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ABSTRACT

This paper provides a focus on the successful and positive facets of schooling from a series of case studies. The study involved 13 researchers in over 500 hours of intensive classroom observation of 20 exemplary teachers and a comparison group of non-exemplary teachers. The qualitative information was complemented by quantitative information obtained from the administration of questionnaires assessing student perceptions of classroom environment. Interpretation of data included comparisons made between the actual classroom environment of exemplary teachers and the following: (1) the actual environment of comparison groups from past research; (2) the classroom environment preferred by exemplary teachers' classes; and (3) the actual classroom environment of non-exemplary teachers of the same grades in the same school. It was found that exemplary teachers' classes can be differentiated from non-exemplary teachers' classes in terms of the psychosocial environment as perceived by students. Also the classroom environments created by the exemplary teachers generally were markedly more favorable than those of non-exemplary teachers. Two of the instruments used in the study are included in the appendix. (RT)

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PSYCHOSOCIAL ENVIRONMENT IN EXEMPLARY TEACHERS' CLASSROOMS

BARRY J. FRASER
Curtin University of Technology, Perth 6001, Australia

KENNETH TOBIN
Florida State University, Tallahassee, Florida 32306, USA

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CONTENTS

ABSTRACT

In order to provide a refreshing alternative to the majority of research reports which malign science and mathematics education and highlight its major problems and shortcomings, a series of case studies of exemplary practice was initiated to provide a focus on the successful and positive facets of schooling. It was assumed that much could be learned from case studies of exemplary practice that would stimulate and guide improvements in science and mathematics education. The major data collection approach was qualitative, relied on the interpretive research methodology proposed by Erickson (1986) and involved 13 researchers in over 500 hours of intensive classroom observation of 20 exemplary teachers and a comparison group of non-exemplary teachers. But a distinctive feature of the methodology was that the qualitative information was complemented by quantitative information obtained from the administration of questionnaires assessing student perceptions of classroom psychosocial environment (Fraser, 1986a). These instruments furnished a quantified picture of life in exemplary teachers' classrooms as seen through students' eyes. In interpreting the data, comparisons were made between the actual classroom environment of exemplary teachers and (1) the actual environment of comparison groups from past research, (2) the classroom environment preferred by exemplary teachers' classes and (3) the actual classroom environment of non-exemplary teachers of the same grades in the same school. It was found that exemplary teachers' classes can be differentiated from non-exemplary teachers' classes in terms of the psychosocial environment as perceived by students. Also the classroom environments created by the exemplary teachers generally were markedly more favorable than those of non-exemplary teachers.

There is little doubt that the findings of research in science and mathematics education can be depressing at times. The literature is replete with reports and research findings which highlight problems and shortcomings associated with the teaching and learning of science and mathematics. But it would be a grave mistake to assume that all science and mathematics teaching is disappointing. Quite on the contrary, in the Exemplary Science and Mathematics Education Project reported in this paper, it was assumed that examples of outstanding teaching could be identified and documented. The specific purpose of this paper is to describe the use of classroom environment instruments as part of the Exemplary Practice in Science and Mathematics study.

PROBLEMS IN SCIENCE AND MATHEMATICS EDUCATION

In recent years in the United States, there has appeared a number of influential reports which have claimed the existence of serious shortcomings in primary and secondary education and proposed major educational reforms (Carnegie Foundation, 1983; College Board, 1983; National Commission on Excellence in Education, 1983; National Science Board, 1983; Task Force on Education for Economic Growth, 1983). As well, some influential research studies further serve to highlight the problems with schooling. For example, Goodlad's (1983, 1984) widely-known A Place Called School painted a dismal picture which emerged from visiting over 1,000 classrooms. The dominant teaching procedure was lecturing, there was a lack of student-student interactions, small group work or any attempt at alternative approaches, the similarity between schools was striking and the emphasis was on recall. In science education, Stake and Easley's (1978) case studies revealed that most teachers taught basic facts and definitions from textbooks and that relatively little emphasis was placed on applications of scientific knowledge in daily life or on the development of higher-order thinking skills.

Some recent studies of science and mathematics classrooms (e.g., Gallagher & Tobin, 1987; Tobin, 1987b) provide important insights into the nature of the academic work in which students engage. Academic work is mainly directed towards earning points for a grade and preparing for tests and examinations which require recall of factual information and application of procedures. Other factors, such as the way that students are organized for instruction, also influence student engagement (Gallagher & Tobin, 1987). In higher-ability classes and in classes with a wide range of student abilities, whole-class interactive activities tend to be most common, with small group work occurring infrequently (Tobin, 1987b). Consequently, most students engage by listening and watching the teacher or another student during whole-class activities.

Criticisms of mathematics teaching have been voiced in the US by the National Council of Teachers of Mathematics (NCTM; Shufelt & Smart, 1983), in England in the Cockroft report (1982) and in Australia by Lovitt (1986). For example, the NCTM recommended greater attention to the development of understanding in mathematics through problem-solving, Cockroft questioned the suitability of school mathematics as a preparation for further and higher education, employment or adult life, and Lovitt claimed that Australian mathematics teachers rely too much on "chalk and talk" and repetitive practice of skills and algorithms.

PROMISE OF RESEARCH ON EXEMPLARY PRACTICE

The research reviewed above certainly casts a gloomy picture over schooling, especially science education. In contrast, there have been some more optimistic research endeavors in recent times which highlight educational accomplishments and pave the way for improvements in schooling. For example, the effective schools movement (Benbow, 1980; Bickel, 1983; Cohen, 1982; Madaus, Airasian & Kellaghan, 1980) is premised on the assumption that successful schools do exist and that other schools could be improved by adopting some of the practices found in effective schools. Similarly, in Australia, the national Curriculum Development Centre has adopted the position that teachers and curriculum developers have much to learn from exemplary practitioners and has funded a project aimed at identifying and documenting effective ideas and practices in mathematics education as "illustrations or models from which other teachers can learn" (Lovitt & Clarke, 1987, p.37).

Berliner (1986) strongly advocated the study of expert teachers because it can provide extremely useful case material from which we can learn. Because trainee and beginning teachers in particular are likely to benefit from the expert's performance, both Berliner (1986) and Shulman (1986) recommend that case studies of expert teachers form a part of teacher education programs.

In science education, Penick and Yager (1983, 1986) concluded that past case studies only highlighted the plight of science education and held little promise for stimulating improvements. Consequently, they initiated a project in the US, known as the Search for Excellence, which was seen as "a new focus upon successes, exciting experiments, the positive facets of school science" instead of "focusing upon failures, problems, and negative aspects" (Yager, 1984, p. 1). The Search for Excellence began in 1982 under the sponsorship of the National Science Teachers Association, the Council of State Supervisors, the National Science Supervisors Association and the National Science Board (Bonnstetter, Penick & Yager, 1983; Penick & Yager, 1983; Yager, 1984). As the focus of the Search for Excellence was on programs, the initial output from the Search for Excellence included case studies of over 50 excellent science programs published as several volumes by the National Science Teachers Association (e.g., Penick, 1983a, 1983b; Penick & Bonnstetter, 1983). As well, six programs identified as excellent were studied more intensively through site visits (Yager & Penick, 1984).

Because the Search for Excellence and other studies based on a similar philosophy had caused considerable excitement, optimism and motivation among teachers, our group of researchers decided to conduct a somewhat similar research effort in Western Australia. Our study was based on the assumption that much could be learned from case studies of the best science and mathematics teachers and that such case studies of exemplary practice could lead to improvements in science and mathematics teaching by motivating and guiding teachers' attempts to improve their practice. In contrast to the Search for Excellence, researchers involved in our Exemplary Practice in Science and Mathematics Education study (Fraser, Tobin & Lacy, in press; Korbosky, Fraser & Tobin, in press; Tobin & Fraser, 1987; Tobin & Fraser, in press; Tobin, Treagust & Fraser, in press) were committed to intensive classroom observation of the exemplary teachers involved in the project.

THE PRESENT STUDY

Our study involved a team of 13 researchers, 20 exemplary teachers and six non-exemplary teachers in schools in the metropolitan area of Perth, Western Australia. Both science and mathematics teachers were involved and the grade levels ranged from the early elementary to the senior high school levels. The exemplary teachers involved in the study were identified through a nomination process in which key educators in Western Australia, including teachers, State Education Department personnel and university staff, were asked to nominate outstanding teachers of science.

An interpretive research methodology (Erickson, 1986) was used in collecting primarily qualitative data by direct observation of teaching by participant observers. The data consisted of observations of teaching for at least eight lessons, interviews with the teacher and students and examination of curriculum materials, tests and student work. Interpretation of data occurred at the individual level, within teams and at the level of the entire research group. Throughout the study, team meetings were held to facilitate discussion of administrative matters and substantive issues related to interpretation.

Although our research relied mainly on qualitative data collection methods, such as classroom observation and interviewing of students and teachers, the case studies at many of the sites were complemented by a quantitative component based on the administration of some instruments assessing psychosocial aspects of the classroom learning environment (Fraser, 1986a, 1986b). These were administered to obtain student perceptions of any systematic differences in the climate of classes taught by exemplary and non-exemplary teachers.

In this paper, our specific purpose is to report classroom environment data from the various case studies in an attempt to identify patterns common to the classes of a number of exemplary teachers. Discussion is divided into two sections devoted to, first, the instruments used to assess classroom environment and, second, salient findings concerning the classroom environments of exemplary science teachers.

ASSESSING CLASSROOM ENVIRONMENT WITH SHORT FORMS OF CES AND MCI

The field of classroom environment and a range of measuring instruments are reviewed comprehensively in various sources (Chavez, 1984; Fraser, 1981, 1986a, 1986b, 1987b, 1988; Moos, 1979; Walberg, 1979). In this research into the classroom environments created by exemplary teachers, most case studies made use of either the Classroom Environment Scale (CES) or the My Class Inventory (MCI). However, as the sections below illustrate, different case studies in the Exemplary Practice in Science and Mathematics Education study involved different classroom environment scales and instruments in order that dimensions most relevant to each case study were included. Although different studies involved use of either the long form or the short form of these instruments, only the short forms are considered below in detail for illustrative purposes. The different subsections following consider (1) the original long form of each instrument, (2) development of the short forms, (3) hand scoring of the short forms and (4) validation of the short forms.

Long Forms of CES and MCI

The initial development of the CES grew out of Moos's program of research in a variety of human environments including hospital wards, therapy groups, military companies, university residences and work settings (Moos, 1974). The long version of the CES (Fisher & Fraser, 1983a; Trickett & Moos, 1973; Moos & Trickett, 1987) consists of 10 items of true-false response format assessing each of nine dimensions (Involvement, Affiliation, Teacher Support, Task Orientation, Competition, Order and Organiza n, Rule Clarity, Teacher Control and Innovation). In addition to an tual (or real) form, the CES also has a preferred (or ideal) form which is concerned with goals and value orientations as it measures perceptions of the environment ideally liked or preferred.

The CES has been used as a source of predictor and criterion variables in a variety of studies. Use of CES dimensions as predictor variables has established relationships between the nature of the classroom environment and science students' achievement of several inquiry skills and science-related attitudes (Fraser & Fisher, 1982a). In studies which have used the actual version of the CES as a source of criterion variables, Trickett (1978) reported differences between five types of public schools (urban, rural, suburban, vocational and alternative), Evans and Lovell (1979) found differences among classes following alternative educational programs or innovations, Trickett, Trickett, Castro and Schaffner (1982) found differences between single-sex and coeducational schools, and Harty and Hassan (1983) reported differences between the classes of Sudanese teachers with different student control ideologies. In studies which made use of both the actual and preferred versions of the CES in the same investigation, Fisher and Fraser (1983b) reported interesting systematic differences between students' and teachers' perceptions of actual and preferred classroom environment and Fraser and Fisher (1983a) found that students achieved better when there was a higher similarity between the actual classroom environment and that preferred by students.

The MCI is a simplification of the widely-used Learning Environment Inventory (LEI) (Fraser, And on & Walberg, 1982). Whereas the LEI was designed originally for use ... research with senior high school students, the MCI is suitable for elementary school children and for junior high school students who might experience reading difficulties with the LEI. The long version of the MCI contains 38 items (Fisher & Fraser, 1981; Fraser, Anderson & Walberg, 1982). Past research applications involving the long form of the MCI include studies of the effects of classroom environment on student achievement (Fraser & Fisher, 1982b; Fraser & O'Brien, 1985), curriculum evaluation studies (Talmage & Walberg, 1978), differences between student and teacher perceptions of actual and preferred environment (Fraser, 1984) and the effects of grouping students in the laboratory according to formal reasoning ability (Lawrenz & Munch, 1984).

Short Forms of CES and MCI

Although the long forms of the CES and MCI have been used successfully for a variety of purposes, experience has shown that some researchers and teachers would prefer a more rapid assessment of classroom environment. Consequently, Fraser and Fisher (1983b) developed short forms of the CES and MCI to satisfy three main criteria. First, the number of items was reduced to provide greater economy in testing and scoring time. Second, because many teachers using these instruments do not have ready access to computerized scoring methods, the short forms were designed to be amenable to easy hand scoring. Third, the short forms were developed to have adequate reliability for uses involving the assessment of class means. (It is recommended that use of the short forms be restricted to applications in which the class mean is the unit of analysis.) The 38 items in the long form of the MCI's five scales were shortened to produce an instrument containing five 5-item scales (i.e., 25 items altogether), whereas the long form of the CES containing nine 10-item scales was reduced to a short form consisting of six 4-item scales (i.e., 24 items altogether).

The results of item analyses performed with large samples of students responding to the long forms of each instrument provided the main statistical criteria for selection of items for inclusion in the short forms. Internal consistency reliability of the short form of each scale was enhanced by removing items with smaller item-remainder correlations (i.e., correlations between item score and total score on the rest of that scale) and discriminant validity was enhanced by including only those items whose correlation with its own a priori assigned scale was larger than its correlation with any of the other items in the same battery. The main logical criteria employed when shortening scales were that a preference was given to items with better face validity and that an attempt was made to maintain a balance (both within individual scales and within each instrument as a whole) of items with positive and negative scoring directions. However, because the long forms of some scales had an imbalance in the number of its items with positive and negative scoring directions, this imbalance tended to be maintained in the short forms.

In order to clarify the nature of the short forms and to make them more readily accessible to teachers and educational researchers, complete copies of the actual forms of the CES and MCI are provided in Appendix A and Appendix B, respectively. Also Table 1 provides a scale description for each of the dimensions in the CES and MCI. Unlike the corresponding long form of each instrument, the short forms do not require separate response sheets because all items and space for responding fit on a single page. Although item wording is almost identical in actual and preferred forms, words such as "would" are included in the preferred form to remind students that they are rating preferred rather than actual classroom environment. For example, the statement "Children in our class fight a lot" in the actual form of the MCI's Friction scale would be changed in the preferred form to "Children in our class would fight a lot".

Scoring Procedures

The short forms have two features which facilitate easy hand scoring. First, underlining of an item number together with inclusion of R in the Teacher Use Only column identifies those items which need to be scored in the reverse direction. Second, items from the different scales are arranged in cyclic order so that all items from a particular scale are found in the same position in each block of items.

Appendix A and Appendix B illustrate how the short forms of the CES and MCI are scored. Items not underlined and without R in the Teacher Use Only column are scored by allocating 3 for Yes and 1 for No. Underlined items with R are scored in the reverse manner. Omitted or invalidly answered items are scored 2. To obtain scale totals, the item scores for each scale are added. For the CES, the first, second, third, fourth, fifth and sixth items in each block of six, respectively, measures Involvement, Affiliation, Teacher Support, Task Orientation, Order and Organization and Rule Clarity. In the case of the MCI, the first, second, third, fourth and fifth items in each block of five, respectively, measures Satisfaction, Friction, Competitiveness, Difficulty and Cohesiveness. For example, the total Satisfaction score for the MCI is obtained by adding scores for Items 1, 6, 11, 16 and 21 (Appendix B). Scale totals can be recorded in the spaces provided at the bottom of the questionnaire. Appendix A illustrates how these scoring procedures were used with the CES to obtain a total of 9 for Affiliation and 7 for Rule Clarity and with the MCI to obtain a total of 10 for Satisfaction and a total of 12 for Cohesiveness.

Validation

Table 2 provides statistical information about the short form of each scale based on the use of the class mean as the unit of analysis with data collected from large and representative samples of science classes. The actual and preferred forms of the CES were administered to a sample of 116 Grade 8 and 9 science classes in 33 different schools in Tasmania, Australia (Fraser & Fisher, 1983b). Data for the MCI are based on a sample of 758 Grade 3 students in 32 classes in eight schools in an outer suburb of Sydney, Australia (see Fraser & O'Brien, 1985). As some reading difficulties were anticipated among some students in this sample, a research assistant visited each school to administer the scales orally. As no data on the correlation between long and short form were available for this sample, Table 2 reports the correlation between long and short form for the actual form only for a sample of 100 classes of Grade 7 science students in Tasmania, Australia. Each sample was made up of approximately equal numbers of boys and girls.

Data reported in Table 2 for the actual and preferred versions of instruments provide evidence in support of each short scale's concurrent validity (namely, the correlation between long and short forms), internal consistency (alpha reliability coefficient), discriminant validity (using the mean magnitude of the correlation of a scale with the other scales in the same instrument as a convenient index) and ability to differentiate

Table 1. Scale description for each dimension in short form of CES and MCI

Scale	Scale Description
Classroom Environment Scale (CES) (High School Level)	
Involvement	Extent to which students have attentive interest, participate in discussions, do additional work and enjoy the class
Affiliation	Extent to which students help each other, get to know each other easily and enjoy working together
Teacher Support	Extent which the teacher helps, befriends, trusts and is interested in students
Task Orientation	Extent to which it is important to complete activities planned and to stay on the subject matter
Order & Organization	Emphasis on students behaving in an orderly, quiet and polite manner, and on the overall organization of classroom activities
Rule Clarity	Emphasis on clear rules, on students knowing the consequences for breaking rules, and on the teacher dealing consistently with students who break rules
My Class Inventory (MCI) (Primary School Level)	
Cohesiveness	Extent to which students know, help and are friendly towards each other
Friction	Amount of tension and quarrelling among students
Difficulty	Extent to which students find difficulty with the work of the class
Satisfaction	Extent of enjoyment of class work
Competitiveness	Emphasis on students competing with each other

Table 2. Concurrent validity (correlation with long form), internal consistency (alpha coefficient), discriminant validity (mean correlation with other scales), and ANOVA results for class membership differences for short forms of CES and MCI

Scale	Correl. with Long Form		Alpha Reliability		Mean Correl. with other Scales		ANOVA Results Eta^2
	Act.	Pref.	Act.	Pref.	Act.	Pref.	Actual
<u>Classroom Environment Scale (CES)</u>							
Involvement	0.92	0.93	0.65	0.71	0.43	0.41	0.27*
Affiliation	0.78	0.79	0.64	0.60	0.29	0.31	0.20*
Teacher Support	0.92	0.87	0.78	0.65	0.41	0.35	0.31*
Task Orientation	0.80	0.78	0.59	0.56	0.36	0.37	0.25*
Order & Organization	0.95	0.94	0.74	0.74	0.40	0.43	0.39*
Rule Clarity	0.90	0.84	0.66	0.63	0.38	0.43	0.19*
(Sample: 116 Grade 8 and 9 classes)							
<u>My Class Inventory (MCI)</u>							
Cohesiveness	0.97	-	0.81	0.78	0.25	0.30	0.28*
Friction	0.91	-	0.78	0.82	0.27	0.34	0.33*
Difficulty	0.91	-	0.58	0.60	0.31	0.31	0.15*
Satisfaction	0.94	-	0.68	0.75	0.30	0.38	0.23*
Competitiveness	0.95	-	0.70	0.77	0.11	0.32	0.15*
(Sample: 32 Grade 3 classes, except for first column which is based on 100 Grade 7 classes)							

* $p<0.01$

between classrooms (ANOVA results) (Fraser & Fisher, 1983b; Fraser & O'Brien, 1985). The first two columns of figures in Table 2 show that the correlations between scale scores on the long form and the short form ranged from 0.78 to 0.97, thus supporting the concurrent validity of the short forms. Table 2 also reports each short scale's internal consistency and discriminant validity (using the class as the unit of analysis). These data indicate that the reliability of a scale's short form is typically less than 0.1 smaller than the reliability of the corresponding long form (as reported in Fraser & Fisher, 1983b) and that the short forms generally have adequate reliability for applications involving class means. In addition, Table 2 shows that the values of the mean correlation of a scale with the other scales in the same instrument are quite similar to those reported previously for the long forms of these scales. These values suggest that the short forms display adequate discriminant validity and that both the short and long forms of scales in each instrument measure distinct although somewhat overlapping aspects of classroom environment.

A desirable characteristic of the actual form of any classroom environment scale which is to be used in applications involving the class mean as the unit of analysis is that it is capable of differentiating between the perceptions of students in different classes. This was explored for each short scale for the present samples by performing a one-way ANOVA with class membership as the main effect and using the individual as the unit of statistical analysis. The results of these analyses are shown in the last column of Table 2 and indicate that the short form of the actual version of each of the 11 scales differentiated significantly ($p<0.01$) between the perceptions of students in different classrooms. The eta^2 statistic, which is the ratio of between to total sums of squares, is provided as an estimate of the amount of variance in classroom environment scores attributable to class membership

PSYCHOSOCIAL ENVIRONMENT IN EXEMPLARY TEACHERS' CLASSROOMS

In this section, the results from administration of classroom environment instruments are described and synthesized for various of the case studies completed as part of our study of exemplary science teaching (Tobin & Fraser, 1987). In an attempt to make meaningful interpretations of the learning environment data collected as part of the Exemplary Practice in Science and Mathematics Education study, the actual environments of exemplary teachers' classes were compared, first, with the actual environment of comparison groups of classes from past research, second, with the class environment preferred by the exemplary teachers' students and, third, with the actual classroom environment of non-exemplary teachers of the same grade levels within the same school. Overall, the results below provide considerable evidence suggesting that, first, exemplary and non-exemplary science teachers can be differentiated in terms of the psychosocial environments of their classrooms as seen through their students' eyes and, second, that exemplary teachers typically create classroom environments that are markedly more favorable than those of non-exemplary teachers.

Exemplary Primary Science Classes

In Fraser, Tobin and Lacy's (in press) case study of exemplary primary science teaching, two teachers referred to as Barbara and Grant were observed. Barbara was teaching a composite class of Grade 5 and 6 students in a small school with just over 200 students of mainly lower socioeconomic status and with relatively old but reasonably comfortable accommodation. In contrast, Grant was teaching a composite class of Grade 3 and 4 students in a large modern school with an enrollment of approximately 600 students predominantly from middle-class backgrounds. At the time of the study, Barbara had five years of teaching experience and Grant had 10 years of teaching experience. Both teachers were committed to "hands on" science teaching. The classroom layout was more formal in Grant's room, with students sitting in rows facing the blackboard, than in Barbara's room, where students were seated in groups along the perimeter of the room.

Classroom observations over numerous lessons built up a tentative picture of some aspects of Barbara's and Grant's classroom practices. Both teachers' lessons usually were somewhat formal and structured in that the teacher expected all students to be seated and paying attention during teacher-centered activities, all students were engaged in similar tasks at any given time and each lesson had the same pattern (namely, whole-class oral activity, followed by individual or group work, followed by whole-class reporting and discussion). Both teachers had efficient methods for organizing science equipment and materials and making them available at the commencement of the class (although Grant often gave students the responsibility of bringing pertinent materials for practical activities from home). In terms of written work, Grant's students usually were responsible for maintaining their own records in their science note books, whereas students in Barbara's class typically used prepared worksheets.

The 31 students (15 girls and 16 boys) in Barbara's class and the 32 students (16 girls and 16 boys) in Grant's class responded to the actual form of the short version MCI described previously in Tables 1 and 2. Table 3 lists the mean score obtained by each exemplary class on each of the MCI's five scales. As well, for comparison purposes, Table 3 also shows the mean and standard deviation (using the class mean as the unit of analysis) for the comparison group consisting of the sample of 32 Grade 3 classes described previously in this paper. In addition, Table 3 expresses the differences between the means of exemplary classrooms and the control group in terms of effect sizes (i.e., in terms of the number of standard deviations of the comparison group). For example, the interpretation of the effect size of 1.3 for the Satisfaction scale for Barbara's class is that her class mean was 1.3 standard deviations higher than the mean of the comparison group.

Table 3. Comparison group data (Mean, SD) for actual form of short version of My Class Inventory and means for classes of two exemplary elementary science teachers

Scale	Comparison Group[a]		Exemplary Classes			
			Barbara		Grant	
	Mean (Class Means)	SD	Mean	Effect Size[b]	Mean	Effect Size
Satisfaction	11.3	1.2	12.9	1.3	14.6	2.8
Friction	11.3	1.8	8.4	-1.6	7.8	-1.9
Competitiveness	12.9	1.0	12.7	-0.2	11.6	-1.3
Difficulty	7.5	0.9	6.5	-1.1	5.9	-1.8
Cohesiveness	9.8	1.8	11.2	0.7	12.4	1.4

a Comparison group consists of 32 Year 3 classes and the class is used as the unit of analysis.

b Effect size is defined as the difference between the means of the exemplary class and the comparison group divided by the standard deviation of the comparison group.

It is noteworthy that students in each of the exemplary classrooms perceived their class environments markedly more favorably than the way the comparison group viewed their classes on several of the MCI's scales. Relative to the comparison group, Barbara's students perceived their class as having much more Satisfaction (1.3 standard deviations for class means above the comparison group), less Friction (1.6 standard deviations) and less Difficulty (1.1 standard deviations). Grant's class, relative to control classes, was perceived as having markedly more Satisfaction (2.8 standard deviations), less Friction (1.9 standard deviations), less Competitiveness (1.3 standard deviations), less Difficulty (1.8 standard deviations) and more Cohesiveness (1.4 standard deviations). These results are depicted graphically in Figure 1 which shows the profile of mean actual environment scores for each exemplary teacher and for the comparison group.

The fact that less Difficulty was perceived by students in classes of exemplary teachers does not necessarily mean that tasks were less complex. Rather, exemplary teachers could have taken certain initiatives which supported students and made potentially complex material appear easier. Possible explanations as to why Barbara's class had a less favorable perceived environment than Grant's class are, first, that her class drew students from a lower socioeconomic catchment area and, second, that her classroom was undergoing building and maintenance work during the time of the study.

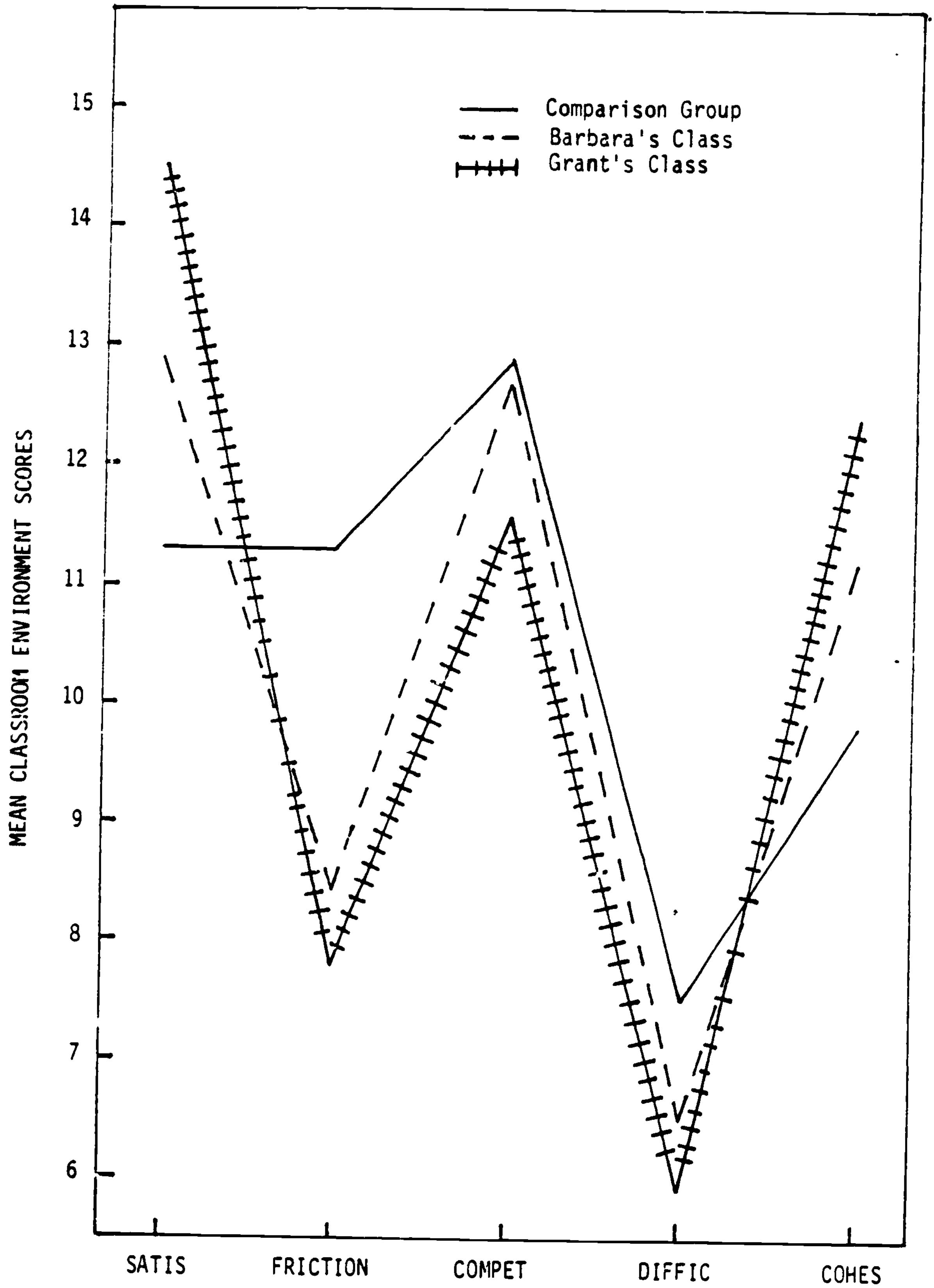

FIGURE 1: Actual Classroom Environment Profiles for Two Exemplary Primary Science Teachers and a Large Comparison Group

Exemplary Senior High School Biology Classes

In Tobin, Treagust and Fraser's (in press), details are provided from a case study of exemplary practice in three classes taught by two senior high school biology teachers. This section examines the classroom environments as perceived by the biology students of these teachers. The students responded to both the actual and the preferred versions of the six scales in the short form of the CES described previously in Tables 1 and 2. In addition to comparing the actual environment of the exemplary classes with a comparison group, an examination also was made of the extent to which the actual environment of exemplary classes approximated the students' preferred environment.

One of the exemplary biology teachers, Les, is male, had completed 11 years of teaching at the time of the study and was the senior teacher in charge of biology at his school. His students came from middle to lower socioeconomic backgrounds and his school is a government high school. The biology curriculum followed was an Australian adaptation of the Biological Sciences Curriculum Study (BSCS). For practical work and discussion groups, students tended to choose to work in single-sex groups. Classroom observations suggested that Les had exceptional classroom management skills, was a good leader in discussions, got on very well with students and encouraged students to ask questions. The case studies and the classroom environment information were based on Les's Grade 11 biology class (14 students consisting of five males and nine females) and his Grade 12 biology class (19 students consisting of seven males and 12 females).

Just as Figure 1 depicts differences between the environments of some exemplary primary classes and a comparison group, Figure 2 provides an analogous graphical illustration of differences between the environment of Les's Grade 11 and 12 biology classes and a comparison group consisting of the 116 junior high school science classes described earlier in this paper. It is clear from Figure 2 that students in both classes of this exemplary biology teacher perceived their actual classroom climate considerably more favorably than the way that the comparison group viewed their science classes. The biggest differences for both the Grade 11 and Grade 12 class occurred for Involvement, Teacher Support and Order and Organization. That is, while Les's students perceived a more favorable classroom environment on all dimensions assessed by the CES, these differences were most marked in terms of high levels of Involvement, Teacher Support and Order and Organization.

Table 4, which is analogous to Table 3, expresses the differences between the mean climate scores of the comparison group and of each of Les's biology classes as effect sizes (i.e., as the number of standard deviations for the normative group). Effect sizes in Table 4 are somewhat larger for some climate scales for the Grade 11 class than for the Grade 12 class, with values ranging from 1.0 to 2.2 for the Grade 11 class and from 0.5 to 2.1 for the Grade 12 class. It can be seen that the largest differences between exemplary classes and the normative group occurred for Involvement (2.2 and 2.1 standard deviations for class means) and that the smallest differences occurred for Affiliation (1.0 and 0.5 standard deviations, respectively).

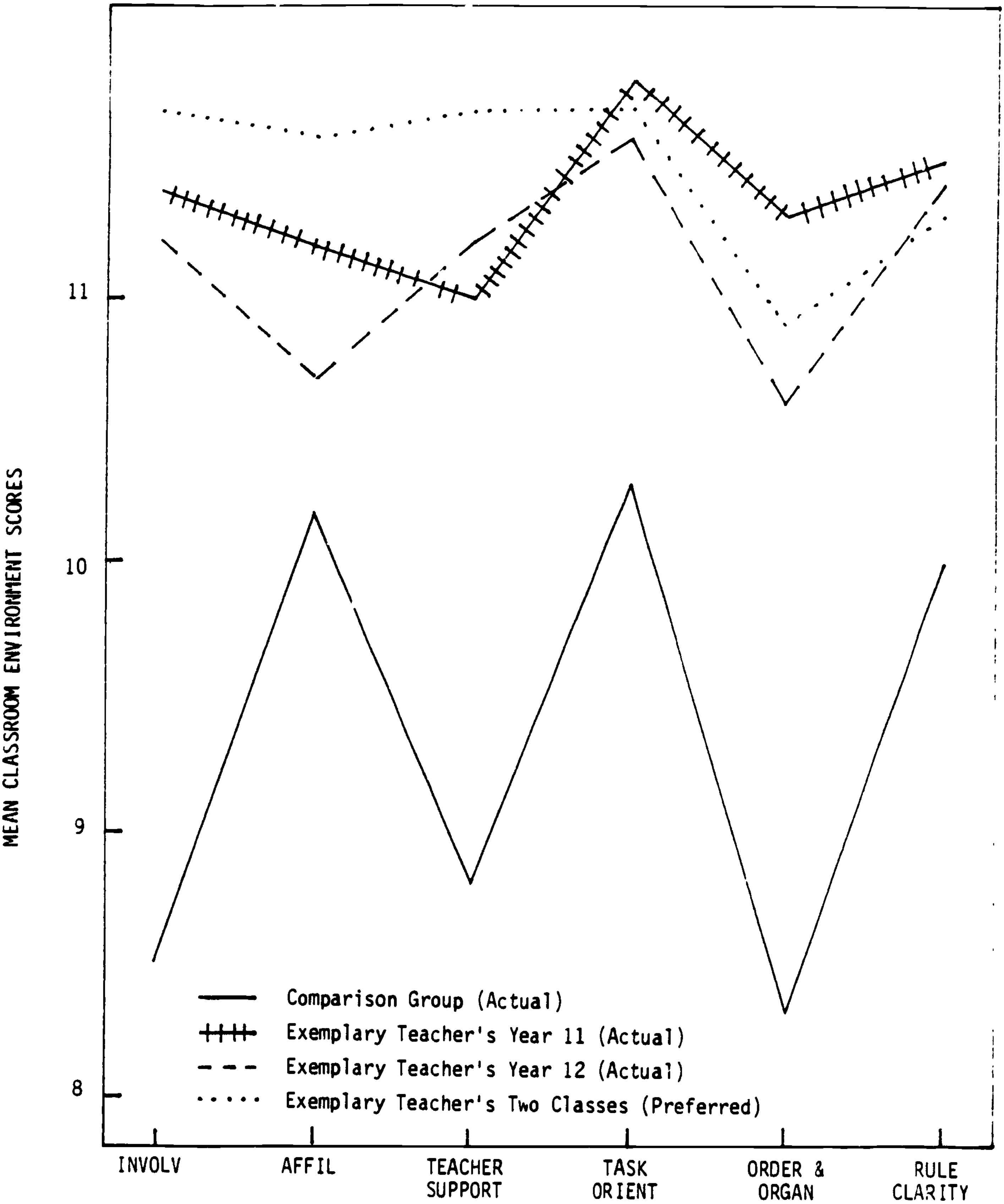

FIGURE 2: Profiles of Actual and Preferred Classroom Environment Scores for Two Classes of an Exemplary Biology Teacher and Actual Environment Scores for a Large Comparison Group

Table 4. Comparison group data (mean, SD) for actual form of short version of Classroom Environment Scale for two classes of an exemplary senior high school biology teacher

Scale	Comparison Group[a]		Exemplary Classes			
			Grade 11		Grade 12	
	Mean (Class	SD Means)	Mean	Effect Size[b]	Mean	Effect Size
Involvement	8.5	1.3	11.4	2.2	11.2	2.1
Affiliation	10.2	1.0	11.2	1.0	10.7	0.5
Teacher Support	8.8	1.5	11.0	1.5	11.2	1.6
Task Orientation	10.3	0.9	11.8	1.7	11.6	1.4
Order & Organization	8.3	1.6	11.3	1.9	10.6	1.4
Rule Clarity	10.0	1.0	11.5	1.5	11.4	1.4

[a] Comparison group data are based on class means for a sample of 116 Year 8 and 9 science classes.

[b] Effect size is the difference between the means of the exemplary class and the comparison group divided by the standard deviation of the comparison group.

Another way of interpreting Les's classroom environment data involved a comparison of the actual environment of Les's biology classes with those classes' preferred classroom environment (see Figure 2). Past research evidence from both science and non-science classes (Fisher & Fraser, 1983b; Fraser, 1984; Moos, 1979) clearly indicates a pattern in which students' preferred classroom environment is consistently more positive than the environment perceived to be actually present. Consequently, Figure 2 depicts quite atypical classrooms in which there is an unusually high congruence between actual and preferred environment on most environment dimensions. For simplicity in Figure 2, a single preferred environment profile has been drawn based on the mean of the scores of the two exemplary biology classes. The levels of actual and preferred Task Orientation, Order and Organization and Rule Clarity are surprisingly similar, although students would prefer somewhat more Involvement, Affiliation and Teacher Support. Clearly, the comparison of actual and preferred environment as perceived by students in Les's exemplary classes provides further evidence about the favorableness of the classroom environments created by this exemplary biology teacher.

The other exemplary biology class described in Tobin, Treagust and Fraser (in press) was an exemplary Grade 12 group taught by Shirley, who worked at a private Catholic all-girls school whose students generally were from middle-class families. Shirley had 13 years of teaching experience and, like Les, was the teacher in charge of biology at her school. The actual and preferred classroom environment data for Shirley's class were consistent with the pattern emerging for Les's classes, although the differences are not as striking. Relative to the same comparison group, Shirley's biology class was about one standard deviation for class means higher on the three dimensions of Teacher Support, Task Orientation and Rule Clarity. On the other hand, Shirley's class was relatively similar to the comparison group in terms of classroom Involvement, Affiliation and Order and Organization.

Exemplary Grade 1 Mathematics Teacher

Ciupryk and Malone's (1987) case study of an exemplary Grade 1 mathematics teacher also involved administration of the My Class Inventory to obtain student perceptions of actual classroom climate. However, in contrast to the way that Lacy's case study (see Figure 1) made use of the short 25-item form of the My Class Inventory, Ciupryk and Malone used the long 38-item version (Fisher & Fraser, 1981). The alpha reliabilities for class means for a comparison sample of 2,305 Grade 7 students in 100 classes reported by Fraser and Fisher (1983c) were 0.88 for Satisfaction, 0.75 for Friction, 0.81 for Competitiveness, 0.73 for Difficulty and 0.80 for Cohesiveness. The exemplary teacher, Lyn, taught a Grade 1 class of 15 boys and nine girls in a government school located in an area of low socioeconomic status.

In Table 5, the classroom environment scores of this exemplary teacher's class are compared with those obtained by the large comparison group of 100 classes. In particular, Table 5 shows the mean and standard deviation obtained by the comparison group when the class mean was used as the unit of analysis. As well, the table compares the comparison group's data with the mean score obtained by the exemplary teacher's class and expresses the differences between the exemplary class and the comparison group as effect sizes (i.e., in terms of the number of standard deviations).

Although similar levels of Competitiveness were perceived in the exemplary teacher's classroom and in the comparison group of classrooms, Table 5 indicates that large differences of approximately two standard deviations (effect sizes ranging from 1.7 to 2.3) were perceived for each of the other four scales. Moreover, three of these four results are readily interpretable in that the classroom climate of the exemplary teacher's class clearly was more favorable than for the comparison group in terms of greater Satisfaction, less Friction and more Cohesiveness.

For the Difficulty scale, however, it is noteworthy that Table 5 shows that the exemplary teacher's class was perceived as less favorable (i.e., a higher level of Difficulty) than the comparison group. Although it is likely that this difference could be explained in part by the fact that students found the exemplary teacher's class especially challenging (as distinct from only very hard), the results suggest the desirability of this teacher giving consideration to attempting to reduce the Difficulty of her class. But it is important to note, too, that the level of class Satisfaction was very high despite the perceived high Difficulty of the class.

Table 5. Comparison group data (mean, SD) for actual form of long version of My Class Inventory and means for classes of an exemplary Grade 1 mathematics teacher

Scale	Comparison Group[a]		Exemplary Class	
	Mean (Class	SD Means)	Mean	Effect Size[b]
Satisfaction	18.9	2.8	24.7	2.1
Friction	18.2	1.9	13.9	-2.3
Competitiveness	16.2	1.5	16.5	0.2
Difficulty	12.3	1.4	15.3	2.1
Cohesiveness	14.0	1.4	16.4	1.7

[a] Comparison group consists of 100 Year 7 classes and the class is used as the unit of analysis.

[b] Effect size is the difference between the mean of the exemplary class and the comparison group divided by the standard deviation of the comparison group.

Exemplary High School Physics Teaching

Deacon's (1987) case study of two exemplary Grade 11 physics teachers involved two classes in responding to some classroom climate scales. One of the two physics teachers taught at a coeducational government high school and the other physics teacher taught at a coeducational private secondary school.

Whereas Treagust's study described earlier made use of the short form of the Classroom Environment Scale (see Tables 1 and 2) which has six four-item scales, Deacon made use of the long version of the Classroom Environment Scale (Fraser & Fisher, 1983c; Moos & Trickett, 1987) which has nine 10-item scales. The alpha reliabilities for class means for these scales for a sample of 116 Grade 8 and 9 science classes were reported by Fraser and Fisher (1983c) to be 0.81 for Involvement, 0.71 for Affiliation, 0.85 for Teacher Support, 0.72 for Task Orientation, 0.60 for Competition, 0.90 for Order and Organization, 0.76 for Rule Clarity, 0.71 for Teacher Control and 0.71 for Innovation.

The mean scores obtained for each exemplary teacher's physics class were compared with means for the comparison group of 116 classes. It was found that the classroom environment of each exemplary teacher's class was perceived by students to be markedly more favorable than the comparison group in terms of greater Teacher Support, less Competition and less Teacher Control. These differences typically were greater than one and a half standard deviations for class means. As well, the class of one of the teachers perceived much greater levels of Involvement than the comparison group (with differences of almost two standard deviations for class means). The findings of a high level of Teacher Support is consistent with Deacon's classroom observations and the low level of Teacher Control is consistent with both teachers' philosophy that students need to take substantial responsibility for their own learning.

Exemplary High School Chemistry Teachers

In a case study of two exemplary chemistry teachers (Don and Alex) reported by Garnett (1987), students responded to seven of the nine scales contained in the long form of the Classroom Environment Scale (Fraser & Fisher, 1983c; Moos & Trickett, 1987). Don taught at an independent girls' school, whereas Alex taught at a government coeducational school. Both teachers had strong chemistry and education backgrounds, had considerable teaching experience at the Grade 11 and 12 levels and were active in professional activities within the local science teaching community.

When the mean for each of the exemplary chemistry teacher's classes was compared with the mean for Fraser and Fisher's (1983c) comparison group of 116 Grade 8 and 9 science classes, large differences of at least one standard deviation for class means were found for both exemplary teachers for Teacher Support, Task Orientation and Competition. In addition, Alex's class also differed from the comparison group by over a standard deviation for class means on Rule Clarity. In the case of both Teacher Support and Task Orientation, both exemplary teachers' classes perceived higher levels of each dimension than did the comparison group. These findings are quite consistent with observations that Don and Alex both displayed a genuine caring for students' welfare and performance and placed considerable emphasis on obtaining high levels of student engagement and making efficient use of class time. The interpretation of the differences for Competition is that each of the exemplary teacher's classes perceived greater Competition than the comparison group. This probably can be explained in part by the fact that Grade 11 and 12 classes (with their orientation to external examinations for entrance to higher education) were involved in the case of the exemplary teachers, whereas Grade 8 and 9 classes were involved in the comparison group. In the case of the large difference for Rule Clarity in Alex's class, the exemplary class perceived less Rule Clarity than the comparison group. This finding for Rule Clarity could be explained either by the fact that Alex was committed to having his students work independently and therefore would have had fewer classroom rules than in other classes, or because Alex's students were older than students in the comparison group and therefore rules did not need to be stressed as much. Nevertheless, the fact that the classes of exemplary teachers were perceived to have greater Competition and less Rule Clarity provides a warning signal about possible problems which Don and Alex might wish to attend to in the future.

A Comparison of Exemplary and Non-Exemplary Teachers

It is possible that confounding could have occurred in some of the comparisons between the classroom environments of exemplary teachers and the comparison groups described previously in this chapter. For example, the subject being taught by the exemplary teacher (e.g., senior physics) might be different from the subject taught by the comparison teachers (e.g., junior science). Or, an exemplary teacher might teach at a school (e.g., a private school) that is atypical of the schools contained in the comparison group (e.g., government schools). Consequently, it would be illuminating to make comparisons between the classroom environments of exemplary teachers and those of non-exemplary teachers at the same school and teaching similar subjects.

Fortunately, Tobin (1987a) reports such a comparison of exemplary and non-exemplary teachers of science and mathematics within the same school and, therefore, provides the basis for an unconfounded comparison of the classroom psychosocial environments created by exemplary and non-exemplary teachers. One part of Tobin's case study involved a comparison of an exemplary and several other science teachers at a private school which was coeducational and had students of medium socioeconomic status. At the time of the study, the exemplary science teacher, Thomas, had been teaching for 12 years. In order to provide a basis for comparison, classroom environment instruments were administered within the same school to Thomas' Grade 8-10 science classes and the Grade 8-10 science classes of four non-exemplary science teachers.

Students in the science classes responded to the six four-item scales in the short version of the actual form of the Classroom Environment Scale (i.e., the instrument described in Tables 1 and 2 and used in Treagust's study described earlier in this paper). However, instead of the original two-point (true, false) response format, a five-point response format (Very Often, Fairly Often, Sometimes, Not Very Often, Hardly Ever) was used, thus producing higher mean scores than those in Table 4 for Treagust's study. Figure 3 shows profiles depicting the mean classroom environment scores for the exemplary science teacher's class and the grand mean for the four non-exemplary science teachers' classes.

Figure 3 clearly shows that the exemplary science teacher's students did perceive their classroom environment more positively than the way in which the non-exemplary science teachers' students viewed their classes. When estimates were made of each scale's standard deviation for class means (based on the comparison group data and with an adjustment for the change from a two-point to a five-point response format), it was found that sizeable differences of approximately three-quarters of a standard deviation existed between the exemplary and the non-exemplary teachers' classes on the four dimensions of Teacher Support, Task Orientation, Order and Organization and Rule Clarity.

Tobin's case study also involved a comparison of an exemplary mathematics teacher, Thomas, and non-exemplary mathematics teachers at the same private school. Grade 8 students in the exemplary mathematics teacher's class and the four control teachers' mathematics classes responded to a total of nine classroom environment scales. Five of these (namely, Affiliation, Task Orientation, Competition, Order and Organization and Teacher Control) were selected from the nine scales contained in the long version of the Classroom Environment Scale (Fraser & Fisher, 1983c; Moos & Trickett, 1987). As with the short form used

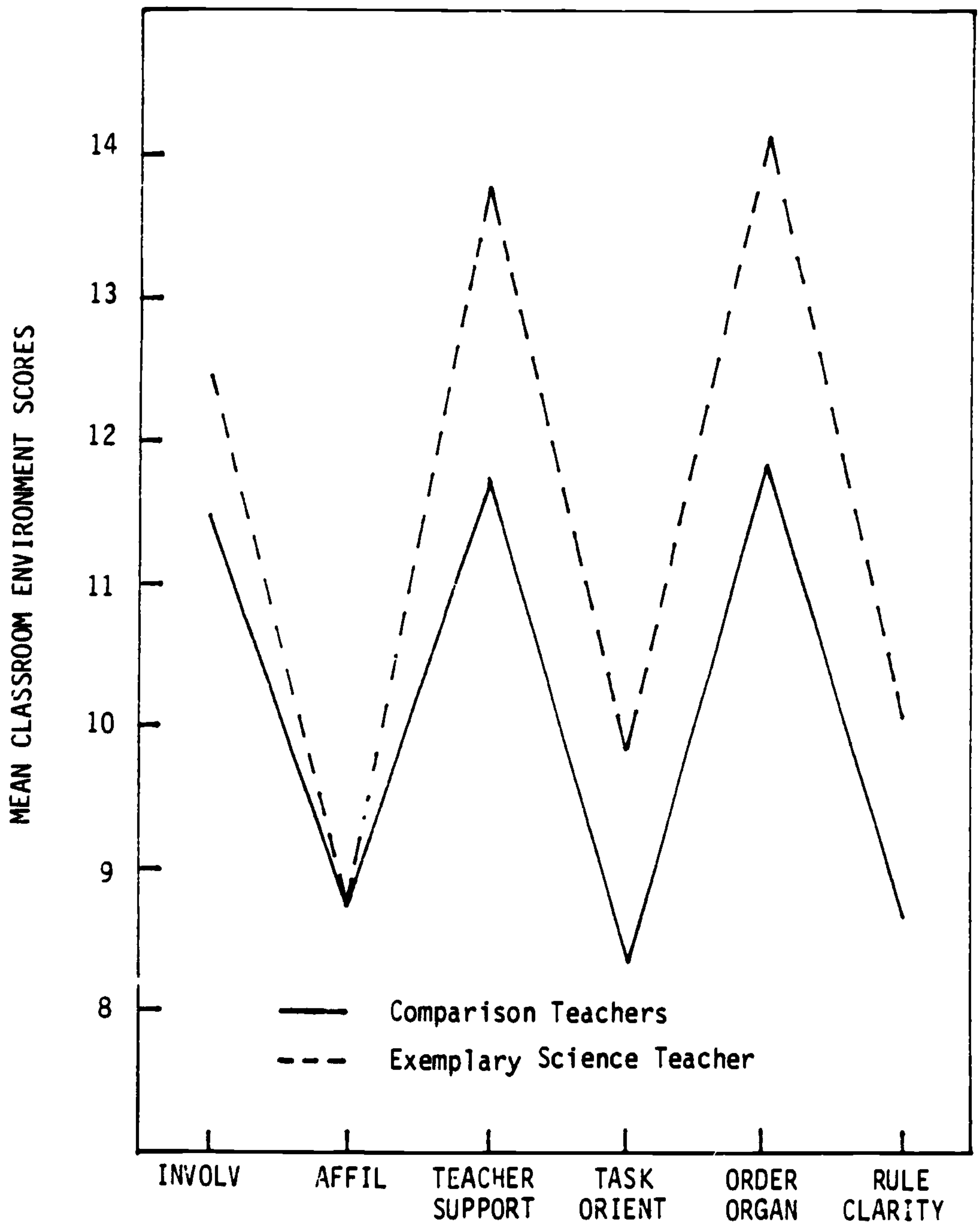

FIGURE 3: Actual Classroom Environment Profiles for an Exemplary Science Science Teacher and Four Compar'son Teachers

with science teachers, the original two-point item response format was changed to a five-point response format in the version administered to mathematics students. As well, this sample of mathematics students responded to the following four of the five 10-item scales contained in the Individualized Classroom Environment Questionnaire (Fraser, 1987a): Personalization, Participation, Investigation and Differentiation. The alpha reliabilities for class means obtained for these four scales with a sample of 150 junior high school classes by Fraser and Fisher (1983c) were 0.90 for Personalization, 0.80 for Participation, 0.77 for Investigation and 0.91 for Differentiation.

Figure 4 shows the mean score obtained on each of the nine classroom climate scales by the exemplary teacher's Grade 8 mathematics class and by the four classes taught by the non-exemplary Grade 8 mathematics teachers. The results in Figure 4 for mathematics teachers are similar to the findings for science teachers (Figure 3) in that, relative to the comparison classes, students in the exemplary teacher's class perceived the classroom environment more favorably on the majority of dimensions assessed. When standard deviations for class means obtained with previous comparison groups were considered (Fraser & Fisher, 1983c), it was found that sizeable differences of approximately one standard deviation existed between the exemplary teacher's class and the other mathematics classes on the dimensions Teacher Control, Personalization, Participation and Differentiation. The largest difference between exemplary and non-exemplary teachers' classes was approximately two standard deviations and this occurred for the Order and Organization scale.

Overall, the present findings emerging from a comparison of exemplary and non-exemplary teachers within the same school replicate the results obtained by contrasting exemplary teachers' classroom environments with those of large comparison groups in previous research. Consequently, these comparisons within the same school setting provide an important validity check and add further support to the general finding that exemplary and non-exemplary teachers can be differentiated in terms of the more favorable perceptions of classroom environment held by exemplary teachers' students. Moreover, this finding from the Exemplary Practice in Science and Mathematics Education project is consistent with Vargas-Gomez and Yager's (1987) finding that students in exemplary science programs involved in the Search for Excellence Project in the USA held more favorable attitudes to their science teachers than did a comparison group of students.

CONCLUSION

The purpose of this paper was to draw together the classroom environment data collected in case studies of exemplary teaching (Fraser, Tobin & Lacy, in press; Korbosky, Fraser & Tobin, in press; Tobin & Fraser, 1987; Tobin & Fraser, in press; Tobin, Treagust & Fraser, in press) in order to identify any systematic differences between the classroom climates of exemplary and other teachers. In an attempt to make meaningful interpretations of the data, the actual environments of some of the exemplary teachers' classes were compared, first, with the actual environment of comparison groups of classes from past research, second, with the class environment preferred by the exemplary teachers' students and, third, with the actual classroom environment of

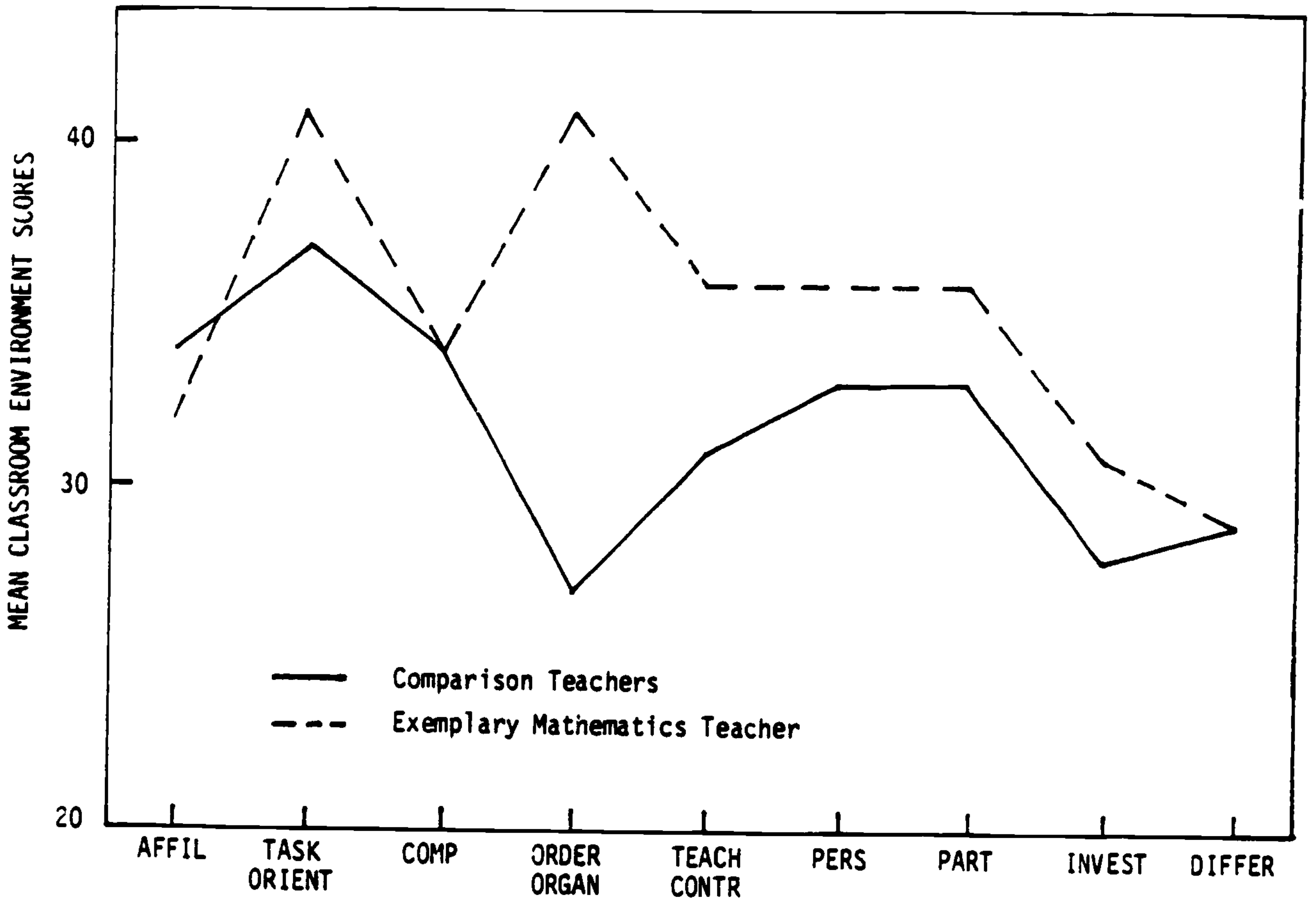

FIGURE 4: Actual Classroom Environment Profiles for an Exemplary Mathematics Teacher and Four Comparison Teachers

non-exemplary teachers of the same grade levels within the same school. Overall, the results reported in this chapter provide considerable evidence suggesting that, first, exemplary and non-exemplary science and mathematics teachers can be differentiated in terms of the psychosocial environments of their classrooms and, second, that exemplary teachers typically create classroom environments that are markedly more favorable than those of non-exemplary teachers.

From a methodological perspective, the inclusion of classroom environment questionnaires among a range of data-gathering techniques in our study of exemplary teaching is noteworthy for several reasons. First, the complementarity of qualitative observational data and quantitative classroom environment data added to the richness of the data base as a whole. Second, the use of classroom environment questionnaires provided an important source of students' views of their classrooms; in particular, the classes of teachers identified as exemplary by their teaching peers also could be differentiated from non-exemplary teachers' classes in terms of student perceptions of classroom psychosocial environment. Third, through a triangulation of classroom climate and other data, greater credibility could be placed in findings because they emerged consistently from data obtained using a range of different data collection methods.

This study broke new ground in classroom environment research in that it provided the first application of classroom climate measures in a study of exemplary teaching. Also the study represents one of the few serious attempts to combine interpretive research methodology with the use of classroom environment questionnaires within the same research. Overall, the study attests to the potential usefulness of incorporating classroom environment measures in investigations of exemplary practice and to the advantages of a confluence of qualitative and quantitative methods in the study of learning environments.

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Appendix A

CLASSROOM ENVIRONMENT SCALE

ACTUAL SHORT FORM

DIRECTIONS

This questionnaire contains statements about practices which could take place in this classroom. You will be asked how well each statement describes what your class is <u>actually like</u>.

There are no 'right' or 'wrong' answers. Your opinion is what is wanted.

Think about how well each statement describes what your actual classroom is like. Draw a circle around

True	if it is TRUE or MOSTLY TRUE that the practice actually takes place;
False	if it is FALSE or MOSTLY FALSE that the practice actually takes place.

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

NAME ______________________ SCHOOL ______________________ CLASS ___

Remember you are describing your <u>actual</u> classroom	Circle Your Answer	Teacher Use Only
1. Students put a lot of energy into what they do here.	True False	3
2. Students in this class get to know each other really well.	True False	___
<u>3</u>. This teacher spends very little time just talking with students.	True False	R ___
<u>4</u>. We often spend more time discussing outside student activities than class-related material.	True False	R ___
5. This is a well-organized class.	True False	___
6. There is a clear set of rules for students to follow.	True False	1
<u>7</u>. Students daydream a lot in this class.	True False	R 1
<u>8</u>. Students in this class aren't very interested in getting to know other students.	True False	R ___
9. The teacher takes a personal interest in students.	True False	___
10. Getting a certain amount of classwork done is very important in this class.	True False	___
11. Students are almost always quiet in this class.	True False	___
<u>12</u>. Rules in this class seem to change a lot.	True False	R 1

Remember you are describing your <u>actual</u> classroom	Circle Your Answer	Teacher Use Only
<u>13</u>. Students are often "clockwatching" in this class.	True False	R 3
14. A lot of friendships have been made in this class.	True False	
15. The teacher is more like a friend than an authority.	True False	
<u>16</u>. Students don't do much work in this class.	True False	R
<u>17</u>. Students fool around a lot in this class.	True False	R
18. The teacher explains what will happen if a student breaks a rule.	True False	2
19. Most students in this class really pay attention to what the teacher is saying.	True False	2
20. It's easy to get a group together for a project.	True False	
21. The teacher goes out of his/her way to help students.	True False	
<u>22</u>. This class is more a social hour than a place to learn something.	True False	R
<u>23</u>. This class is often very noisy.	True False	R
24. The teacher explains what the rules are.	True False	3

I 9 A___ IS___ TO___ OO___ RC 7

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Appendix B

MY CLASS INVENTORY

ACTUAL SHORT FORM

DIRECTIONS

This is not a test. The questions inside are to find out what your class is actually like.

Each sentence is meant to describe what your actual classroom is like. Draw a circle around

Yes if you AGREE with the sentence
No if you DON'T AGREE with the sentence

EXAMPLE

27. Most children in our class are good friends.

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

Yes No

If you don't agree that most children in the class actually are good friends, circle the No like this:

Yes No

Please answer all questions. If you change your mind about an answer, just cross it out and circle the new answer.

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

NAME ______________________ SCHOOL ______________________ CLASS __

Remember you are describing your <u>actual</u> classroom	Circle Your Answer	Teacher Use Only
1. The pupils enjoy their schoolwork in my class.	Yes No	3
2. Children are always fighting with each other.	Yes No	
3. Children often race to see who can finish first.	Yes No	
4. In our class the work is hard to do.	Yes No	
5. In my class everybody is my friend.	Yes No	1
6. Some pupils are not happy in class.	Yes No	R 1
7. Some of the children in our class are mean.	Yes No	
8. Most children want their work to be better than their friend's work.	Yes No	
9. Most children can do their schoolwork without help.	Yes No	R
10. Some people in my class are not my friends.	Yes No	R 3
11. Children seem to like the class.	Yes No	1
12. Many children in our class like to fight.	Yes No	
13. Some pupils feel bad when they don't do as well as the others.	Yes No	
14. Only the smart pupils can do their work.	Yes No	
15. All pupils in my class are close friends.	Yes No	2

Remember you are describing your <u>actual</u> classroom	Circle Your Answer	Teacher Use Only
16. Some of the pupils don't like the class.	Yes No	R 3
17. Certain pupils always want to have their own way.	Yes No	
18. Some pupils always try to do their work better than the others.	Yes No	
19. Schoolwork is hard to do.	Yes No	
20. All of the pupils in my class like one another.	Yes No	3
21. The class is fun.	Yes No	2
22. Children in our class fight a lot.	Yes No	
23. A few children in my class want to be first all of the time.	Yes No	
24. Most of the pupils in my class know how to do their work.	Yes No	R
25. Children in our class like each other as friends	Yes No	3

S 10 F__ Cm__ D__ Ch 12