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Author/s' Name/s:	Perry den Brok[1]
	Darrell Fisher[2]
	Theo Wubbels[3]
	Mieke Brekelmans[1]
	Tony Rickards[2]

Institutional Affiliation:	[1] IVLOS Institute of Education, Utrecht University, the Netherlands
	[2] Key Centre for School Science and Mathematics, Curtin Univers Technology, Australia
	[3] Institute of Educational Sciences, Utrecht University, the Netherlands

Send author proofs to:	Dr. P. den Brok
	IVLOS Institute of Education
	Utrecht University
	P. O. Box 80127
	3508 TC Utrecht
	The Netherlands
	Tel. + 31 30 2532231
	Fax. + 31 30 2532741
	Email: p.j.denbrok@ivlos.uu.nl

Email editor proofs to:	p.j.denbrok@ivlos.uu.nl

Secondary Teachers' Interpersonal Behaviour in Singapore, Brunei and Australia: A cross-national comparison.

Perry den Brok[1]
Darrell Fisher[2]
Theo Wubbels[3]
Mieke Brekelmans[1]
Tony Rickards[2]

[1] IVLOS Institute of Education, Utrecht University, the Netherlands
[2] Key Centre for School Science and Mathematics, Curtin University of Technology, Australia
[3] Institute of Educational Sciences, Utrecht University, the Netherlands

Contact information:
Dr. P. den Brok
IVLOS Institute of Education
Utrecht University
P. O. Box 80127
3508 TC Utrecht
The Netherlands
Tel. +31 30 2532231
Fax. +31 30 2532741
Email: p.j.denbrok@ivlos.uu.nl

Abstract

This study investigates the reliability and validity of the Questionnaire on Teacher Interaction (QTI) in three countries: Singapore, Brunei and Australia. The QTI maps student perceptions of interpersonal teacher behaviour and is based on the circumplex Model for Interpersonal Teacher Behaviour (MITB) that investigates the teacher-student relationship in terms of the two dimensions of influence and proximity. Students' perceptions of their teachers in the three countries are also compared. Results show that the QTI scales are represented by two independent dimensions and that scales can be ordered in terms of a circular structure. However, empirical scale locations differ from their theoretical positions as hypothesised by the circumplex model, and among countries. Differences in teacher influence and proximity are also found among the countries.

Secondary Teachers' Interpersonal Behaviour in Singapore, Brunei and Australia: A cross-national comparison

Rationale

There is a growing interest in cross-cultural research, as it may help advance efforts and accomplishments of educators worldwide (Ferguson & Meyer, 1998). According to Fraser (1996), there are at least two other important reasons for conducting such research. First, there is usually a greater variation in the variables of interest (e.g., teaching methods, student attitudes) in a sample drawn from multiple countries than from a one-country sample. Second, taken-for-granted practices and attitudes, familiar beliefs in one country can be exposed, made "strange" and questioned when researchers from multiple countries collaborate. Cross-cultural research sharpens one's insight into both one's own country as well as other countries.

In order to conduct cross-cultural research, researchers need to use valid instruments that apply across different contexts and countries. Such instruments provide the opportunity to compare practices between cultures, for example the large-scale international educational (effectiveness) studies, such as Second International Science Study (SISS) or Third International Mathematics and Science Study (TIMSS). Cross-culturally valid instruments may also provide opportunity for assessment, self-evaluation and staff development of teachers in international schools or multicultural education contexts (Wubbels, 1985). Moreover, they may provide opportunities for researchers and other interested educators to work on joint research projects and use similar language, models and terminology.

This paper contributes to the need for such information by providing the results from one inter-country study of teaching from an interpersonal perspective. Interpersonal behaviour and communication have long been thought of as critical components of teacher effectiveness (Brophy & Good, 1986). This assertion has been confirmed by research which has found consistent and strong effects of teacher interpersonal behaviour on cognitive and affective student outcomes (den Brok, Brekelmans, & Wubbels, 2004; Fraser, 2002).

Opmerking [TJJ1]: Please give full title.

Opmerking [TJJ2]: Please give full title.

By investigating differences in (and validity of) students' perceptions of teacher interpersonal behaviour in three Pacific countries, the study also aims to contribute to discussions about cross-cultural differences in learning and instruction. For example, it has been argued that in many Asian countries, Confucian values influence classroom learning and communication (Kennedy, 2002). The Confucian code of social conduct has been linked to respect and obedience (towards the teacher), compliant student behaviour and almost unquestionable acceptance of teacher knowledge, harmonious relationships, compromise and moderation of behaviour, student passivity and a low level of uncertainty tolerance (e.g., Bond, 1996). However, these stereotypical descriptions of Asian education have recently been contested by various researchers, such as Kennedy (2002) and Watkins and Biggs (1996), who found many subtleties in Chinese educational values. For example, they found evidence that teachers are expected to be moral examples for students, to develop warm and caring relationships with students that extend the classroom, and to discuss and engage with them in interactions for deeper understanding of knowledge presented in the classroom. The analyses conducted in the present study may help to shed light on the meaning attached to specific interpersonal concepts (such as teacher strictness, leadership, understanding behaviour, etc.) in the three countries.

Opmerking [t3]: that extend (no –s- ?? because of relationships) beyond the classroom

Opmerking [TJJ4]: That extends beyond the classroom?

In conceptualising an interpersonal perspective on teaching, Wubbels, Créton and Hooymayers (1985) developed the Model for Interpersonal Teacher Behaviour (MITB) to map interpersonal teacher behaviour extrapolated from the work of Leary (1957). Interpersonal behaviour has been investigated using the Leary model (or related circumplex models) in many settings and cultures (Lonner, 1980). The dimensions of the Leary model are universally accepted and used to interpret interpersonal behaviour (Lonner, 1980; Triandis, 1994). This model (see Figure 1) maps teacher behaviour in two dimensions[1]: an *influence* dimension (to what degree the teacher is in control in the teacher-student relationship) and a *proximity* dimension (the degree of cooperation between teacher and students). The influence dimension is characterised by *teacher dominance* (D) on one end of the spectrum and *teacher submission* (S) on the other end. Similarly, the proximity dimension is characterised by *teacher cooperation* (C) on one end and by *teacher opposition* (O) on the other. These can be depicted as a two-dimensional plane that is further

subdivided into eight categories or sectors of behaviour: *leadership* (DC), *helpful/friendly behaviour* (CD), *understanding behaviour* (CS), *giving responsibility/freedom* (SC), *uncertain behaviour* (SO), *dissatisfied behaviour* (OS), *admonishing behaviour* (OD) and *strictness* (DO). Each sector can be described in terms of the two dimensions: leadership, for example, contains a high degree of influence and some degree of cooperation; etc.

Figure 1 about here

MITB (as well as the Leary model) is a special model because of its properties and is linked to a particular branch of models called *circumplex models*. Circumplex models are based on a specific set of assumptions that can be phrased in statistical terms (Fabrigar, Visser, & Browne, 1997; Gurtman & Pincus, 2000). These are: (1) the eight behavioural sectors (or scales) of the model are represented by two, dimensions (or factors); (2) the two interpersonal dimensions that lay behind the sectors are uncorrelated; (3) with the two interpersonal dimensions, the sectors of the model can be ordered in a circular structure; (4) the sectors are equally distributed within this circular structure; and (5) the sectors occupy specific positions on the circle (as given in Figure 1), which can be determined with a goniometric circle function.

Based on the MITB, Wubbels et al. (1985) developed the Questionnaire on Teacher Interaction (QTI) that can be used to map students' (and teachers') perceptions of teacher interpersonal behaviour. It originally consisted of 77 items in the Dutch language, using a Likert-type 5-point scale. The items of the QTI refer to the eight sectors of behaviour that jointly make up the MITB.

The QTI has been translated into more than 15 languages and has been the focus of well over 120 (learning environment) studies in many countries (den Brok, et al., 2004). Despite this, very few studies have actually focussed on cross-cultural or cross-national comparisons (examples are Fisher, Rickards, Goh, & Wong, 1997; Wubbels & Levy, 1991). Moreover, these studies were limited to comparisons between two countries at most and mainly focussed on actual differences in perception scores of students or teachers, rather than validity. In single-country

Opmerking [TJJ5]: Because it is a type of circumplex models?

Opmerking [t6]: yes, that was meant by this sentence., although I don't know if you should use the word "type"in theis case)

studies, researchers have hardly compared actual perception scores to those from other countries and have employed limited methods to investigate the (construct) validity of their own country's version of the QTI (den Brok, 2001) (see the section on Cross-Cultural and Multicultural Research with the QTI).

This study analyses students' perception data collected from three countries using the QTI and includes both extensive research on the construct validity of the instrument as well as on actual differences in students' perceptions among countries. The paper starts by explaining the development process of the QTI in different countries, followed by a discussion about earlier cross-cultural research done with the QTI. The method, samples and analyses used in this study are then described. Finally, the paper presents outcomes of analyses regarding the validity and reliability of the QTI as well as a comparison of perception scores across the three countries.

Development of the QTI in Different Countries

The QTI was first constructed in the Netherlands between 1978 and 1984 (Wubbels, et al., 1985). Its development involved four rounds of testing using different sets of items. Interviews with teachers, students, teacher educators and researchers were conducted to judge the face validity of items. The American version was created between 1985 and 1987 by translating the set of 77 items from the Dutch version, adding several items (since several items could be translated in more than one way), and adjusting this set of items based on three rounds of testing (Wubbels & Levy, 1991). Ultimately, the American version contained 64 items. This American version was initially also used in Australia (Wubbels & Levy, 1993), but eventually a more economical 48-item selection was developed. The Australian version, in turn, was initially used without translation or adaptation in Singapore (Fisher, et al., 1997). The Bruneian version was developed by translating the Australian version into Malay and involving several people in checking the back-translation into English (Scott & Fisher, 2001). The Malay translation was later used in both Brunei and Singapore.

Cross-Cultural and Multicultural Research with the QTI.

Only two studies that had previously investigated cross-cultural validity of the QTI (e.g., Fisher, et al., 1997; Wubbels & Levy, 1991) are known to the authors.

Wubbels and Levy (1991) conducted a comprehensive study comparing the Dutch and American versions of the questionnaire. They reported similar Cronbach's alpha coefficients for both instruments, as well as similar percentages of variance at the class level. They also investigated the construct validity of the instrument. Exploratory factor analyses on class-level data showed the presence of two factors in both countries, which could be interpreted as a cooperation-opposition dimension and a dominance-submission dimension. Confirmatory factor analyses showed that both dimensions could be regarded as independent and that factor loadings were equivalent in both samples. To investigate whether interpersonal behaviour was measured on the same metric (e.g., Hui & Triandis, 1985), Wubbels and Levy (1991) computed an average of the eight scale scores. This average score as well as its variance was nearly equal for both countries. Finally, they compared scores on the instrument and concluded that students had similar views on their best and worst teachers in both countries. However, they also found that Dutch teachers wanted to provide more responsibility and freedom to students than students did, while American teachers wanted to maintain similar levels of student freedom and responsibility as their students. In a similar vein, American teachers reported more strictness than their students, while Dutch teachers agreed they wanted to be less strict than their students thought they were. Although their investigation was groundbreaking in many ways, the Wubbels and Levy study can be criticised as well. First, exploratory factor analyses can only be used to tentatively investigate correlation structures within separate samples, and cannot provide any statistical proof for similarity of structures across country samples. Second, using average means and variances to determine similarity of metric seems rather primitive at the present time, since Rash-type of analyses are currently available to establish and compare country scores on a specific measure.

Opmerking [c7]: Rasch?

Opmerking [t8]: YES!!!

Fisher and his colleagues (Fisher, et al., 1997) compared data from Australia and Singapore. They also reported similar alpha coefficients and percentages of variance at the class level for both country versions. Simple correlations linking the scales of the QTI to student attitudes indicated that in both countries positive relationships with attitudes existed for leadership, helpful/friendly, understanding and student responsibility, while negative relationships existed for uncertain, dissatisfied, admonishing and strict behaviour. Correlation coefficients were similar in magnitude

in both countries. However, standardised regression coefficients investigating the same relationships indicated some differences between the two countries, with more significant associations in the Singaporean sample. As such, these differences in predictive validity may be an indication of further differences in (construct) validity between the two countries. Comparing scale scores, they found that teachers in Australia provided more responsibility and freedom to students than Singapore teachers. However, teachers in Australia were also found to be more uncertain, more dissatisfied, more admonishing and less strict.

Studies on teaching in multicultural classes have also investigated whether perceptions of students originating from different countries or cultural groups are similar in terms of construct validity and magnitude. In a study (den Brok, Levy, Wubbels, & Rodriguez, 2003) comparing data of African American, Asian American, Hispanic American and Caucasian American students, scales of the QTI conformed to a circular ordering for all cultural groups. However, the study also showed that factor loadings of the scales on influence and proximity were different for the Caucasian and Asian groups versus the African and Hispanic groups. For the first two groups, the model showed closer fit to the expected theoretical interpersonal circumplex. Other studies consistently report perceptions of Asian students to be lower for teacher influence and proximity than those of European, Hispanic American or African American students (e.g., den Brok, Levy, et al., 2003). A study by Evans and Fisher (2000) on Australian multicultural classrooms showed that Asian students perceived less teacher uncertainty and more strictness than South African or Australian students.

Opmerking [TJJ9]: or Caucasian? See the second sentence in this paragraph.

Opmerking [t10]: Yes: Caucasian

Research Questions.

Using data from three countries—Singapore, Brunei and Australia, the following research questions are investigated:

1) To what degree is the QTI a reliable and valid instrument for use in each of the three countries?
2) To what degree are the Singaporean, Bruneian, and Australian versions of the QTI equivalent?
3) Are there differences in students' perceptions of interpersonal teacher behaviour in Singapore, Brunei and Australia?

Method

To answer the research questions, QTI data was obtained from researchers who conducted studies in the three countries, and was then re-analysed to meet the purposes of the present study. To enhance the cross-country comparison, researchers were asked to provide only data on secondary Science teachers. The Singaporean sample consists of 1,713 students from 50 classes (taught by a similar number of teachers) in 9 schools. Average class size in the sample is 34 students. The sample from Brunei consists of 644 students from 35 classes in 23 schools. The average class size in the Brunei sample is 18 students. Finally, the Australian sample consists of 726 students from 35 classes in 12 schools. Average class size in the Australian sample is 21 students. Unfortunately, the original researchers are not able to provide background information about the representativeness of students, teachers and classes involved, except for the Australian case. The Australian sample was created by inviting all known secondary schools in Western Australia and Tasmania. About 20% of the invited schools participated in the original study and 1 class/teacher from each school was sampled. The researcher involved (the fifth author of this paper) verified the representativeness of the sample. Although the researchers for the Singaporean and Bruneian studies also mentioned their samples are representative, one can only guess the degree to which the samples are equivalent. This is acknowledged as a major limitation of the present study. As can be seen, more classes, larger class sizes and fewer schools can be found in the Singaporean sample.

Students in each country completed the QTI. Sample items for each sector (scale) are given in Table 1[2]. Scale scores were determined by computing a mean over the items within the scale and transforming this (5-point) score linearly to a proportion score between 0 and 1, with 1 representing the highest score possible, and 0 representing the lowest score possible.

Table 1 about here

Cronbach's alpha coefficients for each scale were computed at the student and class level. Table 2 presents these consistencies for each country. As can be seen, the item-intercorrelation is above .80 at the class level for most scales.

Reliability is lowest for the student responsibility/freedom sector (SC) and strictness sector (DO).

Table 2 about here

Results

Equivalence of QTI Versions

To check whether items contributed to their scales in a similar fashion across countries, we performed a multigroup confirmatory (e.g., congeneric) factor analysis (using Mplus) for each of the QTI scales. In these analyses, each country was treated as a group and a one-factor model was formulated for each scale. For each QTI scale, fit indicators show some distance between model and data (see Table 3). Although RMSEA is below its required value of .08 in all cases, CFI, TLI (which should be above .95) and SRMR (which should be below .05) all failed to meet their requirements (e.g., Muthén & Muthén, 1999). This means that (separate) items appear to contribute differently to their scales in each of the three countries, which suggest potentially different scale meaning across countries. Model fit is particularly weak for student freedom and strictness, suggesting largest differences in meaning across countries for these two scales.

Table 3 about here

In order to make further comparisons between the instrument's internal structures, we first investigated the general structure behind the scales. For this purpose, correlations between scales were computed at the (aggregated) class level. According to the MITB, scales should conform to a circular structure. To investigate the circumplexity of the data (e.g., to test if scales were ordered in terms of a circle with two underlying, independent dimensions), each correlation matrix was subjected to a correspondence analysis (Tracey, 1994). If the eight scales are ordered in a circular structure, this should be represented by their (inter)correlations. This means that correlations between pairs of scales are greater for sectors closer on the (interpersonal) circle, and smaller if they are more distant. Thus, correlations between opposing scales are smallest (most negative), while correlations between

neighbouring scales are highest (positive), and correlations decrease in (equal) steps if one moves from neighbouring scales towards opposing scales (Gurtman & Pincus, 2000; Tracey, 1994). Correlations in a matrix can be compared to see if they follow this expected pattern[3]. The outcome of this comparison is a Correspondence Index (or CI) that basically represents the proportion of correlations that is in accordance with the expected circular ordering, and a *p*-value that indicates the probability that the similarity with the expected ordering is based on chance. A CI value of .5, for example, means that as many comparisons are in accordance with a circular ordering as are not, while a value of .75 means that twice as many comparisons are in accordance as are not. For a circular structure, the CI should be close to 1 and its *p*-value should be significant. CI values were computed for each country. For the Singaporean data, the CI is .67 (*p*=.0008); for Australian data, the CI is .84 (*p*=.0008); and for Brunei the CI is .70 (*p*=.0004). These outcomes indicate that the sector intercorrelations correspond with a circular ordering most for Australia and least for Singapore. The CI values are sufficiently high to claim support for a circular ordering in all countries.

To test for similarity of factorial structure among countries, a series of multilevel confirmatory factor analyses was performed using Mplus. First, a set of analyses was conducted specifying the same factor loadings in each of the three countries. In these analyses, different circular models were tested: a perfect circumplex (assuming an equally spaced, circular, two-dimensional factor structure[4]), a quasi-circumplex (assuming a symmetrical, circular, but not equally spaced, two-dimensional factor structure) and an irregular circumplex (testing a two-dimensional, circular factor structure with free factor loadings). Table 4 presents model fit estimates for each of these three models.

Table 4 about here

As can be seen in Table 4, the chi-squared values are high, indicating some distance between model and data. However, this is not surprising given the large number of students and classes involved. Fit indicators that are less sensitive to sample size (Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI)), unfortunately, also remain below their required minimum values of .95. Similarly, the

Opmerking [c11]: need to give full name?

Opmerking [c12]: need to give full name?

average error component (indicated by Root Mean Square Error of Approximation [RMSEA]) lies above its desired value of .08, indicating that model fit still can be improved. However, fit indicators of the irregular circumplex model are just below the required values, which mean that there is some resemblance in factorial structure among countries. Nevertheless, it seems unlikely that the exact same factorial structure is present in each country.

Based on the analyses in Table 4, it was decided to conduct a second set of separate multilevel confirmatory factor analyses for each of the three countries. In these analyses, the ideal circumplex, quasi-circumplex and irregular circumplex models were again specified. The outcomes of these analyses are displayed in Table 5.

Table 5 about here

The outcomes of Table 5 are similar to those in Table 4, showing that irregular circumplex models (that are most distant from the theoretical ideal of Figure 1) fit the data best, presenting reasonable model fit indicators for each of the three countries. The ideal model shows worst fit for all the countries. To further investigate the degree to which factor structures are different for the irregular models and diverge from the ideal circumplex in each of the countries, we inspected the factor loadings of these models. The models are graphically displayed in Figures 2 to 4 and numerically in Table 6.

Figures 2 to 4 about here

Figures 2 to 4 indicate that an elliptic, rather than circular, structure could be found. It seems that the influence dimension has been measured less distinctively than the proximity dimension.

Table 6 about here

All sectors shift from their "theoretical" position to some degree. This was particularly true for the understanding (CS), student responsibility/freedom (SC), and

strictness (DO) sectors. The understanding (CS) and student responsibility/freedom (SC) sectors have moved counter-clockwise for the three samples. Thus, the CS scale contains considerably higher degree of influence in all three countries, while the SC scale contains more proximity than expected in each country. The strictness (DO) sector has moved counter-clockwise for the Bruneian and Singaporean samples, but clockwise in the Australian sample. Thus, in the Singaporean and Bruneian samples, strictness incorporates less proximity than theoretically hypothesised; the opposite is true for Australia. Shifts in locations occur in smaller amounts for the other interpersonal sectors, although in most cases shifts in Australia occur in the opposite direction from the other two countries. Finally, uncertainty (SO) involves positive amounts of proximity in Singapore and Brunei and negative amount in Australia.

In order to test the relative importance of differences found between countries, correlations between empirical dimension scores (based on Table 6) and theoretical dimension scores (see Footnote 4) were computed. These correlations are given in Table 7 and it can be seen that in all countries, a close resemblance was found between empirical and theoretical dimension scores. For proximity, correlations ranged between .956 for the Bruneian sample and .993 for the Australian sample. For influence, correlations ranged between .967 for the Bruneian sample and .993 for the Australian sample. These high correlations show that, despite irregularities found in the model for each of the countries, the QTI is capable of closely reproducing theoretically expected dimension scores in all countries.

Table 7 about here

Interpersonal Behaviour of Teachers in the Three Countries

Table 9 shows mean student perception scores for the three countries on the dominance-submission (DS) dimension and cooperation-opposition (CO) dimension. Because of the factorial differences found with respect to the scales, between-country differences in terms of scale scores were not investigated. An analysis of variance (with class membership as covariate) show that differences between countries are significant for both the influence dimension (F=3.85, p=.024) and the proximity dimension (F=11.10, p=.000). This means that students' perceptions of

their teachers' interpersonal behaviour differ among countries, even after taking into account the differences among teachers within countries.

Table 9 about here

As can be seen, in all three countries teachers find themselves being rated on the positive sides of influence and proximity. Teachers were rated highest in the influence dimension in Brunei and lowest in Australia. However, differences in influence ratings between Australia and Singapore are only minimal, with Brunei teachers being rated somewhat differently from teachers in the other two countries. Based on the cultural differences in pedagogy described in the introduction section (which seem fewer between Singapore and Brunei as compared to Australia), these findings are surprising. They might be the result of subtle differences in meaning of the scales among countries that have been demonstrated in the previous sections. Teachers were rated highest in the proximity dimension in Singapore and lowest in Brunei, with Australian teachers finding themselves rated right in the middle. Again, these findings are somewhat surprising given the cultural differences hypothesised, but it might be the result of differences in scale meanings. Given the fact that differences in factorial structure (scale positions) are largest between Australia and the other two countries, these differences may have balanced each other out in terms of the dimensions. It seems unlikely that the results occurred because of sampling differences, since the Singaporean sample differs more from the other two samples in terms of class and school size than the Australian sample. They might be related to student characteristics and differences in their distribution over the three samples.

Discussion

In this article, reliability, validity and equivalence of QTI versions from three countries were investigated, as well as whether students' perceptions of their teachers' interpersonal behaviour differ among these countries. With the study, further evidence was sought for the cross-cultural validity of the QTI and the theoretical framework supporting it (e.g., Lonner, 1980).

A first conclusion from this study is that scales of the QTI appear to be one-dimensional in Australia, Singapore and Brunei. However, multigroup confirmatory

factor analyses show that items contributed differently to these scales across countries, suggesting different scale meanings. Support was found for the presence of two factors or dimensions behind scale scores at the class level in each country. These factors could be interpreted in terms of a dominance-submission and cooperation-opposition dimension. The conclusions are in line with those of earlier studies investigating the QTI in multiple countries (Fisher, et al., 1997; Wubbels & Levy, 1991; 1993) as well as single western or Asian countries (e.g., den Brok, 2001; Fraser, 2002).

A second conclusion is that the instrument has similar support for its construct validity in each of the three countries. Correspondence analyses support an elliptic ordering of scales. These findings are in line with similar analyses on multicultural samples in the US (den Brok, Levy, et al., 2003). Moreover, scales also conform to two independent dimensions, and with the empirical factor loadings theoretical dimension scores could be closely replicated, despite "shifts" in individual scales in the interpersonal circle compared to the theoretical ideal model. Earlier studies have also indicated that while scales may differ from their expected positions, the instrument is still capable of replicating the theoretical dimensions of influence and proximity (e.g., den Brok, 2001; den Brok, Levy, et al., 2003).

Some of the outcomes of the study deserve closer attention. First, country-to-country differences are found in the positions of the scales on the interpersonal circle. The uncertain (SO) scale contains more proximity in Singapore and Brunei than in Australia. Also, strictness (DO) seems to incorporate more proximity in Australia than hypothesised, while it incorporates less proximity than hypothesised in Singapore and Brunei. These between-country differences might reflect different meanings or connotations attached to the sectors of interest (e.g., Hui & Triandis, 1985). However, they might also reflect differences in focus: in some countries strictness or uncertainty may be observed from different cues, or cues may be valued differently in terms of importance, even if (some) equivalence in meaning exists. Finally, the differences might be caused by sample characteristics which differ from country to country.

In this study, it was found that while sectors occupy different positions than hypothesised and between-country differences are found in this respect, correlations between empirical and theoretical dimension scores are extremely high in all countries and hardly vary between countries. Also, earlier research has shown that the interpersonal dimensions and sectors display similar relationships with student outcomes in different countries, both in terms of directions and magnitude (e.g., Fisher, et al., 1997).

Differences in dimension scores are found among countries. While teachers in Brunei were rated lowest on proximity dimension, they were rated highest on influence. To some extent, the findings support claims that teachers in countries with large power distance and a more collectivist tendency (e.g., Brunei and Singapore) are expected to exert a great deal of power and expertise, and students are expected to follow directions (e.g., Hofstede, 1991; Kennedy, 2002; Lu, 1997; Liberman, 1994; Watkins & Biggs, 1996).

Although the study compensated for some earlier limitations (see Rationale section), it was also subject to limitations. First and most importantly, the study was conducted using convenience samples and only limited information was available on student, class and school background characteristics. As such, respondent (and context) characteristics probably differ across the samples. It may very well be that some of the cultural differences found are partially due to sample differences, especially since the outcomes in this study are not corrected for covariates. Prior research has shown that such characteristics are significantly related to students' perception scores and may alter findings with respect to ethnic or country variables in terms of magnitude and direction (Levy, den Brok, Wubbels, & Brekelmans, 2003). As such, presented findings should be regarded as tentative, and future research is needed to test their stability. Second, sample sizes vary from country to country and are quite small. Third, the study investigates conceptual equivalence (Hui & Triandis, 1985) only to a limited degree. No investigations were made whether concepts such as influence, proximity, leadership, helpfulness, understanding, giving responsibility, uncertainty, dissatisfaction, admonishing or strictness have the same meaning and connotations in the three countries or whether they are interpreted from the same observable (and non-observable) cues. Future research, including interviews with

teachers, students and researchers could provide more information with respect to this issue. Fourth, scalar equivalence (Hui & Triandis, 1985) was also marginally investigated: item-response curves were not checked; nor were the versions administered to bilingual students or students in international schools, in order to see whether translations and response intervals resulted in similar answers. In many respects, therefore, this study should be seen as a beginning to the investigation of interpersonal behaviour cross-culturally, and future research should provide incremental clues for the findings of the present study.

Acknowledgement:

Notes

[1] In the Leary (1957) model, these are originally called the dominance-submission and affection-hostility dimension, but were later adapted and renamed by Wubbels et al. (1985).

[2] The complete instrument with all items can be obtained from the authors.

[3] Graphically, the correlations between the scales can be represented as follows:

	DC	CD	CS	SC	SO	OS	OD	DO
DC	1							
CD	R_1	1						
CS	R_2	R_1	1					
SC	R_3	R_2	R_1	1				
SO	R_4	R_3	R_2	R_1	1			
OS	R_3	R_4	R_3	R_2	R_1	1		
OD	R_2	R_3	R_4	R_3	R_2	R_1	1	
DO	R_1	R_2	R_3	R_4	R_3	R_2	R_1	1

The correlations R_1 to R_4 can be compared pairwise, and in a circular (or circumplex) ordering it can be expected that $R_4 > R_3 > R_2 > R_1$. Also, it is expected that correlations with the same subscript are (more or less) equal in magnitude. By comparing each pair of Rs one can test if the correlations occur according to the

expected patterns. In total 288 comparisons can be made, and for each comparison it can be tested whether the expectation is in agreement with expectations (e.g., true) or not (e.g., false). In a correspondence analysis, the proportion of true expectations is computed and tested against chance.

[4] In an ideal circumplex, factor loadings of the two dimensions (or factors) follow a predetermined pattern, based on their angular location in the circle. In those models, dimension scores are computed as follows (the numbers before the scale labels represent the factor loadings): Influence = (.92*DC) + (.38*CD) - (.38*CS) - (.92*SC) - (.92*SO) -(.38*OS) + (.38*OD) + (.92*DO); Proximity = (.38*DC) + (.92*CD) + (.92*CS) + (.38*SC) - (.38*SO) - (.92*OS) - (.92*OD) - (.38*DO). These scores range between about -3 and +3.

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Table 1
Typical Items for the Scales of the QTI

Scale (sector)	Typical item
DC – leadership	This teacher acts confidently.
CD – helpful/ friendly	This teacher is friendly.
CS – understanding	This teacher is patient.
SC – student responsibility	We can influence this teacher
SO – uncertain	This teacher is hesitant.
OS – dissatisfied	This teacher is suspicious.
OD – admonishing	This teacher gets angry quickly.
DO – strict	This teacher is strict.

Table 2
Cronbach's Alpha at the Student and Teacher/Class level

	DC	CD	CS	SC	SO	OS	OD	DO	Average
Alpha (student)									
Singapore	.81	.83	.77	.57	.77	.79	.70	.63	.73
Brunei	.69	.81	.64	.58	.59	.76	.70	.62	.67
Australia	.79	.86	.79	.61	.65	.78	.64	.56	.71
Alpha (class)									
Singapore	.94	.95	.95	.76	.94	.94	.91	.76	.89
Brunei	.83	.89	.75	.80	.79	.93	.87	.82	.84
Australia	.96	.94	.95	.84	.93	.94	.86	.76	.90

Table 3

Model Fit of Multigroup Confirmatory (Congeneric) Factor Analysis for Each of the QTI Scales

QTI-Scale	Chi-squared (p-value)	CFI	TLI	RMSEA	SRMR
DC	256.80 (.00)	.91	.84	.07	.19
CD	214.88 (.00)	.95	.90	.06	.14
CS	266.19 (.00)	.91	.83	.07	.13
SC	148.05 (.00)	.83	.67	.06	.30
SO	190.23 (.00)	.89	.79	.07	.13
OS	114.57 (.00)	.94	.89	.05	.15
OD	213.72 (.00)	.92	.84	.06	.17
DO	210.24 (.00)	.87	.75	.06	.28

Table 4

Model Fit Indicators of Multilevel Confirmatory Factor Analyses Specifying Equal Factor Loadings for Each of the Three Countries

Model	x^2	df	p-value	RMSEA	CFI	TLI
Irregular circumplex	416.88	77	< .000	.060	.96	.92
Quasi circumplex	623.13	86	< .000	.078	.94	.88
Ideal circumplex	634.73	90	< .000	.077	.94	.88

Table 5

Model Fit Indicators of Multilevel Confirmatory Factor Analyses Specifying Separate Factor Loadings for Each of the Three Countries

Country	Model	χ^2	df	p-value	RMSEA	CFI	TLI
Singapore	Irregular circumplex	79.099	13	< .000	.064	.98	.92
	Quasi circumplex	83.052	14	< .000	.063	.98	.92
	Ideal circumplex	182.892	26	< .000	.070	.95	.90
Brunei	Irregular circumplex	33.515	13	.0014	.050	.99	.95
	Quasi circumplex	37.550	13	< .000	.054	.99	.95
	Ideal circumplex	132.437	26	< .000	.080	.94	.88
Australia	Irregular circumplex	79.947	14	< .000	.081	.97	.88
	Quasi circumplex	75.589	13	< .000	.081	.97	.88
	Ideal circumplex	194.995	26	< .000	.095	.92	.83

Table 6

Empirical Factor Loadings According to the Irregular Circumplex Models of Table 5

Scale	Australia		Singapore		Brunei	
	DS	CO	DS	CO	DS	CO
DC	.72	.60	.82	.44	.89	.58
CD	.07	1.42	.34	1.24	.52	1.10
CS	.18	1.14	.20	1.24	-.03	.98
SC	-.70	.70	-.94	1.37	-.39	.52
SO	-1.00	-.08	-1.15	.06	-1.12	.21
OS	-.12	-1.13	-.19	-1.20	-.05	-1.28
OD	.20	-1.39	.25	-1.74	.38	-1.43
DO	.62	-.74	.68	-1.34	.61	-0.89

Table 7

Correlations Between Theoretical and Empirical Dimension Scores of QTI

	Influence	Proximity
Singapore	.972	.977
Brunei	.967	.956
Australia	.993	.993

Table 8
Mean QTI Scores for the Interpersonal Dimensions in Three Countries (Standard Deviations in brackets)

	DS	CO
Singapore	.56 (.22)	1.28 (.46)
Brunei	.73 (.21)	.85 (.38)
Australia	.55 (.31)	1.13 (.44)

Note. scores range between about –3 and +3.
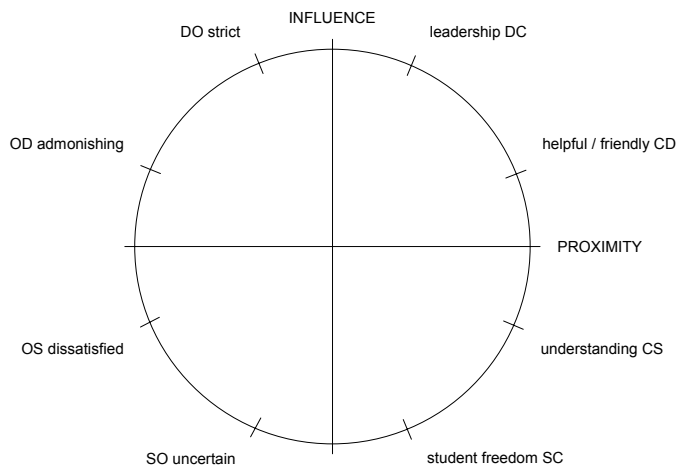
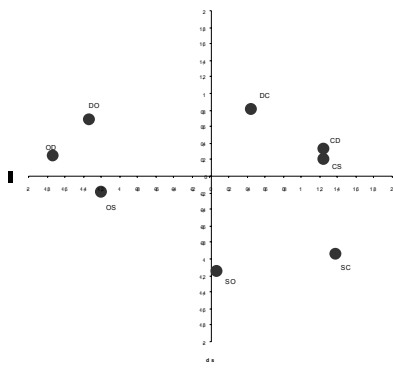*Figure 1.* The Model for Interpersonal Teacher Behavior (MITB).
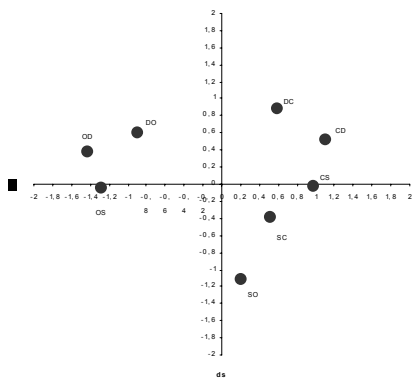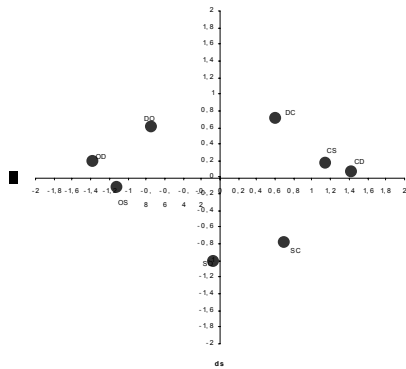
Figure 2. Singapore—factor loadings.

Figure 3. Brunei—factor loadings.

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Figure 4. Australia—factor loadings.