

A study of students' perceptions of science classroom learning environment and teacher-student interaction in Jammu : A cultural perspective.

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ABSTRACT

This paper is a part of a larger study to investigate student-teacher interactions and science classroom learning environments in Jammu, India. The present study reports on the research findings on associations between students' cultural background and their perceptions of their teacher interaction and classroom learning environment, as measured by a standardised test. A sample of 1,021 students from 31 classes in seven co-educational private schools completed a survey including the *Questionnaire on Teacher Interaction* (QTI), *What is Happening in This Class* (WIHC) and a question relating to the cultural background. Statistical analysis shows that the Kashmiri group of students perceived their classrooms and teacher interaction more positively than those from the other cultural groups identified in the study.

Key Words: Culture, Perceptions, Teacher Interaction, and Learning Environment.

INTRODUCTION

The question investigated in this study was, are there any differences in the perceptions of students coming from different cultural backgrounds about their science student-teacher interaction and classrooms learning environment. The study of learning environment was rooted in the formula on relationship of an individual and the environment proposed by Lewin (1936).

Around the globe, in both developed and developing countries science education has become a very important area. In an era of science and technology we can face the challenges of science only by making necessary provision for science education. Ninety percent of eligible students in India do not have access to higher education. The Government spends only 0.5 percent of GNP on this area. The Indian National Science

Academy requested the government to take a fresh look at the country's science and technology system. (INSA, 2001). In this grim situation, a positive teacher student relationship and learning environment is very important.

Students and teachers spend a considerable amount of time in a formal school setting. The teacher's behaviour, when interacting with students, has been found to have a considerable impact on the nature of learning environment that is created Wubbles, Breklmans, & Hermans (1987); Getzel and Thelen (1960) suggested that teacher-student interaction is a powerful force that can play a major role in influencing cognitive and affective development of students. Wubbels and Levy (1993) reaffirmed the role and significance of teacher behaviour in classroom environment and in particular how this can influence students' motivation leading to achievement.

Development and Validation of Questionnaire on Teacher Interaction (QTI)

International studies in the last three decades have firmly established classroom environment research as a thriving field of study (Fraser, 1998). Recent classroom environment research has focused on cross-national studies of science classroom environments (Fisher, Rickards, Goh, & Wong, 1997), constructivist classroom environments (Taylor, Fraser, & Fisher, 1997), science laboratory classroom environments (McRobbie & Fraser, 1993) and computer-assisted instruction classrooms Fisher & Stolarchuk (1997); Teh & Fraser (1995).

In The Netherlands, Wubbles, Creton & Holvast (1988), investigated teacher behaviour in classrooms from a systems perspective, adapting a theory on communication processes developed by Watzlawick, Beavin, and Jackson (1967). Within the systems perspective on communication, it is assumed that the behaviours of participants influence each other mutually. The behaviour of the teacher is influenced by the behaviour of the student and in turn influences student behaviour. Circular communication processes develop which not only consist of behaviour, but determine behaviour as well.

With the systems perspective in mind, Wubbles, Creton & Hooymaners, (1985) developed a model to map interpersonal teacher behaviour extrapolated from the work of Leary (1957). This model has been used in The Netherlands in the development of an instrument, the *Questionnaire on Teacher Interaction (QTI)*, to gather students' and teachers' perceptions of teacher-student interactions (Wubbles, Breklmans, & Hooymaners, 1991; Wubbles & Levy, 1993). This model maps interactions with the aid of an influence dimensions (Dominance-Submission) and a Proximity dimension (Cooperation-Opposition), the QTI was developed to assess student perceptions of eight behaviour aspects. The behaviour aspects measured by QTI are Leadership, Helping/Friendly, Understanding, Student Responsibility/Freedom, Uncertain, Dissatisfied, Admonishing and Strict. Each item has a five-point response scale ranging from Never (0) to Always (5).

The original version of the QTI in Dutch language consisted of 77 items and it was designed to measure secondary students' and teachers' perceptions of teacher-student interactions. After extensive analysis, the 77-item Dutch version was reduced to a 64-item version. This version was translated and administered in the USA ((Wubbles & Levy, 1991; Wubbles & Levy, 1993). Later an Australian version of the QTI containing 48 items

was developed (Fisher, Henderson, & Fraser, 1995). Table 1 clarifies further the nature of the QTI by providing a scale description and a sample item for each of the eight scales.

Associations between actual classroom environment and outcomes were investigated using actual and preferred forms of the WIHIC (Chionh & Fraser, 1998). The associations between examination results, self-esteem and attitude scale and seven classroom environment scales were investigated in geography and mathematics classrooms in Singapore and Australia. It was found that better examination scores were achieved where students perceived the environment as more cohesive. Self-esteem and attitudes were more favourable in classrooms perceived as having more teacher support, task orientation and equity.

Table 1: *Description and Example of Items for Each Scale in the QTI*

Scale	Description	Item
Leadership [DC]	Extent to which teacher provides leadership to class and holds student attention	This teacher explains things clearly.
Helping/ friendly [CD]	Extent to which the teacher is friendly and helpful towards students.	This teacher is friendly.
Understanding [CS]	Extent to which teacher shows understanding and care to students.	If we don't agree with this teacher, we can talk about it.
Student Responsibility/Freedom [SC]	Extent to which the students are given opportunities to assume responsibilities for their own activities.	We can influence this teacher.
Uncertain [SO]	Extent to which teacher exhibits her/his uncertainty.	This teacher seems uncertain.
Dissatisfied [OS]	Extent to which teacher shows unhappiness/dissatisfaction with the students	This teacher thinks that we don't know anything.
Admonishing [OD]	Extent to which the teacher shows anger/temper and is impatient in class.	This teacher gets angry.
Strict [DO]	Extent to which the teacher is strict with demands of the students.	We are afraid of this teacher.

The QTI has been used in The Netherlands, USA, Australia, Singapore and a few other Asian countries and has been cross-validated in different contexts and cultures (Fisher & Rickards, 1998; Fisher et al., 1997; Kim, Fisher, & Fraser, 2000; Wubbles & Levy, 1993) All the studies confirm that data obtained from the questionnaire provide valid, reliable and

useful information for the teacher regarding their learning environment in general and more specifically about their teacher-student interactions.

Fisher & Rickards (1998) analysed a large database of 2,960 student responses to the QTI and found associations between students' perceptions of teacher-student interactions and students' attitudinal and cognitive achievement outcomes. Seven out of eight scales of the QTI were significantly correlated to attitudes to the class and achievement scores when using simple and multiple correlation. It was found that the scales Leadership, Helping/Friendly, and Understanding were positively and significantly correlated with the attitude to class and the achievement scores. The other QTI scales Uncertain, Dissatisfied, Admonishing and Strict were negatively correlated to the attitude to class and the achievement scores. For cultural differences it was reported that students from Asian background perceived their teachers significantly more positively than did those from the other cultural groups used in the analysis.

(Fisher et al., 1997) carried out a similar study involving 720 students in Singapore and 705 students in Australia. In this study the results were the same except that Student Responsibility/ Freedom was also positively associated with students' attitudes towards their science classes in both countries. Rawnsley and Fisher (1998) reported the same results in a study involving 490 students in 23, Year 9 classes in Adelaide.

Khine and Fisher (2001) administered the QTI to 1,188 students from 54 science classes in Brunei. This study provided further validation data on QTI and indicated that this tool is a valid and reliable instrument to be used in this context. This study showed that students enjoyed the science lessons more when their teachers displayed greater leadership, understanding and are helping and friendly. On the other hand, teachers' uncertain, admonishing and dissatisfied behaviours were negatively associated with the enjoyment of science lessons.

Development and Validation of the Questionnaire 'What Is Happening In This Class?' (WIHIC)

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, & McRobbie, 1996) developed this new learning environment instrument. The What is Happening In This Class? (WIHIC) consists of 7 scales and 56 items (Fraser, Fisher, & McRobbie, 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.

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. Currently, the original questionnaire in English has been translated into Chinese for use in Taiwan (Aldridge & Fraser, 1997,

August) and Singapore (Chionh & Fraser, 1998) and Korean for use in Korea (Kim et al., 2000).

In a study on associations between learning environments in mathematics classrooms and students' attitudes, using the WIHIC questionnaire (Rawnsley, 1997), 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 where the teacher involved students in investigations.

Table 2: 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.

Hunus and Fraser (1997) used a modified version of the WIHIC in Brunei, and reported on the associations between perceptions of learning environment and attitudinal outcomes. Simple and multiple correlations showed that there was a significant relationship between the set of environment scales and students' attitudes towards chemistry theory classes. The Student Cohesiveness, Teacher Support, Involvement, and Task Orientation scales were positively associated with the students' attitudes.

Khoo and Fraser (1998) used a modified version of the WIHIC to measure classroom environment when evaluating adult computer courses. The Cooperation scale was dropped in this modified version and Student Cohesiveness and Teacher Support were collapsed into one scale named Trainer Support. A set of 38 items was retained after factor analyses.

This study indicated that the males perceived greater Involvement, while females perceived more Equity. The other striking result of the study was that older females had a more positive perception of Trainer Support than the younger ones.

Fraser and Aldridge (1998) used English and Chinese versions of the 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 centred giving very little opportunity to students to discuss issues.

Khine and Fisher (2001), used the WIHIC in Brunei to study the classroom environment and teachers' cultural background in an Asian context. The study found that teachers from different cultural backgrounds created different types of learning environments. It also indicated that the WIHIC is a useful instrument with which to measure the cultural background differences and can be used as a basis for identification and development of desirable teacher behaviours that will lead to a conducive learning environment.

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 India to get an insight into its use as well as insight into the Indian classroom learning environment. At the same time it may be noted that not much has been examined on the differences in perceptions of students from various cultural backgrounds attending the same class.

RESEARCH METHODOLOGY AND SIGNIFICANCE

The main aim of this study was to investigate how perception of learning environment and teacher-student interaction in science classroom varies with student's cultural background. For the purpose of the study, cultural background was determined by asking students what language they and their parents normally speak at home.

Jammu city is understood to be a melting pot of various cultures, because of the migration from neighbouring provinces into the city due to the various political reasons of the past five to six decades. It was amazing to know that students covered in this study, who underwent the same core curriculum at school, came from 13 different cultural subgroups. The languages spoken at home, a clear indication of their cultural backgrounds, are Hindi, Kashmiri, Dogri, Punjabi, Balti, Pahari, English, Badarwahi, Muzfarabadi, Punchy, Telgu, Urdu and Kistwari. However, only four of these groups contain sufficient numbers for the

analyses. These are Hindi, Kashmiri, Dogri and Punjabi, which constituted 98% of the sample.

RESULTS:

Associations between Teacher-Student Interaction and Cultural Group of the Student

To examine the cultural differences in students' perception of the teacher-student interaction in the science classes, the within-class cultural subgroup mean was chosen as the unit of analysis which aims to eliminate the effect of class differences due to the strength of various groups being unevenly distributed in the sample.

In the data analysis, mean scores for each of the four cultural groups were computed. Table 3 shows the scale item means and F values of the scales of the QTI with the perceptions of students from the four main cultural groups. The purpose of this analysis is to establish whether there are significant differences in the perceptions of students according to their cultural backgrounds

Table 3: *Item Mean for Cultural Differences (Language Spoken at Home) in Students' Perceptions of Teacher-Student Interactions Measured by the QTI Scales.*

Scale	Language Spoken at Home				F Value
	Hindi	Kashmiri	Dogri	Punjabi	
Leadership	4.22	4.16	4.12	4.16	1.01
Helping/ Friendly	3.78	3.86	3.64	3.71	3.48**
Understanding	4.14	4.12	3.86	4.08	6.82**
Student Responsibility	3.07	3.12	3.10	3.12	0.33
Uncertain	2.41	2.34	2.64	2.36	6.11**
Dissatisfied	2.46	2.26	2.61	2.51	5.93**
Admonishing	2.59	2.45	2.71	2.60	3.94**
Stttric	3.60	3.41	3.50	3.50	4.27**
	<i>n</i> = 522	<i>n</i> = 221	<i>n</i> = 175	<i>n</i> = 82	

** $p < 0.001$

As can be seen in Table 3, the differences in the perceptions of students about their science teachers on six of the eight QTI scales are statistically significant. The scales in which there were significant differences were Helping/Friendly, Understanding, Uncertain,

Dissatisfied, Admonishing and Strict. Tukey's post hoc test ($p < 0.05$) revealed that for the Helping/Friendly scale the Kashmiri group of students was dominant and had statistically significant higher means while the Dogri group of students had the lowest mean for the scales of Understanding and higher means for the scales of Admonishing, Dissatisfied and Strict. Graphical representation of these results can be seen in Figure 1.

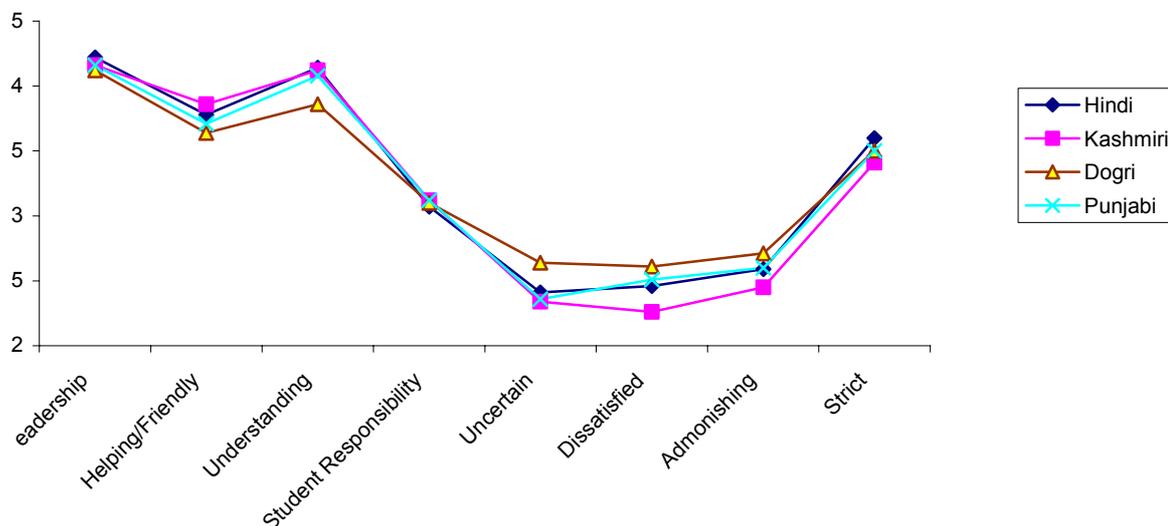


Figure 1. Means for cultural differences in students' perception of teacher-student interactions measured by the QTI scales.

Associations between Classroom Environment and Culture of the Students

Associations between perceptions of classroom environment and the cultural group of the students also were examined. The same four groups as used with the QTI, were used again.

Table 4 shows the scale means and F value for the scales of the WIHIC with the perceptions of the students from the four main cultural groups who constituted nearly 98% of the total sample. The purpose of this analysis is to establish whether there are significant differences in the perceptions of students about their classroom-learning environment according to their cultural backgrounds. These differences can be seen in Figure 2.

Statistical analysis indicated that student perceptions on four scales out of seven of the WIHIC had statistically significant differences according to the cultural groups of the students they belonged to. These were the scales of Student Cohesiveness, Task Orientation, Cooperation and Equity. The Tukey's post hoc test ($p < 0.05$) revealed that, the students coming from the Kashmiri group had significantly higher means for Student Cohesiveness, Task Orientation, Cooperation and Equity scales. The Dogri group of students perceived their classroom environment as least on Involvement and Investigation than did the other three groups involved in the study.

Table 4 : *Item Mean for Cultural Differences (Language Spoken at Home) in Students Perceptions of Classroom Learning Environment as Measured by the WIHIC Scales*

Scale	Hindi	Dogri	Punjabi	F Value
Student Cohesiveness	4.23	4.08	4.06	6.77**
Teacher Support	3.52	3.43	3.41	0.93
Involvement	3.38	3.39	3.43	0.20
Investigation	3.42	3.36	3.40	0.76
Task Orientation	4.24	4.07	4.19	10.03**
Cooperation	3.95	3.81	3.83	2.91**
Equity	4.04	3.77	3.89	9.57**
	<i>n</i> = 522	<i>n</i> = 221	<i>n</i> = 175	<i>n</i> = 82

** $p < 0.001$

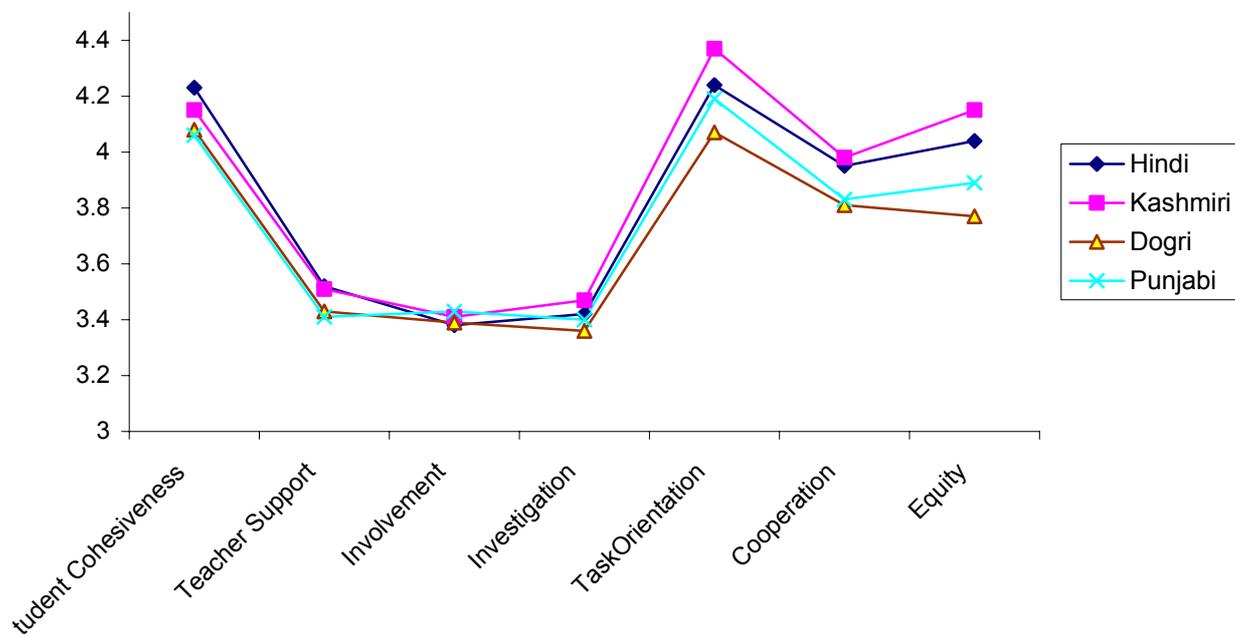


Figure 2. Means for cultural differences in students' perceptions of classroom learning environment as measured by the WIHIC scales.

CONCLUSION

The results from this study indicated that there are differences in the student's perceptions of their learning environment and teacher-student interactions that are associated with students' cultural background for the indicator variable taken as language spoken at home. For both the instruments namely the WIHIC and the QTI, the Kashmiri group of students had more positive perception of their classroom environment and teacher interactions than other three groups in the study.

Analysis of the data collected in this study demonstrated that students in Jammu come from a range of different cultural backgrounds and this influences how the students perceive their learning environments. Teachers with students of different cultural backgrounds in their classrooms should not interact with students as a homogenous group, but take cultural differences into view when interacting with different students.

The findings of this study suggest some future directions for research into classroom learning environment. For example, do findings for science classes have parallels in mathematics classes, in technology classes, and in classes for other subjects or do students who share same culture as the teacher respond differently from teachers who do not?

The results from the study have implications for science teachers who are interested in developing more positive and productive learning environments for their students. The conclusions although are made specifically for science classes but in principle can be applicable to learning environments in other areas as well.

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