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A FACTOR ANALYTIC STUDY OF THE ADULT CLASSROOM ENVIRONMENT SCALE

MICHAEL LANGENBACH
LOLA AAGAARD

ABSTRACT

This study explored the factor structure of Darkenwald and Valentine's Adult Classroom Environment Scale (ACES). The Student Ideal form of the ACES was administered to 449 adult students from a variety of educational settings and a factor analysis was performed. All but 15 of the original 49 items loaded clearly with a five-factor orthogonal solution, which only partially supported the seven dimensions proposed by Darkenwald and Valentine. A revised version of the scale was then administered to an additional 287 adult students. A second factor analysis largely confirmed the stability of the five factor solution, although a tentative sixth factor was identified.

ADULT CLASSROOM ENVIRONMENT SCALE

It has been two decades since Herbert Walberg and Rudolf Moos independently began their programs of research in classroom environment (Fraser, 1986). The instruments they developed for measuring perceptions of classroom environment are still widely used. Unfortunately for adult education researchers, most of the existing scales, including the Classroom Environment Scale (Trickett & Moos, 1974) and the Learning Environment Inventory (Fraser, Anderson & Walberg, 1982), were developed for use in elementary and secondary school classrooms.

There are two exceptions: the College and University Classroom Environment Inventory (CUCEI) and the Adult Classroom Environment Scale (ACES). Fraser and Treagust (1986) designed the CUCEI specifically for use in higher education classes, although it has been used with adult students in evening technical colleges and alternative high schools (Fraser, Williamson & Tobin, 1987). Darkenwald and Valentine's (1986) ACES is the only scale developed to measure the social environment of adult education classrooms in general.

MICHAEL LANGENBACH is professor of Adult and Community Education at the University of Oklahoma. LOLA AAGAARD is a research associate for the Oklahoma City Public Schools. Portions of this research were presented at the Lifelong Learning Research Conference, College Park, Maryland, 1987, and at the Adult Education Research Conference, Calgary, Alberta, Canada, 1988.

BACKGROUND AND PURPOSE

Darkenwald and Valentine (1986) observed a lack of research in the area of the social environment of adult education classrooms and also noted that existing classroom environment scales were not valid for research with adults. Believing that it would be valuable to be able to measure teacher and student expectations and perceptions of adult classrooms, they developed the Adult Classroom Environment Scale (ACES) in an attempt to obtain a valid instrument for use in classroom environment research with adult populations. Beginning with interviews of adult students and educators, reviews of other environment scales, and brainstorming among themselves, a research team generated 159 usable items that pertained to adult classroom environments. The list was then reduced to 89 items that were inductively classified into seven dimensions. After administering the 89 items to 220 subjects, item-analysis and respondent feedback were used to reduce the item pool to a final total of 49. Seven items were associated with each of the following dimensions: (a) Affiliation, defined as student interaction and cohesion; (b) Teacher Support, defined as sensitivity and encouragement; (c) Task Orientation, defined as focus and accomplishments; (d) Personal Goal Attainment, defined as relevance and flexibility; (e) Organization and Clarity, defined simply as organization and clarity; (f) Student Influence, defined as collaborative planning and teacher nonauthoritarianism; and (g) Involvement, defined as student attentiveness, participation, and satisfaction (Darkenwald & Valentine, 1986).

Much of the classroom environment theory behind the ACES stems from the work of Moos (1979). Indeed, the dimensions of the ACES could be classified into his three proposed domains of Relationship (the type and degree of personal relationships formed in class), Personal Development (the opportunity for personal goal achievement and self-improvement), and System Maintenance and Change (the clarity of expectations, maintenance of control, and responsiveness to change in the classroom). Factor analyses of the Moos Classroom Environment Scale have, in general, supported the three domains, although dimensions lost their distinctiveness (Fraser, 1986).

There are three forms of the ACES: the Student Ideal, Student Real, and Teacher Real. Each form differs from the others only in the directions and tense form of the items. The Ideal form is meant to elicit opinions about students' ideal classrooms, while the Real forms are essentially student or teacher evaluations of real classes. Subjects respond to 49 items on a four-point Likert scale of Strongly Disagree to Strongly Agree. Table 1 presents the text of the items for each dimension of the Student Ideal form.

Although the final form of the ACES was subsequently administered to a large sample (355 completed the Real form, 375 completed the Ideal), and dimension scores were analyzed, no factor analysis was conducted. In a 1987 article, Darkenwald claimed that the ACES "measures a unitary dimension" and on that basis labeled factor analysis of the scale as "misguided" (p. 131). However, in the same article he analyzed the seven dimen-

Table 1
Item Numbers and Item Text for the Seven Dimensions of Darkenwald and Valentine's (1986) Adult Classroom Environment Scale

Item No.	Item Text
	Affiliation
8	The students in the class work well together.
17	Students often share their personal experiences during class.
31	The students in the class often learn from one another.
33	The students in the class enjoy working together.
42	Students seldom interact with one another during class.
45	Students in the class feel free to disagree with one another.
46	Many friendships develop in the class.
	Teacher Support
14	The teacher makes every effort to help students succeed.
15	The teacher talks down to students.
23	The teacher encourages students to do their best.
34	The teacher cares about students' feelings.
40	The teacher respects students as individuals.
44	The teacher likes the students in the class.
48	The teacher cares whether or not the students learn.
	Task Orientation
5	The teacher often talks about things not related to the course.
16	Students rarely meet assignment deadlines.
18	Students often discuss things not related to course content.
19	Activities not related to course objectives are kept to a minimum.
24	Students do a lot of work in the class.
36	Getting work done is very important in the class.
38	The class is more a social hour than a place to learn.
	Personal Goal Attainment
2	The class is flexible enough to meet the needs of individual students.
6	Many students think that the class is not relevant to their lives.
12	The teacher expects every student to learn the exact same things.
13	Students in the class can select assignments that are of personal interest to them.
32	Most students in the class achieve their personal learning goals.
35	The teacher tries to find out what individual students want to learn.
43	Students have the opportunity to learn at their own pace.

Table 1 (continued)

Item No.	Item Text
Organization and Clarity	
3	The teacher comes to class prepared.
9	Learning objectives are made clear at the start of the course.
22	The class is well organized.
26	The class has a clear sense of direction.
27	The subject matter is adequately covered.
30	Students do not know what is expected of them.
41	Learning activities follow a logical sequence.
Student Influence	
1	Students help to decide the topics to be covered in the class.
10	The teacher makes all the decisions in the class.
28	The teacher sticks to the lesson plan regardless of student interest.
37	Students participate in setting course objectives.
39	The teacher dominates classroom discussion.
47	Students feel free to question course requirements.
49	The teacher insists that you do things his or her way.
Involvement	
4	Students are often bored in class.
7	Students often ask the teacher questions.
11	Most students enjoy the class.
20	Most students look forward to the class.
21	Most students in the class pay attention to what the teacher is saying.
25	A few students dominate the discussions in the class.
29	Most students take part in class discussion.

sions and stated that their low intercorrelations indicated "that they do not measure the same thing" (Darkenwald, 1987, p. 131). Because we do not understand how a truly unidimensional scale could have seven uncorrelated subscales, we maintain that a factor analysis of the ACES is warranted.

The purpose of this research was to determine if a factor analysis of responses from a similar sample would empirically support the seven dimensions proposed by Darkenwald and Valentine.

METHODOLOGY

Two factor analyses were conducted during the course of this research. The ACES (Student Ideal form) was revised after the first analysis, and the

revised scale was administered to a new sample in the interest of determining factor stability.

Description of Respondents

Because the appearance of factors can be influenced by anything that introduces correlation between variables, samples as consistent as possible with the one in the original study were desired. The original study drew subjects from three major settings: an evening M.B.A. program at a large state university; a special credit-bearing program for adults at a community college in an economically depressed urban environment; and non-credit, personal enrichment courses at a large middle-class community adult school. About 65 percent of the subjects were less than 34 years of age, and 60 percent were female. Their educational background ranged from no credential at all to having a graduate degree, with 87 percent having a high school diploma or bachelor's degree.

The 449 subjects in the first factor analysis and the 287 in the second were adult students from a wide variety of educational settings, ranging from ABE classes and government service technical training classes to graduate classes in education. Subjects in both samples tended to be somewhat older than those in the original sample (40 and 47 percent were 34 or older), slightly more educated (18 and 25 percent had graduate degrees), and were more evenly balanced between males and females.

Data Analysis

Because factor structures of the Moos CES remained stable regardless of whether individuals or classes were analyzed (Fraser, 1986), the individual rather than the class mean was chosen as the unit of analysis in this research. Both analyses employed maximum likelihood factor analysis, with the squared multiple correlations of each item with all other items as the prior communality estimates. Promax rotation, which produces an orthogonal varimax prerotation followed by an oblique rotation, was used in both analyses. Solutions with three to eight factors were evaluated for clarity of theoretical interpretation. Because the oblique rotations provided no further theoretical clarity in either analysis, the orthogonal rotations were chosen and are reported here.

The criteria used to determine whether or not an item loaded clearly were: a loading of .39 or higher on one factor, with no loadings within .10 on the other factors; and no loadings higher than .40 on any other factors. Reverse-scored items were recoded before analysis in order to clarify the interpretation of factor loadings.

RESULTS

First Factor Analysis

The most readily interpretable solution included five factors. Fifteen items did not load clearly on any factor: 2, 7, 13, 15, 19, 21, 24, 25, 29, 32, 34, 36, 42, 44, and 47.

The first factor contained 13 items and was called "Teacher Activities" because it encompassed all but three items of Darkenwald and Valentine's (1986) dimensions of Teacher Support and Organization and Clarity. It also included two items from the Task Orientation dimension.

The second factor contained six items. Because this factor nearly paralleled Darkenwald and Valentine's dimension of Affiliation, it was labeled "Student Affiliation."

Factor three contained six items and included three items from the Involvement dimension, along with the items from Task Orientation concerning whether or not the teacher and students discuss things unrelated to course content, and one item from Personal Goal Attainment on the relevancy of the class to the lives of the students. Consequently, this factor was difficult to name, but was tentatively labeled "Student Attitudes."

The fourth factor contained five items very clearly related to teacher domination of the class, and thus the factor was called "Teacher Domination." Four of these items were from the dimension of Student Influence and one item was from Personal Goal Attainment.

The final factor contained four items. It was labeled "Student Prerogative" because the items dealt with what the students wanted to learn, learning at their own pace, and student participation in setting the course objectives, topics, and requirements. The dimensions of Personal Goal Attainment and Student Influence were both partially represented in this factor.

To determine the stability of the five-factor structure, the 15 nonloading items were eliminated and the revised scale was administered to a second sample.

Second Factor Analysis

The second analysis resulted in a six-factor solution, and three items failed to load clearly on any factor. Table 2 presents the factor names, item numbers, and the factor loadings. For clarity, the original item numbers were retained throughout these analyses.

The Teacher Activities, Student Affiliation, Teacher Domination, and Student Prerogative factors from the first analysis were reproduced nearly item-for-item in the second analysis. One item from Student Affiliation and one from Teacher Domination failed to load.

The remaining factor, Student Attitudes, did not maintain its integrity. One item failed to load, and the two items dealing with teacher and student discussion of unrelated topics split off to form a sixth factor, "Unrelated Discussion." This left only three items on the factor Student Attitudes.

Table 2
Second Factor Analysis: Factor Names, Item Numbers, and Factor Loadings

Factor 1 Teacher Activities		Factor 2 Student Affiliation		Factor 3 Student Prerogative		Factor 4 Teacher Domination		Factor 5 Student Attitudes		Factor 6 Unrelated Discussion	
3	.44	8	.48 *	1	.54 *	12	.41	4	.59 *	5	.59 *
9	.64 *	31	.49	35	.62 *	28	.69 *	6	.49 *	18	.68 *
14	.60 *	33	.79 *	37	.66 *	39	.46 *	11	.52 *		
16	.46	45	.45	43	.52 *	49	.48 *				
22	.71 *	46	.62 *								
23	.64 *										
26	.72 *										
27	.63 *										
30	.59 *										
38	.51										
40	.48 *										
41	.64 *										
48	.48										

Note. Items with asterisks after their loadings achieved final communality estimates of at least .35.

The reliability (alpha) for the total revised scale was .90. Reliabilities for Factors 1 through 6 were .89, .74, .72, .69, .68, and .67, respectively.

CONCLUSIONS

The seven dimensions of the Adult Classroom Environment Scale, as conceptualized and developed by Darkenwald and Valentine, were not entirely supported by these factor analyses. The Affiliation dimension did hold together well and essentially became one of the factors. The dimensions of Teacher Support and of Organization and Clarity largely maintained their item integrity, but were combined into a single large factor. The other dimensions (Task Orientation, Personal Goal Attainment, Student Influence, and Involvement) did not remain intact, Involvement faring the worst with only two of its items contributing to the final factor structure.

The combination of some of the previously distinct dimensions resulted in the first factor encompassing all three of the domains proposed by Moos (1979). The remaining factors can be classified more clearly into single domains.

A revised Adult Classroom Environment Scale appears to have six reasonably reliable factors. The next revision of the scale might add additional items to reinforce the factors that currently have only 2 to 4 items. Or perhaps, if unrelated class discussion is not seen to be theoretically impor-

tant enough to warrant an entire factor, those items simply could be eliminated, leaving the remaining five factors. If the current structure is supported in such a revision, perhaps through confirmatory factor analysis, then educators interested in adult classroom research with similar populations would have available a reliable instrument based on empirically supported constructs.

If researchers desired to use a form of this instrument with markedly different populations (such as the aged, high-school dropouts, or single- gender groups), this factor structure would have to be reconfirmed by administering the original 49-item version. Otherwise, given that over a third of the items from the original version did not load and the seven dimensions were not totally supported, it is our opinion that the final revised version will yield more theoretically sound and interpretable data on perceptions of adult classroom environments.

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