

**Triadic Reciprocity: A Path to Assessing Student Variables  
in Web-Based Distance Education**

**Authors: Dailey, Kathleen A., Carey, Lou M., & White, J. A.  
University of South Florida**

**Abstract**

The focus in distance education has often been more directed to the development and delivery of instruction with an emphasis on the technological aspects of that process than on the learner. This paper reports the development and study of the Distance Learning Dimensions (DLD), an instrument grounded in Social Cognitive Theory (Bandura, 1986), focusing on the learner-participant. A factor analysis revealed three factors (environmental influences, personal traits, and learner behaviors) in the instrument consistent with the theory used in development of the items. This instrument, intended to profile the successful distance learner, is useful in the face of the high dropout and failure rates observed among university students who attempt to learn at a distance.

**Paper presented at the annual Meeting of the American Educational Research Association  
New Orleans, Louisiana  
April, 2000**

## **Triadic Reciprocity: A Path to Assessing Student Variables in Web-Based Distance Education**

**Authors:** Dailey, Kathleen A., Carey, Lou M., & White, J. A.  
University of South Florida

### **Abstract**

*The focus in distance education has often been more directed to the development and delivery of instruction with an emphasis on the technological aspects of that process than on the learner. This paper reports the development and study of the Distance Learning Dimensions (DLD), an instrument grounded in Social Cognitive Theory (Bandura, 1986), focusing on the learner-participant. A factor analysis revealed three factors (environmental influences, personal traits, and learner behaviors) in the instrument consistent with the theory used in development of the items. This instrument, intended to profile the successful distance learner, is useful in the face of the high dropout and failure rates observed among university students who attempt to learn at a distance.*

### **Introduction**

Rapid growth in computer and communication technology has encouraged an increase in distance education and training programs for adult learners in higher education contexts. The availability of technological media through which instruction and training can be delivered stimulates instructional development and increased opportunities to extend training interventions beyond the physical confines of educational institutions. Communicating with learners in new ways can lead to cost effective skill development and expanded learning opportunities; however, within this dynamic context of technological development, few have studied the relationship of the learner to the changing learning environment. A primary obstacle to successful distance education is the discrepancy between the skills students need and the skills they have as they approach new learning situations. Distance education programs, which encompass early forms of correspondence learning as well as instant-access Internet-delivered instruction, have reported significant problems with high failure and dropout rates among the students who attempt to learn at a distance from an institution that provides instruction (Moore & Kearsley, 1996). It is important to identify the characteristics and influences that successful distance education students share so that selection or self-selection guidelines can be developed that will both reveal the degree of readiness and predict the successful performance of the learner.

### **Purpose**

The purpose of this study is to develop and validate a survey instrument designed to enable students to judge their preparedness and suitability for successful computer-based learning at a distance. Based on knowledge of where they stand with respect to factors that contribute to successful distance learning, students can make better enrollment choices. In addition, institutions can increase efficiency by directing available learning resources to those students who are likely to persist and be successful in distance education. Careful attention to an examination of related research literature and sound instrument development procedures have preceded a pilot test in which data were collected using the instrument. Data from an initial test were assembled and used to evaluate the performance of the Distance Learning Dimensions instrument. A follow-up study was conducted with a revised version of the instrument to further develop the instrument and to accumulate information to support its validity.

### **Rationale and Background**

**Nature of Distance Education.** Contrasted with instructional delivery within the traditional classroom, instruction delivered by means of distance education changes the nature of the demands placed on individual students as they learn. Desmond Keegan's analysis of distance education definitions (1996) produced five basic characteristics that describe the environment of distance education. These characteristics include: (1) the separation of the teacher and learner in space and/or time throughout the defined learning process; (2) the influence of a training organization that supports the planning and preparation of learning materials and the provision of student support services; (3) the use of some media to connect teacher with learner and to convey educational content; (4) the provision of some form of two-way communication in which both teacher and learner can initiate interaction; and (5) some separation of the learner from the learning group so that the student is treated as an individual learner within the defined learning process (Keegan, 1996). To accommodate these characteristics of distance education, specific characteristics and context supports that learners need in order to be successful must be identified.

**Bandura's Model of Triadic Reciprocity in the Learning Process.** Within the context of Social Cognitive Theory, Bandura (1986) provides a theoretical framework through which one can examine characteristics of successful distance education students. Using Bandura's concept of triadic reciprocity, this framework classifies student characteristic variables into three dimensions: personal learning characteristics, environment factors, and personal learning behaviors. The theory suggests that variables within these dimensions interact with each other to impact the learner. Their reciprocal interaction can be observed in relation to performance outcomes in distance education. Personal learning characteristic variables reflect individual traits and predispositions; environment variables reflect those external factors that impact the student; learning behavior variables reflect the set of practices and behaviors that the student brings to the learning situation.

Personal characteristics that merit examination include learner autonomy, curiosity, persistence, initiation skills, trait anxiety, self-efficacy, and goal commitment. Moore (1991) studied the impact of learner autonomy, and he suggested that learner autonomy is the ideal toward which each student will move as a result of natural maturation. The autonomous learner must temporarily surrender autonomy in order to seek help from a teacher. The learner will get what he needs and then seek to resume his autonomous learning processes. Moore's first hypothesis was that distance education programs, by the nature of their structure, require more autonomous behavior from students than do traditional education programs. The people who choose to participate and who succeed in distance education will be measurably more autonomous. He found significant person by treatment interactions to support this hypothesis. The second hypothesis was that, the more distant the program, the more autonomous the learner who will choose to participate. This hypothesis was not supported. In contrast, learner autonomy explored by others is seen as too general to explain differences observed in learner motivation, ability, and learning strategies (Keegan, 1993; Lund & Barksdale, 1995). Highlighting the importance of learner autonomy in situations where traditional external motivators like teacher presence are less accessible to the learner, Deci & Ryan (1987) contrasted effects of controlling and autonomy supportive environments. They found that students' perceptions of competence showed significant improvement in autonomy supportive environments as opposed to controlling environments. When the context was autonomy supportive, intrinsic motivation was maintained. Students chose to spend time on a task in the absence of any extrinsic reward or directive.

Environmental impact variables include home, work, study, and technological environments as well as state anxiety, students' role identification, and their sense of isolation. The isolation of the student from the teacher, the institution, and the learning group can be exacerbated by the differentiated staffing models that are often used to implement distance education (Kember, 1995). Hatcher and Craig (1998) conducted a study of a degree program in human resource development (HRD) that was delivered by distance education. This program placed great emphasis on student support services that were established to support socialization between learners and faculty. Instructional approaches were designed to accommodate varied levels of preparedness for autonomy from students. Sense of isolation was measured across two groups of students, and those in the social support condition reported significantly less isolation ( $p < .01$ ) than those in a control group. The performance outcomes in the treatment group, however, were not significantly different from the control group.

Learning behavior variables include expectations for course structure, goal setting, pursuit of extrinsic reinforcement, experience with computer-delivered instruction, self-regulation, management of information overload, and specific rationale for studying at a distance. Everett & Grubb (1997) hypothesized that major factors that influence a learner's accommodation to distance education include prior experience, the rationale behind a student's decision to take a distance course, acclimation to sensory overload, and the participatory role that is supported by the course structure. Results from student surveys revealed that being encouraged to participate, asking questions, being given explicit instructions, being provided access to support from a human facilitator, being called by name by the instructor, being encouraged to reflect on their own learning process within the environment, use of prior experience as a referent, and the feeling that they were able to monitor their own learning all correlated with their comfort within the learning environment.

At present, technological developments have stretched educators to deliver instruction in multiple ways using teleconferencing, networking, the Internet, multimedia, and other tools (Brenner, 1998; Keegan, 1996). Simultaneously, the relationship of the learner to the changing learning environment has often been neglected as instructional developers have focused their attention on the processes of developing and implementing technology-supported instruction. Charles Wedemeyer of the University of Wisconsin, who spent a lifetime teaching and administering university correspondence programs, focused on the independence of the learner in distance education. He stated that teachers and learners carry out 'essential tasks and responsibilities' while separated. However, communication supports the motivated learner's freedom from the demands of traditional instructional pacing and allows him or her to participate in 'self-directed learning' (1971).

Desmond Keegan describes successful distance education as the "reintegration of the teaching act" which has been separated from its target, the learner. The design of effective learning materials for distance delivery and interactive communication between teacher and student are the tools to reintegrate and bring quality to the learning experience (1996). According to Michael G. Moore, distance education provides the bridge between teachers and learners in a setting where the two are separated by physical space and/or time. His Theory of Transactional Distance provides a descriptive theory of distance education (1990). The separateness of teacher and learner contributes to the "transactional distance, a communications gap which is a psychological space of potential misunderstandings" between teacher and learner. Instructional design and interaction routines are used to bridge this distance which is pedagogical, not geographic. On the other hand, Borje Holmberg (1989) asserts that the learner-teacher dialog is the defining aspect of successful distance education. He is very concerned with interactive support for the learner because people develop and extend their thinking by talking their ideas over with some other partner. Together, all of these characterizations of distance education suggest a need to examine students' responses to the conditions experienced in distance education.

Teaching interventions used to bridge the gap can be classified as structure or dialog, and they can be measured along a continuum. These are the variables between distance education programs. The success of distance education programs might be reflected by the extent to which the appropriate course structure works with the appropriate quantity and quality of dialog between teacher and learner while taking into account the extent of the learner's autonomy. Learner autonomy relates to the degree of learner responsibility or independence where increased autonomy increases the transactional distance. Programs can be rated on the degree of structure and the degree of interactive dialog in the context of appropriate learner autonomy (Moore & Kearsley, 1996). Moore attributes high importance to the autonomy of the learner. He sees the freedom for the learner to define his own goals as an important part of learning that is particularly supported by the context that distance education provides (Moore, 1990).

A selection process requires a well-specified criterion and valid predictors of the criterion. It begins with a task analysis that can be used to identify knowledge, skills, abilities, and other characteristics that are important for successful performance. Once criteria for successful performers have been defined, then predictors of those criteria must be selected that can be measured and used to represent each criterion (Spector, 1996). In their meta-analysis of trainability test studies, Robertson and Downs (1989) reported that psychologists produce valid selection procedures and instruments by carefully matching predictors through a point-to-point correspondence with specified criteria. This process has led to the development of work-sample testing, trainability screenings, and realistic job previews that yield valid information and possess relevance for the tasks for which candidates are being evaluated. These matching procedures build content validity into the selection tools. Procedures like these are important to develop quality instruments that assess the readiness of students to commit to a term of distance-delivered education.

### **Method**

To provide a conceptual foundation for the development of the Distance Learning Dimensions (DLD) instrument, a literature review was focused on theories that relate to the particular demands placed on distance learners and on theories of distance education. Relatively few studies have focused on which learner characteristics lead to successful performance in distance education. The concept of triadic reciprocity from Social Cognitive Theory (Bandura, 1986) suggested a framework for classifying learner characteristic variables into three interactive dimensions: personal traits, environmental factors, and behavior characteristics. This classification process began with the construction of a matrix of key student characteristics focused around these three areas. A group of distance educators met several times and used this matrix to define and analyze the characteristics displayed by distance learners and the conditions encountered. They generated items to reflect these student learning characteristics, obstacles and learning conditions encountered, and student learning behaviors observed as they interacted with their distance learning students.

After the items were further reviewed by experts, necessary item revisions were made to enhance clarity. This initial collection of items was developed into a 65-item Distance Learning Dimensions (DLD) survey instrument which was intended to profile the distance education student with the intention of comparing the constructed profiles to measures of successful performance in distance education courses.

To study the validity of the DLD, data from an initial small-group field trial were collected at the midterm point from students enrolled in a variety of distance classes. The original 65-item Distance Learning Dimensions (DLD) instrument was placed on interactive web pages for this pilot test of the instrument with 72 student participants. During this first phase, data were assembled and used to evaluate the performance of the instrument. Items were analyzed descriptively and several malfunctioning or redundant items were revised or removed. This process yielded the revised 35-item DLD instrument that was used in the second study.

During the second phase of the study, a follow-up field trial was conducted using the revised 35-item version of the instrument with a larger sample from the target population. The revised DLD was administered to 339 distance education students registered in a variety of courses. Students completed the survey at the beginning of their course orientation session.

### Data Source

**Sample.** Students who are new to distance education have little to inform them on the demands of learning within the context of a distance education course. Those in the population that the DLD is designed to assess present a wide range of educational experiences, success levels, and exposure to previous distance learning situations. The university students from which the samples were drawn for these studies are mostly commuter students at a large state university located in an urban setting. They have the opportunity to enroll in a variety of distance education courses, many of which feature web-based delivery.

Study 1 was conducted during the spring term of 1999. During the term, DLD surveys were made available to 139 distance education students enrolled in a variety of courses characterized by distance delivery and web-based instruction. Completed surveys were received from 72 distance education students, and 60 of those surveys provided complete records for use in the analysis of the instrument. Of those students responding, 83% were enrolled in upper division undergraduate programs, and the others were enrolled in graduate courses. The graduate courses included instructional technology courses such as programming, telecommunications, and instructional design. The single undergraduate course included was measurement for teachers.

Study 2 was conducted during the summer term of 1999. A total of 339 students from the same population and distribution of courses completed a revised Distance Learning Dimensions (DLD) instrument on the first day of class before any instruction or course orientation was provided. Of those students, 321 produced complete records for analysis. Individual students represent the units of analysis in these studies.

**Instrument.** The Distance Learning Dimensions (DLD) questionnaire included in Appendix A was constructed to represent the three areas of influence on individual learning based on the model of triadic reciprocity from Bandura's Social Cognitive Theory. Its 35 items describe learning environment conditions and influences, personal learning characteristics, and personal behaviors and practices that represent supports or obstacles to successful performance. A semantic differential response format with a four-point scale is used. In addition, the DLD includes 14 biographical questions related to major, gender, year of study, and other variables of interest to researchers in order to facilitate comparisons across subgroups.

**Analysis.** In study 1, descriptive statistics were obtained for the 65 items on the original DLD to study response distributions. A correlation matrix was generated for the items to identify redundancy and poor item performance. Further, Cronbach's Alpha was calculated to estimate the reliability of the instrument and to examine the item-total relationships of the items.

In study 2, simple descriptive statistics were obtained for each of 35 items on the revised DLD to capture and describe the variance of the students' responses on the items. A correlation matrix was generated for the 35 items to look for redundancy or disparity among items. Next, a principal factor exploratory factor analysis was conducted to extract factors from the data that corresponded in content to the three influences on learners: learning environments, personal traits, and learners' behaviors. Finally, Cronbach's Alpha was obtained to measure the internal consistency of each factor of the revised scale and to estimate their reliabilities.

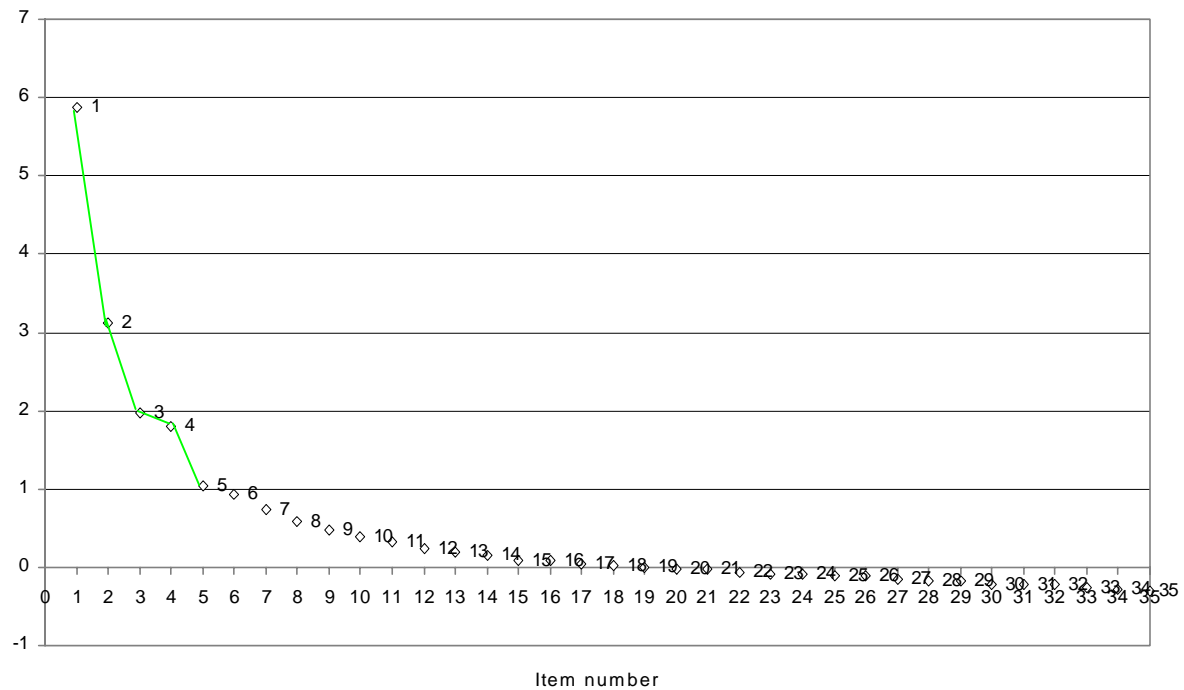
### Results and Conclusions

To examine the performance of the DLD in the first phase of the study, descriptive statistics were obtained for all items. Across the small-group participating in the pilot study, response distributions were studied within items to determine whether each item was yielding variance as expected. Item means ranged from 2.14 to 3.41 on a four-point scale. Several items with means above 3.2 were identified as negatively skewed. Items with standard deviations less than 0.75 were identified as possible weak performers. Second, an inter-item correlation matrix was used to locate items with correlations that did not match expectations. When correlations between two items were greater than 0.8, items were flagged for possible redundancy and further review. All of the items flagged by these processes were then reviewed carefully for content and redundancy. Finally, the internal consistency was estimated using Cronbach's Coefficient Alpha ( $\alpha = .95$ ) to provide an estimate of the reliability of the scale and an opportunity to examine the item-total relationships. Revision and removal of items to refine the instrument for use with subsequent samples of distance education students were based primarily on content review and item-level statistics. Through these examination processes, 30 items were eliminated and many others were revised.

During the second phase of data collection and analysis, the same processes were repeated with response data for 35 items of the revised DLD that were administered to 339 students. Response distributions were examined using descriptive statistics for each item and visual inspection of patterns in the data to identify poorly performing items. In addition, a principal factor exploratory factor analysis was used to identify the number and nature of the factors underlying the 35 items of the DLD. Three factors were identified that corresponded in content to the three areas of environment, characteristics, and learners' behaviors.

A principal factor exploratory factor analysis was conducted in SAS to analyze the response data from 321 complete observations. A visual inspection of the scree plot of the eigenvalues located in Figure 1 was somewhat ambiguous, suggesting that three to five factors could be useful to explain the patterns in the data. It was noted that a straight line fitted to the first three eigenvalues on the scree plot begins to change direction after the fourth eigenvalue is considered. The three-factor solution was retained because it was a more parsimonious representation than other solutions with greater interpretability with respect to the theoretical foundation of the instrument. This three-factor solution seemed most useful to reveal the simple structure of latent variables underlying the instrument.

**Figure 1. Scree Plot of Eigenvalues for the Distance Learning Dimensions Survey**



Because these factors were expected to be correlated, an oblique rotation (promax) was used to develop structure and pattern matrices. The analysis revealed that the three factors did, in fact, show a moderately small positive inter-factor correlation as presented in Table 1. Since the factors are related, the pattern coefficients are

**Table 1. Inter-factor Correlations**

	<b>FACTOR1</b>	<b>FACTOR2</b>	<b>FACTOR3</b>
<b>FACTOR1</b>	1.00000	0.15172	0.21264
<b>FACTOR2</b>	0.15172	1.00000	0.32354
<b>FACTOR3</b>	0.21264	0.32354	1.00000

necessary to reveal the unique contributions made by the underlying factors to each item variable. The criterion of 0.45 as a threshold for pattern coefficients was established in this study for meaningful unique contributions of an underlying factor to an item. This decision was based on the categories suggested by Comrey (1992) where pattern

coefficients greater than .71 were considered excellent, greater than .63 were very good, greater than .55 were good, greater than .45 were fair, and greater than .32 were poor. The rotated pattern matrix is presented in Table 2 and the structure matrix is provided in Table 3. The structure coefficients present the actual correlations between the factors and each item. Pattern and structure coefficients that meet the criteria for representing meaningful unique contributions and correlations are shaded in the tables to simplify examination.

**Table 2.**  
**Matrix of Rotated Pattern Coefficients**  
**Representing Unique Contributions**  
**of Factors to Each Item**

	FACTOR 1	FACTOR 2	FACTOR 3
	Environment	Trait	Behavior
Item 15	-0.09	0.46	-0.10
Item 16	-0.08	0.59	-0.06
Item 17	-0.05	0.71	0.02
Item 18	-0.03	0.69	0.00
Item 19	-0.01	0.63	-0.01
Item 20	0.05	0.66	0.11
Item 21	0.01	0.58	0.10
Item 22	-0.01	0.47	0.17
Item 23	0.14	0.12	0.09
Item 24	0.12	0.29	0.16
Item 25	0.08	0.51	0.22
Item 26	0.02	0.34	0.33
Item 27	0.02	0.05	0.29
Item 28	0.06	-0.11	0.69
Item 29	-0.02	-0.12	0.76
Item 30	0.03	0.04	0.62
Item 31	0.10	0.12	0.44
Item 32	0.11	0.01	0.36
Item 33	0.04	0.13	0.36
Item 34	0.02	0.08	0.35
Item 35	-0.09	0.09	0.46
Item 36	0.03	0.04	0.56
Item 37	-0.01	0.14	0.49
Item 38	0.35	-0.03	0.12
Item 39	0.35	-0.06	0.12
Item 40	0.36	-0.07	0.16
Item 41	0.48	-0.07	0.18
Item 42	0.76	0.03	-0.19
Item 43	0.71	0.05	-0.12
Item 44	0.69	0.10	-0.07
Item 45	0.71	0.08	-0.16
Item 46	0.33	0.03	-0.01
Item 47	0.51	-0.09	0.18
Item 48	0.50	-0.11	0.17
Item 49	0.44	-0.08	0.22

**Table 3.**  
**Matrix of Structure Coefficients**  
**Representing Correlations Between**  
**the Factors and the Items**

	FACTOR 1	FACTOR 2	FACTOR 3
	Environment	Trait	Behavior
Item 15	-0.04	0.42	0.03
Item 16	-0.00	0.55	0.11
Item 17	0.06	0.71	0.24
Item 18	0.08	0.69	0.22
Item 19	0.08	0.63	0.19
Item 20	0.17	0.70	0.33
Item 21	0.12	0.62	0.29
Item 22	0.09	0.53	0.32
Item 23	0.18	0.17	0.16
Item 24	0.19	0.36	0.28
Item 25	0.20	0.59	0.40
Item 26	0.14	0.45	0.45
Item 27	0.09	0.15	0.32
Item 28	0.19	0.12	0.67
Item 29	0.12	0.13	0.72
Item 30	0.16	0.24	0.63
Item 31	0.21	0.28	0.50
Item 32	0.19	0.15	0.39
Item 33	0.14	0.26	0.41
Item 34	0.11	0.18	0.38
Item 35	0.02	0.22	0.47
Item 36	0.16	0.23	0.58
Item 37	0.12	0.30	0.54
Item 38	0.37	0.06	0.19
Item 39	0.37	0.03	0.17
Item 40	0.39	0.04	0.21
Item 41	0.50	0.06	0.26
Item 42	0.73	0.09	-0.01
Item 43	0.69	0.12	0.05
Item 44	0.69	0.18	0.10
Item 45	0.69	0.13	0.01
Item 46	0.34	0.07	0.07
Item 47	0.54	0.05	0.26
Item 48	0.52	0.02	0.24
Item 49	0.48	0.06	0.29

Results revealed that eight items were most highly correlated with an environment factor, nine items were most highly correlated with a personal trait factor, and seven items correlated highly with a learner behavior factor. An examination of the pattern matrix revealed that items 41 through 45 and items 47 through 49 are related to factor 1 which represents the influence of the environment on the learner. Items 15 through 22 and item 25 are shown to correlate with factor 2 which represents the learners' personal traits, and items 28 through 31 and items 35 through 37 correlate with factor 3 which represents the learners' behaviors. Item 26 was complex with two factors contributing to its interpretation. Ten items did not correlate with any of the factors, and some of these had been flagged for problematic performance in an earlier step in the analysis. These items did not appear to be performing effectively and did not correlate with any of the three factors at a level greater than the cutoff established at .45. In subsequent administrations of the instrument, these items will be further reviewed, revised, or removed. The reliability estimates obtained for each set of items were  $\alpha = .81$  for factor 1 (environment impact),  $\alpha = .83$  for factor 2 (personal learning traits), and  $\alpha = .78$  for factor 3 (personal learning behaviors). While three factors were certainly contributing to the items of the DLD, their stability must be examined further as revisions are made to the instrument and data is collected from new samples of distance students.

### **Educational and Scientific Importance**

If there exists a discrepancy between the skills needed and the skills already possessed, educators can offer appropriate compensatory support mechanisms that will promote student success. High failure and withdrawal rates of distance education students signal the necessity of finding new and more reliable ways of preparing and screening students for successful participation in distance education courses. Based on knowledge of where they stand with respect to factors that contribute to successful learning, students can make better enrollment choices. In addition, institutions can increase efficiency by directing learning resources to those students who are likely to persist and be successful in distance education.

The construct validity of this instrument is dependent on the derivation of the items from an application of learning theory to the literature on learning theory and emerging theory in the field of distance education. To ensure content validity throughout the development process, the items were examined and reviewed by three experts in distance education course design and delivery as well as experts in learning theory and measurement. Further study to support validity will examine the performance of the DLD instrument across contrasting criterion groups, one of which will consist of successful distance education students and another which will consist of students who have dropped out or failed to master the material presented in the course.

### **Limitations**

During phase two, several items did not function as expected. Further revision must be considered, and the instrument must be studied again with a new sample. The use of intact class groups as a convenience sample provided an opportunity to study the performance of this new instrument. However, the results cannot be generalized to a larger population of distance education students or to a wider range of distance education delivery techniques without caution. Further study will be required to both to refine the instrument and to extend its generalizability.

## References

- Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice Hall.
- Brenner, J. (1998). An analysis of student's cognitive styles in asynchronous distance education courses at a community college. Journal of Information Technology for Teacher Education, 7(1), 23-29.
- Comrey, A. L. & Lee, H. (1992). A first course in factor analysis (2<sup>nd</sup> ed.). New York: Academic Press.
- Deci, E. L. & Ryan, R. M. (1987). The support of autonomy and the control of behavior. Journal of Personality and Social Psychology, 53(6), 1024-1037.
- Everett, D. R. & Grubb, A. (1997, October). Facilitating learner adjustment to the distance learning environment. Paper presented at the Teaching/Learning conference, Ashland, KY. (ERIC Reproduction Service No. ED 415 925)
- Hatcher, T. & Craig, B. (1998). Humanizing the technological learning experience: The role of support services as socialization in a human resource development distance education program. Journal of Industrial Teacher Education, 35(4), 234-245.
- Holmberg, B. (1989). Theory and practice of distance education. London: Routledge.
- Keegan, D. (1996). Foundations of distance education. (3rd ed.). London and New York: Routledge.
- Keegan, D. (Ed.). (1993.) Theoretical principles of distance education. London and New York: Routledge.
- Kember, D. (1995). Open learning courses for adults: A model of student progress. Englewood Cliffs, NJ: Educational Technology Publications.
- Lund, T. B. and Barksdale, S. B. (1995). Strategic planning for education and training: A report from the field. Performance and Instruction, 34(2), 30-33.
- Moore, M. G. (Ed.). (1990). Contemporary issues in American distance education. Oxford and New York: Pergamon Press.
- Moore, M. (1991). Learner autonomy: The second dimension of independent learning. American Journal of Distance Education, 5(3), 176-188.
- Moore, M. G. & Kearsley, G. (1996) Distance education: A systems view. Belmont, CA: Wadsworth.
- Reilly, R. R. & Israelski, E. W. (1988). Development and validation of minicourses in the telecommunication industry. Journal of Applied Psychology, 73(4), 721-726.
- Robertson, I. T. & Downs, S. (1989). Work-sample tests of trainability: A meta-analysis. Journal of Applied Psychology, 74(2), 402-410.
- Spector, P. E. (1996). Industrial and organizational psychology. New York: John Wiley & Sons, Inc.
- Wedemeyer, C. (1971). Independent study. In L. C. Deighton (Ed.), The Encyclopedia of Education, 4. New York: MacMillan.