Zimbabwean Science Students' Perceptions of Their Classroom Learning Environments and Attitude Towards Science

Mandina Shadreck

Department of Educational Foundations, Management and Curriculum Studies
Midlands State University P Bag 9055 Gweru, Zimbabwe
Email: mandinas@msu.ac.zw, mandinashadreck@yahoo.com, phone: 263 54 260464

Doi:10.5901/mjss.2012.v3n11p415

Abstract: *The purpose of the present study was to examine Zimbabwean junior secondary school students' perceptions of their classroom environment in science and to investigate relationships between these perceptions and students' attitudes toward science. The study also aimed to investigate differences in students' attitudes toward science by gender, school location. Data were collected from 1728 Zimbabwean junior secondary school science students in 10 Kwekwe district schools. Data were collected with an adapted and modified version of the "What is Happening in This Classroom" (WIHIC) instrument and the "Test of Science Related Attitudes" (TOSRA). The study confirmed that the Zimbabwean version of the modified WIHIC is a valid and reliable instrument for measuring the classroom learning environment in the Zimbabwean educational context. Significant differences between students' perceptions of the actual and preferred learning environment were shown to exist with students tending to prefer a more favorable classroom learning environment than the one which they actually are experiencing. Female students generally hold more positive perceptions of the learning environments than their male counterparts. The findings also revealed that student' perceptions of the classroom learning environment depending on the schools' locality, with students in rural schools holding less favorable perceptions than students in urban schools for all seven WIHIC scales. Correlation and regression analyses revealed that students' perceptions of their learning environment in science were significantly associated with their attitudes.*

Key words: *Learning environment; Science classroom; Student perceptions; Attitude towards science*

1. Introduction

The classroom environment has a powerful influence on learning, and children's perceptions of that environment influence their behavior. The classroom environment is thus an important determinant of student learning in an educational system (Fraser, 1998a). Students learn better when they perceive the classroom environment more positively, thus the study of classroom environment has become a concern to educators, researchers, administrators of the school system and parents. Numerous researches on classroom environment or climates have been conducted years ago and have provided a lot of valuable information for educators and researchers on students' perceptions of classroom environment (Fraser, 1998a, 1998b; Dorman, 2003; den Brok et al., 2006; Wahyudi and Treagust, 2004; Rickards et al., 2003).

Research studies in maths, physics, chemistry, and biology education have shown that student perceptions of the classroom environment account for appreciable amounts of variance in learning outcomes, often beyond that attributable to background student characteristics. Moreover, students' perceptions of their teachers' behavior do act as one set of important mediators between the actual behaviors of teachers and the actual performance of learning activities by each student (Jennings and Greenberg, 2009; Den Brok, 2001; Shuell, 1996). That is, students will only react upon those teacher behaviors that they observe and will interpret (perceive) these behaviors each in their personal idiosyncratic ways (Shuell, 1996; Stahl, 1987). Thus, in order to stimulate and optimize student learning and the environment in which they learn, knowledge of students' perceptions of this environment and the factors that influence these perceptions is crucial for both teachers and educational researchers.

Research studies on classroom learning environments have employed a number of salient and robust instruments that have been validated and cross-validated (Fraser, 1998a, 1998b). This educational area has attracted researchers from non-Western countries, such as Brunei (Khine and Fisher, 2003; Majeed et al., 2002), Korea (Kim, Fisher & Fraser, 2000;), Taiwan (Aldridge, Fraser & Huang, 1999), Nigeria (Idiris & Fraser, 1997), Papua New Guinea (Raj, 1998), Singapore (Wong & Fraser, 1996), India (Koul and Fisher, 2003), Indonesia (Wahyudi and Treagust, 2004) and Turkey

(Carkiroglu et al., 2007; Telli et al., 2009; den Brok et al., 2010). Thus, there has been an acceptance of the learning environment as a significant variable in predicting the success of educational practice. It seems that the evaluation of learning environment is as important as evaluating students' other performances and outcomes.

Fraser, Fisher, and McRobbie (1996) developed a learning environment instrument called the What Is Happening In This Class? (WIHIC) questionnaire. This questionnaire has been used by many researchers from different countries to collect data about the classroom environment. It has been validated in Australia (Rawnsley, and Fisher, 1998) and Taiwan (Aldridge, Fraser, & Huang, 1999), Singapore (Wong and Fraser, 1996), Korea (Kim, Fisher, and Fraser, 2000), Indonesia (Fraser, and Aldridge, 2002) and validated cross-nationally (Dorman, 2003). Because of its cross-cultural validity, the WIHIC was selected as one of the questionnaires for this study in Zimbabwe.

Research in this area in Western countries and in some developing countries has grown rapidly, but such research is scarce in Zimbabwe. Over the years, there have been no studies in Zimbabwe devoted to learning environment issues. A review of studies conducted by Irianto & Treagust, 2001; Margianti & Fraser, 2000; Margianti, Fraser & Aldridge, 2002; Soerjaningsih, Fraser & Aldridge, 2001) confirms that the classroom learning environment can be a determinant of school achievement and should be taken into account. Accordingly, this study was conducted to provide insights into the nature of science classroom learning environments in rural and urban lower secondary schools in the Zimbabwean educational context.

The domain of learning environments research is a new born research field in Zimbabwe. This study is the first in its kind to connect the WIHIC to student attitudes in Zimbabwe and thereby adds significantly to this field in the region. Moreover, the study adds to the existing knowledge base on WIHIC-related studies by investigating effects on student attitudes conjointly with other possible relevant background variables, something that has not been attempted before. The outcomes of this study might be a base for improvement and evaluation of teaching and science classrooms in Zimbabwe. This study also significantly adds to the cross-national validity of the learning environment instruments used, consequently revealing more insight in the cultural variation that may exist in learning environments across the world, an area of current and future interest to the learning environments domain.

2. Theoretical Framework

The What Is Happening In this Class (WIHIC) Questionnaire

Developed by Fraser, Fisher, and McRobbie (1996), the WIHIC measures high school students' perceptions of their classroom environment. The WIHIC questionnaire brings parsimony to the field of learning environment by combining modified versions of the most salient scales from a wide range of existing questionnaires with additional scales that accommodate contemporary educational concerns (e.g., equity and cooperation, Fraser, (1998). Based on the previous studies, Fraser, Fisher and Mc Robbie (1996) developed this new learning environment instrument. The What is Happening In This Class? (WIHIC) consists of 7 scales and 56 items (Fraser, Fisher, & Mc Robbie, 1996) The seven scales are Student Cohesiveness, Teacher Support, Involvement, Investigation, Task Orientation, Cooperation and Equity. Table 1 shows the scales in the WIHIC, along with a brief description and a sample item from each scale in the questionnaire.

Table 1:Scale Description for each Scale and Example of Items in the What Is Happening In This Class? (WIHIC) Questionnaire

Scale	Description	Item
Student Cohesiveness [SC]	Extent to which students know, help and are supportive of one another.	I make friendship among students in this class
Teacher Support [TS]	Extent to which teacher helps, befriends, trusts, and shows interest in students.	The teacher takes a personal interest in me.
Involvement [IV]	Extents to which students have attentive interest, participate in discussions, perform additional work and enjoy the class.	I discuss ideas in class.

Investigation [IN]	Extent to which there is emphasis on the skills and their use in problem solving investigation.	I am asked to think about the evidence for statements.
Task Orientation [TO]	Extent to which it is important to complete activities planned and to stay on the subject matter.	Getting a certain amount of work done is important.
Cooperation [CO]	Extent to which students cooperate rather than compete with one another on learning tasks.	I cooperate with other students when doing assignment work.
Equity [EQ]	Extent to which the teacher treats students equally.	The teacher gives as much attention to my questions as to other students' questions.

The WIHIC questionnaire has been used to measure the psychosocial aspects of the classroom learning environment in various contexts since its development. In certain cases, the questionnaire has been adapted without any modifications, while as in other cases modifications were made to suit the specific context. Until now, the original questionnaire in English has been translated into Chinese for use in Taiwan (Aldridge & Fraser, 1997) and Singapore (Chionh & Fraser, 1998) and Korean for use in Korea (Kim, Fisher, & Fraser, 2000).

A study by Rawnsley and Fisher (1998) investigated associations between learning environments in mathematics classrooms and students' attitudes towards that subject in Australia using the WIHIC questionnaire. It was found that students developed more positive attitudes towards their mathematics in classes where the teacher was perceived to be highly supportive, equitable, and in which the teacher involved them in investigations.

Chionh & Fraser, (1998) investigated associations between actual classroom environment and outcomes were using actual and preferred forms of the WIHIC. The associations between five different outcome measures, namely, examination results, self-esteem, and three attitude scales and the seven actual classroom environment scales were investigated in geography and mathematics classrooms in Singapore and Australia. The study revealed that better examination scores were found in geography and mathematics classrooms where students perceived the environment as more cohesive. It was also found that self-esteem and attitudes were more favorable in classrooms perceived as having more teacher support, task orientation, and equity.

Gender-related differences in students' perceptions of their learning environment and teacher behavior were explored by Kim, Fisher, and Fraser (2000). The study involved 543 eighth-grade students in 12 different secondary schools in metropolitan and rural areas of Korea. Statistically signficant di fferences were found between boys and girls on all seven scales. It was reported that boys perceived more Teacher Support, Involvement, Investigation, Task Orientation, and Equity than did girls.

A study by Wahyudi (2004) found association between students' outcomes and the status of classroom learning environments. Both simple analysis and multiple regression analysis procedures showed that all scales of the Indonesian WIHIC were statistically significantly positively associated with two scales of the Indonesian adapted TOSRA and students' cognitive scores. Hoffner-Moss and Fraser (2002) reported that attitudes are particularly favorable in investigative, task oriented and equitable classes in their study with 364 biology students in 18 classes. They also revealed that all students in the study perceived relatively high level of Task orientation.

Fraser and Aldridge (1999) used English and Chinese versions of WIHIC in Australia and Taiwan, respectively, to explore the potential of cross-cultural studies. Results of the study indicated that students in Australia consistently perceived their classroom environment more positively than students in Taiwan. Significant differences were detected on the WIHIC scales of Involvement, Investigation, Task Orientation, Cooperation and Equity. This indicated that students in Australia perceived they are given more opportunity to get involved in the experiments and investigate scientific phenomena. In this study, cultural differences were highlighted. Education in Taiwan is examination based and teaching styles are adopted to suit the particular situation. In Taiwan, having good content knowledge of the subject was the yardstick for being a good teacher, while as in Australia having good interpersonal relationships between students and teachers is considered the most important factor in education process. Taiwan classrooms are teacher centered giving very little opportunity to students to discuss issues.

Aldridge et al. (2004) compared students' perceptions on the WIHIC between South Africa and Australia. Their study showed that students in South Africa perceived a greater degree of investigation opportunities in their science classrooms than Australian students, while students perceived less cooperation and equity in South Africa than students in Australia.

Rickards, den Brok, Bull, and Fisher (2003), validated the WIHIC in California classrooms. Their results showed correlations between the scales of the WIHIC in the range of 0.20 to 0.81 indicating that the scales measured distinct, yet

somewhat overlapping variables. Their results also proved the reliability of the WIHIC yielding alpha reliability coefficients between 0.78 and 0.96 at the class level. In discussing the results, Rickards et al.(2003) reported that male students have a more favorable perception of the science learning environment than female students. Ethnic make-up variables and class size also displayed positive effects. There was a positive association between the number of ethnic groups in the classroom and their perception of student cohesion. There also appeared to be a positive correlation between class size and investigation as measured by the WIHIC. The larger classes tended to score higher in the investigation dimension. This might be related to the idea that teachers have less time to spend with individual students in larger classes and thus students are left to discover things on their own.

Cakiroglu et al. (2007), investigated grade eight students' perceptions of their science learning environment (WIHIC), of teachers' interpersonal behaviour (QTI) and their subject- related attitudes (TOSRA). The findings indicated a positive relationship between students' perceptions of their science teachers' interpersonal behaviours and perceptions of the learning environment and their affective outcomes. Some WIHIC scales correlated particularly strong with attitudinal outcomes: Teacher Support, Investigation, Equity, and Task orientation. It was also demonstrated that, in general, Turkish students perceive their classes as highly task oriented and cooperative, moderately cohesive, teacher supportive, and equitable. With respect to gender differences, all dimensions of the WIHIC attained statistical significance, that is, girls viewed their learning environment in a more positive way than did boys.

The above studies support the validity and reliability of WIHIC in portraying the nature of science classroom environments. These studies also have consistently demonstrated that the WIHIC can be used to gather information from students for improving teaching and learning in different classroom contexts. Thus, with such a wide use and applicability of the WIHIC, its applicability was validated in Zimbabwe to get an insight into its use as well as insight into the Zimbabwean classroom learning environment.

3. Aim of the Study

The aim of this study was to investigate the nature of science classroom learning environments in schools in Kwekwe District, Zimbabwe. The study was designed to answer the following research questions:

1. Can the What Is Happening in this Class (WIHIC) questionnaire be used in a valid and reliable manner with Form 2 science students in Kwekwe, Zimbabwe?
2. What are students' perceptions of their science classroom learning environment?
3. Are there differences between male and female students' perceptions of their science classroom learning environment?
4. Are there differences between rural and urban students' perceptions of their science classroom learning environment?
5. Are there differences between teachers' and students' perceptions of their science classroom learning environment?
6. What is the association between students' perception of their learning environment and their attitude towards science

4. Methodology

4.1 Research Design

The study employed the descriptive survey method. This method focused on systematic description or exposure of the salient aspects of a situation with a focus on the patterns that emerge. The study was analytic (qualitative) in that the researchers focused on the relationships between variables and further interpreted the relationships. The survey design was preferred because it is the most appropriate design where self-reported beliefs and opinions of participants are sought (David and Sutton 2004).

4.2 The sample

A multistage sampling or cluster sampling method (Haber, 1994) was employed that initially categorized schools in the district into rural and urban. Five urban and five rural schools were then randomly selected and learners in Form 2 (Zimbabwe Junior Certificate,(ZJC) classes at each school automatically became participants in the study. Thus the sample consisted of 1728 learners (880 boys and 848 girls) in 42 classes and their science teachers (40) in 10 junior secondary schools in urban, and rural areas of Kwekwe district, Zimbabwe.

4.3 Research Instrumentation and validation

To assess students' perceptions of their learning environment, the WIHIC was administered to all students of participating classes and schools. The WIHIC contains 56 items that are answered on a 5-point Likert-type scale. The items refer to seven scales. For each scale, Table 2 presents a typical item. Prior to the main data collection, a pilot study that involved 245 Form 1 students and their teachers was conducted to ensure suitability and readability of the questionnaire. Based on the pilot study results, modifications were made. After this, the instrument was distributed among the classes and students involved in the present study. The final modified form of instrument was constructed with a five-point Likert-type response scale with the following alternatives: (1)Almost Never, (2) Seldom, (3) Often, (4) Usually, (5) Almost Always. To ensure that scales had been measured reliably, a Cronbach's alpha reliability coefficient at the student and class (aggregated) levels was computed (see Table 3). An intra class coefficient was also computed to see the degree to which the scales managed to differentiate between classes (den Brok et al., 2006). The consistency of each of the WIHIC scales was determined by computing Multi level lambda based on both the reliability and intra-class correlation coefficients and represents the degree to which the instrument is capable of measuring consistently across classes (Snijders and Bosker,1999).

Table 2. Typical items for the WIHIC scales

Scale	Typical item
Student Cohesiveness	I work well with other class members.
Teacher Support.	The teacher helps me when I have trouble with the work
Involvement	I give my opinion during class discussions
Investigation.	I find out answers to questions by doing investigations
Task Orientation	I know how much work I have to do.
Cooperation	When I work in groups in this class, there is teamwork.
Equity	I am treated the same as other students in this class.

4.4 Data Collection

The data about the classroom learning environment in this study was collected mainly through the administration of the WIHIC questionnaire . In addition, observations of some classrooms and interviews with both teachers and students were conducted as a way of triangulating the data in order to portray a more accurate picture of the learning environment. The classroom observations mainly focused on the aspects that corresponded to items of the scales in the instruments, while the semi-structured interviews aimed to scrutinize those related aspects.

All students responded to the Test of Science Related Attitudes (TOSRA) questionnaire an already existing attitude scale measuring students' attitudes towards their science classrooms. The scale comprises eight items measuring the extent to which students enjoy, are interested in and look forward to science lessons. The attitude scale is based on the Test of Science Related Attitudes (TOSRA), developed by Fraser earlier.

5. Results and Discussion

5.1 Reliability and Validity of the WIHIC

Since this study was the first to use the WIHIC on a Zimbabwean secondary school sample, several analyses were done to investigate the quality of the outcomes. First, an examination of whether scales had been measured reliably was conducted by computing a Cronbach's alpha reliability coefficient at the student and class (aggregated) levels. The findings of these analyses are given in Table 3.

Table 3. WIHIC scales, sample item, reliability (Cronbach's Alpha), Ability to differentiate between classes (ANOVA results). And consistency (Lambda).

Scale	Alpha(student)	Alpha(class)	Anova Eta^2	Lambda
Student Cohesiveness	0.80	0.83	0.12	0.36
Teacher Support	0.88	0.91	0.14	0.82
Involvement	0.89	0.93	0.11	0.55
Investigation	0.87	0.89	0.12	0.54
Task Orientation	0.85	0.92	0.10	0.35
Cooperation	0.89	0.89	0.09	0.65
Equity	0.87	0.93	0.14	0.79

As can be seen in table 3, the pilot study generally revealed that the questionnaire has good reliability and discrimant validity. The scale reliability (Cronbach's alpha) for different WIHIC scales ranged from 0.80 to 0.89 in this Zimbabwean sample. The highest alpha reliability (0.89) was obtained for the involvement and cooperation scales and the lowest (0.80) for the scale Student Cohesiveness. The results being consistently above 0.50 suggests that the WIHIC can be considered to be a reliable tool (de Vellis,1991) for use with Zimbabwean students. The values were even higher for the preferred form suggesting the trustworthiness of the Zimbabwean version of modified WIHIC questionnaire in measuring this group of students' perceptions of their science classroom learning environment. The values of the *Eta*^{2} statistic ranged from 0.09 to 0.16 and was statistically significant for each scale. This indicates that each scale of the WIHIC is capable of differentiating significantly between classes ($p = 0.01$). Overall the reliability, discriminant validity and ANOVA results confirmed that the WIHIC could be used with confidence for further research.

The WIHIC scale intercorrelations : the mean correlation of a scale with the other scales, which measures each scale's discriminant validity, are displayed in table 4. As can be seen, all scales are positively related, meaning that if students have higher perceptions of one element of their learning environment, they also tend to see more of the other elements of the learning environment. This indicates that each scale measures a reasonably distinct aspect of the classroom learning environment, although with a degree of overlap with other scales. Nevertheless, correlations rarely exceed 0.50, and the average scale correlation between one WIHIC scale and the other scales ranges between 0.39 (Student Cohesiveness) and 0.44 (Involvement).

Table 4: WIHIC scales correlations and average correlation.

	Cohes	Support	Involvm	Investig	Task ori	Cooper	Average Corrrelation
Cohes							0.39
Suppo	0.41						0.41
Involvm	0.44	0.44					0.44
Investig	0.33	0.40	0.49				0.41
Task ori	0.32	0.37	0.39	0.52			0.40
Cooper	0.52	0.35	0.47	0.41	0.39		0.43
Equity	0.30	0.46	0.45	0.39	0.49	0.42	0.43

Note: all correlations were significant at p=0.01 ; N= 1728 in 42 classes. Cohes=Student Cohesiveness; suppo=Teacher Support, involvm=Involvement; investig=Investigation; task ori=Task Orientation; cooper =Cooperation; equity =Equity.

5.2 Student perceptions of their learning environment

To investigate the nature of student perceptions of the science classroom learning environment, the average item mean (the scale mean divided by the number of items in that scale) and average item standard deviation of each scale for both actual and preferred forms of each WIHIC scale were calculated. A t-test for paired samples was performed for each scale to check the statistical significance of differences between students' actual and preferred perceptions of their learning environment. The results are shown in table 5.

Table 5: Average Item Mean, Standard Deviation and t-Test for Paired Samples

Scale	Average Item mean		Average item Standard deviation		*t*
	Actual	Prefered	Actual	Prefered	
Student Cohesiveness	3.80	4.62	0.48	0.42	58.12
Teacher support	2.86	4.18	0.65	0.61	67.77
Involvement	2.65	2.65	0.62	0.62	0.00
Investigation	2.54	3.48	0.71	0.75	63.10
Task Orientation	3.79	4.60	0.52	0.48	59.50
Cooperation	3.30	4.05	0.62	0.64	44.05
Equity	3.65	4.50	0.75	0.59	44.28

The results from t-tests for paired samples show that there are significant differences ($p < 0.01$) between students' perceptions of their actual and preferred learning environment on all scales except Involvement. The results, are consistent with previous studies (Fisher & Fraser, 1983; Wahyudi and Treagust, 2004), and suggest that most students would prefer a learning environment which is characterized by more Student Cohesiveness, Teacher Support, Task Orientation, Investigation, Cooperation and Equity. The same perception by the students on the involvement scale does indicate that students have classrooms in which they experience activities associated with involvement with a frequency between 'seldom' and 'usually'. The students are thus happy within the classroom atmosphere that allows them to be passive. This finding is consistent with Wahyudi and Treagust, (2004) Thair and Treagust (1997), who found out that the teacher in the Indonesian classroom has absolute authority and gives students little chance to participate.

5.3 Student perceptions of their learning environment based on gender

This study also explored the differences in perceptions of male and female students on the science classroom learning environment. A paired sample t-test was conducted for each scale using the within-class gender mean as the unit of analysis. Since the number of male and female students was not equal, the data were organized into 84 within-class means (42 male means and 42 female means). These pairs of data then were matched for analysis. The results are shown in Table 6.

Table 6: Female and male Students' perceptions of Classroom Learning Environment using WIHIC and Within –Class Gender Subgroup Mean as unit of Analysis

Scale	Average Item mean		Average item Standard deviation		*t-value*
	Male	Female	Male	Female	
Student Cohesiveness	4.15	4.25	0.49	0.46	2.4
Teacher support	3.54	3.50	0.75	0.79	- 0.85
Involvement	3.45	3.40	0.72	0.74	- 1.9
Investigation	3.49	3.43	0.65	0.72	- 2.01
Task Orientation	4.15	4.35	0.48	0.60	5.15
Cooperation	3.79	4.12	0.69	0.64	4.15
Equity	3.85	4.20	0.65	0.69	5.28

Female n = 848 ; Male n = 880 ; $p<0.01$

The results of this study are consistent with those from previous research (Goh & Fraser, 1995; Riah, 1998; Wahyudi and Treagust, 2004; Koul and Fisher, 2006) in which females hold more positive perceptions of the classroom learning environment than do males as indicated by significant statistical differences in the scales for Cohesiveness, Task Orientation, Cooperation and Equity whose magnitude are relatively large in favor of female students. Furthermore, gender has been found to be a significant factor that differentiates students' perceptions of learning environments. For example, according to Mok (2002), female students had both higher developmental expectations of their schools and more positive perceptions of the classroom atmosphere. Thus it can be inferred that girls on the whole have more positive perceptions of their science classes than did boys. Girls seem to perceive their science teacher as more cohesive, task oriented, cooperative and giving them equal opportunity in the class while the boys perceived for more of teacher support, involvement and investigation activities in the science classroom.

5.4 Student perceptions of their learning environment based on school location

In order to explore differences between students' perceptions of actual learning environment based on school location (urban, rural), a one-way between-groups ANOVA with post-hoc comparisons was carried out for each WIHIC scale. Table 7 shows the scale means and F value for the scales of the WIHIC with the perceptions of the students from the two main localities(rural and urban). The purpose of this analysis was to establish whether there are significant differences in the perceptions of students about their classroom-learning environment according to their school localities.

Table 7 : Item Mean for School locality Differences in Students Perceptions of Classroom Learning Environment as Measured by the WIHIC Scales

Scale	Average Item mean		*F-value*
	Rural	Urban	
Student Cohesiveness	3.65	3.88	7.84
Teacher support	2.59	2.90	3.92
Involvement	2.50	2.56	2.89
Investigation	2.42	2.54	2.97
Task Orientation	3.60	3.85	5.75
Cooperation	3.0	3.48	3.98
Equity	3.47	3.55	3.05

Statistical analysis indicated that student perceptions on all the seven scales of the WIHIC had statistically significant differences according to the location of the schools students belonged to. The Tukey's post hoc test ($p<0.05$) revealed that, the students coming from the urban schools had significantly higher means in all the seven scales. Students in rural schools held less favorable perceptions than did students in urban schools for all seven scales. The findings are consistent with findings from classroom observations. In most cases, classroom transactions in rural schools were more dominated by teacher-centered methods and had less investigation or laboratory activities. Most of the time, in rural schools students copied notes from the blackboard before the teacher explained them. Consequently, students in rural schools did not have a chance to develop a better learning environment. Interviews conducted with science teachers also confirmed this assertion. The teachers noted that most rural schools are deprived and lack resources, facilities and teachers. It was also observed that the majority of these rural schools do not have financial resources to purchase chemicals and consumables to conduct practical investigations moreover the laboratories in most rural schools are not adequately equipped. This, thus results in a relatively poor teaching performance in science. Milkie and Warner (2011) have also noted that students in a negative learning environment such as classrooms with fewer material resources have more learning, externalizing, interpersonal, and internalizing problems.

5.5 Differences Between Students'and Teachers' in Their Perceptions of Classroom Environment

To explore the differences between students and teachers' perceptions of science classroom learning environment, class means of students' scores and the individual scores of teachers were calculated as the units of analysis. The average item means and average standard deviations of each scale for the actual forms of the WIHIC are reported in table 8. The differences between students' and teachers' perceptions were investigated using t-tests for paired samples.

Table 8: Average Item Mean, Average Item Standard Deviation and Difference Between Students' and Teachers' Perceptions (Effect Size and t-Test for Independent Samples) on WIHIC Scales

Scale	Average Item mean		Average item Standard deviation		*t-value*
	Student	Teacher	Student	Teacher	
Student Cohesiveness	4.60	4.72	0.19	0.28	-2.84
Teacher support	4.20	4.56	0.16	0.32	- 5.65
Involvement	2.70	3.58	0.24	0.48	- 4.88
Investigation	3.82	4.35	0.28	0.40	- 2.38

Task Orientation	4.60	4.81	0.20	0.31	0.08
Cooperation	4.05	4.62	0.39	0.20	-2.59
Equity	4.50	4.78	0.21	0.35	-3.48

Sample size 40 teachers and 72 student means ; $p<0.01$

The results do indicate that teachers hold more favorable views of the actual classroom learning environments than do their students, with the exceptions of Task Orientation for which students' and teachers' views are in agreement. The findings are consistent previous research (Fisher & Fraser, 1983; Wahyudi and Treagust, 2004) in that teachers' views of science classroom learning environments are more positive than those of their students.

5.6 Associations between learning environment and attitude towards science

To investigate the associations between science classroom environments and individual students' attitudes towards science, simple and multiple correlation analyses were computed between the TOSRA scales and the WIHIC scales. The results are shown in table 9.

Table 9: Associations between WIHIC Scales and Attitudes Towards Science Lessons in Terms of Simple Correlations (r), Multiple Correlation (R) and Standardized Regression Coefficient (b)

Scale	Attitude towards Science	
	r	β
Student Cohesiveness	0.19	-0.05
Teacher support	0.25	0.06
Involvement	0.27	0.02
Investigation	0.29	0.18
Task Orientation	0.40	0.30
Cooperation	0.25	0.00
Equity R – 0.47 R^2 – 23%	0.35	0.20

The results of the simple correlation analysis indicate that all the seven scales were significantly correlated with attitude to science classroom environment ($p<0.01$). It was found that these associations were positively correlated ranging from 0.19 to 0.40 suggesting a positive effect of perceptions of the learning environment on attitudes towards the subject. The multiple correlation, R, computed was 0.47 and is statistically significant ($p<0.01$) an indication that strongly supports the conclusion that the nature of the classroom environment is strongly influencing students' attitudes towards science lessons. To further confirm this relationship, the standardized regression coefficient (β) was computed and examined. Only three scales (Investigation, Task Orientation and Equity) out of the seven retained their significance ($p<0.01$) an indication that these scales are independent predictors of individual students' attitude towards science lessons. The R^2 value, which indicates the proportion of variance in attitude towards science lessons that can be attributed to students' perception of classroom environments was 23%. The results are consistent with previous findings (Koul and Fisher, 2003; Telli et al., 2006) in that there is a strong link between student attitudes and their perceptions of the learning environment.

6. Conclusion

This study provided insights into the science classroom environment in junior secondary school classes in Kwekwe district of Zimbabwe. This study is a pioneering study for Zimbabwe in the domain of learning environments research in some respect. Based on the findings, the Zimbabwean version of the modified WIHIC was reliable and valid for measuring the classroom learning environment junior secondary science classrooms in Zimbabwe. It has shown that the WIHIC is a valid a reliable instrument for use in the Zimbabwean secondary education context and is also capable of differentiating between the perceptions of students in different classes, groups and locations.

The study also revealed that students were dissatisfied with the actual learning environment as indicated in their preferred perceptions of what kind of learning environment should be created by the teacher. The Students would prefer

a learning environment which is characterized by more Student Cohesiveness, Teacher Support, Task Orientation, Investigation, Cooperation and Equity. Consequently science educationists, teachers and policy makers need to take note of this information and then use it to enhance, improve and foster their service to students.

Furthermore the study has also shown that females hold more positive perceptions of the classroom learning environment than do males as indicated by significant statistical differences in the scales for Cohesiveness, Task Orientation, Cooperation and Equity whose magnitude are relatively large in favor of female students. in urban and suburban schools. Students in rural schools have been found to experience a less positive learning environment than did their counterparts in urban areas due to inadequate resource materials and facilities and shortage of qualified teachers. Therefore the Ministry of Education should consider what can be done to provide a better education, especially with respect to the classroom learning environment, in those schools.

Finally, teachers were found to hold more favorable views of the actual classroom learning environment than do their students, with the exceptions of Task Orientation for which students' and teachers' views are in agreement. The results of the simple correlation analysis indicate that all the seven scales were significantly correlated with attitude to science classroom environment. It was found that these associations were positively correlated suggesting a positive effect of perceptions of the learning environment on attitudes towards the subject supporting the notion that the nature of the classroom environment strongly influences students' attitudes towards science lessons.

References

Aldridge, J.M., & Fraser, B.J. (2000). A cross-national study of classroom environments in Taiwan and Australia. *Learning Environments Research: An International Journal,* 3, 101-134.

Aldridge, J. M., & Fraser, B. J. (1997, August). Examining science classroom environments in a cross-national study. Paper presented at 12th WAIER Research Forum for the Weatern Australian Institute for Educational Research, Perth, Australia.

Aldridge, J. M., Fraser, B. J. & Huang, T. (1999). Investigating classroom environments in Taiwan and Australia with multiple research methods. *Journal of Educational Research*, 93, 48-57.

Aldridge, J., Laugksch, R. C., & Fraser, B. J.(2004, April). A cross-national study of the learning environments of Science classrooms in South Africa and Australia. Paper presented at the annual meeting of the American Educational Research Association, San Diego.

Cakiroglu, J., Tekkaya, C., & Rakici, N. (2007). Learning environments, teacher interpersonal behavior, and students' attitudinal outcomes in science classrooms: A Turkish context. In Mutua, K. & Sunal, C. S. (Eds.), The enterprise of education research on education in Africa, the Caribbean and the Middle East (pp. 291-311). Charlotte, NC: Information Age Press..

Chionh, Y. H. & Fraser, B. J. (1998). Validation and use of the "What is Happening In This Class" Questionnaire in Singapore. Paper presented at Annual Meeting of the American Educational Research Association, San Diego.

David, M., and Sutton, C. D. (*2004*) "*Social Research: The Basics*" London: Sage

de Vellis, R. F. (1991). *Scale development: Theory and application*. Newbury park: Sage Publications.

den Brok, P., Telli, S., Cakiroglu, J., Taconis, R., and Tekkaya, C.(2010). Learning environment profiles of Turkish secondary biology classrooms. *Learning Environvionment Research* 13:187–204. DOI 10.1007/s10984-010-9076-5

den Brok, P., Fisher, D. L., Rickards, T., & Bull, E (2006). Californian science students' perceptions of their classroom learning environments. *Educational Research and Evaluation*, 12 (1), 3-25

Den Brok, P. (2001). *Teaching and student outcomes*. Utrecht, The Netherlands: W.C.C.

Dorman, J. P. (2003). Cross-national validation of the What is Happening in This Class? Questionnaire using confirmatory factor analysis. *Learning Environments Research*, 6, 231–245.

Fisher, D.L. & Fraser, B.J. (1983). A comparison of actual and preferred classroom environment as perceived by science teachers and students. *Journal of Research in Science Teaching*, 20, 55–61.

Fraser, B. J. (1998a). Classroom environment instruments; development, validity and applications. *Learning Environment Research,* 1, 7-33.

Fraser, B. J. (1998b). Science learning environments: Assessments effects and determinants. In B. J.Fraser & K. Tobin (Eds.), International handbook of science education (pp. 527–564). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Fraser, B. J., & Aldridge, J. M. (1998). The potential of cross-national studies of science classrooms; An example involving Australia and Taiwan. In L. Y. Pak., L. Ferrer., & M. Quigley. (Eds.) Science, Mathematics and Technical Education for National Development (pp. 76-83). Brunei: Universiti Brunei Darussalam.

Fraser, B. J., Fisher, D. L., & McRobbie, C. J. (1996, April). Development, validation and use of personal and class forms of a new classroom environment instrument. Paper presented at the annual meeting of the American Educational Research association, New York, USA.

Goh, S.C. & Fraser, B.J. (1996). Validation of an elementary school version of the Questionnaire on Teacher Interaction. *Psychological Reports*, 79, 512–522.

Haber, J. (1994). Sampling. In G. LoBiondo-Wood & J. Haber (Eds.), Nursing research: Methods, critical appraisal, and utilization (3rd ed., pp. 286–312). St Louis, MO: Mosby-Year Book.

Hoffner Moss, C., & Fraser, B. J. (2002, April). Using environment assessments in improving teaching and learning in high school biology classrooms. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, New Orleans, LA.

Idiris, S. A., & Fraser, B. J. (1997). Psychosocial environment of agricultural science classroom in Nigeria. *International Journal of Science Education*, 19, 79–91.

Irianto, B., & Treagust, D. F. (2001, March). Teachers' perceptions of the role of the laboratory in a national professional development centre. Paper presented at the annual meeting of the National Association for Research in Science Teaching, St Louis, MO.

Jennings, P.A. & Greenberg, M.T. (2009). The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes. *Review of Educational Research, 79, 491-525*

Koul, R.B., and Fisher, D.(2003). Students' perception of science classroom Learning environment in Jammu, India: Attitudes and gender differences, *Journal Of Science And Mathematics Education In South East. Asia* Vol. 26, No. 2 107 - 130

Khine, M. S. and Fisher, D. L. (eds) (2003) *Technology-Rich Learning Environments*: A Future Perspective. Singapore: World Scientific.

Kim, H., Fisher, D., & Fraser, B. (2000). Classroom environment and teacher interpersonal behavior in secondary science classes in Korea. *Evaluation and Research in Education*, 14, 3-22.

Majeed A., Fraser B.J., Aldridge J.M.(2002) Learning Environment And Its Association With Student Satisfaction Among Mathematics Students In Brunei Darussalam *, Learning Environments Research 5(2) 203 - 226*

Margianti, E.S., Aldridge, J.M. and Fraser, B.J. (2004). Learning environment perceptions, attitudes and achievement among private Indonesian university students. *International Journal of Private Higher Education*. Available at: www.xaiu.com/xaiujournal.

Milkie, M.A., and Warner,C.H.(2011). Classroom Learning Environments and the Mental Health of First Grade Children, *Journal of Health and Social Behavior vol. 52 no. 1 4-22.* doi: 10.1177/0022146510394952

Mok, M. C. (2002). Determinants of students' quality of school life: a path model. *Learning Environments Research,* 5, 275-300.

Rawnsley, D., & Fisher, D. L. (1998, December). Learning environments in mathematics classrooms and their associations with students' attitudes and learning. Paper presented at the Australian Association for Research in Education Conference, Adelaide, Australia. Retrieved 8 July from: http://www.aare.edu.au/98pap/fis98269.htm

Riah, H., & Fraser, B. J. (1998, April). The learning environment of high school chemistry classes. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.

Rickards, T., den Brok, P., Bull, E. & Fisher, D. (2003). Predicting student views of the classroom: A Californian perspective. *Proceedings Western Australian Institute for Educational Research Forum 2003*. Retrieved July8, 2012 from: http://education.curtin.edu.au/waier/forums/2003/rickards-1.html

Shuell,T.J.(1996).Teaching and learning in a classroom context.In D.C.Berliner&R.C.Calfee (Eds.), Handbook of educational psychology (pp. 726–764). New York: Macmillan.

Snijders, T. A. B., & Bosker, R. J. (1999). *Multilevel analysis: An introduction to basic and advanced multilevel modeling*. London: Sage.

Soerhaningsih, W., Fraser, B. J., & Aldridge, J. M. (2001, April). Achievement, satisfaction and learning environment among Indonesian computing students at the university level. Paper presented at the Annual meeting of the Americal Education Research Association (AERA), Seattle, USA.

Stahl, R. J. (1987, July). A way of thinking about how humans think and learn: An information constructivist perspective with implications for curriculum and instruction. Session presented at the biennial meeting of the Australian Association for Curriculum Studies, Macquarie University, North Ryde, NSW, Australia.

Telli, S., Cakiroglu, J., & Brok, P. den (2006).Turkish secondary education students' perceptions of their classroom learning environment and their attitude towards Biology. In D. L. Fisher & M. S.Khine (Eds.), Contemporary approaches to research on learning environments: world views (pp.517-542). Singapore: World Scientific

Thair, M., & Treagust, D. F. (1997). A review of teacher development reforms in Indonesian secondary science: The effectiveness of practical work in biology. *Research in Science Education,* 27, 581–597.

Wahyudi, D. and Treagust, D.F.(2004). The status of science classroom learning Environments in Indonesian lower secondary Schools, *Learning Environments Research* 7: 43–63,

Wong, A.F.l., & Fraser, B. J. (1996). Environment-attitude associations in the chemistry laboratory classroom. *Research in Science and Technological Education*, 64, 29-40.