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ABSTRACT

This paper describes the development, validation, and analysis of a classroom learning environment questionnaire that uses parent perceptions in conjunction with student perceptions in investigating classroom learning environments in grades 4 and 5 in a South Florida school. Two modified versions of the What Is Happening in this Class (WIHIC) (Fraser and others, 1996) questionnaire were developed for parents (actual and preferred environments) and two for students. Qualitative interviews and observations were used to augment the richness of the quantitative findings. The student sample consisted of 520 students aged 9 to 11 years from 22 classes in 3 schools. The parent sample of 120 represented the responding parents from 1 school. The 161 children of participating parents became a subsample for the study of student achievement. Follow-up interviews were held with 10 parents and their children. The six-scale version of the actual form of the WIHIC was found to have satisfactory factorial validity for the student sample, with factor analysis supporting a five-scale structure. The WIHIC also demonstrated satisfactory reliability and discriminant validity for student and class mean for students and parents. Students and parents preferred a more favorable learning environment than they actually perceived, and parents' evaluations of the actual learning environment were somewhat less favorable than those of students. Positive, but weak, relationships existed between student outcomes and student and parent perceptions of the learning environment. Two appendixes contain tables of factor loadings for the parent and student actual forms. (Contains 30 references.) (SLD)

Parent and Student Perceptions of the Classroom Learning Environment and its Influence on Student Outcomes

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PARENT AND STUDENT PERCEPTIONS OF THE CLASSROOM LEARNING ENVIRONMENT AND ITS INFLUENCE ON STUDENT OUTCOMES

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The paper, which describes the development, validation, and analysis of a classroom learning environment questionnaire, is distinctive in that parents' perceptions were utilised in conjunction with students' perceptions in investigating grade 4 and 5 classroom learning environments in South Florida. First, an existing valid questionnaire (Fraser, McRobbie & Fisher, 1996) was modified for young students and their parents and subsequently analysed for validity and reliability. Second, differences between students' and parents' perceptions of the learning environment were explored. Finally, associations between parents' and students' perceptions and student outcomes were investigated.

Background

This section considers, first, the link between home and school and the effect on student outcomes and, second, the field of learning environment.

Connection between Home and School

Many researchers recognize that education takes place within the context of the community and family (Kellaghan, Sloane, Alvarez & Bloom, 1993; Majoribanks, 1999; Moos, 1991; McCaleb, 1997). Families should be involved in this learning process and invited to share their own values and life goals with their children and the schools (McCaleb, 1997). The family remains central to the preparation of children for academic learning (Families & Schools, 1995).

School learning and the home environment are highly linked (Kellaghan et al., 1993). Kellaghan et al. have proposed that it would be desirable to extend the traditions of learning environment research involving students to also involve their parents. Majoribanks (1991) advocates family-school environment research in which families and schools are examined not only as places where ideology is imposed upon students, but also where they are produced. Investigations that include students from different family contexts are likely to lead to a more complete understanding of the complexities of learning environments and the

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challenges that confront parents and teachers when they attempt to influence students' school outcomes by altering the school or home learning environment (Majoribanks, 1999).

Kellaghan et al. (1993) have established a link between positive school-home partnerships and improved student outcomes. Likewise Moos (1991) established that students achieve better in classrooms with interaction rules that are similar to those that the students have experienced in their families. Kellaghan et al. (1993) propose that any effort to support children's development and learning should take into account the context in which it is implemented as well as parents' needs and wishes (p. 15).

Field of Learning Environments

There is a wide variety of economical and valid questionnaires that have been used for the past 25 years to assess students' perceptions of the learning environment (Fraser, 1998a). Some highlights in the use of questionnaires include the construction of instruments which permit the investigation of differences between actual and preferred classroom environment (Fisher & Fraser,.1983). Additionally, qualitative methods for assessing the learning environment have been combined with the quantitative methods to provide additional support for the validity of questionnaires and plausible explanations for the findings from questionnaire data (Fraser & Tobin, 1991; Tobin, Kahle & Fraser, 1990; Tobin & Fraser, 1998).

Much of the past research has focused on the students' perceptions of the learning environment and the effect on student outcomes (Fraser, 1986, 1994, 1998b; Fraser & Walberg, 1991). Also student achievement and attitudes have been shown to be enhanced when their is similarity between actual class environment and students' preferred class environment (Fraser & Fisher, 1993). Fraser's (1994) tabulation of 40 past studies has shown that associations between the perceptions of the classroom environment and student outcomes have been replicated with a variety of instruments, outcome measures, and samples. The questionnaires that have been so widely and successfully used to assess students' perceptions of the classroom learning environment has not previously been adapted and used among parents. Therefore, this study makes a distinctive contribution by validating and using a widely-applicable questionnaire to assess parents' perceptions of their children's learning environment.

Aims

(1) To develop valid questionnaires to assess:

   a. 9-11 years-old students' perceptions of the actual and preferred learning environment
   b. parents' perceptions of the actual and preferred learning environment for their children

(2) To investigate differences between parents and students in their preferred classroom environment and in their perceptions of the same actual classroom environment

(3) To examine associations between the student outcomes of achievement and attitudes and:

a. students' perceptions of the learning environment
b. parents' perceptions of their children's learning environment

Method

Learning Environment Questionnaire

Parents' and students' perceptions of the learning environment were assessed by using a modified version of the What is Happening in this Class (WIHIC) (Fraser et al., 1996) questionnaire. The WIHIC was developed (Fraser et al., 1996) to incorporate scales that that had been shown in previous studies to be significant predictors of outcomes (Fraser, 1994). For this study, the original seven scales were reduced to six: *Student Cohesiveness, Teacher Support, Involvement, Investigation Task Orientation* and *Equity.* The WIHIC has consistently demonstrated impressive validation results in numerous countries (Aldridge & Fraser, 1999; Chionh & Fraser, 1998; Fraser, Fisher & McRobbie, 1996; Huang, and Fraser, & Aldridge, 1998).

The WIHIC questionnaire was used in this study in four forms. Two forms measured students' and parents' preferred classroom environment, while the other two forms measured students' and parents' perceptions of the actual classroom environment. The wording of the items in the original WIHIC was simplified and the number of items was reduced from 56 to 39 items to improve appropriateness for 9–11 years old. The parent versions of the WIHIC were modelled after the modified student versions. The main modifications in the wording of the parent version were as follows:

Student Version	Parent Version
I	My child
My teacher	My child's teacher
My class	My child's class

Combining Quantitative and Qualitative Methods

This study combined quantitative and qualitative methods for collecting data. Through triangulation of quantitative data and qualitative information, greater credibility can be placed on the findings (Fraser & Tobin, 1991; Tobin & Fraser, 1998). When a study using quantitative methods has been completed, the main findings can be contextualised through observations and verbal accounts from participants (Tobin & Fraser, 1998).

In this study, the qualitative interviews and observations were used to augment the richness of the quantitative findings. Fraser (1999) explains that qualitative and quantitative methods can be appropriately used with differing 'grain sizes'. While this study used a relatively

large 'grain size' for the quantitative finds, the qualitative component involved a much smaller 'grain size' (see *Sample* subsection for description of samples used in this study). Various qualitative methods were used in this study: focus group interviews (parents and children), paired interviews (parent and child), individual interviews (students) and classroom observations.

The interpretive methods of Erickson (1998) guided the collection of the qualitative data. First, quantitative information was collected and analysed. Next, the interviews and classroom observations were examined for patterns of responses and then these patterns were quantified. Finally, the qualitative findings were reconciled with the quantitative findings.

Student Outcomes

Students' attitude towards science and achievement in science were the two outcome measures used in this study. A modified version of the Test of Science-Related Attitudes (TOSRA) (Fraser, 1981) was administered to the subsample of students whose parents gave permission to access student academic records (N=161). The TOSRA was originally developed to measure science-related attitudes among secondary school students and is suitable for group administration within the duration of a normal class lesson (Fraser, 1981). The questions were modified to include 20 items evaluating two conceptual categories: *Attitude to Scientific Inquiry* and *Enjoyment of Science Lessons* and the questionnaire was read aloud to the students to minimise reading/response errors. The response format required students to express their degree of agreement with each statement on a five-point scale consisting of the responses: Strongly agree, Agree, Not sure, Disagree and Strongly disagree.

The achievement levels of individual students were determined from the Stanford Achievement Test (SAT) science subtest, which was administered by Miami-Dade County Public Schools in April 2001. The SAT 9 science subtest assesses understanding in the domains of life, physical, and earth science. The test items allow students to apply information and data, interpret data, draw conclusions, and predict events (Harcourt, 2000). The SAT 9 is a nationally-normed test that has been widely administered by many school districts (Harcourt, 2000). Additionally, student achievement was obtained from the school's final report card grade. Students receive a grade at the end of the first, second, third and fourth nine weeks of school and these grades are averaged for a final report card grade at the end of the academic school year.

Sample

The student sample for the learning environment questionnaire consisted of 520 students aged 9-11 years. These 520 students in 22 classes from three schools reside in a large urban school district in South Florida. The classroom teachers administered the preferred and actual forms of the learning environment questionnaire to this 'large grain' sample size (Fraser, 1999). The classroom teachers read the directions aloud to the students and then the

students completed the questionnaires independently. Teachers offered additional help if the student raised his or her hand and specifically requested clarification.

Teachers at the researcher's school willingly administered the WIHIC for students. The return rate at the researcher's school was 100 percent for a total of approximately 360 students in 11 classes. The other 160 students were in 11 classes from two schools from the same school district. Because the class rosters of these schools were not provided to the researcher, there is no way to know the completion rate for these two schools. It should be noted though that six additional classes were asked to participate, but the teachers declined. These teachers expressed a fear that the information generated could be used against them in some way.

The parent sample was limited to the researcher's school and grade level because of the anticipated difficulty in obtaining cooperation from parents. Additionally the school district requires parental approval before academic records can be released. Out of the 200 parents who were asked permission to access their children's academic records, only 161 responded affirmatively and only 120 parents completed the actual and preferred versions of the WIHIC for parents.

Because permission was obtained from only 161 parents to access students records, this group became a subsample of 161 students who responded to the Test of Science Related Attitudes (TOSRA) (Fraser, 1981) to assess attitudinal outcomes. Additionally, achievement outcomes for these 161 students were obtained through their final report card grades and stanine scores on the Stanford 9 standardised achievement test.

120 parents of the subsample of 161 students completed the learning environment questionnaire. Of the 120 parents, 10 parents participated in follow-up interviews. These 10 parents and their children were interviewed using various techniques. Focus group, paired (parent and child), and individual interviews were conducted with this 'fine grain' sample (Fraser, 1999).

The racial and ethnic make-up of these students and parents was White Non-Hispanic (21%), Black Non-Hispanic (50%), Hispanic (23%) and other (6%) and this is somewhat typical of the school district. Boys and girls were equally represented (School Improvement Assistance and Intervention Plan, 1999).

Results

The results are presented in four subsections. The reliability and factorial validity of the questionnaires were investigated using factor and item analyses. We report Cronbach alpha reliability coefficients, discriminant validity indices, and ANOVA results for class membership differences in students' perceptions. Next, the average item mean, average item standard deviation, effect size and *t* test were determined to explore the differences between parents' and students' perceptions of the learning environment. Then simple correlation and multiple regression analyses were used to investigate associations between the student

outcomes of attitudes and academic achievement and dimensions on the WIHIC. Finally, selected student and parent comments for each dimension of the WIHIC are provided.

Reliability and Factorial Validity of Questionnaire

Factor and item analyses showed that the same questionnaire could be used to assess young students' and their parents' perceptions of actual classroom learning environment along the six dimensions of *Student Cohesiveness, Teacher Support, Involvement, Task Orientation, Equity,* and *Investigation.* While factor and item analyses were carried out for the student and parent preferred versions, the results obtained for the parent version were not as strong as those for the student version. The small parent sample is the probable the cause of this result.

Factor and item analyses were used to identify faulty questionnaire items on the student actual version of the WIHIC whose removal improved the internal consistency reliability and factorial validity. Thirty-seven of the original 39 items were retained in the same six-factor structure of *Student Cohesiveness, Teacher Support, Involvement, Task Orientation, Equity,* and *Investigation.*

The remaining 37 items had a factor loading of at least 0.30 on their *a priori* scale. The exceptions are items 3 and 17. Item 26 is the only item which has a loading greater that 0.30 on its own scale. The percent of variance ranged from 3.51 to 23.83 for different scales, with the total variance being 49.45%. The results of a principal components factor analysis with varimax rotation are show in Appendix A for the student sample of 520 students. Overall the student actual WIHIC had satisfactory factorial validity.

As with the student version of the WIHIC, the parent actual version was analysed for factorial validity and faulty items were removed to improve the internal consistency reliability. Thirty-seven of the original 39 items were retained. Appendix B shows the factor analysis results for the parent version. Of note is the collapsing of the originally separate scales of *Teacher Support* and *Equity* into one factor. The 37 items all have a factor loading of at least 0.40 on their *a priori* scale. The percentage of variance ranged from 4.13 to 29.88 for different scales, with the total variance accounted for being 54.21%.

A note should be made on the difficulty in obtaining the parent sample. Parents of students in the researcher's class readily completed the questionnaires with a 97% return rate. Parents of students in the other five classes (from the same school and grade level but in different classes) averaged a return rate of only 43%. Because of the small sample of parent responses (N=120), replicating the *a priori* factor structure was not likely.

These findings suggest a need for replication with a larger sample. Additionally, findings suggest that parents might not distinguish between *Student Cohesiveness* and *Equity* in the same way that students do and this could have affected the results. Overall the factor analysis supports a five-scale structure (with *Student Cohesiveness* and *Equity* forming a single factor) rather than the *a priori* six-scale structure for the actual parent WIHIC.

The internal consistency reliability (Cronbach alpha coefficient), discriminant validity (using the mean correlation of a scale with the other scales) and ability to differentiate between classrooms (ANOVA results) for the actual version were determined for each scale and are presented in Table 1 for students and Table 2 for parents.

Scale reliability (alpha coefficient) for the student version ranged from 0.67 to 0.86 with the individual as the unit of analysis and from 0.73 to 0.90 with the class as the unit of analysis (Table 1). As expected, reliability is higher when the class mean is used as the unit of analysis (Fraser, 1994). These results are similar to those found using the WIHIC in Australia (Aldridge & Fraser, 2000).

The discriminant validity results indicate that most scales were fairly unique in the dimension that each assessed. The mean correlation of a scale with the other scales varied between 0.37 and 0.46 with the individual as the unit of analysis and between 0.66 and 0.77 with the class mean as the unit of analysis (see Table 1). Although there is some overlap between raw scores, the factor analysis results support the independence of factor scores.

Table 1 Internal Consistency Reliability (Cronbach Alpha Coefficient), Discriminant Validity (Mean Correlation With Other Scales) and Ability to Differentiate Between Classrooms (ANOVA Results) for Two Units of Analysis for the WIHIC for Students

Scale	Number of Items	Unit of Analysis	Alpha Reliability	Mean Correlation with other Scales	ANOVA Eta^2
Student Cohesiveness	5	Individual	.67	.38	.06
		Class Mean	.73	.69	
Teacher Support	7	Individual	.80	.42	.10
		Class Mean	.90	.68	
Involvement	5	Individual	.74	.46	.09 **
		Class Mean	.86	.73	
Task Orientation	6	Individual	.71	.41	.09
		Class Mean	.85	.77	
Equity	6	Individual	.82	.39	.11 **
		Class Mean	.92	.70	
Investigation	6	Individual	.86	.37	.07 **
		Class Mean	.90	.66	

** $p<0.01$

The sample consisted of 520 students in 22 classes in South Florida.

The eta^2 statistic (which is the ratio of 'between' to 'total' sums of squares) represents the proportion of variance explained by class membership.

The last column in Table 1 reports the ANOVA results concerning whether students in the same class perceive the classroom environment relatively similarly, while mean class perceptions vary from class to class. These analyses revealed statistically significant differences between students' perceptions in different classes for *Involvement*, *Equity*, and *Investigation* but not for *Student Cohesiveness, Teacher Support* and *Task Orientation.* The eta^2 statistic (which represents the proportion of variance in scale scores accounted for by class membership) ranged from 0.06 to 0.11.
Overall the findings indicate that the student actual version of the WIHIC demonstrates satisfactory reliability and discriminant validity for two units of analysis (student and class mean) and that most scales can differentiate between the perceptions of students in different classes (see Table 1).

Whereas Table 1 presents the results for the student version, Table 2 presents parallel results for the parent version. Scale reliability (alpha coefficient) for the parent version ranged from 0.77 to 0.89 with the individual as the unit of analysis and from 0.80 to 0.95 with the class as the unit of analysis if *Student Cohesiveness* is excluded. As expected, the reliability is higher when the class mean was used as the unit of analysis except for the scale *Student Cohesiveness*. Of note is the low level of reliability for the *Student Cohesiveness* scale (0.29) with the class as the unit of analysis. It is likely that the small sample size for parents could explain this anomalous result.

Table 2 Internal Consistency Reliability (Cronbach Alpha Coefficient), Discriminant Validity (Mean Correlation With Other Scales) and Ability to Differentiate Between Classrooms (ANOVA Results) for the WIHIC for Parents

Scale	Number of Items	Unit of Analysis	Alpha Reliability	Mean Correlation with other Scales	ANOVA Eta^2
Student Cohesiveness	5	Individual	.78	.33	.01
		Class	.29	.30	
Teacher Support	7	Individual	.89	.51	.11**
		Class	.95	.50	
Involvement	6	Individual	.77	.45	.11**
		Class	.83	.53	
Task Orientation	6	Individual	.81	.41	.11**
		Class	.91	.52	
Equity	6	Individual	.88	.44	.10
		Class	.95	.48	
Investigation	6	Individual	.87	.39	.06
		Class	.80	.26	

** $p<0.01$
The sample consisted of 120 parents of students from 6 classes in South Florida.
The eta^2 statistic (which is the ratio of 'between' to 'total' sums of squares) represents the proportion of variance explained by class membership.

The discriminant validity results indicate whether each scale is unique in the aspect it assesses. The mean correlation of a scale varied between 0.33 and 0.51 with the individual as the unit of analysis and between 0.26 and 0.53 with the class mean as the unit of analysis (see Table 2). While there was some overlap between raw scores, factor analysis results support the independence of factor scores (except for *Student Cohesiveness* and *Equity).*

The last column in Table 2 reports the ANOVA results. That is, parents with students in the same class should perceive the classroom environment relatively similarly, while mean class parent perceptions should vary from class to class. This analysis showed there were statistically significant differences between the perceptions of parents with students in different classes for the *Teacher Support, Involvement,* and *Task Orientation* scales. The *Student Cohesiveness, Equity, and Investigation* scales did not show significant differences. The proportion of variance accounted for by class membership (eta^2) ranged from 0.01 to 0.10 for different WIHIC scales.

Overall, the actual parent version of the WIHIC demonstrates satisfactory reliability and discriminant validity for two units of analysis (individual and class mean), and is able to differentiate between the perceptions of parents whose children were in different classes. Nevertheless, the results suggest the desirability of replication with a larger sample.

Differences between Parents' and Students' Perceptions of the Learning Environment

To explore differences between students' and parents' perceptions of their actual environment and their preferred environment, the average item mean was calculated for each WIHIC scale. The average item mean is simply the scale mean divided by the number of items in a scale, and it was used to enable easy comparison of the average scores on scales with different number of items. Using the individual as the unit of analysis, effect sizes were calculated to determine the magnitude of the difference between parents' and students' scores as suggested by Anderson (1998) and Thompson (1998). The effect size expresses the difference between two means in standard deviation units.

In order to determine the statistical significance of difference, a one-way MANOVA (multivariate analysis of variance) for repeated measures was performed with the set of WIHIC scales as the dependent variables and with the group responding to the instrument (students versus parents) as the independent variable. Because the multivariate test using Wilks' lambda criterion yielded significant differences, paired *t* tests were performed separately for each scale. All analyses were performed separately for the actual and the preferred forms of the WIHIC.

Table 3 shows that parents perceive the actual classroom environment a little less favourably than their children do, but the effect size are generally small. Parents perceive that there is less *Teacher Support* (effect size of 0.09), *Involvement* (effect size of 0.17), *Task Orientation* (effect size of 0.28), and *Investigation* (effect size of 0.18) than their children.

There is a negligible difference between parents' and students' perceptions of the amount of *Student Cohesiveness* (0.04 difference) present in the classroom learning environment. Students and parents indicate agreement on the amount of *Equity* in the classroom with no difference shown. *Task Orientation* was the only scale for which a statistically significant difference was found between students' and parents' perceptions of actual classroom environment.

Table 3 Average Item Mean, Average Item Standard Deviation and Difference between Students and parents (Effect Size and *t* Test for Paired Samples) for Actual and Preferred Perceptions on the WIHIC with the Individual as the Unit of Analysis

Scale	Average Item Mean		Average Item Standard Deviation		Differences	
	Students	Parents	Students	Parents	Effect Size	*t*
Student Cohesiveness						
Actual	4.21	4.23	.49	.47	.04	-.23
Preferred	4.14	4.34	.48	.52	.40	-3.35**
Teacher Support						
Actual	4.00	3.94	.69	.68	.09	.70
Preferred	4.04	4.31	.60	.62	.44	-3.96**
Involvement						
Actual	3.89	3.78	.69	.58	.17	1.52
Preferred	3.88	4.30	.65	.77	.59	-5.04**
Task Orientation						
Actual	4.32	4.17	.53	.55	.28	2.57**
Preferred	4.36	4.40	.50	.55	.08	-.82
Equity						
Actual	3.93	3.93	.88	.66	.00	.01
Preferred	4.11	4.35	.73	.61	.36	-2.91**
Investigation						
Actual	3.94	3.81	.81	.67	.18	1.55
Preferred	4.09	4.29	.68	.65	.30	-2.55**

**$p<0.01$

The sample consisted of 120 parents and students in 6 classes in South Florida.

The differences between what parents would prefer happening in their children's science classroom and what their children prefer happening are large. Parents prefer greater levels of *Student Cohesiveness* (effect size of 0.40), *Teacher Support* (effect size of 0.44), *Involvement* (effect size of 0.59), *Equity* (effect size of 0.36), and *Investigation* (effect size of 0.30). All of these effect sizes suggest an educationally important difference between students' and their parents' preferences. The only area in which parents indicate only a slight difference preference than students is *Task Orientation* (effect size of 0.08).

Parents consistently indicated preference for a more favourable learning environment for their children than do their children (see Figure 1). *T* tests confirmed the statistical

significance of these differences between students' preferred and parents' preferred learning environment for five of the six scales.

Figure 1 graphically illustrates the item mean averages. Overall parents perceive a somewhat less favourable actual science classroom environment than students, but parents prefer a much more favourable science classroom environment than students do. Figure 1 also shows that students prefer a classroom environment that is more favourable than the one which they perceive as actually being present (see Figure 1), a finding that is consistent with previous studies conducted throughout the world (Fraser, 1998b; Henderson, Fisher & Fraser, 2000). Moreover, Figure 1 illustrates that the differences between actual and preferred scores are considerable larger for parents than students.

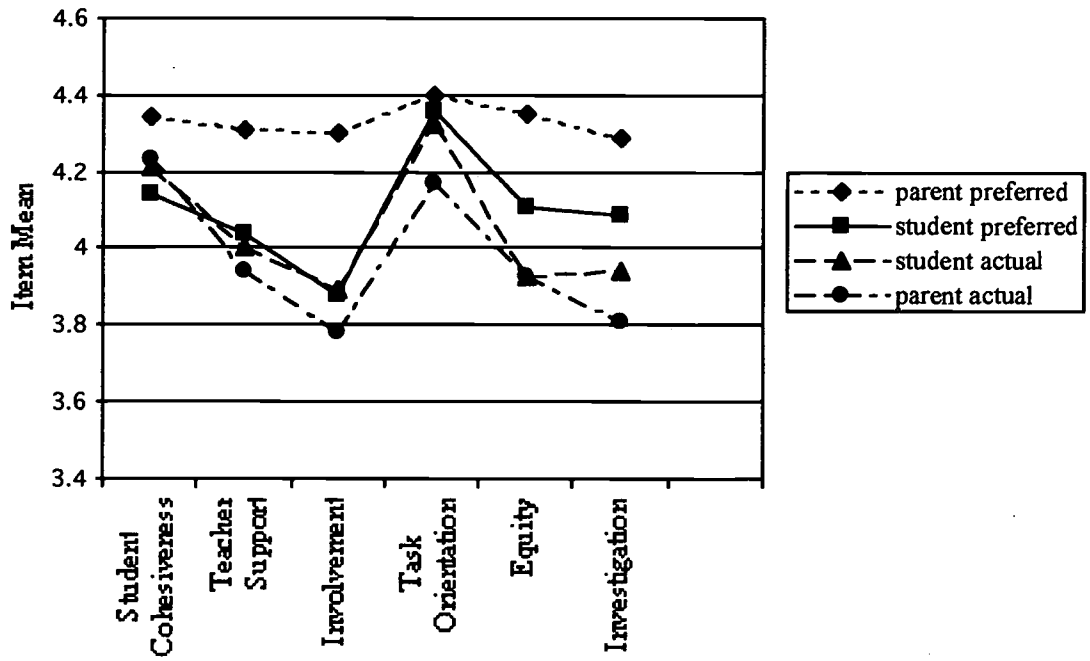

Figure 1 Differences between student and parent perceptions of the actual and preferred learning environment.

Associations between Students' and Parents' Perceptions and Outcomes

Simple correlation and multiple regression analyses were carried out to determine associations between the student outcomes of attitudes and academic achievement and dimensions on the actual form of the WIHIC. Attitudes were assessed by student responses to the TOSRA (*Enjoyment of Science Lessons* and *Attitude of Scientific Inquiry*) and achievement (final grade in science and stanine score on the Standford-9 science subtest). Analyses were performed separately for students' perceptions of classroom environment (Table 4) and for parents' perceptions of classroom environment (Table 5).

Table 4 shows the relative strength of the associations between student outcomes (attitude and achievement) and the six scales of the WIHIC. The sample consisted of 161 students in 6 classes in South Florida. This sample was comprised of the students whose parents had signed a release form required by the school district before academic achievement information can be released.

The results of the simple correlational analysis reported in Table 4 for the student sample show that 4 out of 24 simple correlations are statistically significant, which is three times that expected by chance. The results show that *Investigation* is significantly correlated with *Attitude to Scientific Inquiry*, and that the learning environment scales of *Involvement, Task Orientation,* and *Investigation* are significantly correlated with *Enjoyment of Science.* All of these statistically significant correlations are positive. The students' final grade and SAT-9 scores are not significantly related to any of the environmental scales.

The multiple correlation between an outcome measure and the set of six environment scales is 0.25 for *Attitude to Scientific Inquiry,* 0.39 for *Enjoyment of Science Lessons,* 0.21 for Final Grade, and 0.26 for SAT-9 scores. The multiple correlation is statistically significant only for *Enjoyment of Science Lesson* (see Table 4).

Table 4 Simple Correlation and Multiple Regression Analyses for Associations between Student Attitudes, Academic Achievement and Dimensions of the WIHIC for Students

Scale	Attitude to Scientific Inquiry		Enjoyment of Science Lessons		Final Grade		SAT-9 Stanine Scores	
	r	*β*	*r*	*β*	*r*	*β*	*r*	*β*
WIHIC								
Student Cohesiveness	0.05	-0.01	0.05	-0.12	0.03	-0.09	-0.09	-0.17
Teacher Support	0.06	0.08	0.00	-0.04	.0.14	0.10	0.01	.0.05
Involvement	0.08	-0.02	0.24**	0.16	0.08	-0.01	0.02	-0.09
Task Orientation	0.09	0.03	0.33**	0.33**	.0.15	0.12	0.20	0.21**
Equity	-0.03	-0.11	0.03	-0.07	.0.14	0.07	-0.03	-0.07
Investigation	0.23**	0.23**	0.20**	0.07	0.11	0.06	0.13	0.13
Multiple Correlation (*R*)		0.25		0.39**		0.21		0.26

**$p<0.01$

The sample consisted of 161 students in 6 classes in South, Florida.

Regression coefficients were used to identify which of the six WIHIC scales contributed uniquely to the variance in any one of the student outcomes (*Attitude to Scientific Inquiry, Enjoyment of Science Lessons,* Grades and SAT-9 Scores*)* when other environmental scales were mutually controlled. The analysis revealed that 3 out of 24 regression coefficients were statistically significant. Table 4 shows that, with the other environment scales mutually controlled, student *Attitude to Scientific Inquiry* was significantly greater in classes with greater levels of *Investigation,* and *Enjoyment of Science Lessons* and SAT-9 Scores were significantly greater in classes with greater levels of *Task Orientation.*

Overall the findings in Table 4 indicate a positive but relatively weak relationship between student outcomes (especially attitudes) and student perceptions of the learning environment (especially *Task Orientation* and *Investigation*).

Whereas Table 4 shows the associations for the student version of the WIHIC, Table 5 displays the results for the parent version of the WIHIC. As with the student version, simple correlation and multiple regression analyses were carried out to determine associations between student outcomes of attitudes and academic achievement and dimensions on the actual form of the parent WIHIC. Table 5 shows the relative strength of the associations between student outcomes and parent perceptions on the six scales of the WIHIC. The sample consisted of 120 students and their parents.

Table 5 Simple Correlation and Multiple Regression Analyses for Associations between Student Attitudes, Academic Achievement and Dimensions of the WIHIC for Parents

Scale	Attitude to Scientific Inquiry		Enjoyment of Science Lessons		Final Grade		SAT-9 Stanine Score	
	r	β	r	β	r	β	r	β
Student Cohesiveness	.12	.08	.20*	.12	.22*	.09	.07	-.03
Teacher Support	.11	.20	.21*	.28	.18	-.04	-.15	.04
Involvement	.15	.06	.08	-.21	.21*	.02	.12	.02
Task Orientation	.04	.04	.24*	.28**	.41**	.37**	.15	.06**
Equity	-.07	.32**	.11	-.16	.21*	.03	.17	.09
Investigation	.22*	.20	.11	-.03	.21	.00	.16	.09
Multiple Correlation (R)		.33		.33		.42**		.21

**$p<0.01$

The sample consists of 120 parents of students in 6 classes in Miami-Dade County, Florida.

The results of the simple correlational analysis reported in Table 5 show that 8 out of 24 simple correlations were statistically significant, which is seven times than that expected by chance. Results show that *Investigation* is significantly correlated with *Attitude to Scientific Inquiry.* This is consistent with the student results (see Table 4). *Student Cohesiveness, Teacher Support,* and *Task Orientation* also are significantly correlated with *Enjoyment of Science Lessons. Student Cohesiveness, Involvement, Task Orientation,* and *Equity* are significantly correlated with the students' final grade. As with the students' results, all significant relationships are positive. There were no significant correlations between the SAT-9 scores received on the standardised science achievement test and any of the six environmental scales (see Table 5).

The multiple correlation between an outcome measure and the set of six environment scales was 0.33 for *Attitude to Scientific Inquiry,* 0.33 for *Enjoyment of Science Lessons,* 0.42 for Final Grade, and 0.21 for SAT-9 scores (see Table 5). The multiple correlation was statistically significant only for the Final Grade outcome.

As with the student version, we used regression coefficients to identify which of the six WIHIC scales contributed uniquely to the variance in student outcomes (*Attitude to Scientific Inquiry, Enjoyment of Science Lessons,* Grades and SAT-9 scores) when other environmental scales were mutually controlled. The analysis revealed that 4 out of 24 regression coefficients were statistically significant, which is three times expected by chance. *Equity* uniquely accounted for a significant amount of variance in *Attitude to Scientific Inquiry.* For student *Enjoyment of Science Lessons,* the final grade and SAT-9 scores, *Task Orientation* was a significant independent predictor.

As with the student version, outcome-environment associations were generally positive, but the relationships were relatively weak. Associations were found between student outcomes (attitudes and achievement) and the parent perceptions of the learning environment (especially Task Orientation) as suggested by the multiple regression analyses.

Interview Responses

Overall the interviews with parents and students helped to support and elaborate the results from the questionnaires. Interviews were held with 10 selected parents and their children. During interviews, parents and students were asked to describe the actual learning environment and their preferred learning environment. Additionally, the 10 students interviewed were observed in their classrooms. Table 6 provides selected student and parent comments for each dimension of the WIHIC.

Table 6 Student and Parent Comments about the Learning Environment

WIHIC Scale	Parent Comments	Student Comments
Student Cohesiveness	It is always good to have friends in class. You are more relaxed. I think it helps because you want to be good or 'up here' with the level [of the class] proving that you are in the same class.	We have to get along in the group, but not too much. So, if we get along and work together as a team, we will get the work done.
Teacher Support	The relationship between the student and teacher is number one. If my son has a good relationship with his teacher, he will learn.	The teacher doesn't have to walk around the whole class. She has the whole class to deal with. If the teacher stays at the front, we can raise our hands.
Involvement	Eighty-five percent of students are saying to themselves "I hope that the teacher doesn't call on me." It would seem germane to take this 85 percent kicking and screaming into the enclosure and get them involved anyway.	I don't explain my thoughts about science to other students because they might think it's silly.
Task Orientation	The most important area in the achievement of my child is outside the teacher's control. Does the child have the capacity and desire? The teacher has 30 to 40 students. It is intrinsic to the child as to whether they do well or not.	I know that I am supposed to take out my notebook and write down notes when my teacher writes on the board.
Equity	Because kid's hearts are pure, they can really tell if someone is caring. So I think it [Equity] is very important, because they work harder if they feel that way. It helps them to want to learn more.	The teacher always makes me answer the questions and that isn't fair to the other students. She doesn't pay attention to some students like the LDs [Learning Disabled Students].
Investigation	I don't know how many hands-on things they do, especially in these rooms. We used to put the plants by the windows so the sun would come in and let them grow. And in the portables, some portables have no windows at all.	A lot of people like science because of the experiments, and I especially like the experiments. I think people wouldn't like science that much if there weren't hands-on experiments.

Conclusion

This paper describes a study involving the validation and use of a questionnaire for assessing students' and their parents' perceptions of classroom learning environment. We report the analyses and results of the quantitative and qualitative probes used in this study. Data were collected using two student versions (actual and preferred) and two parent versions (actual and preferred) of the *What is Happening in This Class?* (WIHIC) questionnaire. We investigated the factor structure, validity and reliability of the WIHIC for the student and parent samples. The similarities and differences between students and parents in their preferred classroom environment and in their perceptions of the same actual classroom environment were analysed. And, finally, possible associations between parents' perceptions of their children's learning environment and students' perceptions of the learning environment and outcomes (achievement and attitude in science) were analysed. Overall, the findings reported in this paper are as follows:

Finding 1: The six-scale version of the actual form of the WIHIC has satisfactory factorial validity for the student sample.

Finding 2: Factor analysis supports a five-scale structure (with *Student Cohesiveness* and *Equity* forming a single factor) rather than the six-scale structure for the actual form of the WIHIC for the parent sample. Replication with a larger sample is desirable.

Finding 3: The WIHIC demonstrates satisfactory reliability and discriminant validity for two units of analysis (student and class mean) for students and parents, and can differentiate between the perceptions of students in different classes and between perceptions of parents whose children are in different classes.

Finding 4: Students and parents generally prefer a more favourable learning environment in the science classrooms than what they perceive as actually present. However, parents' effect sizes are notably larger than the corresponding students' effect sizes.

Finding 5: Parents perceive a somewhat less favourable actual science classroom environment than students, but parents prefer a much more favourable science classroom environment than students.

Finding 6: Positive but relatively weak relationships exist between student outcomes (especially attitudes) and student and parent perceptions of the learning environment (especially Task Orientation and Investigation). Overall the strength of outcomes-environment associations is similar for students and parents.

This research is significant because it paves the way to extend traditions of classroom environment research involving students' perceptions also to involve the perceptions of their parents. An economical and widely-applicable questionnaire for assessing elementary school students' and their parents' perceptions of actual and preferred classroom learning

environment was developed, validated and used. The relationship between parents' perceptions of the learning environment and their children's outcomes show that parents prefer a much more favourable science classroom than their children do. Parents and children both prefer a more favourable learning environment than what they perceive as actually being present. And parents and children perceive the actual science classroom somewhat similarly. Relationships were found between outcomes (especially attitudes) and perceptions (especially Task Orientation) for students and parents. These associations were relatively weak and suggest the need to replicate this study with a larger sample.

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Factor Loadings for the WIHIC Items (Actual Form) for Students

Item No.	Factor Loading					
	Student Cohesiveness	Teacher Support	Involvement	Task Orientation	Equity	Investigation
1	.56					
2	.61					
3	-					
4	.64					
7	.42					
8	.37					
9		.53				
10		.72				
11		.51				
12		.46				
13		.65				
14		.41				
15		.32				
16			.42			
17			-			
18			.31			
19			.49			
20			.64			
21			.53			
22				.44		
23				.64		
24				.52		
25				.66		
26	.34			.39		
27				.33		
28					.51	
29					.61	
30					.49	
31					.67	
32					.64	
33					.63	
34						.56
35						.71
36						.78
37						.72
38						.75
39						.53
%Variance	4.06	8.02	3.51	4.66	5.37	23.83
Eigenvalue	1.5	3.0	1.3	1.7	2.0	8.8

Factor loadings smaller than 0.30 have been omitted.
The sample consisted of 520 students in 22 classes in South Florida.

Factor Loadings for the WIHIC Items (Actual Form) for Parents

Item No.	Factor Loading: Student Cohesiveness	Teacher Support	Involvement	Task Orientation	Equity	Investigation
1	.75					
2	.74					
3	.46					
4	.63					
7	.48					
8	.48					
9		.75				
10		.60				
11		.69				
12		.55				
13		.60				
14		.48				
15		.45				
16		-	.45			
17		.44	-			
18			.41			
19			.71			
20			.62			
21			.46			
22				.55		
23				.58		
24				.64		
25				.63		
26				.49		
27				.56		
28	.67				-	
29	.74				-	
30	.60				-	
31	.82				-	
32	.74				-	
33	.62				-	
34						.50
35						.50
36						.75
37						.79
38						.76
39						.66
%Variance	7.06	29.88	4.13	5.00		8.14
Eigenvalue	2.6	11.1	1.5	1.8		3.0

Factor loadings smaller than 0.40 have been omitted.
The sample consisted of 120 parents of students in 6 classes in South Florida.

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