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Development of the Distance Education Learning Environments Survey (DELES) for Higher Education

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Abstract

This research involves designing, developing and validating the Distance Education Learning Environments Survey for students in distance education-delivered subjects in higher education. This study is unique in that only one other similar instrument, the Distance and Open Learning Environment Scale, which focuses on science education, currently exists. Globally governments and institutions are calling for meaningful research on distance education. This research has yielded a widely-applicable learning environment survey suitable for use in higher education in research applications and in practitioners' attempts to improve their classrooms.

Introduction

This paper describes the development of the Distance Education Learning Environments Survey (DELES), which is a preliminary step in assessing learning environments using a validated instrument for distance education. A thorough background of learning environments research is presented, followed by a statement about the significance of such research. The method completed to design the DELES is then outlined and the development of the instrument itself is described, which includes preliminary, secondary, and pilot forms of the survey's dimensions and scales.

Research Objectives

The objectives of the research described here are twofold: (1) to develop and validate a psychosocial learning environment instrument for higher education courses delivered via asynchronous distance education technologies, and (2) to investigate associations between student satisfaction and the nature of the asynchronous distance education learning environment.

Background

Distance Education Terms and Usage

The term 'distance education' is used to define instructional delivery that does not restrict students to being physically present in the same location as an instructor (Steiner, 1995). For clarification it should be noted

that multiple modes of delivering distance education are available. These modes can be categorised as those that are *synchronous*, requiring students and their instructor to gather at some place, or places, at a given time, and those that are *asynchronous*, whereby students and their instructor are not confined to time and place. Asynchronous distance education as it is considered here includes delivery of instruction using the postal system to mail audio or video cassettes, CD-ROMs, or DVDs, computer-based or -moderated conferencing, web-based bulletin boards, or e-mail (Leach & Walker, 2000). Meanwhile, synchronous forms of distance education include that which is delivered by web-based chats, Internet relay chats, multiple-user domains (MUDs), satellite television broadcasts, radio broadcasts, audio-conferences, and two-way videoconferences, which are occasionally referred to as interactive television (Steiner, 1995). This study focuses on education delivered exclusively by any means of asynchronous communication, despite the arrangement or equipment used.

Given the above terms, much of the distance education literature available does not distinguish between the delivery modes used in distance education; rather, authors interchange terms such as 'distance learning,' 'distance education,' 'open learning,' and 'distributed learning.' Therefore, the intentions of the authors and related statistics are difficult to discern. For the purpose of this research, *distance education* is used in the most general sense.

Learning Environments Research

The term *learning environment* carries with it a variety of meanings. It has been used to indicate a type of learning task (Tynjälä, 1999), to refer to the classroom psychosocial environment (Henderson, Fisher, & Fraser, 2000), and to denote virtual spaces found in computer applications and on the Internet (Gibbs, 1999). In this study, *learning environments* refers exclusively to psychosocial classroom environments.

Learning environments research, just over three decades old, is firmly established (Tobin & Fraser, 1998) among a variety of education research and evaluation methods dominated by the assessment of students' academic achievement (Fraser, 1998b). While quantitative measures of classroom effectiveness are often based on "narrow testable, standardized, superficial, and easily forgotten outcomes," other areas of schooling are less emphasized (Kyle, 1997, p. 851) and a complete image of the process of education is not formed within the research. In the early 1960s, Bloom pointed to measurements of educational environments as a decisive component for prediction and successful learning manipulation (Anderson & Walberg, 1974). Since then, numerous studies have demonstrated that students' perceptions of their educational environments can be measured with survey instruments and the results serve as valid predictors of learning (Anderson & Walberg, 1974; Fraser, 1997, 1998a, 1998b), turning evaluation away from individual student achievement and toward the effectiveness of the environment of the learning organization (Walberg, 1974). Moreover, variables within learning environments themselves can be manipulated to achieve different learning outcomes (Anderson & Walberg, 1974).

In addition to approaching learning environments research to enhance teaching and learning in the individual classroom, there are increasingly strong indicators of the need to accommodate tertiary education students in a globalised economy in order to create, distribute, and exploit knowledge for international competitive advantages (Commonwealth, 2000; Hinde, 2000; OECD, 2000; Salmi, 2000; Wagner, 1998). Given that many universities are marketing globally (Hinde, 2000; Salmi, 2000), assurances of quality in education move to the forefront and must be addressed (Olsen, 2000). Learning environment research can provide some of these assurances in the form of addressing what factors shape effective learning environments.

Evaluation of Learning Environments

Learning environments research can be traced to Lewin's classic human behaviour definition (Fraser, 1998b) represented by $B=f(P,E)$, whereby B represents behaviour, f is function, P is person, and E is person's environment (Lewin, 1936). Lewin noted that "every scientific psychology must take into account whole situations, *i.e.*, the state of both person and environment" (1936, p. 12). Thus, determinants of B are describable by composite measures of P and E (Stern, 1974). Lewin's purpose for this definition was to conceptualise human behaviour with new strategies in psychological research where functional

relationships and states of interaction are emphasized over those of correlation of disjointed responses derived from isolated stimuli—the prevailing psychological trend of the time (Stern, 1974).

Through the study of educational environments, students and teachers define their environment based upon their perceptions. Students, with their distinctive frame of reference generated from spending numerous hours as learners, have a large interest in what is going on around them in their educational environments "and their reactions to and perceptions of school experiences are significant" (Fraser, 1998b, p. 527) given that environments, like people, take on distinctive personalities (Insel & Moos, 1974; Kirtz & Moos, 1974). Likewise, there is an association between students' "psychosocial characteristics of their classrooms" (Fraser, 1998a, p. 17) and their learning achievements and viewpoints. Instructors, on the other hand, can utilize learning environments research to discover differences between their perceptions and those of their students and then attempt to make improvements in the actual classroom environment based upon the preferences of students.

Learning Environments Research Instruments

Learning environments research has successfully merged (Fraser, 1998a) what is often a topic of contention among schools of research—qualitative versus quantitative methods (Fetterman, 1987; Fleischer, 1995; Glesne & Peshkin, 1992; Spindler & Spindler, 1987). Qualitative observation, inquiry, ethnography, self-reflection, semiotics, and case study, among other qualitative and subjective forms of assessment and evaluation, can be supported by quantitative research based on validated, efficient, and broadly relevant questionnaires that students and teachers complete for the researcher's gathering of perceptions of learning environments (Fraser, 1998a).

Early instruments used in the education social environment include the *Learning Environment Inventory* (LEI), the *My Class Inventory* (MCI), and the *Class Activities Questionnaire* (CAQ) (Anderson & Walberg, 1974). The LEI, patterned after *Hemphill's Group Dimensions Description Questionnaire*, was established in the 1960s (Anderson & Walberg, 1974; Fraser, 1998a). It assumes the students, as well as the teacher, are learning environment determinants (Anderson & Walberg, 1974). The MCI was a simplified version of the LEI, adapted for use with younger children, ages 6-12 years old. The CAQ was constructed to measure Bloom's six-level taxonomy (Anderson & Walberg, 1974) consisting of: knowledge, comprehension, application, analysis, synthesis, and evaluation. Meanwhile, the *College and University Classroom Environment Inventory* (CUCEI) broke the mould and focused exclusively upon perspectives at the post-secondary level (Fraser, Treagust, & Dennis, 1986).

Instruments that are more contemporary include the *Science Laboratory Environment Inventory* (SLEI) geared toward upper secondary and post-secondary students (Fraser, Giddings, & McRobbie, 1992); the *Constructivist Learning Environment Survey* (CLES) aimed at secondary students (Taylor, Fraser, & Fisher, 1997); and the *Computer Laboratory Environment Instrument* (CLEI), which has foundations in the SLEI (Newby & Fisher, 1997). The *What Is Happening In This Classroom* (WIHIC) instrument focuses on secondary classrooms and is designed to bring economy to the field by combining the most relevant scales from existing questionnaires (Aldridge, Fraser, & Huang, 1999).

Distance Education Learning Environments

Although distance education evolved in the early 1700s in the form of postal-delivered correspondence (Jayroe, 1998), recent advances in and proliferation of technology and telecommunications have created possibilities that stretch the boundaries of post-secondary distance education (Harnar, Brown, & Mayall, 2000). Developments in distance education have changed how we communicate and learn (Leh, 1999) and will continue to do so as growing numbers of students become distance learners and a growing number of instructors become distance educators.

Distance Education Research

Currently, research on distance education is relatively narrow. According to Merisotis and Olsen (2000), while a plethora of literature on the distance education phenomenon is available, *original* research on

distance education is still somewhat limited. Distance education evaluation is concentrated primarily on (1) student outcomes (achievement, grades, test scores); (2) attitudes of students and instructors; and (3) satisfaction of students and instructors (Diaz & Cartnal, 1999; Harnar, Brown, & Mayall, 2000; IHEP, 1999; Lane, n.d.; Olsen, 2000). Postulated in the context of distance education *system* evaluation, Harnish and Reeves (2000) discovered the emergence of distance education evaluation primarily in terms of:

Training (programming skills, barriers, availability, identification of needs, costs);
Implementation (administration, costs, fees course credits, institutional ownership, priority for use, integration, coordination);
System Usage (information collection, electronic data collection, accuracy);
Communication (information sharing around internal, local, and regional issues of concern regarding distance education); and
Support (fiscal, staff, faculty, instructional, administrative resource allocation).

What is conspicuously missing from evaluations and research related to the broader body of distance education evaluation are issues related to learning environments.

Learning Environments Research and Distance Education

Learning environment research and associated survey instruments have been developed related to computer use in classrooms or laboratories, telecomputing, and computer-mediated communication. Examples of such instruments include: the *Constructivist Multimedia Learning Environment Survey* (Maor, 1999), the *Computer Classroom Environment Inventory*, the *Geography Classroom Environment Inventory*, and the *Computer Laboratory Environment Inventory* (Newby & Fisher, 1997). Related research includes studies of perspectives of computer-mediated learning environments specific to teacher education (Admiraal, Lockhorst, Wubbels, Korthagen, & Veen 1998; Goh & Tobin, 1999), computer-facilitated learning environments in higher education (Bain, McNaught, Mills, & Lueckenhausen, 1998), collaborative distance learning environment design (Spector, Wasson, & Davidson, 1999), and the function and useability of virtual learning environment software (Britain & Liber, 1999). However, only one published study and related instrument, the *Distance and Open Learning Environment Scale* (DOLES), developed in 1995, focuses exclusively on distance education among university students (Fraser, 1998a; Jegede, Fraser, & Fisher, 1998), yet it spotlights science education and may not be generally applicable.

Research Significance

Only one learning environment instrument is currently available for higher education distance education—the DOLES. The DOLES focuses on World Wide Web-delivered science education with a distinct Australasian focus, thus it is inappropriate for use in studying general distance delivered higher education. The availability of a *Distance Education Learning Environments Survey* (DELES), as outlined in this paper, for a more general audience enables practitioners and researchers to examine educational learning environments in tertiary education settings with an altogether new instrument. The DELES allows unparalleled opportunities for sources of information in program and course evaluation as outlined below:

Learning environment instruments are economical in that they do not require trained observers and significant coding (Jegede, Fraser, & Fisher, 1998) resulting from interviews or observations. The DELES is easily employed by practitioners, evaluators, and researchers alike.

The learning environment can be assessed in the *beta press*, that is, from the perception of the learner, rather than exclusively in the *alpha press*, or that which is assessed by a detached third party (Fraser, 1998b), offering the advantage of characterizing a setting through the eyes of the participants, thus collecting information that an observer could overlook or deem insignificant (Fraser, 1998a).

Student and instructor perceptions can be contrasted with those of external evaluators or observers with this instrument.

Likewise, in the context of the larger research setting, in an era of an increasing call for national and international distance education, researchers and evaluators can use this instrument to complement distance education research that currently focuses primarily on student achievement, attitudes and behaviours

(Harnar, Brown, and Mayall, 2000), student participation (Grasinger, 1999), the role of technology in a distance education environment (Jamieson, 1999), the tired 'no significant difference' between traditional vs. distance education argument (Lane, n.d.), and the 'how-to' instructor methodology research found predominantly in conference proceedings (Squire & Johnson, 2000).

What is most significant about this study is that, as we progress through the information age, the forces of *educommerce* and *e-learning* have converged to the point that education as a consumer-based commodity, or *knowledge product* designed to "preserve and expand" (Connell, 2001, p. 1) the customer base of businesses through distance education, is creating new demands upon universities to play as "market actors" (Traub, 2000, p. 50) in what was a \$23 billion market experiencing an annual rate of growth of 12% in the United States in 2003 (Eduventures, 2003). Universities experiencing pressure to become part of the profit-driven market must preserve that which gives universities status as unique institutions of higher learning (Rose Communications, 2001). Post-secondary distance education not grounded in high-quality teaching and learning theory, with respect to social and psychological determinants and effects of the environment in which they are presented stand to become diminished, appearing less of a scholarly pursuit and more of a "work-for-hire" (Traub, 2000, p. 5) institution blurring the lines between university status and business profit making.

Finally, as pressure continues to increase on higher-education instructors to teach in some form of distance model, those who have several years of experience teaching in face-to-face classrooms need to develop new models and methodologies if they are to continue to provide high-quality courses demanded by a global education market (Conrad, 2004; Slay, 1998; Thor & Scarafiotti, 2004). This instrument can assist instructors in improving their teaching, which aids in maintaining the historical significance of the university, leading to improvements in post-secondary distance education as a whole.

Research Characteristics

The design, development and validation of the DELES was guided by consistency with learning environments research literature, consistency with previously-developed learning environment instruments, and characteristics of the relevance to distance education learning environments.

Measurement of Perception

Psychosocial learning environments can be measured in three ways:

Actual environment, which asks respondents questions about the learning environment as they perceive it is.

Preferred environment, which focuses on the ideal learning environment preferred by students.

Instructor's perception of the environment, which can be compared to those of the students.

Preferred and Instructor versions in learning environment survey instruments are variations on the Actual version. A statement in an Actual version of a survey might read, "activities are carefully planned in this class," whereas the same statement in the Preferred version might read, "activities should be carefully planned..." Likewise, the Instructor's version might read, "I carefully plan activities..." The development and validation component of this study used an Actual survey that has been modified into the Preferred or Instructor version.

Psychosocial Dimensions

Moos (1974) conceptualised three overarching dimensions characterising and discriminating among subunits within social organizations. These dimensions refer to scales, the final unit into which survey items are clustered. These dimensions are as follows:

Relationship Dimensions – assess "the extent to which individuals are involved in the environment and the extent to which they tend to support and help each other" (Moos, 1974, p. 19). In short, these are personal

relationships between inhabitants in a given environment. Examples of these dimensions include involvement, affiliation, support, assistance and peer cohesion (Fraser, 1998a; Moos, 1974).

Personal Development Dimensions – assesses “the opportunity afforded by the environment for self-enhancement and the development of self-esteem” (Moos, 1974, p. 19). This is the extent to which personal growth and development can occur. Examples in tertiary educational settings include autonomy, independence, intellectuality, academic achievement, and competition (Moos, 1974).

System Maintenance & System Change Dimensions – assesses the “extent to which the environment is orderly, clear in expectations, maintains control and is responsive to change” (Fraser, 1998a, p. 9). In short, this is order, organization, clarity and control of the environment (Moos, 1974). Given the international potential of this study and the resultant measurement instrument, it is noted here that Moos (1974) suggests this dimension could be applicable to cross-cultural comparison.

These three long-standing psychosocial dimensions serve as the framework through which the DELES has been developed. The relationship between these dimensions in terms of distance education and the scales found in the DELES is outlined in detail in the following section.

Instrument Development

The development of the *Distance Education Learning Environments Survey* (DELES) follows a three-stage strategy outlined in Fraser (1986). Stage one included identification of salient scales within Moos’s (1974) dimensions of *Relationship*, *Personal Development*, and *System Maintenance and Change* outlined above. However, this study goes one step beyond the learning environment exclusively and includes an added affective measure of *student satisfaction*—the data from which can be analysed for strength in association with the learning environment. Stage two involved writing individual items within the scales, and stage three called for field testing items followed by an item analysis. This section discusses in detail the steps taken to develop the DELES.

Stage One – Identification and Development of Salient Scales

Stage one development took three primary components into consideration: (1) review of and consistency with previously developed instruments (Fraser, Treagust, & Dennis, 1986; Jegede, Fraser, & Fisher, 1998); (2) review and consistency with the literature related to distance education learning environments and student satisfaction; and (3) review of preliminary scales by a panel of experts (Jegede, Fraser, & Fisher, 1998).

Review and consistency with previously developed instruments. From the classical perspective of survey development, Hase and Goldberg’s National Science Foundation-supported study on differing strategies for the development of personality inventory scales purports that there are three primary strategies from which to consider when developing scales: (1) Internal, (2) External, and (3) Intuitive (1967). Within the *internal* scale development strategy falls the *factor-analytical* strategy. In this case items are given to a significant population and are then factor analysed. Items with high factor loading are then used for the scales.

Accordingly, this strategy selects the best properties occurring from the internal structure of the original item pool. Within the *external* scale development strategy falls the empirical *group discriminative* strategy. In developing scales from this perspective, the researcher administers the instrument to persons falling on opposite poles of the personality trait under measure. Items within these scales are examined from the point of view of discriminating between the two groups at some level of significance. Those items with significant discriminating power remain in the scale. Likewise, within the *intuitive* strategy falls the *intuitive-rational* and the *intuitive-theoretical* strategies for scale development. The categorisation of the scales developed for the DELES fall under the intuitive-rational development of scales category following Fraser (1986). This categorisation is termed as such due to the intuitive understanding of the subject matter by the researcher. Validity within this categorisation of scales is contingent upon subjective opinion of the researcher. While no specific psychological theory is followed under this category of scale development, the scales are filtered by selecting items of highest internal consistency and only those items remain in the revised scales. Opposite the intuitive-rational strategy is the intuitive-theoretical strategy that, while still relying on filtering by means of high internal consistency, is based upon a given psychological theory.

Hase and Goldberg found that when constructing scales using these strategies, there was little difference in the outcomes and that they were “equivalent in their validity across 13 diverse criteria” (1967, p. 242). They went on to state, “dogmatic assertions of the superiority of one strategy over another are premature” (pp. 242-243).

Following the selection of strategy for scale development is the identification of salient scales. As discussed by Fisher and Fraser (1990) regarding the *School Level Environment Questionnaire* (SLEQ), new inventories require scales that distinguish important aspects of the environment under study. However, while new scales should be developed, similar studies of learning environments not only develop new scales, the precedent is set for modification and adaptation of scales from previously validated and tested questionnaires (Fish & Dane, 2000; Fisher, Rickards, & Fraser, 1996; Maor, 1999; Newby, & Fisher, 1997). This study was influenced by previous inventories including the *College and University Classroom Environment Inventory* (Fraser, Treagust, & Dennis, 1986), the *Constructivist Learning Environment Survey* (Taylor, Fraser & Fisher, 1997), the *Distance and Open Learning Environment Scale* (Jegede, Fraser, & Fisher, 1998), and the *Test of Science-Related Attitudes* (Fraser, 1981).

Review and consistency with the literature related to distance education learning environments and student satisfaction. Literature related to distance education is prolific. However, when filtered for indications of the relationship of distance education to psychosocial learning environments, the number of sources drops to a level that allows for the character of quality distance education to be summarized and categorised under Moos’ dimensions. Likewise, consideration of student satisfaction, often used in higher education as a key indicator of quality (National Survey of Student Engagement, 2000) as related to post-secondary distance education can be measured for strength against that of the learning environment. Below is a discussion of how the scales are consistent with literature related to distance education in terms of Moo’s three psychosocial dimensions of Relationship, Personal Development, and System Maintenance and Change.

Relationship Dimension. Over one third of the preliminary scales developed for the DELES, both new scales and those scales adapted from previous instruments, representing characteristics of distance education as related to the learning environment, tend to fall under the Relationship Dimension, whereby individuals are active in their learning environment and engage with one another. Peer collaboration, review, interaction, exchange, contribution, and community development are keywords continually identified as indicators of a quality distance education environment that promotes thinking and learning (Butler, 2001; Chickering & Ehrmann, 1996; Frederick, Cannon, Umble, Steckler, & Shay, 2001; Golbeck & Sinagra, 2000; Hartley, 2000; Ho & Tabata, 2001; Morihara, 2001; Nader, 2001; Owen, 2000; Park-Kim, 2001; Twigg, 2004; Zhu & McKnight, 2001). Likewise, the opportunity for interaction between the student and the instructor was continually noted as a leading indicator of a quality distance education environment (Chickering & Ehrmann, 1996; Ho & Tabata, 2001; Morihara, 2001; Park-Kim, 2001; Zhu & McKnight, 2001). Sinagra and Golbeck (2000) summarized the strength for the need of relationship-oriented interaction in distance education by stating, “from a Piagetian, constructivist perspective, the symmetrical nature of peer relationships presents an ideal context for promoting the development of thinking” (p. 22).

Personal Development. The opportunities offered by the distance-education learning environment for self-enhancement and development of self-worth, personal development, independence, intellectual pursuit, and academic achievement make up the dimension of Personal Development. Fewer references to characteristics of this dimension were found in the literature directly related to distance education. However, key indicators include such aspects of learning as authentic learning, problem solving, active learning, student reflection, and scaffolded activities (Chickering & Ehrmann, 1996; Hartley, 2000; Ho & Tabata, 2001; Markel, 1999; Merrill, 2001; Morihara, 2001; Owen, 2000, Twigg, 2004).

System Maintenance and Change. In terms of System Maintenance & Change, this is the extent to which the distance education environment is orderly, organized, clear in expectation, student control exercisable and the environment is student focused, responsive to change, and orderly. In this dimension, motivational goals are mastery goals where locus of control is student-oriented and effort and outcome are seen as interdependent (Cox, Preston, & Cox, 1999; Chang, & Fisher, 2001; Jegede, Taplin, Fan, Chan & Yum,

1999). Students are provided assignment overviews and advanced organizers (Park-Kim, 2001), there is room for student decision-making, activity initiation, and expectations are clearly set forth by the instructor (Owen, 2000).

Student Satisfaction. Student satisfaction is not a measure of the psychosocial learning environment, yet is used consistently in post-secondary education to measure how effectively a program or institution delivers what students, expect, need, and want, and is associated with student achievement (Kuh, 2001a; 2001b). With the addition of an attitudinal scale to a learning environment instrument, the relationship between learners’ attitudes and their perceptions of the psychosocial distinctiveness of the learning environment can be measured (Fraser, 1981). When classified in terms of Kirkpatrick’s four level framework of evaluation within a distance environment (Walker, 1998) the researcher gains a subjective measure of the learners’ reactions to the materials, instructor, methodology, and environment with measures of satisfaction. Human resources training development programs regularly use any number of approaches to reaction evaluation such as with the following instruments: *Reaction Outcomes* (Bell System Approach), *Reaction Evaluation* (The CIRO Approach), *Training Satisfaction* (Saratoga Institute Approach), and *Reaction* (The IBM Approach) (Phillips, 1991).

Review of preliminary scales by a panel of experts. Given the literature above, new scales were created to address each of Moos’ three psychosocial dimensions. Likewise, previously developed scales from existing instruments were modified, adapted, and considered in a compilation making up a set of 14 preliminary scales.

One of the aims of learning environment studies by means of survey instrument is that the instrument be designed to be economic in size (Fraser, 1986). After the preliminary 14 salient scales were developed through reviews of literature and previous instruments, they then required reduction in order to generate an economic survey instrument. To achieve this goal of reduction of scales and to reduce subjectivity in that reduction, seven new scales developed from literature review and seven scales adapted from previous learning environment surveys, along with their descriptions, were presented to an international panel of experts following precedent in previous scale development (Fish & Dane, 2000; Jegede, Fraser, & Fisher, 1998). A 14-person panel of distance education researchers and practitioners was assembled after being identified through literature review and a call for participation via 10 international distance-education specific e-mail discussion groups. The panel was asked to rank each preliminary scale related to its appropriateness, relevance, and suitability toward post-secondary distance education. The preliminary scales were then reduced based on the panel’s rankings and comments. This reduction resulted in six scales assumed to be principal to the study of post-secondary distance education as listed in Table 1.

Table 1. Six scales remaining after face validation by an expert panel.

Dimension	Scale
Relationship – Individuals are involved in the environment and support/help each other; personal relationships between inhabitants; involvement, affiliation, support, assistance, peer cohesion.	Instructor Support
	Student Interaction & Collaboration
Personal Development – Opportunity afforded by the environment for self-enhancement and development of self-esteem; personal growth and development; autonomy, independence, intellectuality, academic achievement, competition.	Personal Relevance
	Authentic Learning
	Active Learning
System Maintenance & Change – the environment is orderly, clear in expectation, control, responses to change; order, organization, clarity, control.	Student Autonomy

In addition to the six scales designed to measure Moos’ three psychosocial dimensions, a scale of satisfaction, adapted from the *Test of Science-Related Attitudes* (Fraser, 1981) was included for later analysis related to discovering associations between the psychosocial learning environment scales in Table 1 and an affective measure of student satisfaction (see Table 2).

Table 2. Measure of satisfaction.

Measure	Scale	Scale Description
Satisfaction – Program or institution’s effectiveness in delivering what students, expect, need, and want.	Enjoyment	Extend to which students enjoy learning in a distance education environment.

Stage Two – Writing Individual Items

Once the salient scales were developed and face validated, the next step in the development of this survey was writing a set of items to measure each scale. In writing items, there must be consideration given to maximizing the relationship between the item and the scale under measure and in avoiding cross-scale measurement.

The draft items used in this survey were distributed to an international panel of distance education practitioners for their comments on the individual item’s suitability, face validity, readability, and freedom from ambiguity (Fraser, 1986; Jegede, Fraser, & Fisher, 1998). Items related to scales adapted from previous studies were subsequently adapted and reviewed for this study. Further face validation was conducted by submitting the items to graduate-level distance education students ($N=12$) for review of readability and ambiguity. All survey items were rendered in their ‘actual’ form of the three forms (preferred, actual, instructor) and the survey was distributed for the present research.

Table 3 presents the dimensions/measure, scales, and items as they relate to one another. The items were then distributed in the final survey instrument.

Table 3. Final scales and their preliminary items.

<i>Scale</i>	<i>Items</i>
Instructor Support	In this class... If I have an inquiry, the instructor finds time to respond. The instructor helps me identify problem areas in my study. The instructor responds promptly to my questions. The instructor gives me valuable feedback on my assignments. The instructor adequately addresses my questions. The instructor encourages my participation. It is easy to contact the instructor. The instructor provides me with positive and negative feedback on my work.
Student Interaction & Collaboration	In this class... I work with others. I relate my work to other’s work. I share information with other students. I discuss my ideas with other students. I collaborate with other students in the class. Group work is a part of my activities.
Personal Relevance	In this class... I can relate what I learn to my life outside of university. I am able to pursue topics that interest me. I can connect my studies to my activities outside of class. I apply my everyday experiences in class. I link class work to my life outside of university. I learn things about the world outside of university. I apply my out-of-class experience.
Authentic Learning	In this class... I study real cases related to the class. I use real facts in class activities. I work on assignments that deal with real-world information.

	I work with real examples. I enter the real world of the topic of study.
Active Learning	In this class... I explore my own strategies for learning. I seek my own answers. I solve my own problems.
Student Autonomy	In this class... I make decisions about my learning. I work during times that I find convenient. I am in control of my learning. I play an important role in my learning. I approach learning in my own way.

Response choices are: Always, Often, Sometimes, Seldom, and Never. © 2003, 2004

Stage Three – Field Testing and Item Analysis

The final stage of the development of the DELES was a field test in the form of a Web-based survey. The Web-based instrument used the response choices of *Always*, *Often*, *Sometimes*, *Seldom*, and *Never*. Data resulting from the field test was then analysed for internal consistency reliability. Likewise, the data for each item was analysed for discriminant validity to identify if each item measures a unique dimension not measured by other items and to be certain items are primarily measuring within their own scales. Analysis also included the identification of associations between six DELES psychosocial learning environment scales and the scale of student satisfaction by means of simple correlations (r) and standardized regression coefficients (β). The results of these analyses are presented in detail at the South Central RTEC's *Insight Instrument Library and Data Repository* found at the following URL:
<http://insight.southcentralrtec.org/ilib/delesa/delesainfo.html>

Conclusion

This paper has described the three-stage preliminary development of the Distance Education Learning Environments Survey for post-secondary distance education that consisted of: (1) identifying/developing salient scales within Moo's (1974) psychosocial environment dimensions of Relationship, Personal Development, and System Maintenance and Change; (2) writing individual items within each of the three dimensions; and (3) field testing the new instrument to obtain significant data to conduct item analyses to demonstrate instrument reliability and validity.

The first instrument of its kind and significant for utilization on a global scale, the DELES is a useful tool for distance education researchers and those desiring to conduct action research or evaluation of their own distance education courses or programs. Demonstration Web-based "actual" and "instructor" versions of the DELES are housed online at the South Central RTEC's *Insight Instrument Library and Data Repository* found at the following URL: <http://insight.southcentralrtec.org/ilib/masterlist.html>.

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