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ABSTRACT

The Learning Environment Inventory (LEI) measures student perceptions of the social climate of high school classrooms. The My Class Inventory (MCI), a simplified version of the LEI, is suitable for younger children 8 to 12 years of age. This manual is a revised version of a 1976 manual (previously revised in 1971). In addition to its many editorial changes, the present manual includes a comprehensive and up-to-date overview of research involving use of the LEI and MCI in numerous countries, instructions for administration and hand scoring of the two instruments, and new and expanded material related to the MCI. In particular, the version of the MCI included here is slightly different from the previous one. More comprehensive statistical information about the MCI is provided, and published research involving the MCI is reviewed. The contents of this manual include a description of the initial development of the LEI and MCI; extensive normative and validation statistics for each instrument; reviews of relevant research using these instruments; and suggestions for ways in which teachers, researchers, and curriculum evaluators might make use of the scales. Copies of the LEI and MCI, together with administration and scoring instructions, are provided in the appendices. (Author/PN)

ASSESSMENT OF LEARNING ENVIRONMENTS: MANUAL FOR LEARNING ENVIRONMENT INVENTORY (LEI) AND MY CLASS INVENTORY (MCI)

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THIRD VERSION

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PREFACE

The **Learning Environment Inventory (LEI)** mesures student perceptions of 15 dimensions of the social climate of high school classrooms. The **My Class Inventory (MCI)**, a simplified version of the LEI measuring five dimensions of social climate, is suitable for younger children in the 8 to 12 years age range. Both instruments have been carefully developed, extensively field tested, used widely in research, and shown to be reliable. Both the LEI and MCI are suitable for convenient group administration. Uses of these instruments include providing teachers with feedback about their classrooms, evaluating new educational programs, and investigating the effects of classroom climate on student learning.

This manual is a revised version of a previous manual written by Gary Anderson and Herbert Walberg in 1976 and distributred by the Office of Evaluation Research at the University of Illinois at Chicago Circle. In turn, the 1976 manual was an updated version of an earlier document written by Gary Anderson in 1971 and distributed by the Atlantic Institute of Education in Halifax. In addition to its many editorial changes, the present manual includes a comprehensive and up-to-date overview of research involving use of the LEI and MCI in numerous countries, instructions for administration and hand scoring of the two instruments, and new and expanded material related to the MCI. In particular, the version of the MCI included here is slightly different from the previous one, more comprehensive statistical information about the MCI is provided, and published research involving the MCI is reviewed.

The contents of this manual include a description of the initial development of the LEI and MCI, extensive normative and validation statistics for each instrument, reviews of relevant research using these instruments, and suggestions for ways in which teachers, researchers, and curriculum evaluators might make use of the scales. Copies of the LEI and MCI, together with administration and scoring instructions, are provided in the appendixes.

The authors would appreciate it if reports of any studies using the LEI or MCI could be sent to Barry J. Fraser, Faculty of Education, Western Australian Institute of Technology, South Bentley, Western Australia 6102, Australia.

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February, 1982

BACKGROUND

Since much of formal education takes place within a group, analysis of classroom group properties and their relationships to student behavior hopefully can do much to increase our understanding of the factors affecting pupil learning in school classes. Study of the school class group is particularly important since, next to the family, the school is one of the most focal socializing agencies. Established relationships of group characteristics to productivity in industrial as well as educational environments, moreover, imply that an analysis of the characteristics and dynamics of school class groups ultimately may be helpful for more effective educational diagnosis, intervention, and planning.

Classroom social climate or learning environment, as referred to in this manual, includes the profile of class group properties that are measureable and presumably have significance for research on classes as social groups. These properties include interpersonal relationships among pupils, relationships between pupils an their teacher, relationships between pupils and both the subject studied and the method of learning, and, finally, pupils' perceptions of the structural characteristics of the class. Representative dimensions of the interpersonal realm include cohesiveness and friction among classmates. Properties of teacher-pupil interaction include the extent to which pupils have formal rules to guide their behavior, as well as the extent of democratic policy making, disorganization, and teacher favoritism of some pupils over others. Pupils' perceptions of the speed of the class, the difficulty of the subject matter, and the amount of diversity in classroom activities relate to the subject and method of study. Among structural characteristics are included the acceptance of common goals toward which activities are directed, pupils' perceptions of their physical environment, and the degree of stratification of the class into friendship cliques.

INITIAL DEVELOPMENT OF LEI

The initial development and validiation of a preliminary version of the LEI began in the late 1960s in conjunction with the evaluation and research on Harvard Project Physics, a new physics course for high schools. The rationale for developing this instrument consisted of three very important factors. First, the prohibitive expense of classroom observations caused the Harvard Project Physics evaluation group to seek a paper-and-pencil measure of classroom interaction that teachers could administer. Second, the traditional methods of

classroom observation include mainly "low inference" variables which bear little relationship to pupil learning in past research (Rosenshine, 1969). Third, the pupils themselves were considered to be in the best position to assess their own learning environment, particularly as observer ratings have failed to provide valid measures of "high inference" variables within the class.

Beginning with the general format described by Hemphill and Westie (1950), Herbert Walberg successfully devised an instrument called the **Classroom Climate Questionnaire** which included 18 scales selected by factor analysis and considered meaningful for the description of school class groups (Walberg, 1968a). In several validity studies using this instrument, climate scores were found to be related to the personality of the class teacher (Walberg, 1968b) and to the cognitive, attitudinal, and behavioral characteristics of pupils within the class (Walberg, & Anderson, 1968a). Also climate scores themselves were found to be significantly related to measures of pupil learning for both individuals (Walberg, & Anderson, 1968b) and for classes (Anderson, & Walberg, 1968).

The Classroom Climate Questionnaire was not without its problems. It was not suited ideally for extensive research studies and became only the first stage in the development of a classroom oriented measure. A number of weak scales constituted its major shortcoming. Class mean reliabilities were found to be inadequate for several of the scales, and 12 of the 18 scales contained but two or three items. Furthermore, the climate scores were in no sense a complete representation of classroom interaction, and failed to measure a number of potentially important class dimensions. Nevertheless, since some of the scales were relatively good predictors of student learning despite their low reliabilities, further modification of this promising instrument seemed justified.

The LEI is an expansion and improvement of the Classroom Climate Questionnaire. It also can be used to describe the nature of interpersonal relationships in the class as well as its structural characteristics. A form of the LEI developed in 1968 contained 14 scales, but a 1969 revision was expanded to include 15 scales. In selecting the 15 climate dimensions, an attempt was made to include as scales only concepts previously identified as good predictors of learning, concepts considered relevant to social psychological theory and research, concepts similar to those found useful in theory and research in education, or concepts intuitively judged relevant to the social psychology of the classroom.

Experience with the Classroom Climate Questionnaire indicated that six or seven items were sufficient for each scale in order to obtain internally consistent ratings. Seven items were therefore included in each LEI scale. In order to ensure homogeneity of content, a draft of the individual items was prepared so that four independent judges could classify them into scales. Each judge was provided with two sample items considered indicative of the intended meaning of the scale and then asked to assign draft items to their presumed scales. Thirty-four items which had been misclassified by one or more judges were revised or replaced. Also, data collected in 1967 provided a basis for identifying and removing six items with poor correlations with total scale scores. Finally, a fifteenth scale was added.

DESCRIPTION OF LEI

The final version of the LEI contains a total of 105 statements (i.e., seven per scale) descriptive of typical school classes. The respondent expresses degree of agreement or disagreement with each statement on a four-point scale with response alternatives of Strongly Disagree, Disagree, Agree, and Strongly Agree. Also the scoring direction (or polarity) is reversed for some items.

Table 1 lists the name of each scale in the final version of the LEI, and clarifies the meaning of scales by providing a description and sample item for each. It can be seen that scale names merely are suggestive of the content of items within a scale and that, wherever possible, dictionary defined scale names have been used in preference to less familiar psychological names.

Appendix A contains a copy of the whole LEI, while Appendix B provides a separate student Response Sheet which can be used with this version of the LEI. Appendix C contains a table which indicates how the 105 items in this version of the LEI are allocated among the 15 scales, and shows the scoring direction of each item. It should be noted also that LEI scale scores cannot be summed to provide an overall score, as this would be contrary to the principle of multidimensional assessment.

The LEI has two distinct uses: to assess the perceptions of an individual student, or to gauge the learning environment of the class as a group. For the former purpose, the normal research procedures apply with one caution. Since individuals' scores are measures of their perceptions of the group of which they are a part, the scores of different individuals within the same class are not strictly independent. Thus, as scores of subjects within a class all relate to common class experiences, often it is the variance among scores rather than the scores themselves which are of educational or psychological interest. Since the class mean provides the best estimate of the collective student perceptions of the class, it should be used when one is examining different conditions or treatments across classes. That is, if such variables as teacher characteristics or curriculum are of concern, the class mean is the appropriate unit of analysis. If one is concerned with such variables as pupil sex, self-concept, or personality, individual scores are generally required.

In the paragraphs below, an attempt is made to further clarify the nature of each LEI scale and to justify its inclusion in terms of theoretical considerations or prior research work. Also, although past research involving the LEI forms the basis for discussion in a separate section of this manual, brief mention is made below of some of the interesting relationships established between LEI dimensions and other selected variables. In particular, attention is drawn to what is known about associations between each LEI dimension and student learning outcomes. This information about environment-learning associations is taken from the findings of Haertel, Walberg, and Haertel's (1981) recent synthesis of 12 studies involving 17,805 students in four nations.

TABLE 1. Scale Description and Sample Item for each LEI Scale

Scale	Scale Description	Sample Item
Cohesiveness	Extent to which students, know, help and are friendly toward each other.	All students know each other very well. (+)
Diversity	Extent to which differences in students' interests exist and are provided for.	The class has students with many different interests. (+)
Formality	Extent to which behavior within the class is guided by formal rules.	The class is rather informal and few rules are imposed. (-)
Speed	Extent to which class work is covered quickly.	Students do not have to hurry to finish their work. (-)
Material Environment	Availability of adequate books, equipment, space, and lighting.	The books and equipment students need or want are easily available to them in the classroom. (+)
Friction	Amount of tension and quarrelling among students.	Certain students in the class are responsible for petty quarrels. (+)
Goal Direction	Degree of goal clarity in the class.	The class knows exactly what it has to get done. (+)
Favoritism	Extent to which the teacher treats certain students more favorably than others.	Every member of the class enjoys the same priveleges. (-)
Difficulty	Extent to which students find difficulty with the work of the class.	Students in the class tend to find the work hard to do. (+)
Apathy	Extent to which students feel no affinity with the class activities.	Members of the class don't care what the class does. (+)
Democracy	Extent to which students share equally in decision-making related to the class.	Class decisions tend to be made by all the students. (+)
Cliqueness	Extent to which students refuse to mix with the rest of the class.	Certain students work only with their close friends. (+)
Satisfaction	Extent of enjoyment of class work.	There is considerable dissatisfaction with the work of the class. (-)
Disorganization	Extent to which classroom activities are confusing and poorly organized.	The class is well organized and efficient. (-)
Competitiveness	Emphasis on students competing with each other.	Students seldom compete with one another. (-)

Items designated (+) are scored 1, 2, 3, and 4, respectively, for the responses Strongly Disagree, Disagree, Agree, and Strongly Agree. Items designated (-) are scored in the reverse way.

Cohesiveness (Previously called Intimacy) When several individuals interact for a period of time, a feeling of intimacy or cohesiveness may develop. This property separates members of a group from non-members, and has been found in research to relate to several class and course properties. For example, smaller classes were found to be more cohesive than were larger classes (Walberg, 1969a; Anderson, & Walberg, 1972), classes of teachers inexperienced with a new course were perceived as more cohesive than those taught by teachers more familiar with the course (Anderson, Walberg, & Welch, 1969), and history and English classes were found to be more cohesive than science classes (Anderson, 1971). Also class cohesiveness has been found consistently to be positively related to learning criteria.

Diversity The extent to which the class provides for a diversity of pupil interests and activites is regarded important by educational philosophers and curriculum developers. When the LEI was employed in an evaluation of the Harvard Project Physics course, it was found that classes using the experimental course were perceived as having significantly more diversity of interests and activities than those using traditional courses (Anderson, Walberg, & Welch, 1969). Consistent links between classroom diversity and student outcomes has not yet been established.

Formality The extent to which behavior within the class is guided by formal rules reveals something about the behavioral norms of the group. Research suggests that larger classes are considered more formal than are smaller classes (Walberg, 1969a), and that mathematics classes tend to be less formal than classes in science, humanities, and languages (Anderson, 1971). Relationships between formality and student learning have tended to be positive.

Speed The rate of progress of the class ideally should be matched to the characteristics of individual pupils within it. The individual student's perception of how fast the teacher covers the work tells us something about the student, whereas the class rating of speed should tell us something about how well the teacher is able to communicate with and adapt to the needs of the group. Examples of research findings are that speed was negatively correlated with the mean IQ score in the class, and that classes in science and mathematics were considered as having a faster pace than those in English and history (Anderson, 1971). But speed has not been found consistently to relate to pupil learning.

Material Environment In children's groups, the physical or material environment, including the amount of space and the type of equipment available, greatly influences the structure of the group (Cartwright, & Zander, 1968). Furthermore, studies of seating patterns in school classes provide evidence for the importance of the physical environment on learning. Research findings suggest that an experimental physics course promoted high ratings of material environment due to the wealth of materials provided with that course (Anderson, Walberg, & Welch, 1969), and that ratings of material environment are generally positively correlated with various measures of pupil learning.

Friction Of Thelen's (1950) three major concepts of experiencing, interdependence, and conflict, conflict is considered the most significant social psychological phenomenon. Energy expended in conflict cannot be channelled

in other directions and the emotional upset resulting from extensive or continued conflict can be expected to impair learning. The Friction scale in the LEI measures, from the pupil's viewpoint, essentially the three observational categories "shows disagreement", " shows tension", and "shows antagonism" of Bales' (1950) interaction process analysis. Past studies have revealed that friction is higher in mathematics classes than in other subject areas (Anderson, 1971), is higher when the class contains a larger number of boys than girls (Walberg, & Ahlgren, 1970), and is negatively correlated with measures of learning.

Goal Direction Bany and Johnson (1964), in their book on classroom group behavior, consider group goals of vital importance to individual pupil learning. The recognition of goals and their subsequent acceptance by the group serve to sanction only goal-oriented behavior and provide an expected role or norm for class members. Anderson, Walberg, and Welch (1969) found that, as hypothesized, goal direction was higher in classes following traditional courses than in classes using an experimental physics course. Studies of learning critieria have established positive relationships between goal direction and students' learning.

Favoritism This scale is essentially a measure of negative affect and might be used to indicate whether given pupils have a low academic self concept. As a measure of group properties, it assesses the amount of tension and quarrelling in a class. Consistent favoritism-learning associations have not been found.

Difficulty The Difficulty scale can be considered important for the same reasons as for the Speed scale and because it completes the "depth-breadth" paradigm used by some educational theorists. It assesses the extent to which students find difficulty with the work of the class. Examples of research findings for this scale are that classes following a new physics course were perceived as less difficult than classes following traditional courses (Anderson, Walberg, & Welch, 1969), that mathematics classes were considered more difficult than classes in other subjects (Anderson, 1971), and that larger classes were perceived as less difficult than were smaller ones (Walberg, 1969a; Anderson, &Walberg, 1972). Positive relationships have been found between student-perceived difficulty and student learning outcomes.

Apathy This scale complements the Cohesiveness scale and indicates whether individuals within the class feel a lack of affinity with class activities. Apathy has been found consistently to be negatively related to learning criteria.

Democracy A large number of studies on the authoritarian-democratic continuum has attempted to support or oppose "democratic" classroom atmospheres (i.e., situations in which students share in decision-making related to the class). In research applications, this scale has not discriminated among courses, but it has been found to relate significantly and positively to pupil learning.

Cliqueness Subgroups or cliques within a class can lead to hostility among members of various parts of the class. These cliques offer protection to those who are failures in the group at large and provide alternative norms which presumably lead to less than optimal group productivity. Cliqueness has been found to be higher in classes following traditional courses than in those

following an experimental course (Anderson, Walberg, & Welch, 1969), and to be negatively associated with student learning.

Satisfaction Whether or not pupils like their class can be expected to affect their learning. If students dislike the subject, the teacher, or their classmates, their frustrations may result in less than optimal performance. Furthermore, because satisfaction with school is itself a goal of educators, research use of this scale may help shed light on the effects of such practices as homogeneous and heterogeneous grouping, sexual and racial integration, and so forth. Satisfaction has been found to be negatively related to class size (Walberg, 1969a), and to be consistently positively associated with student learning.

Disorganization This scale measures the extent to which pupils consider the class and its activities to be confusing and poorly organized. Research has revealed that mathematics classes tend to be viewed as more disorganized than in other subjects (Anderson, 1971), and that greater disorganization has been linked consistently with a reduction in pupil learning.

Competitiveness Class emphasis on students competing with each other is a central concept in group dynamics and therefore was added to the 1969 revision of the LEI. It has been found that competitiveness tends to be greater in classes with a higher proportion of boys than girls (Walberg, & Ahlgren, 1970), but consistent relationships between competitiveness and student learning outcomes have not been established.

STATISTICAL INFORMATION ABOUT LEI

Means and Standard Deviations

Some normative data are provided in Table 2 based on a sample of students who responded to the LEI in 1969. This sample consisted of 1,048 individual students in 64 Grade 10 and 11 classes in various subject areas. Because both the individual student and the class mean have been used commonly in prior research involving the LEI, Table 2 includes scale means and standard deviations separately for individuals and classes. These class mean data are based on 61 of the 64 classes in the sample. This table shows that, as anticipated, standard deviations are quite a bit lower for class means than for individuals.

More detailed normative information for eight different reference groups is contained in Appendix C. Data for the first two reference groups were obtained in 1967 from Grade 11 and 12 physics classes in the U.S.A. Whereas the first reference group consisted of 47 classes using Harvard Project Physics material, the second reference group consisted of 37 classes following traditional physics materials. Appendix C, however, contains no data for the Competitiveness scale for these reference groups because use was made of the 1967 version of the LEI which does not contain this scale. The remaining six reference groups in Appendix C are comprised of the Grade 10 and 11 classes in the sample described above. These students were studying different subjects in

TABLE 2. LEI Scale Means and Standard Deviations for Individuals and Classes

Scale	Individuals[a]		Class Means[b]	
	Mean	Standard Deviation	Mean	Standard Deviation
Cohesiveness	17.71	3.14	17.68	1.70
Diversity	20.23	2.32	20.36	0.75
Formality	18.00	3.44	17.67	2.05
Speed	17.33	3.41	17.63	1.63
Material Environment	16.77	3.06	16.51	1.50
Friction	16.82	3.33	17.16	1.79
Goal Direction	17.96	3.80	17.92	1.55
Favoritism	14.18	3.81	14.48	1.83
Difficulty	18.72	2.80	18.98	1.10
Apathy	17.80	3.74	17.96	1.84
Democracy	17.53	3.16	17.35	1.25
Cliqueness	19.33	2.94	19.56	1.30
Satisfaction	16.77	3.65	16.44	1.97
Disorganization	16.43	4.18	16.84	2.58
Competitiveness	17.04	3.33	16.96	1.32

[a]Based on 1,048 individual students in 64 classes with various subject areas in Montreal (1969 data)

[b]Based on 61 class means for the same sample (1969 data)

1969 in eight English speaking high schools in metropolitan areas of Montreal, Canada. Of the 62 classes, six were physics classes, 10 were chemistry classes, 10 were biology classes, 20 were English and history classes, nine were mathematics classes, and seven were French classes.

Reliability

As stated earlier, the LEI can be used either to obtain scale scores for individuals within classes, or to generate class means on each scale in order to estimate the climate profile of a class. For this latter purpose, a 50 per cent sample of the pupils in each class has proven adequate for a reliable assessment of class mean scores (Anderson, 1968). Because there are two potential uses for the LEI, the two types of reliability coefficient shown in Table 3 are required. The alpha coefficient for individual students is a measure of internal consistency and indicates the extent to which an individual respondent answers similarly for each item on the scale. The intraclass correlation is a coefficient indicating the reliability of class means, and is based on the ratio of between-class variance to within-class variance (Guilford, & Fruchter, 1978). It indicates both the extent to which pupils within the same class respond similarly and the extent to which the scale discriminates among classes. As well, Table 3 contains some preliminary information about each LEI scale's test-retest reliability (i.e., stability over time).

The alpha coefficients and intraclass correlations are shown in Table 3 for two separate samples of senior high school students in North America. The first set of alpha estimates is based on the data collected in 1967 from a random sample of 464 students participating in the evaluation of Harvard Project Physics. The first set of intraclass correlations is based on 29 large classes also drawn from the same sample. The second set of estimates for the alpha coefficients and the intraclass correlations are both based on the sample of 1,048 students in 64 classes in Montreal in 1969 in a variety of subject areas. The test-retest estimates are based on a sample of 139 individual students in 1970 in nine Grade 11 and 12 classes in three Boston area high schools. Taken together, the results contained in Table 3 suggest that all LEI scales possess satisfactory reliability.

Intercorrelations Among Scales

LEI scale intercorrelations for class mean scores are reported in Table 4. As these correlations are a function of sample size, a large sample of 149 senior high school physics classes (1967 data) was used, except in the case of the newly added Competitiveness scale which involved 62 classes (1969 data). Correlations for individual subjects as opposed to class means are not shown here, but such correlations could be expected to be generally lower than the correlations reported for class means due to an increase in the potential sources of variance. Also, in the last column of Table 4, data on intercorrelations have been summarized by calculating the mean correlation of each scale with the other 14 scales. Although Table 4 suggests that several of the scales are substantially interrelated, they may be treated independently in analyses, provided that conservative statistical tests are employed.

TABLE 3. Individual and Group Reliabilities of LEI Scales

Scale	Alpha Coefficient for Individuals		Intraclass Correlation for Groups		Test-Retest Reliability for Individuals
	(N=464)	(N=1048)	(N=29)	(N=64)	(N=139)
Cohesiveness	0.78	0.69	0.82	0.85	0.52
Diversity	0.58	0.54	0.43	0.31	0.43
Formality	0.64	0.76	0.82	0.92	0.55
Speed	0.77	0.70	0.71	0.81	0.51
Material Environment	0.65	0.56	0.76	0.81	0.64
Friction	0.78	0.72	0.77	0.83	0.73
Goal Direction	0.86	0.85	0.71	0.75	0.65
Favoritism	0.77	0.78	0.53	0.76	0.64
Difficulty	0.66	0.64	0.84	0.78	0.46
Apathy	0.83	0.82	0.79	0.74	0.61
Democracy	0.67	0.67	0.54	0.67	0.69
Cliqueness	0.74	0.65	0.77	0.71	0.68
Satisfaction	0.80	0.79	0.74	0.84	0.71
Disorganization	0.81	0.82	0.82	0.92	0.72
Competitiveness	0.78	0.78	-	0.56	-

All reliability estimates are based on samples of senior high school students in North America. Alpha coefficients have been estimated for a sample of 464 students in 1967 and a sample of 1,048 students in 1969. Intraclass correlations were calculated on a sample of 29 classes in 1967 and of 64 classes in 1969. Test-retest data were collected in 1970 from a sample of 139 individuals.

TABLE 4. LEI Scale Intercorrelations

Scale	Scale Intercorrelations															Mean Correl. with other Scales
	Coh	Div	For	Sp	ME	Fri	CD	Fav	Dif	Ap	Dem	Cli	Sat	Dis	Comp	
Cohesiveness	-															14
Diversity	04	-														16
Formality	-09	-04	-													18
Speed	08	-01	20	-												17
Material Environment	14	06	22	00	-											24
Friction	-16	31	-06	05	-22	-										36
Goal Direction	14	-26	42	-17	34	-38	-									37
Favoritism	-09	16	-03	23	-40	53	-40	-								32
Difficulty	27	-17	21	57	13	-21	08	00	-							16
Apathy	-32	16	-17	16	-38	61	-63	45	-21	-						39
Democracy	12	-28	09	-20	32	-58	43	-63	-01	-55	-					34
Cliqueness	-27	21	-21	-02	-25	69	-36	34	-20	53	-40	-				33
Satisfaction	10	-20	15	-40	37	-57	70	-52	-04	-73	54	-45	-			39
Disorganization	-07	23	-50	12	-48	47	-77	54	-14	60	-50	48	-71	-		40
Competitiveness	-13	04	11	-10	00	13	06	18	06	00	-08	17	-03	04	-	08

Correlations are based on means of 149 physics classes (1967 data) for all scales except Competitiveness, for which 62 classes (1969 data) were used. Decimals have been omitted, so correlations should be read in hundredths.

Percentages Choosing Each Response

Appendix C also shows the percentage of students choosing each of the four alternatives (Strongly Disagree, Disagree, Agree, Strongly Agree) to each item. These data are based on the previously described 1969 sample of 1,048 senior high school students in various subject areas.

Item-Scale Correlations

Adequate measures of internal consistency were ensured during scale development by maintaining only those items whose correlation with its a priori assigned scale was appreciable. In fact, Appendix D shows the magnitude of the item-scale correlation obtained for each LEI item for the two previously described samples (i.e., 464 students in 1967 and 1,048 students in 1969). Furthermore, in all cases, items correlated higher with the assigned scale than with any of the other scales in the instrument.

RESEARCH INVOLVING LEI

Considerable interest in the LEI has been evident internationally among educational researchers since the late 1960s. Although much of the earlier work was carried out in the U.S.A. in connection with the research and evaluation activities of Harvard Project Physics, significant amounts of research have been conducted in Canada, Australia, and Israel, and a few key studies have been done in developing countries including India, Thailand, Brazil, and Indonesia. This research has involved the use of the LEI as a source of both dependent and independent variables.

Readers interested in detailed descriptions of prior studies can refer to a number of key reviews of research involving the LEI (Randhawa, & Fu, 1973; Anderson, & Walberg, 1974; Walberg, 1976; Walberg, 1979; Walberg, & Haertel, 1980; Fraser, 1981a; Fraser, & Walberg, 1981; Haertel, Walberg, & Haertel, 1981). In the present section, the main purpose is to provide an informative but relatively brief overview of the scope and variety of research carried out in different parts of the world over the previous 15 years. Furthermore, in organizing this overview, studies involving the LEI as independent or predictor variables are discussed first, whereas research involving the use of environment dimensions as independent or criterion variables is considered afterwards.

Relationships Between LEI and Learning

The strongest tradition in prior research with the LEI has involved investigation of the predictability of students' cognitive, affective, and behavioral learning outcomes from their perceptions of classroom learning environment. In fact, a large number of studies conducted in numerous countries has provided consistent and strong support for the incremental predictive validity of students' classroom perceptions in accounting for appreciable amounts of learning outcome variance, often beyond that attributable to student entry characteristics such as pretest or IQ.

Studies into the predictive validity of perceptions on the LEI exhibit marked differences in terms of the instruments, sample, and methodology used. Table 5 illustrates how these studies vary in terms of eight key characteristics, namely, choice of instruments to measure outcomes, location of the study, school subject area, grade level, sample size, unit of statistical analysis (students, classes, or class subgroups), background variables controlled when estimating the strength of the environment-learning relationship (especially parallel pretest and IQ), and data analytic techniques (particularly simple correlation, multiple regression, and canonical analysis).

Table 5 shows that some of the earliest predictive validity research was associated with Harvard Project Physics. Different studies, however, employed one of three similar but not identical versions of the LEI, different overlapping samples of senior high school classes (mainly from the U.S.A. but also from Canada in some studies), different overlapping batteries of learning outcome measures, various units of statistical analysis, control for different background variables, and a variety of methods of data analysis. For example, the predictive validity of the LEI was supported in studies using three different combinations of units of analysis: individual student environment perceptions and individual learning outcome scores (Walberg, & Anderson, 1968b); class mean environment perceptions and class mean learning outcome scores (Anderson, & Walberg, 1968); and class mean environment perceptions and individual learning outcome scores (Anderson, 1970). Also Walberg (1969b, c, 1972) analyzed a data set based on 144 classes in several different ways using different units of analysis, controlling for different background variables, and adopting a variety of data analytic techniques. One of Walberg's (1972) findings was that the multiple correlations between the set of LEI dimensions and raw scores on four learning outcomes were 0.29, 0.30, 0.22, and 0.25 (three significant) when the individual was used as the unit of analysis compared with 0.63, 0.59, 0.49, and 0.43 (all significant) when the class was employed as the unit of analysis.

While the studies related to Harvard Project Physics provided substantial evidence supporting the predictive validity of students' environment perceptions in senior high school physics classes, studies by Walberg and Anderson (1972) and Lawrenz (1976) explored this question for North American senior high school students in other subject areas. Walberg and Anderson's study of 64 classes in three science and five non-science areas revealed that the set of LEI dimensions accounted for a significant increment of 51 per cent of examination achievement variance beyond that attributable to IQ. Lawrenz's study of 238 classes showed that the amount of variance in raw attitude scores accounted for by a block of 10 LEI scales was 39 per cent for biology classes, 32 per cent for chemistry classes, and 29 per cent for physics classes.

Several other studies conducted in the U.S.A. have established associations between student outcomes and their perceptions of learning environment as measured by versions of the LEI. O'Reilly's (1975) study of 48 Grade 9 and 10 mathematics classes in Eastern Ontario established relationships between achievement and student perceptions. Cort's (1979) study of 81 social studies classes at the Grade 5 and 6 levels in 11 different states of the U.S.A. established links between LEI scores and various immediate and follow-up measures of achievement and attitude. Haladyna and Shaughnessy's

TABLE 5. Overview of Studies of Predictive Validity of LEI

Study	Learning Outcomes	Sample				Methodology		
		Location	Subject area	Grade level	Size	Unit of analysis	Variables controlled	Analysis technique
Walberg, & Anderson (1968b); Anderson, & Walberg (1968); Anderson (1970); Walberg (1969b, c, 1972)	achievement; understanding; processes; participation; interest; attitudes	mainly USA; also Canada in some studies	physics	senior high school	varying (maximum of 144 classes)	either student or class	pretest & IQ in some analyses	simple, multiple, and/or canonical correlation
Walberg, & Anderson (1972)	examination results	Montreal, Canada	3 science & 5 non-science	10 & 11	1,600 students in 64 classes	class	IQ	multiple regression
O'Reilly (1975)	mathematics achievement	Eastern Ontario, Canada	mathematics	9 & 10	48 classes in 12 schools	class	IQ	simple, partial, & multiple correlation
Lawrenz (1976)	science attitudes	Midwest regions of USA	biology, physics, & chemistry	senior high school	238 classes	class	none	multiple regression
Cort (1979)	10 immediate & 10 follow-up measures of achievement and attitude	11 USA states	social studies	5 & 6	81 classes in 76 schools	class	pretest, class size, percentage of girls	multiple & canonical correlation
Haladyna, & Shaughnessy (1981)	attitude	Oregon	science, mathematics & social studies	4, 7, & 9	5,804 students in 277 classes	class	none	simple & multiple correlation

continued

TABLE 5. (Continued)

Study	Learning Outcomes	Sample				Methodology		
		Location	Subject area	Grade level	Size	Unit of analysis	Variables controlled	Analysis technique
Fraser (1978a, 1979)	3 inquiry skills; understanding; several attitudes	Melbourne, Australia	science	7	531 students in 20 classes	class sub-group	pretest, IQ, sex, social class	multiple regression
Power, & Tisher (1979)	2 achievement; 3 attitude; 3 satisfaction	Melbourne, Australia	science	junior high school	315 students in 20 classes	student & class	pretest (some analyses)	simple, multiple & canonical correlation
Hofstein et al. (1979)	4 attitudes	Israel	chemistry	11	400 students in 12 classes	student	none	canonical analysis
Walberg, Singh, & Rasher (1977)	achievement	Rajasthan, India	science & social science	10	3,000 students in 150 classes	class subgroup	IQ	simple & multiple correlation
Chativanonda (1978)	3 attitudes	near Bangkok, Thailand	physics	12	989 students in 31 classes	class subgroup	pretest, IQ, personality, sex, etc.	simple correlation & multiple regression
Holsinger (1972, 1973)	information learning; individual modernity	Brazil	-	3-5	2,533 students in 90 classes	class	-	multiple regression
Paige (1978, 1979)	cognitive achievement; individual modernity	East Java, Indonesia	-	6	1,621 students in 60 schools	class	pupil background, home environment, etc.	multiple regression

recent (1981) study involved 5,804 science, mathematics, and social studies students in 277 Grade 4, 7, and 9 classes on Oregon in providing responses to a learning environment instrument based on the LEI and the Classroom Enviroment Scale (Moos, 1979). Simple correlational analyses and multiple regression analyses performed separately for each subject area and grade level (with sample sizes ranging from 22 to 38 classes) revealed numerous statistically and practically significant relationships between student attitudes and LEI dimensions.

In Australia, Fraser (1978a, 1979) explored the predictability of numerous learning outcomes from student perceptions on a modified nine-scale version of the LEI. The sample consisted of 531 seventh grade students in 20 classes, although the unit of statistical analysis used was the subgroup mean obtained by grouping students similar in general ability, socioeconomic status, and sex. Fraser (1979) found that the increment in variance in end-of-year achievement on seven measures (three inquiry skills, understanding of nature of science, and three attitudes) accounted for by the set of environment scales - beyond that attributable to corresponding beginning-of-year scores, IQ, socioeconomic status, and sex -ranged from 2.9 per cent to 22.4 per cent for different learning criteria. These increments were statistically significant for five of the seven outcomes. In analyses of other attitude data collected from the same sample, Fraser (1978a) found that more favorable classroom environments (especially in terms of more satisfaction) tended to promote more positive attitudes to experiments as a source of scientific information, while less favorable environments (especially in terms of more difficulty, competitiveness, and disorganization and a worse material environment) tended to promote more positive attitudes to three non-experimental and more authoritarian sources, namely, experts, books, and teachers. In another study of junior high school science classes in Australia (Power, & Tisher, 1975, 1979), a modified version of the LEI was used to reveal the existence of a number of statistically significant relationships between learning outcomes and environment dimensions.

Table 5 also indicates that translated versions of the LEI have been employed in predictive validity studies involving students in Israel (Hofstein, Gluzman, Ben-Zvi, & Samuel, 1979), India (Walberg, Singh, & Rasher, 1977), Thailand (Chatiyanonda, 1978), Brazil (Holsinger, 1972, 1973), and Indonesia (Paige, 1978, 1979). Each of these studies provided evidence of the cross-cultural predictive validity of students' classroom environment perceptions.

The support for the predictive validity of student perceptions on the LEI emerging from the studies reviewed above is highlighted further in Haertel, Walberg, and Haertel's (1981) meta-analysis. This ambitious synthesis involved correlations of classroom environment scales (mainly from the LEI) with cognitive, affective, and behavioral learning measures. The data consisted of 734 correlations from a collection of 12 studies of 10 data sets from 823 classes in eight subject areas containing 17,805 students in four nations. A total of 31 of 36 hypotheses that Walberg (1969c) derived from psychology were supported in the synthesis. Both learning posttests and regression-adjusted gains in learning in a variety of subject areas were positively associated with student-perceived cohesiveness, satisfaction, difficulty, formality, goal direction, democracy, and material environment, and negatively associated with friction, cliqueness, apathy, and disorganization. The chief exceptions to the relatively

constant size of correlations were that correlations were generally higher in samples of older students and in studies employing collectivities such as classes and schools (in contrast to individual students) as the units of statistical analysis. The important conclusions, however, are that classroom environment perceptions contribute to a greater or lesser degree to accounting for variance in learning outcomes beyond the variance accounted for by ability and pretest measures no matter what the characteristics of the study, and that the signs and magnitudes of the correlations are surprisingly consistent across studies.

LEI Dimensions as Criterion Variables

Numerous studies have involved the use of student perceptions on the LEI as criterion variables. In particular, classroom environment dimensions can provide important process criteria of curricular effectiveness (Walberg, 1975; Fraser, 1981a). In fact, several studies of alternative curricula have shown that classroom environment variables have differentiated revealingly among the curricula when various cognitive outcome measures have shown little sensitivity (e.g., Welch, & Walberg, 1972; Fraser, 1979). It appears that valid and useful differences among educational treatments are often reflected first and most strongly in changes in students' perceptions of their classroom learning environment, and that later, in moderated form, these changes also show up in terms of student learning outcomes.

Anderson, Walberg, and Welch (1969) used students' perceptions on the LEI to reveal differences in classes using the penultimate version of Harvard Project Physics materials and classes following alternative physics curriculum materials. The sample consisted of 3,264 senior high school students in 150 physics classes. Multiple discriminant analysis (including rotation of principal discriminant loadings) with the class mean as the unit of analysis revealed that students in classes using Harvard Project Physics materials perceived their classrooms as more diverse and democratic, less difficult and goal directed, and having a better material environment and less friction. In further analyses performed for the 53 randomly chosen classes in the original sample, Welch and Walberg (1972) found that Harvard Project Physics students perceived their classes as having greater diversity and less favoritism and difficulty than was perceived by students in classes using alternative materials.

Student perceptions of classroom environment have been used as criteria in the evaluation of materials developed by ASEP, the Australian Science Education Project. Fraser (1978b, 1979) employed a modified nine-scale version of the LEI with a sample of 541 seventh grade students in Melbourne to compare the perceived environment in ASEP and conventional classrooms six months after the beginning of the school year. When student socioeconomic status, general ability, and sex were controlled, multiple regression analyses revealed that ASEP students perceived their classrooms as more satisfying, more individualized, and having a better material environment. Tisher and Power (1976, 1978) traced changes occurring in student perceptions on the LEI during the use of an ASEP unit in 20 junior high school classrooms. It was found that, after using the ASEP unit, students perceived their classrooms as having greater cohesiveness, diversity, goal direction, satisfaction, formality, and cliqueness and less speed, favoritism, disorganization, and apathy.

Several interesting applications of the LEI in non-science subject areas have provided additional support for the criterion validity of students' perceptions. For example, LEI dimensions have been employed as criterion variables in evaluating an innovative middle school curriculum in Illinois (Eash, & Talmage, 1975), an individualized instructional strategy in primary schools in Israel (Levin 1980), and usage of MACOS (Man: A Course of Study) materials in elementary schools in the U.S.A. (Cort, 1979).

Walberg (1968b) related student environment perceptions on a preliminary version of the LEI to teachers' personality characteristics. Canonical analysis of teacher personality characteristics and class mean environment scores among a sample of 72 senior high school physics classes and their 36 male teachers revealed four significant canonical relationships of which three were readily interpretable. Teacher need for dependence, power, order, and change were associated with a formal, subservient classroom environment with little friction among class members; teachers with needs to interact with others tended to have classes which were controlled and goal-directed; and self-centered teachers had classes characterized by disorganization, constraint, loose supervision, and lower group status.

Walberg (1969a) reported a study of the relationship between class size and the nature of the classroom learning environment. Subjects consisted of a North American sample of 149 high school physics classes which provided responses to the LEI. A multiple regression analysis, conducted separately for each LEI scale using the class mean as the unit of analysis, was used to predict learning environment from a linear, quadratic, and cubic class size term. It was found that increasing class size was linearly associated with greater formality and diversity and less intimacy (cohesiveness) and difficulty. Results for a quadratic term also suggested that, beyond the middle two-thirds range of class sizes (about 17 to 31 students), there were significant trends toward greater intimacy, formality, and goal direction and less divesity and disorganization. Also it is interesting to note that Anderson and Walberg (1972) have attempted to replicate this study using 61 classes in eight English-speaking schools in Montreal. It was found that, of the nine significant relationships identified in the study in the U.S.A., the direction of relationship was the same for the Canadian sample in eight cases. Only two of these relationships were statistically significant, however, and these indicated that increasing class size was linearly associated with decreasing cohesiveness and difficulty.

A comprehensive study reported by Walberg and Ahlgren (1970) employed simple, multiple, and canonical correlations to describe relationships between class means on the LEI and several different blocks of predictor variables among a sample of 144 senior high school physics classes. A series of canonical analyses revealed at least one significant canonical relationship between the set of 14 LEI dimensions and each of the following blocks of predictors: a group of three cognitive and three affective pretests; a block of seven student personality traits; a group of 20 student biographical variables; a linear and a quadratic class size term combined; the ratio of boys to girls in the class; and student IQ.

The LEI has been used also in exploring grade level differences in classroom environment. In a comprehensive study involving use of 10 of the

LEI's scales with a stratified random sample of 1,121 science and mathematics classes in 15 U.S.A. states, Welch (1979) found that, relative to senior high school students, junior high school students perceived their classes as less difficult, satisfying, and democratic, with more disorganization, diversity, formality, friction, cliqueness, and favoritism.

Discriminant function analysis has been employed to investigate differences between science and other subjects in their classroom environment. Anderson (1971) used class means on the LEI from a sample of 62 science, mathematics, humanities (i.e., English literature and history), and French classes in high schools in Montreal. Results indicated that: first, relative to other classes, mathematics classes were seen as high on friction, favoritism, difficulty, disorganization, and cliqueness and lower on formality and goal direction; second, relative to humanities classes, science classes were perceived as more formal and fast-moving with less friction, favoritism, cliqueness, and disorganization; third, French classes were perceived as higher on goal direction and lower on friction and disorganization than other classes. Kuert (1979) compared student classroom enviroment perceptions in the four subject areas of science, mathematics, social studies, and language arts. This study used both the LEI and the Class Activities Questionnaire (Steele, House, & Kerins, 1971) among a sample of 414 high school students in 18 classrooms. Three discriminant functions emerged: convergence-divergence contrasted mathematics with language arts; substance-syntax contrasted science and social studies with language arts and mathematics; and objectivity-subjectivity contrasted science with social studies. It is interesting also to note that Welch's (1979) large-scale study involving the use of 10 scales from the LEI with a stratified random sample of 1,121 science and mathematics classes in 15 U.S.A. states has provided results largely compatible with the three studies described above. In particular, Welch's use of MANOVA revealed that, relative to mathematics classes, science classes were perceived as having more diversity, disorganization, formality, friction, cliqueness, and favoritism and less goal direction, difficulty, and democracy.

The LEI has been used in several studies comparing and contrasting the learning environments in different types of schools. Randhawa and Michayluk's (1975) study of 96 Grade 8 to 11 classes in Saskatchewan revealed that, relative to urban classes, rural classes were perceived as having more cohesiveness, cliqueness, disorganization, and competitiveness, less difficulty and satisfaction, and a worse material environment. In a study involving 317 Grade 10 boys and girls in a small Canadian city, Randhawa and Hunt (1981) found some interesting differences between the classroom environments of parochial and secular schools. In comparison with secular school classrooms, the learning environment of a girls' parochial school had greater cohesiveness and cliqueness, a worse material environment, and less apathy, democracy, and competitiveness, whereas the learning environment of a boys' parochial school had higher cohesiveness, friction, favoritism, and competitiveness, and less goal direction and democracy. Hofstein, Gluzman, Ben-Zvi, and Samuel's (1980) study of 350 eleventh grade classes in Israel showed that vocational school students perceived greater speed, goal direction, satisfaction, difficulty, and democracy, and less disorganization, apathy, and competitiveness than high school students. Sharan and Yaakobi's (1981) use of an adapted version of the LEI with 572 students in tenth grade biology classes in Israel revealed that, compared with urban schools, Kibbutz district schools had a more positive

classroom environment especially in terms of cohesiveness, favoritism, and cliqueness.

MY CLASS INVENTORY (MCI)

The LEI has been simplified to form another instrument called the **My Class Inventory (MCI)** which is suitable for children in the 8 to 12 years age range. Although the MCI was developed originally for use at the elementary school level, it also has been found to be very useful with students at the seventh grade level (i.e., the first year of the junior high school), especially among students who might experience reading difficulties with the LEI.

Description of MCI

The MCI differs from the LEI in four important ways. First, in order to minimize fatigue among younger children, the MCI contains only five of the LEI's original 15 scales (namely, Cohesiveness, Friction, Satisfaction, Difficulty, and Competitiveness). Second, item wording has been simplified to enhance readability. Third, the LEI's four-point response format has been reduce to a two-point (Yes-No) response format. Fourth, students answer on the questionnaire itself instead of on a separate response sheet to avoid errors in transferring responses from one place to another.

The final form of the MCI contains 38 items altogether (six for Cohesiveness, eight for Friction, eight for Difficulty, nine for Satisfaction, and seven for Competitiveness). All items in the MCI are listed in Appendix E, which contains a copy of the instrument. It can be seen from this appendix that the reading level of the MCI is considerably lower than that of the LEI. Table 6 shows which items belong to each MCI scale, and which items are scored in the reverse direction.

The version of the MCI contained in Appendix E is a slightly modified, more reliable form than the one described in the previous version of this manual. The initial version contained 45 items altogether, with nine items assessing each scale. The previous form of the manual indicates that the internal consistency reliability (alpha coefficient) based on a sample of 655 elementary school pupils in the U.S.A. was 0.54 for Cohesiveness, 0.70 for Friction, 0.56 for Difficulty, 0.77 for Satisfaction, and 0.56 for Competitiveness. Comparable alpha reliability coefficients have been reported for the original MCI scales by Perkins (1976) for a large sample of individual fourth graders in Georgia (0.46 for Cohesiveness, 0.57 for Friction, 0.52 for Difficulty, 0.73 for Satisfaction, and 0.41 for Competitiveness). Because of the relatively low reliabilities of some scales in the original version of the MCI, however, Fisher and Fraser (1981) undertook item analysis of data collected from a large sample of students in order to identify certain items whose removal would enhance scale reliability. It is for this reduced 38-item version of the MCI that data are reported in this manual.

TABLE 6. Scale Allocation and Scoring Direction for MCI Items

Scale	Item Numbers
Cohesiveness	12, 17, 22, 27, 32 38
Friction	2, 4, 10, 14, 20, 26, 31, 34,
Difficulty	3, 7, 11, 18, 23, 28, 33, 37
Satisfaction	1, 5, 8, 13, 16, 21, 25, 30, 36
Competitiveness	6, 9, 15, 19, 24, 29, 35

Underlined items are scored 1 and 3, respectively, for the responses Yes and No. All other items are scored in the reverse manner. Omitted or invalid responses are scored 2.

TABLE 7. Means, Standard Deviations, Reliabilities, and Intercorrelations for MCI Scales

Scale	Number of Items	Mean[a]	Standard Deviation		Alpha Reliability		Scale Intercorrelations (N=100)					Mean Correl. with other scales
			Students (N=2305)	Classes (N=100)	Students (N=2305)	Classes (N=100)	Coh	Fri	Dif	Sat	Comp	
Cohesiveness	6	14.01	3.12	1.41	0.67	0.80	-					0.27
Friction	8	18.23	3.81	1.92	0.67	0.75	-.41	-				0.30
Difficulty	8	12.31	3.40	1.44	0.62	0.73	-.17	.17	-			0.20
Satisfaction	9	18.87	5.08	2.77	0.78	0.88	.36	-.41	-.31	-		0.28
Competitiveness	7	16.20	3.62	1.51	0.71	0.81	-.13	.20	-.13	.05	-	0.13

[a]Means were approximately the same for both the student and the class as the unit of analysis.

The sample consisted of 2,305 students in 100 seventh grade classes.

Statistical Information for MCI

Table 7 provides for the MCI statistical information analogous to that supplied in previous tables for the LEI. Data in this table are based on a large and representative sample of 2,305 seventh grade students in 100 classrooms in 30 schools throughout Tasmania, Australia. This information includes the mean and standard deviation for each scale for this sample. Although standard deviations are shown separately for the individual student and the class mean as the unit of analysis, scale means were sufficiently similar for the two sampling units to justify a single entry in the table.

Reliability estimates for each MCI scale are shown in Table 7 for both the individual student and the class mean as the unit of analysis. In each case, the alpha coefficient was used as the index of internal consistency reliability. The alpha reliability for class means was obtained simply by substituting values of the variance of class item means in the usual alpha formula. The reliability data in Table 7 show improvements for some scales in comparison with prior results, and indicated that each MCI scale has satisfactory reliability for use with either the individual or the class as the unit of analysis.

The scale intercorrelations shown in Table 7 were calculated using the class mean as the unit of analysis. Values, therefore, could be expected to be smaller if the individual were employed as the unit of analysis. Also, in the last column of the table, these data on intercorrelations have been summarized to form the mean correlation of each scale with the other four scales. The data in Table 7 suggest that the MCI measures distinct, although somewhat overlapping, aspects of classroom learning environment.

Another desirable characteristic of any classroom environment scale is that it is capable of differentiating between the perceptions of students in different classrooms. That is, students within the same class should perceive their class relatively similarly, while mean within-class perceptions should vary from classroom to classroom. This characteristic was explored for each scale for the sample of 2,305 students in 100 classrooms using a one-way ANOVA, with class membership as the main effect and using the individual as the unit of analysis. It was found that each MCI scale diffeerentiated significantly ($p < 0.001$) between classrooms, and that the eta^2 statistic, which is an estimate of the amount of variance in MCI scores attributable to class membership, ranged from 0.18 for the Difficulty scale to 0.31 for the Friction scale.

Research Involving MCI

Although the MCI has been used extensively in local evaluations, usually these either remain unreported or are reported in unavailable, unpublished sources. The number of published studies using the MCI is relatively small compared with the volume of published research involving the LEI. Nevertheless, the number of published reports of research involving the MCI is growing, and these are reviewed in the present section.

Talmage and Walberg (1978) explored the predictive validity of MCI dimensions among students following a district reading program in Illinois. The sample consisted of approximately 1,600 students in Grades 1, 2, 3, and 6 in 60 classes, and reading achievement was measured on two occasions one year

apart using alternative forms of the Science Research Associates Reading Test. A multiple regression analysis with the class as the unit of analysis revealed that the set of MCI dimensions accounted for a significant increment of 11 per cent in the variance in posttest reading achievement beyond that attributable to pretest reading scores. The interpretation of this finding was that perceptions of greater classroom competitiveness were associated with lower reading achievement scores.

Fraser and Fisher (in press) used the previously described sample of 2,305 students in 100 classes to explore associations between perceptions on the MCI and several student outcomes (inquiry skills, understanding of the nature of science, and attitudes). The class mean was used as the unit of statistical analysis, and corresponding pretest outcome and IQ were controlled in some analyses. Simple, multiple and canonical correlation analyses consistently supported the predictive validity of the MCI.

Boulanger (1980) adminstered the MCI to a sample of 27 classes at the Grade 4 to 8 levels in schools spread throughout metropolitan Chicago. With corresponding pretest controlled, associations between a reasoning outcome and environment perceptions were found to be statistically significant for four of the MCI's five scales.

Talmage has used the MCI in a curriculum evaluation study (Talmage, & Hart, 1977; Talmage, & Eash, 1978). The experimental group consisted of 23 elementary-school classes in metropolitan Chicago taught by teachers who had participated in a National Science Foundation program in investigative approaches to mathematics teaching. The experimental group, together with a control group of 23 classes, respondened to the MCI at the beginning and end of the year in which the training program was run. When a multiple regression analysis was performed separately for each MCI scale with the class as the unit of analysis, it was found that the group variable (experimental/control) accounted for a significant increment in posttest cohesiveness scores beyond that attributable to pretest cohesiveness scores. The interpretation of this finding was that mathematics classes taught by participants in the training program were perceived as more cohesive.

In some research that was primarily exploratory and methodological, Walberg, Sorenson, and Fishbach (1972) reported the use of a classroom environment instrument which was similar but not identical to the MCI. This study involved a sample of 2,677 American fifth graders in 40 different schools, employed environment perceptions as criterion variables, and involved student sex, student socioeconomic status (SES), and the size of the school's fifth grade enrollment as predictorvariables. The unit of statistical analysis was the school subgroup mean obtained by dividing students in each school into one of four subgroups (higher SES boys, lower SES boys, higher SES girls, lower SES girls). Significant findings emerging from the study were complex but interesting. For example, the greater the fraction of higher SES children, the less competitive the higher SES children perceived the school, but the more competitive the lower SES children found it.

Further information about the predictive validity of MCI variables is provided in reports describing a large-scale research program in elementary schools in Georgia. This research involved students' perceptions of the school

rather than the classroom and, consequently, the word "class" in MCI items was changed to "school". Ellett, Masters, and Pool (1978), for example, administered the MCI orally in investigating the relation of school environment to achievement (total score on the Iowa Test of Basic Skills) and school attendance over a 20-day period. The sample consisted of 6,151 fourth grade students in 89 different schools, and the school mean was used as the unit of statistical analysis. Multiple regression analyses revealed that the five MCI dimensions together accounted for a significant amount of the variance in achievement (72 per cent) and attendance (14 per cent). Furthermore, using partial canonical correlation techniques, Perkins (1976) found that student perceptions were still related to an outcome variate of achievement and attendance when teacher attitude was controlled.

In another aspect of the research program in Georgia, Ellett and Masters (1978) investigated associations between student perceptions of the school environment as measured by the MCI and teacher perceptions of the school environment as measured by Coughlan and Cooke's (1974) School Survey. Examples of some of the 14 dimensions in the School Survey are Administrative Practices, Professional Work Load, and Colleague Relations. Canonical analysis of school means from 81 elementary schools (8,461 students and 1,695 teachers) revealed two significant canonical correlations of 0.68 and 0.62, respectively, between the sets of student and teacher perceptions of the school environment. Canonical weights associated with the first significant coefficient suggested that teachers' perceptions of worse administrative practices and better school-community relations and educational effectiveness were linked with student perceptions of lower friction and cohesiveness.

USES OF INSTRUMENTS

Researchers are likely to use the LEI and MCI in attempts to replicate, consolidate, and extend the traditions of past research described earlier in this manual. In particular, further studies of predictive validity (i.e., of associations between learning outcomes and environment perceptions) could be pursued for a variety of student ages, cultures, and subject areas using various cognitive, attitudinal, and psychomotor outcome criteria valued in education. Similarly, there is scope for employing classroom social climate characteristics as criterion variables in studies into factors influencing the classroom environment. Prior research reviewed earlier already has involved a great diversity of independent variables (e.g., curriculum or course variables, class size, subject area, grade level, type of school, teacher personality, ratio of boys to girls in the class), but there is a need to replicate this work and to investigate other factors likely to affect the social climate.

Curriculum evaluators and teachers have not used classroom climate criteria nearly as much as they might have when evaluating educational innovations, new curricula, and particular teaching approaches or school organizations. The use of process criteria is especially important since it is becoming common for the philosophy of contemporary educational curricula to define, not only the aims to be achieved, but also the nature of the learning

environment considered desirable. Consequently, Walberg (1975) has decried the overemphasis on standard achievement criteria in curriculum evaluation and has urged that psychosocial classroom processes be viewed as valuable ends in their own right. Moreover, the research reviewed previously in this manual has attested to the potential value of using environment perceptions as criteria of curricular effectiveness because they have differentiated revealingly among alternative curricula when various cognitive achievement measures have shown little sensitivity.

It is highly desirable that the recent emphasis on research on classroom environment should have some practical application in facilitating improvements in classrooms. The availability of instruments such as the LEI or MCI makes it possible for teachers to obtain convenient, reliable feedback information about the climate of their own classrooms as perceived by their students. This feedback information can be employed by teachers as a basis for reflection upon, discussion of, and systematic attempts to improve classroom environments. A suggested approach described by Fraser (1981b) involves, first, administering a classroom environment instrument twice (once to assess actual environment and once to assess preferred environment), second, identifying discrepancies between the actual environment and that preferred by students, third, implementing classroom strategies aimed at aligning the actual environment more closely with students' preferred environment, and, fourth, readministering the climate scales in order to determine the extent to which attempts at environmental improvement were successful. Furthermore, a recent empirical study (Fraser, 1981c) has supported the effectiveness of this strategy, and attests to the potential usefulness of employing classroom environment instruments to provide teachers with meaningful information about problem areas and a tangible basis to guide improvements in these areas.

Future research on classroom learning environment is likely to follow several important new directions which involve a confluence of classroom environment research traditions with some previously distinct research tradition. For example, Marjoribanks (1979, 1980) has reported a valuable study in which classroom environment and family environment variables simultaneously were related to student intelligence, personality, and affective characteristics. The complex results emerging from this study refuted much of previous research which suggested that, compared with measures of family environment, classroom environment variables bear negligible realtionships with student outcome criteria. Although classroom-level and school-level environment research previously have been based on different theoretical foundations and have remained separate, a recent study (Fraser, & Rentoul, in press) has revealed several interesting links between school climate variables and classroom climate variables.

While prior research has concentrated on the preditive validity of student perceptions of actual classroom environment, using an enviornment scale to measure both actual and preferred climate enables a synthesis of classroom environment research with person-environment fit research (Mitchell, 1969; Hunt, 1975). Fraser and Rentoul (1980) reported a person-environment fit study in which classroom climate scales were used to provide a set of five dimensions characterizing student perceptions of actual environment, and another set of five commensurate personal dimensions consisting of student perceptions of their preferred environment. The

relationship between cognitive achievement and actual-preferred congruence (i.e., person-environment fit) was tested to explore the intuitively plausible idea that students' preferences for classroom environment could mediate relationships between learning outcomes and actual environment. The promising finding from this study was that relationships between residual outcome scores and scores on a particular classroom environment scale were positive for students with higher preferences on that environment dimension, but negative for students with lower preferences on that dimensions.

Another recent development has been the incorporation of psychosocial classroom environment as one factor in a multifactor psychological theory of educational productivity (Walberg, 1981). This theory, which is based on an economic model of agricultural, industrial, and national productivity, holds that learning is a multiplicative, diminishing-returns function of student age, ability, and motivation; of quality and quantity of instruction (including self-instruction); and of the psychosocial environments of the home and the classroom. Since the function is multiplicative, it can be argued in principle that any factor at a zero-point will result in zero learning; thus either zero motivation or zero time for instruction will result in zero learning. Moreover, it will do less good to raise a factor that already is high than to improve a factor that currently is the main constraint to learning. The model provides a comprehensive approach to statistically-controlled, multivariate research on productive factors in schooling in contrast to much past research in education which considered only two or three factors in a single study.

This productivity theory was probed recently using National Assessment of Educational Progress data from a stratified American sample of 2,346 13 year-olds (Walberg et al, 1981). When science achievement was regressed on socioeconomic status, motivation, quality of instruction, classroom psychosocial environment, and home environment, all these productivity factors were found to be statistically significant in ordinary multiple regression analyses. Under a more stringent probe of causal direction and influence, however, only classroom environment appeared as an unequivocal cause of science learning. Furthermore, another major study currently in progress (Walberg and Zerega, 1981) is employing samples of Grade 5 to 8 students in Japan and the United States to investigate nine theoretical constructs (age, ability, motivation, quality of instruction, quantity of instruction, classroom environment, home environment, peer environment, media environment) of an educational productivity model for science achievement.

ADMINISTRATION AND SCORING

For easy reference, instructions for administration, computer scoring, and hand scoring of the LEI are provided in Appendix F. Similar instructions for the MCI are in Appendix G. Whereas experienced research workers are likely to use some form of computer scoring, teachers should find useful the simple methods of hand scoring described in these appendixes.

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APPENDIX A: LEARNING ENVIRONMENT INVENTORY

DIRECTIONS

The purpose of the questions in this booklet is to find out what your class is like. This is not a "test". You are asked to give your honest, frank opinions about the class which you are attending **now.**

Record your answer to each of the questions on the Response Sheet provided. Please make no marks on this booklet. Answer every question.

In answering each question, go through the following steps:

1. Read the statement carefully.
2. Think about how well the statement describes your class (the one you are now in).
3. Find the number on the Response Sheet that corresponds to the statement you are considering.
4. Indicate your answer by circling:

   SD if you **strongly disagr**ee with the statement,
   D if you **disagr**ee with the statement,
   A if you **agr**ee with the statement
   SA if you **strongly agr**ee with the statement.

5. If you change your mind about an answer, cross out the old answer and circle the new choice.

Be sure that the number on the Response Sheet corresponds to the number of the statement being answered in the booklet. Don't forget to record your name and other details on your Response Sheet.

1. Members of the class do favors for one another.
2. The class has students with many different interests.
3. Students who break the rule are penalized.
4. The pace of the class is rushed.
5. The books and equipment students need or want are easily available to them in the classroom.

6. There is constant bickering among class members.
7. The class knows exactly what it has to get done.
8. The better students' questions are more sympathetically answered than those of the average students.
9. The work of the class is difficult.
10. Failure of the class would mean little to individual members.

11. Class decisions tend to be made by all the students.
12. Certain students work only with their close friends.
13. The students enjoy their class work.
14. There are long periods during which the class does nothing.
15. Most students want their work to be better than their friends' work.

16. A student has the chance to get to know all other students in the class.
17. Interests vary greatly within the group.
18. The class has rules to guide its activities.
19. The class has plenty of time to cover the prescribed amount of work.
20. A good collection of books and magazines is available in the classroom for students to use.

21. Certain students have no respect for other students.
22. The objectives of the class are not clearly recognized.
23. Every member of the class enjoys the same privileges.
24. Students are constantly challenged.
25. Students don't care about the future of the class as a group.

26. Decisions affecting the class tend to be made democratically.
27. Students cooperate equally well with all class members.
28. Personal dissatisfaction with the class is too small to be a problem.
29. The work of the class is frequently interrupted when some students have nothing to do.
30. Students compete to see who can do the best work.

31. Members of the class are personal friends.
32. Some students are interested in completely different things than other students.
33. Student are asked to follow strict rules.
34. Students do not have to hurry to finish their work.
35. The students would be proud to show the classroom to a visitor.

36. There are tensions among certain groups of students that tend to interfere with class activities.
37. Students have little idea of what the class is attempting to accomplish.
38. The better students are granted special privileges.
39. The subject studied requires no particular aptitude on the part of the students.
40. Members of the class don't care what the class does.

41. Certain students have more influence on the class than others.
42. Some students refuse to mix with the rest of the class.
43. Many students are dissatisfied with much that the class does.
44. The class is well organized.
45. A few of the class members always try to do better than the others.

46. All students know each other very well.
47. Class members tend to pursue different kinds of problems.
48. The class is rather informal and few rules are imposed.
49. There is little time for day-dreaming.
50. The room is bright and comfortable.

51. Certain students in the class are responsible for petty quarrels.
52. The objectives of the class are specific.
53. Only the good students are given special projects.
54. Students in the class tend to find the work hard to do.
55. Students share a common concern for the success of the class.

56. Certain students impose their wishes on the whole class.
57. Some groups of students work together regardless of what the rest of the class is doing.
58. There is considerable dissatisfaction with the work of the class.
59. The class is disorganized.
60. Students feel left out unless they compete with their classmates.

61. Students are not in close enough contact to develop likes or dislikes for one another.
62. The class divides its efforts among several purposes.
63. There is a recognized right and wrong way of going about class activities.
64. The class members feel rushed to finish their work.
65. There are displays around the room.

66. Certain students don't like other students.
67. Each student knows the goals of the course.
68. The class is controlled by the actions of a few members who are favored.
69. The subject presentation is too elementary for many students.
70. Most students sincerely want the class to be a success.

71. Each member of the class has as much influence as any other member.
72. Certain groups of friends tend to sit together.
73. The members look forward to coming to class meetings.
74. The class is well organized and efficient.
75. Most students cooperate rather than compete with one another.

76. The class is made up of individuals who do not know each other well.
77. The class is working toward many different goals.
78. All classroom procedures are well-established.
79. The class has difficulty keeping up with its assigned work.
80. The classroom is too crowded.

81. Certain students are considered uncooperative.
82. The class realizes exactly how much work it is required to do.
83. Students who have past histories of being discipline problems are discriminated against.
84. Most students consider the subject-matter easy.
85. Failure of the class would mean nothing to most members.

86. What the class does is determined by all the students.
87. Most students cooperate equally with other class members.
88. After the class, the students have a sense of satisfaction.
89. Many class members are confused during class meetings.
90. There is much competition in the class.

91. Each student knows the other members of the class by their first names.
92. Different students vary a great deal regarding which aspects of the class they are interested in.
93. There is a set of rules for the students to follow.
94. The course material is covered quickly.
95. There is enough room for both individual and group work.

96. There is an undercurrent of feeling among students that tends to pull the class apart.
97. Each student in the class has a clear idea of the class goals.
98. Certain students are favored more than the rest.
99. Many students in the school would have difficulty doing the advanced work in the class.
100. Students have great concern for the progress of the class.

101. A few members of the class have much greater influence than the other members.
102. Certain students stick together in small groups.
103. Students are well-satisfied with the work of the class.
104. There is a great deal of confusion during class meetings.
105. Students seldom compete with one another.

LEARNING ENVIRONMENT INVENTORY RESPONSE SHEET

NAME _____ SCHOOL _____ CLASS/GRADE _____

Strongly Disagree Disagree Agree Strongly Agree

						Teacher Use Only
1. SD D A SA	16. SD D A SA	31. SD D A SA	46. SD D A SA	61. SD D A SA	76. SD D A SA	91. SD D A SA	Ch ____
2. SD D A SA	17. SD D A SA	32. SD D A SA	47. SD D A SA	62. SD D A SA	77. SD D A SA	92. SD D A SA	Dv ____
3. SD D A SA	18. SD D A SA	33. SD D A SA	48. SD D A SA	63. SD D A SA	78. SD D A SA	93. SD D A SA	Fo ____
4. SD D A SA	19. SD D A SA	34. SD D A SA	49. SD D A SA	64. SD D A SA	79. SD D A SA	94. SD D A SA	Sp ____
5. SD D A SA	20. SD D A SA	35. SD D A SA	50. SD D A SA	65. SD D A SA	80. SD D A SA	95. SD D A SA	MI ____
6. SD D A SA	21. SD D A SA	36. SD D A SA	51. SD D A SA	66. SD D A SA	81. SD D A SA	96. SD D A SA	Fr ____
7. SD D A SA	22. SD D A SA	37. SD D A SA	52. SD D A SA	67. SD D A SA	82. SD D A SA	97. SD D A SA	GD ____
8. SD D A SA	23. SD D A SA	38. SD D A SA	53. SD D A SA	68. SD D A SA	83. SD D A SA	98. SD D A SA	Pa ____
9. SD D A SA	24. SD D A SA	39. SD D A SA	54. SD D A SA	69. SD D A SA	84. SD D A SA	99. SD D A SA	Df ____
10. SD D A SA	25. SD D A SA	40. SD D A SA	55. SD D A SA	70. SD D A SA	85. SD D A SA	100. SD D A SA	A ____
11. SD D A SA	26. SD D A SA	41. SD D A SA	56. SD D A SA	71. SD D A SA	86. SD D A SA	101. SD D A SA	De ____
12. SD D A SA	27. SD D A SA	42. SD D A SA	57. SD D A SA	72. SD D A SA	87. SD D A SA	102. SD D A SA	Cl ____
13. SD D A SA	28. SD D A SA	43. SD D A SA	58. SD D A SA	73. SD D A SA	88. SD D A SA	103. SD D A SA	Sa ____
14. SD D A SA	29. SD D A SA	44. SD D A SA	59. SD D A SA	74. SD D A SA	89. SD D A SA	104. SD D A SA	Ds ____
15. SD D A SA	30. SD D A SA	45. SD D A SA	60. SD D A SA	75. SD D A SA	90. SD D A SA	105. SD D A SA	Cm ____

APPENDIX B:

Class Means and Standard Deviations for Eight Reference Groups

Scale	Statistic	Harvard Project Physics (47 Classes)	Traditional Physics (37 Classes)	Physics (6 Classes)	Chemistry (10 Classes)	Biology (10 Classes)	English & History (20 Classes)	Mathematics (9 Classes)	French (7 Classes)
Cohesiveness	Mean	19.88	21.07	18.40	16.53	17.05	18.38	18.70	17.18
	S.D.	2.03	1.96	1.18	0.67	0.86	2.54	1.42	0.92
Diversity	Mean	19.95	19.46	19.78	19.87	20.38	20.60	20.66	20.29
	S.D.	0.84	0.84	1.28	0.57	0.67	0.61	0.67	0.83
Formality	Mean	17.57	17.78	17.31	19.29	19.75	17.00	15.57	19.19
	S.D.	1.40	1.33	2.71	1.87	2.08	1.83	1.62	1.45
Speed	Mean	16.38	16.87	16.35	17.47	19.48	16.48	17.45	17.75
	S.D.	1.40	2.03	2.03	1.26	1.12	1.51	0.91	1.18
Material Environment	Mean	20.93	19.88	17.56	16.58	17.60	16.28	15.84	17.00
	S.D.	1.33	1.26	1.89	1.26	1.01	1.59	1.24	1.63
Friction	Mean	14.98	15.19	15.64	16.44	16.63	16.59	19.04	16.42
	S.D.	1.89	2.10	1.52	1.27	1.40	2.22	2.09	1.24
Goal Direction	Mean	17.64	18.97	18.46	18.26	18.25	17.27	17.08	19.77
	S.D.	1.89	1.68	0.86	1.05	1.34	2.06	1.58	0.90
Favoritism	Mean	12.60	12.88	12.51	14.08	14.56	13.76	16.02	13.59
	S.D.	1.33	1.40	1.04	1.07	1.34	2.01	2.61	1.48
Difficulty	Mean	19.25	20.37	19.64	19.13	19.19	16.03	19.63	18.95
	S.D.	1.40	1.47	1.79	0.94	1.14	1.10	0.82	0.50
Apathy	Mean	15.33	15.12	16.85	17.75	17.77	17.80	17.75	18.06
	S.D.	1.68	1.89	1.39	1.01	1.27	2.50	1.89	1.43
Democracy	Mean	18.20	17.85	18.16	17.81	17.36	17.55	16.70	17.98
	S.D.	1.33	1.40	0.89	1.04	1.40	1.34	1.50	0.87
Cliqueness	Mean	17.92	18.27	18.29	19.07	18.82	19.21	20.70	19.36
	S.D.	1.54	2.03	1.33	1.35	1.37	1.42	0.95	1.10
Satisfaction	Mean	18.62	19.04	18.60	17.40	16.67	16.63	10.37	17.03
	S.D.	1.75	1.54	1.18	1.22	1.86	2.41	1.95	1.42
Disorganization	Mean	14.84	14.35	14.95	15.39	15.63	16.73	19.92	14.70
	S.D.	1.89	2.03	1.22	1.67	2.26	3.26	3.04	2.31
Competitiveness	Mean	-	-	17.89	17.18	16.77	17.06	16.65	16.46
	S.D.	-	-	1.05	0.98	0.67	1.47	1.50	1.40
Mean Class Size		24.3	24.3	13.7	24.9	22.0	22.9	19.4	23.4
Mean IQ Percentile[a]		80	80	59	47	37	59	52	49

[a] IQ scores are from the Henmon-Nelson Test of Mental Abilities (College Form).

Data for the first two reference groups were collected in 1967 from Grade 11 and 12 classes in the U.S.A. Data for the other six reference groups were collected from Grade 10 and 11 classes in Montreal.

APPENDIX C:

APPENDIX D: Percentage Choosing Each Alternative and Item-Scale Correlation for each LEI Item

Item	Percentage Choosing each Response (N=1048) SD D A SA	Item-Scale Correlation (N=464)	Item-Scale Correlation (N=1048)
Cohesiveness			
1	4 21 69 5	.42	.42
16	13 37 37 13	.66	.67
31	3 23 54 20	.55	.43
46	22 60 14 3	.78	.66
61	8 34 45 12	.65	.62
76	7 35 48 11	.76	.70
91	4 29 47 20	.73	.62
Speed			
4	14 47 26 13	.70	.70
19	16 32 46 7	.77	.66
34	15 36 42 7	.78	.67
49	15 29 41 15	.41	.44
64	8 50 31 11	.81	.75
79	8 60 26 6	.68	.59
94	7 44 41 8	-	.39
Goal Direction			
7	11 34 41 13	.70	.69
22	14 46 34 7	.76	.71
37	12 52 27 8	.78	.73
52	7 20 46 7	-	.73
67	6 38 49 7	.77	.77
82	6 39 51 5	.70	.73
97	7 46 42 4	.76	.73
Apathy			
10	21 39 32 9	.67	.66
25	8 28 47 17	.74	.74
40	11 46 35 8	.64	.67
55	15 55 28 2	.72	.72
70	7 36 50 8	.71	.68
85	11 44 38 7	.74	.73
100	10 61 27 3	.72	.71
Satisfaction			
13	13 39 43 5	.66	.67
28	15 27 47 11	.58	.52
43	11 45 32 13	.67	.67
58	11 53 27 9	.68	.72
73	22 52 23 3	.68	.65
88	19 46 32 3	.75	.73
103	10 42 45 3	.77	.72
Diversity			
2	1 6 52 40	.53	.59
17	1 15 55 29	-	.62
32	1 8 58 32	.61	.59
47	2 24 67 7	.52	.45
62	4 43 51 2	.51	.40
77	7 50 38 6	.54	.45
92	1 20 66 13	.57	.50
Material Environment			
5	12 35 45 8	.51	.55
20	38 45 12 5	.61	.52
35	14 35 44 6	.57	.57
50	21 29 43 7	.63	.61
65	21 36 33 10	.50	.46
80	16 51 22 10	.53	.48
95	8 27 56 8	.64	.49
Favoritism			
8	27 42 19 11	.62	.63
23	7 20 55 18	.66	.58
38	33 45 15 7	.71	.73
53	41 49 7 3	.62	.61
68	33 53 11 3	.66	.65
83	25 48 15 11	.57	.68
98	16 51 26 7	.76	.74
Democracy			
11	13 24 47 16	.62	.62
26	9 21 56 14	.53	.56
41	3 18 52 27	.57	.52
56	15 53 26 6	.50	.50
71	10 42 40 8	.63	.66
86	10 46 38 7	.49	.56
101	7 47 39 7	.63	.62
Disorganization			
14	21 44 22 14	.62	.65
29	17 45 25 13	.58	.59
44	12 27 49 12	.80	.82
59	26 45 19 10	.80	.81
74	12 32 46 10	.74	.76
89	6 44 36 14	.58	.53
104	12 57 23 8	.68	.71
Formality			
3	8 31 45 16	.50	.65
18	7 30 57 6	.67	.61
33	16 50 23 11	-	.70
48	13 30 43 14	.60	.72
63	3 23 62 11	.48	.55
78	7 34 52 7	.54	.48
93	6 33 53 8	.69	.74
Friction			
6	30 50 13 7	.52	.57
21	8 31 43 18	.69	.65
36	13 54 26 7	.70	.61
51	18 45 29 8	.74	.68
66	4 27 56 12	.66	.58
81	5 36 48 11	.65	.60
96	12 60 24 4	.60	.58
Difficulty			
9	8 54 32 6	-	.67
24	7 47 38 7	.55	.44
39	27 53 17 3	.53	.54
54	4 49 41 7	-	.63
69	19 68 10 3	.56	.50
84	10 59 29 2	.60	.64
99	7 39 42 12	.60	.54
Cliqueness			
12	4 22 50 24	.63	.56
27	14 41 40 5	.64	.57
42	9 35 42 14	.60	.59
57	7 36 46 11	.65	.58
72	3 9 53 35	.62	.56
87	4 28 64 4	.53	.52
102	1 15 64 20	.70	.63
Competitiveness			
15	6 32 43 19	-	.67
30	12 45 34 10	-	.79
45	3 19 63 15	-	.55
60	16 63 17 3	-	.54
75	5 24 64 7	-	.56
90	13 61 22 3	-	.71
105	10 38 45 7	-	.74

Underlined items are scored by allocating 4, 3, 2, and 1, respectively, for the responses Strongly Disagree, Disagree, Agree, and Strongly Agree. All other items are scored in the reverse manner. Omitted or invalid responses are given a score of 2½.

Data for the sample of 1,048 students were collected from Grade 10 and 11 classes in various subject areas in Montreal in 1969. Data for the sample of 464 students were for Grade 11 and 12 physics classes in the U.S.A. in 1967.

APPENDIX E: MY CLASS INVENTORY

NAME _____

SCHOOL _____ _____ **CLASS** _____

DIRECTIONS

This is not a test. The questions are to find out what your class is like. Please answer all the questions.

Each sentence is meant to describe your class. If you agree with the sentence, circle **Yes.** If you don't agree with the sentence, circle **No.**

If you change your mind about an answer, cross out the old answer and then circle the new choice.

EXAMPLE

		Circle Your Answer	
1.	Most children in the class are good friends	Yes	No

If you think that most children in the class are good friends, circle the **Yes** like this:

1.	Most children in the class are good friends.	(Yes)	No

If you do **not** think that most children in the class are good friends, circle the **No** like this:

1.	Most children in the class are good friends.	Yes	(No)

Don't forget to write your name and other details on top of this page.

Teacher Use Only

S _____ F _____ CM _____ D _____ CH _____

START HERE	Circle Your Answer		Teacher Use Only
1. The pupils enjoy their schoolwork in my class.	Yes	No	+ _____ S
2. Children are always fighting with each other.	Yes	No	+ _____ F
3. In our class the work is hard to do.	Yes	No	+ _____ D
4. Some of the children in our class are mean.	Yes	No	+ _____ F
5. Most pupils are pleased with the class.	Yes	No	+ _____ S
6. Children often race to see who can finish first.	Yes	No	+ _____ CM
7. Most children can do their schoolwork without help.	Yes	No	- _____ D
8. Some pupils don't like the class.	Yes	No	- _____ S
9. Most children want their work to be better than their friend's work.	Yes	No	+ _____ CM
10. Many children in our class like to fight.	Yes	No	+ _____ F
11. Only the smart people can do the work in our class.	Yes	No	+ _____ D
12. In my class everybody is my friend.	Yes	No	+ _____ CH
13. Most of the children in my class enjoy school.	Yes	No	+ _____ S
14. Some pupils don't like other pupils.	Yes	No	+ _____ F
15. Some pupils feel bad when they do not do as well as the others.	Yes	No	+ _____ CM
16. Most children say the class is fun.	Yes	No	+ _____ S

	Circle Your Answer		Teacher Use Only
17. Some people in my class are not my friends.	Yes	No	- _____ CH
18. Children often find their work hard.	Yes	No	+ _____ D
19. Most children don't care who finishes first.	Yes	No	- _____ CM
20. Some children don't like other children.	Yes	No	+ _____ F
21. Some pupils are not happy in the class.	Yes	No	- _____ S
22. All of the children know each other well.	Yes	No	+ _____ CH
23. Only the smart pupils can do their work.	Yes	No	+ _____ D
24. Some pupils always try to do their work better than the others.	Yes	No	+ _____ CM
25. Children seem to like the class.	Yes	No	+ _____ S
26. Certain pupils always want to have their own way.	Yes	No	+ _____ F
27. All pupils in my class are close friends.	Yes	No	+ _____ CH
28. Many pupils in our class say that school is easy.	Yes	No	- _____ D
29. In our class some pupils always want to do best.	Yes	No	+ _____ CM
30. Some of the pupils don't like the class.	Yes	No	- _____ S
31. Children in our class fight a lot.	Yes	No	+ _____ F
32. All of the pupils in my class like one another.	Yes	No	+ _____ CH
33. Schoolwork is hard to do.	Yes	No	+ _____ D

	Circle Your Answer		Teacher Use Only
34. Certain pupils don't like what other pupils do.	Yes	No	+ _____ F
35. A few children in my class want to be first all of the time.	Yes	No	+ _____ CM
36. The class is fun.	Yes	No	+ _____ S
37. Most of the pupils in my class know how to do their work.	Yes	No	- _____ D
38. Children in our class like each other as friends.	Yes	No	+ _____ CH

APPENDIX F: Instructions for Administration and Scoring of LEI

Time Required

No time limit should be applied when administering the LEI (although it is not necesary to allow exceptionally slow students to finish). The approximate time for instructions and answering has been found to range from 40-55 minutes for the Grade 7 level to 20-35 minutes at the Grade 12 level.

Administration

1. Instruct students not to commence writing until told to do so.
2. Hand out booklets and Response Sheets.
3. Go through all the Directions on the first page of the booklet thoroughly with the class.
4. Answer any reasonable student questions.
5. Tell students to write their name, school, and class/grade designation on the Response Sheet, and then to commence answering.
6. During testing move around the class to check that students are responding as instructed and to answer questions.
7. Student who finish early should be given something quiet to do.
8. Collect the booklets and Response Sheets when all (or nearly all) students have finished.

Computer Scoring

Appendix D shows how the 105 items in the LEI are allocated to the 15 different scales, which items all scored 4, 3, 2 and 1, respectively, for the responses SD, D, A, and SA, and which items are scored in the reverse manner. Omitted or invalidly answered items are score 2½. In situations where particlar computer programs cannot be used with a score of 2½, all item

scores can be doubled and scale totals halved. The 15 separate scales scores are obtained by adding the scores on all items within a given scale.

Hand Scoring

In order to facilitate ready hand scoring, the Response Sheet for the LEI has been designed so that all items belongong to a particular scale are located in the same horizontal row. The following simple method of hand scoring is illustrated for two LEI scales on the copy of the Response Sheet on the next page:

1. Score each item and record the item score as shown on the next page. Underlined items (e.g., Items 61 and 105) are scored 4, 3, 2, and 1, respectively, for the response SD, D, A, and SA. All other items (e.g., Items 1 and 60) are scored in the reverse manner. Omitted or invalid responses (e.g., Items 30 and 31) are scored 2½ .

2. Add the scores in each horizontal row to obtain the total score for a particular scale and record this in the "Teacher Use Only" column. The scales measured by successive horizontal rows of items (starting with the first row) are Cohesiveness, Diversity, Formality, Speed, Material Environment, Friction, Goal Direction, Favoritism, Difficulty, Apathy, Democracy, Cliqueness, Satisfaction, Disorganization, and Competitiveness. For example, the next page shows how scores are added to given a total of 16 ½ for Cohesiveness and 18 for Competitiveness.

LEARNING ENVIRONMENT INVENTORY RESPONSE SHEET

NAME _____ SCHOOL _____ CLASS/GRADE _____

Strongly Disagree Disagree Agree Strongly Agree

1. SD D A (SA) 4	16. (SD) D A SA 1	31. SD D A SA 2½	46. SD (D) A SA 2	61. SD D (A) SA 2	76. SD D (A) SA 2	91. SD D (A) SA 3
2. SD D A SA	17. SD D A SA	32. SD D A SA	47. SD D A SA	62. SD D A SA	77. SD D A SA	92. SD D A SA
3. SD D A SA	18. SD D A SA	33. SD D A SA	48. SD D A SA	63. SD D A SA	78. SD D A SA	93. SD D A SA
4. SD D A SA	19. SD D A SA	34. SD D A SA	49. SD D A SA	64. SD D A SA	79. SD D A SA	94. SD D A SA
5. SD D A SA	20. SD D A SA	35. SD D A SA	50. SD D A SA	65. SD D A SA	80. SD D A SA	95. SD D A SA
6. SD D A SA	21. SD D A SA	36. SD D A SA	51. SD D A SA	66. SD D A SA	81. SD D A SA	96. SD D A SA
7. SD D A SA	22. SD D A SA	37. SD D A SA	52. SD D A SA	67. SD D A SA	82. SD D A SA	97. SD D A SA
8. SD D A SA	23. SD D A SA	38. SD D A SA	53. SD D A SA	68. SD D A SA	83. SD D A SA	98. SD D A SA
9. SD D A SA	24. SD D A SA	39. SD D A SA	54. SD D A SA	69. SD D A SA	84. SD D A SA	99. SD D A SA
10. SD D A SA	25. SD D A SA	40. SD D A SA	55. SD D A SA	70. SD D A SA	85. SD D A SA	100. SD D A SA
11. SD D A SA	26. SD D A SA	41. SD D A SA	56. SD D A SA	71. SD D A SA	86. SD D A SA	101. SD D A SA
12. SD D A SA	27. SD D A SA	42. SD D A SA	57. SD D A SA	72. SD D A SA	87. SD D A SA	102. SD D A SA
13. SD D A SA	28. SD D A SA	43. SD D A SA	58. SD D A SA	73. SD D A SA	88. SD D A SA	103. SD D A SA
14. SD D A SA	29. SD D A SA	44. SD D A SA	59. SD D A SA	74. SD D A SA	89. SD D A SA	104. SD D A SA
15. (SD) D A SA 1	30. (SD) D (A) SA 2½	45. SD (D) A SA 2	60. SD D A (SA) 4	75. SD D (A) SA 2	90. SD D A SA 2½	105. (SD) D A SA 4

Teacher Use Only

Ch 16½
Dv _____
Fo _____
Sp _____
ME _____
Fr _____
GD _____
Fa _____
Df _____
A _____
De _____
Cl _____
Sa _____
Ds _____
Cm 18

APPENDIX G: Instructions for Administration and Scoring of MCI

Time Required

No time limit should be applied when administering the MCI (although it is not necessary to allow exceptionally slow students to finish). The approximate time for instructions and answering has been found to range from 15 to 30 minutes for Grades 4 to 6 students.

Administration

1. Instruct students not to commence writing until told to do so.
2. Hand out the questionnaires.
3. Go through all the Directions and the example on the first page of the questionnaire thoroughly with the class.
4. Answer any reasonable student questions.
5. Tell students to write their name, school, and class designation on the front of the questionnaire, and then to commence answering.
6. During test, move around the class to check that students are responding as instructed and to answer questions. (Reading questions aloud to the class has been found to work satisfactorily for third graders likely to experience reading difficulties).
7. Students who finish early should be given something quiet to do.
8. Collect questionnaires when all (or nearly all) students have finished.

Computer Scoring

Table 4 shows how the 38 items in the MCI are allocated to the five different scales, which items are scored 1 and 3, respectively, for the responses Yes and No, and which items are scored in the reverse manner. Omitted or invalidly

answered items are scored 2. The five different scale scores are obtained by adding the scores on all items within a given scale.

Hand Scoring

In order to facilitate ready hand scoring, the MCI questionniare has a "Teacher Use Only" column which indicates each item's scale allocation and scoring direction and provides spaces for recording item scores. The following simple method of hand scoring is illustrated for two scales on the copy of the MCI questionnaire on the next pages:

1. Score each item and record its score as shown on the following pages. Items designaged + in the "Teacher Use Only" column are scored 3 for Yes and 1 for No (e.g., Items 1 and 18). Items designated - are scored in the reverse manner (e.g., Items 7 and 21). Omitted or invalid responses are scored 2 (e.g., Items 8 and 36).

2. Add the scores for items with the same scale identification (e.g., S) in the "Teacher Use Only" column to yield the total score for that scale. The five scale totals can be recorded in the "Teacher Use Only" spaces at the bottom of the first page of the questionnaire. Total scores on the Satisfaction, Friction, Competitiveness, Difficulty, and Cohesiveness scales are obtained by adding scores obtained for those items designated, respectively, S, F, CM, D, and CH. For example, in the case of the questionniare responses shown on the following pages, the Satisfaction total score is 17 and the Difficulty total score is 14.

MY CLASS INVENTORY

NAME John Smith

SCHOOL _____ CLASS _____

DIRECTIONS

This is not a test. The questions are to find out what your class is like. Please answer all the questions.

Each sentence is meant to describe your class. If you agree with the sentence, circle **Yes**. If you don't agree with the sentence, circle **No**.

If you change your mind about an answer, cross out the old answer and then circle the new choice.

EXAMPLE	Circle Your Answer
1. Most children in the class are good friends	Yes No

If you think that most children in the class are good friends, circle the **Yes** like this:

1. Most children in the class are good friends.	(Yes) No

If you do **not** think that most children in the class are good friends, circle the **No** like this:

1. Most children in the class are good friends.	Yes (No)

Don't forget to write your name and other details on top of this page.

Teacher Use Only

S 17 F _____ CM _____ D 14 CH _____

START HERE	Circle Your Answer		Teacher Use Only
1. The pupils enjoy their schoolwork in my class.	(Yes)	No	+ 3 S
2. Children are always fighting with each other.	Yes	No	+ _____ F
3. In our class the work is hard to do.	Yes	(No)	+ 1 D
4. Some of the children in our class are mean.	Yes	No	+ _____ F
5. Most pupils are pleased with the class.	Yes	(No)	+ 1 S
6. Children often race to see who can finish first.	Yes	No	+ _____ CM
7. Most children can do their schoolwork without help.	(Yes)	No	- 1 D
8. Some pupils don't like the class.	(Yes)	(No)	- 2 S
9. Most children want their work to be better than their friend's work.	Yes	No	+ _____ CM
10. Many children in our class like to fight.	Yes	No	+ _____ F
11. Only the smart people can do the work in our class.	(Yes)	No	+ 3 D
12. In my class everybody is my friend.	Yes	No	+ _____ CH
13. Most of the children in my class enjoy school.	(Yes)	No	+ 3 S
14. Some pupils don't like other pupils.	Yes	No	+ _____ F
15. Some pupils feel bad when they do not do as well as the others.	Yes	No	+ _____ CM
16. Most children say the class is fun.	(Yes)	No	+ 3 S

	Circle Your Answer		Teacher Use Only
17. Some people in my class are not my friends.	Yes	No	- _____ CH
18. Children often find their work hard.	Yes	(No)	+ 1 D
19. Most children don't care who finishes first.	Yes	No	- _____ CM
20. Some children don't like other children.	Yes	No	+ _____ F
21. Some pupils are not happy in the class.	(Yes)	No	- 1 S
22. All of the children know each other well.	Yes	No	+ _____ CH
23. Only the smart pupils can do their work.	(Yes)	No	+ 3 D
24. Some pupils always try to do their work better than the others.	Yes	No	+ _____ CM
25. Children seem to like the class.	Yes	(No)	+ 1 S
26. Certain pupils always want to have their own way.	Yes	No	+ _____ F
27. All pupils in my class are close friends.	Yes	No	+ _____ CH
28. Many pupils in our class say that school is easy.	(Yes)	No	- 1 D
29. In our class some pupils always want to do best.	Yes	No	+ _____ CM
30. Some of the pupils don't like the class.	(Yes)	No	- 1 S
31. Children in our class fight a lot.	Yes	No	+ _____ F
32. All of the pupils in my class like one another.	Yes	No	+ _____ CH
33. Schoolwork is hard to do.	(Yes)	No	+ 3 D

	Circle Your Answer		Teacher Use Only
34. Certain pupils don't like what other pupils do.	Yes	No	+ _____ F
35. A few children in my class want to be first all of the time.	Yes	No	+ _____ CM
36. The class is fun.	Yes	No	+ 2 S
37. Most of the pupils in my class know how to do their work.	(Yes)	No	- 1 D
38. Children in our class like each other as friends.	Yes	No	+ _____ CH