboration. Teachers will need to learn more about and become familiar with the use of these new tools to determine their potential efficacy in the classroom.

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