Relationship between teachers' preferred teacher–student interpersonal behaviour and intellectual styles

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Abstract

This study examines the associations between teachers' preferred interpersonal behavior in teaching and their thinking styles. A sample of 131 secondary teachers from Hong Kong (n=94) and Macau (n=37) participated in a survey to measure their preferred interpersonal behavior by the Questionnaire for Teacher Interaction (QTI) and their thinking styles by the Thinking Style Inventory-Revised (TSI-R). Results indicated that teachers in both regions preferred to employ student centered interpersonal behavior (leadership, helpful and friendly, understanding, and freedom teaching styles) in the classroom teaching. The results indicated that teachers' thinking styles were related to their preferred interpersonal teaching styles. Specific relationships were found between the types of thinking styles and their preferred teacher interpersonal behavior among Hong Kong and Macau teachers.

Key words: intellectual styles, teacher-student interpersonal behaviour, student-teacher interaction

Introduction

Student-teacher interaction is an important part of the teaching and learning processes (den Brok, Brekelmans & Wubbels, 2004; Wubbels & Levy, 1993). Previous research shows that teachers who provide support students' learning, demonstrate equity in the classroom, ensure that students complete learning activities, and engender student cohesion in classroom are more likely to enhance students' academic achievement (Brekelmans, Levy & Rodriguez, 1993; Dorman, Fisher & Waldrip, 2006; Wubbels & Levy, 1993). Lawrence (1997) argues that teachers' choice of interpersonal behaviour in teaching is a response to their students, and at the same time it is a reflection of teachers' own intellectual style preference. While student-teacher interaction research has been given close attention in the learning environment research, research of teachers' intellectual styles that influence their choice of interpersonal behaviour with students is limited (Evans, 2004; Fish, Kent & Fraser, 1998). In addition, research conducted in this field is limited in the Asian contexts. Therefore, this research focuses on studying student-teacher interaction in the Hong Kong and Macau contexts to investigate the relationship between teachers' intellectual styles and their preference of interpersonal behavior.

Teacher-student interpersonal behaviour

Conceptualization of student-teacher interaction is based on systems perspective (Wubbels & Levy, 1993). The core idea of systems theory rests on the notion of circularity which implies that all aspects of the system are linked (Kiesler, 1996). Any changes in one part of the system lead to changes in other parts of the system that influence the first part, and so on (Wubbels & Levy, 1993). Practically speaking, the behaviour of teachers is influenced by the behaviour of students and in turn influences each other. Interaction between students and teachers do not only consist of behaviour, but also determines behaviour. In this light,

student-teacher interaction can be considered as a continual transaction. Transactional process shapes both students' and teachers' interpersonal behaviour. Research in the USA and Australia found that students' perceived teacher interpersonal behaviour, class characteristics, teacher experiences, student and teacher gender, student ethnicity, student age and class size are factors that enhance interaction between students and teachers (den Brok, Levy, Rodrigues & Wubbels, 2002; den Brok, Levy, Wubbels, & Rodrigues, 2003; Levy, Wubbels & Brekelmans, 1992; Fisher, Fraser & Richards, 1997; Henderson, 1995; Waldrip & Fisher, 1999).

The Questionnaire for Teacher Interaction (QTI) (Wubbels, Créton & Hooymayers, 1985) is an instrument that has been developed and used to measure teaching styles in terms of teachers' interpersonal behaviour in teaching. The QTI is developed from the Model for Interpersonal Teacher Behaviour (MITB) (Wubbels, Créton & Hooymayers, 1985). Development of the MITB is based on the systems perspective and Leary's (1957) works on interpersonal behaviour. The model defines interpersonal behaviour in transactional sense as two people's conjoint behaviours during their interaction with each other (Kiesler, 1996). The Leary's (1957) 16-interpersonal behaviour scales were employed as a framework to conceptualize interaction between students and teachers. Continous research work has eventually reduced 16 interpersonal scales into 8 scales, and they are plotted on a two-dimensional coordinate system (Wubbels, Créton & Hooymayers, 1985). The two-dimensional coordinate system represents the interpersonal behaviour map which shows the degree of cooperation between the individuals communicating on the horizontal axis, and the degree of control over the communication process of the communicator along the vertical axis (Wubbels, Créton & Hooymayers, 1992). The model identifies 8 different types of teachers' interpersonal behaviours: leadership, helpful/friendly (helpfulness), understanding, student-responsibility/freedom (freedom), uncertainty, dissatisfaction, admonishment, and

strictness. Based on the MITB model, a 66-item QTI questionnaire was developed to assess teacher interpersonal behaviour (Brekelmans, Wubbels & den Brok, 2002). The scales have been studied intensively in the Netherland, the United States and Australia (den Brok, 2001; Fraser, 1998; Rickards, den Brok, & Fisher, 2005; Telli, den Brok & Cakiroglu, 2007; Wubbels & Levy, 1993). Research suggested that a shorter version of 40 items could used in the Chinese context (Chen & Chen, 2001). During the past decade, studies involving QTI have been expanded to some Asian countries like Brunei, India, Korea, and Singapore (Khine, 2002; Khine & Fisher, 2004; Kim, Fisher & Fraser, 2000; Koul & Fisher, 2005; Goh, 1994; Goh & Fraser, 1998; Fraser, 2002). The QTI has been tested in both Hong Kong and mainland China (Jiang, 2001; Chen & Chen, 2001). The cross-cultural analyses of the QTI support its reliability and validity (Fraser, 2002), and confirmed that it is a reliable instrument to measure teacher interpersonal behaviour across different cultures.

<Insert Figure 1 about here>

Intellectual styles

By definition, intellectual style is an encompassing term for constructs such as cognitive styles, learning styles, and thinking styles and they refer to human beings' preferred ways of processing information and dealing with tasks (Zhang & Sternberg, 2006). The threefold model of intellectual styles (Zhang & Sternberg, 2005, 2006) proposes that people possess three types of intellectual styles, namely Type I, Type II and Type III intellectual styles. People with dominant preference for Type I intellectual styles prefer to engage in creative-generating activities, whereas people with dominant preference for Type II intellectual styles prefer to work in the environment with clear and specific rules and regulations. People with dominant preference for Type III intellectual styles are mainly to manifest the characteristics of either Type I or Type II intellectual styles. In short, teachers with dominant preference for Type I intellectual styles will manifest very different types of

teaching styles when compared with their Type II counterparts.

Many instruments can be used to measure intellectual styles. Among various instruments, the Thinking Style Inventory-Revised (TSI-R, Sternberg, Wagner, & Zhang, 2003) is the one that has been widely investigated. The TSI-R is developed from the theory of mental self-government (MSG, Sternberg, 1997). This theory proposes that people possess 13 different thinking styles and they are conceptualized as Type I, II and III thinking styles (Zhang 2003). Type I thinking styles include legislative, judicial, hierarchical, global and liberal thinking styles. Characteristics of people with dominant Type I thinking styles prefer to work on complex and creative-generating activities, and they are more effective in producing positive behaviour. People with dominant Type II thinking styles show a dominant tendency to engage themselves in more simplistic and norm-favoring activities. Type II thinking styles include executive, monarchic, local and conservative thinking styles. Finally, the last group of thinking styles is known as the Type III thinking styles which include oligarchic, anarchic, internal and external thinking styles. The characteristics of people with dominant Type III thinking styles are inclined to act in a more situational-dependent manner. They can sometimes exhibit behaviour that characterized the features of Type I thinking styles, and at other times, they may show the behaviour that characterized Type II thinking styles.

Intellectual styles and teacher-student interpersonal behaviour

Teaching involves communication and interaction between students and teachers (Goodenow, 1992; Minuchin & Shapiro, 1983). Research evidences to date suggest that people differ consistently from each other in their preferences for certain ways of processing information and this is known as intellectual styles (Zhang & Sternberg, 2006). Intellectual styles influence teachers' preferred teaching styles (Evans, 2004; Riding, 2001, Riding & Watts,

1996; Zhang, 2008a). In a study, Evans (2004) found that teachers with dominant preference for analytic-verbaliser style were identified as adopting the most analytical approach in teaching; whereas teachers with dominant preference for wholist-imager style preferred to teach with the most wholist approach. In another study, Mahlios (1981) observed that teachers with field-independent style preferred to initiate a significantly greater number of academic interactions with their students as a whole class, and that teachers with dominant preference for field-dependent styles tended to interact with their students individually or in small group. A recent research by Zhang (2008b) also found that teachers' teaching styles were consistent with their intellectual styles. Teachers with dominant preference for Type I thinking styles would tend to use Type I teaching styles and teachers with dominant preference for Type II thinking styles would prefer to use Type II teaching styles (Zhang, 2008b). In other words, teacher's natural teaching style is a reflection of their own intellectual styles (Riding, 2002), and teachers' interpersonal behaviour may be related to their own intellectual styles as well. As teachers with preference for Type I thinking styles are more open and global, they may be more inclined to adopt student-teacher interpersonal style that facilitates communication and understanding. Teachers with preference for Type II thinking styles may be more inclined to maintain a strict relationship between students and teachers. In addition, teachers with preference for Type I thinking styles may adopt more diverse types of teaching styles compared to teachers with preference for Type II and Type III thinking styles.

Research objectives and research questions

This study has three research objectives. The first objective is to verify the psychometric properties of the shorter 40-item Questionnaire for Teacher Interaction (QTI) (Wubbels, Créton & Hooymayers, 1985) and the TSI-R. Secondly, it aims to investigate the relationship between teachers' thinking styles and their preferred interpersonal behaviour in teaching. The

third objective is to investigate the features of thinking styles and preferred interpersonal behaviour in teaching among Hong Kong and Macau teachers.

Three research questions are to be addressed in this study: 1) what are the thinking styles of teachers in Hong Kong and Macau? 2) what are the preferred interpersonal behaviours of teachers in Hong Kong and Macau? and 3) can teachers' thinking styles predict their preferred interpersonal behaviour in teaching? As to the third research question, based on the theoretical background and the conceptual link presented above, three hypotheses were developed for this study.

H1. Teachers with dominant preference for Type I thinking style are predicted to have a higher preference for student centered interpersonal behavior;

H2. Teachers with dominant preference for Type II thinking style are predicted to have a higher preference for teacher centered interpersonal behavior;

H3: Teachers with dominant Type I thinking styles show larger number of correlations with QTI than teachers with dominant Type II thinking styles.

Method

Variables

Teachers' thinking styles were considered as independent variable in this study. Teachers' thinking styles were measured by the Chinese translated version of the Thinking Style Inventory-Revised (Sternberg, Wagner, & Zhang, 2003). This instrument measured the 13 thinking style scales. The dependent variable was the preferred teacher interpersonal behaviour in teaching and they were measured by the Questionnaire for Teacher Interaction (Wubbels, Créton, & Hooymayers, 1992). The variables to be controlled in this study were teachers' age, gender, teaching experiences, subject taught, ranking in school, traveling experiences, birth order, parents' occupations and parents' educational levels.

Participants

Data were collected from a sample of 131 (44 male, 83 female) teachers in Hong Kong (n = 94) and Macau (n = 37), China. The teachers in Hong Kong were recruited from a part-time postgraduate program in education in the University of Hong Kong, and the teachers from Macau were invited from a renowned high school in the region. The Hong Kong teachers' ages ranged from 36-40 years. The Macau teachers' ages ranged from 31-35 years. The length of the Hong Kong teachers' teaching experience ranged from 11-15 years, and the Macau teachers' ranged from 6-10. Among the Hong Kong and Macau teachers, they taught courses in sciences and humanities (e.g., arts, Chinese or English language, history, chemistry, biology, and physics).

<Insert Table 1 about here>

Procedure

The Hong Kong participants were teachers who were following a part-time postgraduate program in education, and the Macau teachers were recruited through the principal of a high school in Macau. The questionnaires were distributed to teachers. Teachers were informed about the general purpose of the research and that participation in the research was voluntary.

Measures

Participants provided basic demographic information (e.g., age, gender, subject taught, length of work experience, travel experience, birth order, parents' educational level and occupation). They also responded to two measures: the TSI-R (Sternberg, Wanger, & Zhang, 2003) and the QTI (Wubbels, Créton & Hooymayers, 1985). The TSI-R is a revised version of the TSI (Sternberg & Wagner, 1992). This 65-item inventory contains 13 scales, each corresponding to a thinking style in the MSG (Sternberg, 1997). Each scale is composed of 5 items. Each item is a statement that allows respondents to rate themselves on a 7-point scale ranging from 1 (not at all well) to 7 (extremely well) describing the way they normally carry out their tasks.

The QTI is a 40-item self-report questionnaire in which respondents rate themselves on a 7-point scale ranging from 1 (not at all well) to 7 (extremely well) describing the way they prefer to interact with students. The inventory was designed to assess eight teacher interpersonal behaviours. Each scale was measured by 5 items. We present a sample item for each scale: I hold students' attention (Leadership); I am friendly (Helpful/Friendly); Students can talk to me, if they don't agree with me (Understanding); Student can decide some things in my class (Student responsibility/freedom); I act as if I do not know what to do (Uncertain); I think that student can't do things well (Dissatisfied); I get angry quickly (Admonishing); and I expect students to be silent in my class (Strict).

Data analysis

Cronbach's alpha was used to examine the internal consistency for the scales in the two inventories. Validity of the inventories was examined with exploratory factor analysis. Then multivariate analyses of variance (MANOVAs) was performed to identify any group differences in the TSI-R or the QTI based on age, gender, teaching experience, school types, traveling experiences, ranking in school, birth order, parents educational levels and parents' occupation. Any of these variables would be controlled in the remaining analyses, if statistically significant differences in particular thinking styles and QTI based on these tested variables were found. The MANOVA results are presented in Table 2.

<Insert Table 2 about here>

To explore the relationships between teachers' thinking styles and teacher interpersonal behaviour, partial correlation coefficients between the TSI-R and QTI were calculated, controlling for gender, school types and birth order. To investigate whether teachers' thinking styles statistically predicted teacher interpersonal behaviour in teaching, stepwise multiple regression analyses was used, with teacher interpersonal behaviour as the dependent variables,

thinking styles as the independent variables, and gender, school types and birth order as the control variables.

Results

Internal Scale Reliability

Reliabilities of the research instruments were assessed by the internal consistency estimates of Cronbach's coefficient alpha (α). The alpha (α) scores on 13 thinking style scales and 8 teacher interpersonal behaviour scales for the teachers in Hong Kong and Macau were shown in table 2. In general, the Cronbach's coefficient alpha (α) for the entire sample (N=131) were 0.72 (legislative), 0.70 (executive), 0.72 (judical), 0.81 (hierarchic), 0.63 (monarchic), 0.74 (oligarchic), 0.64 (anarchic), 0.53 (global), 0.64 (local), 0.83 (liberal), 0.74 (conservative), 0.79 (internal), and 0.79 (external), and 8 teacher interpersonal behaviour scales were 0.66 (leadership), 0.65 (helping), 0.62 (understanding), 0.40 (freedom), 0.59 (uncertain), 0.61 (dissatisfying), 0.59 (admonishing), and 0.59 (strict). The Cronbach's coefficient alpha (α) for the teachers in Hong Kong and Macau were reported in the Table 3. In general, the Cronbach's coefficient alpha (α) scores for all the scales were satisfactory and over 0.5 except freedom teacher interpersonal behaviour scales.

In particular, 2 Cronbach's coefficient alpha (α) needed further attention. The Cronbach's coefficient alpha (α) for the freedom (0.21) teacher interpersonal behaviour and global (0.25) thinking styles are unexpectedly low in the Macau sample. In future research, the items measuring these scales need further investigation or revision to verify their reliabilities.

Validity

For the TSI-R, an exploratory factor analysis was performed separately for the Hong Kong and Macau teacher dataset. Factor solution for both samples showed a three-factor solution.

For the Hong Kong teacher sample, the first factor representing Type III thinking styles, including anarchic (0.68), oligarchic (0.51), external styles (0.83), and internal styles (0.81), the second factor representing Type II thinking styles, including executive (0.83), monarchic (0.58), conservative styles (0.86), and local style (0.69), the third factor representing Type I thinking styles, including legislative (0.75), judicial (0.56), hierarchic (0.63), liberal (0.64), and global style (0.73). The three factors accounted for 73.5% of the variance in the data.

For the Macau teacher sample, the first factor representing Type II thinking styles, including executive (0.89), monarchic (0.69), local (0.65), and conservative styles (0.90), the second factor representing Type I thinking styles, including legislative (0.56), judicial (0.70), liberal (0.74), global (0.94) and hierarchic (0.58), and the third factor representing Type III thinking styles, including external styles (0.72), oligarchic (0.75), anarchic (0.83), and internal styles (0.71). The three factors accounted for 60% of the variance in the data.

For the QTI, an exploratory factor analysis was performed separately for the Hong Kong and Macau teacher dataset as well. Factor solution for both samples showed a two-factor solution. The factor loading for all the scales were over 0.4. For both the Hong Kong and Macau teacher sample, the first factor was loaded with leadership, helpfulness, understanding, and freedom. The second factor was loaded with uncertainty, dissatisfaction, admonishment, and strictness. The two factors accounted for 58.2% and 62.8% of the variance in the Hong Kong and Macau data.

Features of thinking styles and teacher-student interpersonal behavior among teachers in Hong Kong and Macau

For the TSI-R: Table 3 shows the profile of thinking styles and teacher interpersonal behaviour styles of teachers in Hong Kong and Macau. In terms of teachers' thinking styles, teaching styles of Hong Kong and Macau teachers were very close, both teachers in Hong

Kong and Macau preferred to use executive, hierarchic, and external thinking styles. In particular, teachers in Hong Kong preferred to use more global and conservative thinking styles than teachers in Macau, whereas, teachers in Macau preferred to use more local and liberal thinking styles.

Statistically significant differences were found in global and liberal thinking styles among teachers in Hong Kong and Macau. Teachers in Hong Kong scored higher on the global thinking styles (M_{HK} = 4.41, SD_{HK} = 0.72; M_{Mac} = 3.89, SD_{Mac} = 0.57; t[125] = 4.35, p<0.05), but lower on the liberal thinking styles (M_{HK} = 4.28, SD_{HK} = 0.93; M_{Mac} = 4.77, SD_{Mac} = 0.46; t[125] = 4.05, p<0.00) compared to teachers in Macau.

<Insert Table 3 about here>

Regarding the QTI, basically the profile of teacher interpersonal behaviour of teachers in Hong Kong and Macau were similar. Both teachers in Hong Kong and Macau preferred to use more student centered (leadership, helpfulness, understanding, and freedom) interpersonal teaching behaviors (with a mean from 4.44 to 5.77) compared to teacher centered (uncertainty, dissatisfaction, admonishment and strictness) interpersonal behaviors (with a mean from 2.30 to 4.19). The result indicated a statistically significant difference between Hong Kong and Macau teachers in using dissatisfaction interpersonal behaviour, with teachers in Hong Kong scored higher than teachers in Macau (M_{HK} = 2.96, SD_{HK} = 0.82; M_{Mac} = 2.77, SD_{Mac} = 1.05; t[125] = 1.05, p < 0.05).

An analysis of variance was also performed on the data obtained for each QTI and thinking styles scales to investigate if it had the ability to differentiate between QTI and thinking styles from different locations (Hong Kong and Macau). This characteristic was examined for each scale of the QTI and thinking styles using one-way ANOVA, with location as the main effect and using the individual teacher as the unit of analysis. Table 3 shows that each QTI and thinking style scale cannot differentiate significantly (p>0.05) between the

locations for our sample.

Differences in thinking and teacher interpersonal behaviour styles based on demographics

Statistically significant differences in particular thinking styles and teacher interpersonal behaviour styles were identified on the basis of all demographic variables except age, subject taught and parents' occupation. In the subsequent data analysis, the demographic variables including gender, teaching experience, school types, teachers' ranking in school, traveling experience, birth order and parents' educational level were controlled. To avoid confusion, the controlled demographic variables are collective named as GES-RTBE.

<Insert Table 4 about here>

Correlations between TSI-R and QTI, controlling for GES-RTBE

As Table 4 shows, after the GES-RTBE was controlled, the thinking style and teacher interpersonal behaviour scales correlated in predictable ways that Type I thinking styles had more correlations with student centered interpersonal behavior compared to Type II and Type III thinking styles; and Type I thinking styles show larger number of correlations with QTI compared to Type II and Type III styles. The results show that Type I thinking styles had a greater number of correlations with student centered interpersonal behaviors compared to Type II and Type III styles. Results show that all five thinking styles of Type I were significantly correlated with the *Helpfulness* and *Freedom* interpersonal behaviors. Three thinking styles of Type I were significantly correlated with the *Leadership* and *Understanding* interpersonal behavior. Type II thinking styles had more significant correlations with teacher centered interpersonal behaviors compared to Type I and Type III thinking styles. The results indicate that, all four thinking styles of Type II showed significant correlations with the *Strictness* interpersonal behavior. The results also showed that Type III thinking styles had significant association with the *Freedom* interpersonal behaviour.

<Insert Table 5 about here>

Prediction of QTI from TSI-R, Controlling for GES-RTBE

Table 5 summarizes the results of the hierarchical multiple regression analyses. These results indicated that after the GES-RTBE were controlled, 7 of the 13 thinking styles statistically predicted 6 teacher interpersonal behaviours. The total contributions of thinking styles and demographic variables to teacher interpersonal behaviours were indicated by the total R^2 values. The variations in teacher interpersonal behaviours accounted for by the demographic variables (as represented by $R^2_{GES\text{-}RTBE}$) were 0.18, 0.10, 0.10, 0.16, 0.13, and 0.09 for the leadership, helpfulness, understanding, freedom, admonishment, and strictness interpersonal behaviours respectively. The unique contributions of thinking styles to teacher interpersonal behaviours beyond the demographic variables (as represented by $R^2_{TSI\_R}$) were 0.05, 0.28, 0.11, 0.13, 0.10, and 0.13, for leadership, helpfulness, understanding, freedom, admonishment, and strictness interpersonal behaviours respectively. Regarding the nature of the unique contributions of thinking styles to teacher interpersonal behaviours, all statistically significant βs except judicial thinking styles were positive, signifying a positive relation. The results indicate that *Legislative* and *hierarchic* (Type I) thinking styles significantly predict two of the student centered interpersonal behaviors (*Helpfulness* and *Freedom*); Executive (Type II) significantly predict one of the teacher centered interpersonal behavior (*Strictness*) (p<.001) Therefore, the results from the regression analyses partly supported the hypotheses.

Discussion

The present study verified the reliability and validity of TSI-R and QTI with Hong Kong and Macau teachers. The features of teacher intellectual styles and their preferred interpersonal behaviors were found. In addition, the relationships between teachers' intellectual styles and

their interpersonal behaviour in teaching were identified. In the following, we discuss these findings.

Preferred interpersonal behaviour in teaching among teachers in Hong Kong and Macau

The results indicate that a very large part of the thinking styles and interpersonal behaviors were not significantly different between the Hong Kong and Macau teachers. Although *t*-test found that there was statistically significant difference in the degree of preference for using *dissatisfaction* interpersonal behaviour in teaching for teachers in Hong Kong and Macau, the mean difference was only 0.19. When comparing this difference (0.19) to the entire scale (1-7), this difference became insignificant (2.7%). The one-way ANOVA with location as the main effect showed that location could not differentiate the statistically significant differences ($p > 0.05$) in means between the two groups. Therefore, it can be concluded that teachers' preferred interpersonal behaviour in teaching were almost identical for teachers in Hong Kong and Macau. This might be related to the fact that although Hong Kong and Macau are two separate Special Administrative Regions of China, they share the same Chinese culture.

Relationships between teachers' thinking styles and their teacher-student interpersonal behavior

Based on the findings in the partial correlation and stepwise multiple regression analysis, it partially supports the prediction that teachers' intellectual styles predict their interpersonal behaviour in teaching. The results show clearly that Type I thinking styles were significantly related to the four student centered interpersonal behaviors (H1). H2 was partly supported as Type II thinking styles were found to be correlated with three of the student centered interpersonal behaviors and two of the teacher centered interpersonal behaviors. The results confirm that teachers with predominant preference for Type I thinking styles prefer to use a

wider range of interpersonal behaviour to interact with students; whereas, teachers with predominant preference for Type II thinking styles prefer to use a narrower range of interpersonal behaviour to interact with students (H3). The findings indicated that teachers with preference for Type I thinking styles preferred to use leadership, helpfulness, understanding, freedom, and strictness interpersonal behaviours in their teaching, while, teachers with preference for Type II thinking styles preferred to use helpfulness, understanding, freedom, dissatisfaction and strictness interpersonal behaviours in their teaching. In other words, both Type I and Type II thinking styles predicted teachers to employ a wider range of interpersonal behaviours in teaching. However, based on the number of statistically significant correlations identified for the Type I and Type II thinking styles, we can conclude that teachers with predominant preference for Type I thinking styles were more inclined to adopt student centered interpersonal behaviours compared to their Type II counterparts, whereas teachers with preference for Type II thinking styles were more inclined to use coercive or teacher centered interpersonal behaviour to teach their students.

These findings lend some support to the advocate of value-laden nature of intellectual styles. Zhang and Sternberg (2006, 2009) proposed that one feature of intellectual styles is that they are value-laden. It means some kinds of intellectual styles are more effective in producing positive behaviour than others. Referring to the findings in the correlation analysis and regression analysis, it showed that Type I thinking styles could predict teachers' preference for student centered interpersonal behaviour in teaching, and Type II thinking styles predicted teachers' preference for both student centered and teacher centered interpersonal behaviours. A recent research suggested that Type I thinking styles were consistently considered to facilitate more effective learning, whereas Type II thinking styles were repeatedly deemed to hinder effective learning (Zhang, 2008b). Findings in this study echoed with the findings from the previous research, as intellectual styles were value-laden,

and value-laden nature of the intellectual styles could be identified from the interpersonal behaviour manifested by intellectual styles.

Our study predicted that teachers with predominant preference for Type I thinking styles show larger number of significant correlations with QTI than teachers with preference for Type II intellectual styles. The findings from the partial correlation and stepwise multiple regression both support this hypothesis (H3). These findings can help to explain why Type I intellectual styles are more effective in producing positive behaviour than their Type II counterparts. In practice, we expect teachers to demonstrate a wider range of interpersonal behaviour to interact with students and to make the lesson more interesting. On the other hand, if teachers used only one or two types of interpersonal behaviour in teaching, and at the same time teachers use coercive interpersonal behaviour such as dissatisfaction to control and hold students' attention. It is beyond doubt that the lesson will be boring and students will soon lose interest in learning.

Significance of this study

This study made three contributions in research in this filed. First, it found that teachers' thinking styles predict teacher interpersonal behaviours. These findings expand the theoretical development of Model for Interpersonal Teacher Behaviour (MITB) (Wubbels, Créton & Hooymayers, 1985) to consider the effects of teachers' intellectual styles on their choice of interpersonal behaviour in teaching. Although the systems perspective argues that interpersonal behaviour are conjoint behaviours of two people during their interaction with each other, when students first meet their teachers or vice verse, one of the most significant factors that determining their choice of interpersonal behaviour is their intellectual styles.

The second contribution of this study is that it offers empirical support to the theoretical development for both constructs of intellectual styles and teacher interpersonal behaviours. Zhang and Sternberg (2006, 2009) commented that styles are value-laden.

However, there is a long debate over whether styles are value-laden or value free, and this is a significant issue that threatens theoretical advancement of styles. The traditional view of styles suggested that they are neither better nor worse than each other, but simply different from each other. However, the present study and previous studies (Zhang, 2008a, 2008b) lend support that intellectual styles are value-laden. Type I thinking styles produce more effective teaching and learning, whereas Type II thinking styles could hinder learning and student-teacher interaction.

The third contribution is that this study provides empirical evidence for the reliability and validity of the QTI and TSI-R instruments. Educators or school principals can use the Chinese Thinking Styles Inventory-revised (Sternberg, Wagner & Zhang, 2003) and Questionnaire for Teacher Interaction (Wubbels, Créton & Hooymayers, 1985) to assess their teachers' thinking styles and their preferred interpersonal behaviour in teaching, which can be helpful for school principals to analyze the teaching effectiveness of teachers. Based on individual teacher's profile, it is possible to tailor-made training program for teachers to enhance their teaching. By repeating this study in secondary schools, principals, or subject heads can identify the most effective thinking styles and interpersonal teaching behaviour for a particular subject. Furthermore, Sternberg (1997) suggested that intellectual styles can be trained. In other words, it is possible to help teachers to develop specific type of interpersonal behaviour through training. For example, if more student-centered interpersonal behaviour in teaching should be encouraged, teachers can be trained to get familiarized with the use of Type I intellectual styles and the characteristics of interpersonal behaviours that are student-centered.

Limitations

This study had some limitations. First, this study was relied on convenience sampling method and teachers in Macau were selected from one school. Therefore, generalization of results in

the Hong Kong and Macau contexts should be cautious. Secondly, the short version of the Questionnaire for Teacher Interaction (Wubbels, Créton & Hooymayers, 1985) was used instead of the full version, which may be less comprehensive to reflect the complexity of teacher-student interpersonal behaviors. Thirdly, the teachers invited to this study were all teaching in secondary schools. Therefore, the results may be not suitable for other levels of education. In addition, an exploratory data analysis method was used to verify the psychometric properties of the scales with limited samples. A larger randomized sample should be use in the future study in order to further validate the psychometric properties of the instruments. In addition, more advanced data analysis methods such as LISREL could be employed for data analysis in future studies.

Conclusions

Although this study had the above limitations, this study is valuable as it is a pioneer research to examine the relationships between teachers' intellectual styles and their preferred interpersonal behaviour in teaching in the Hong Kong and Macau contexts. The identified relationships can be helpful for educators to be more attentive to the development of teachers' intellectual styles and correspondingly to the development of more student-centered interpersonal behaviors in order to facilitate more effective teacher-student interaction.

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FIGURE 1

The Model for Interpersonal Teacher Behavior

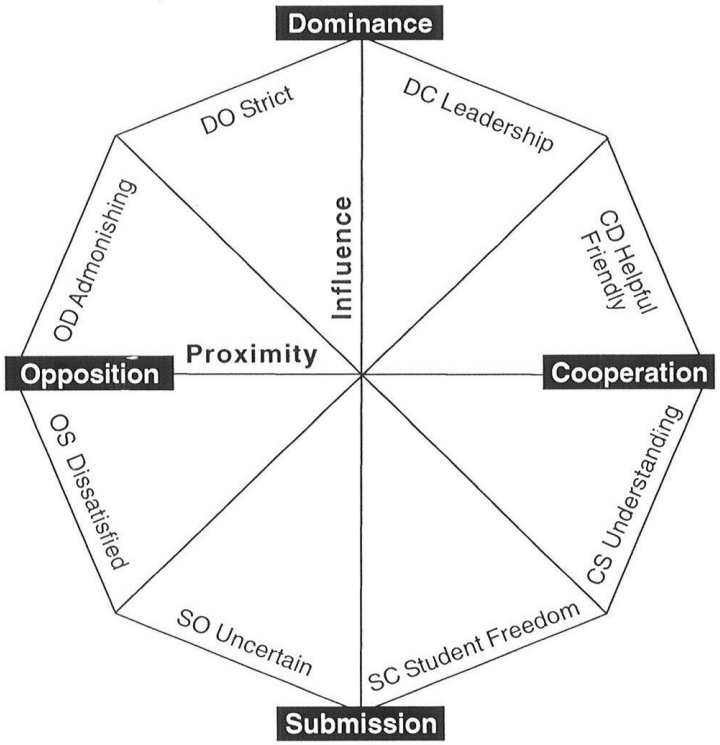

Table 1. General characteristics of teachers in Hong Kong and Macau (N = 131)

	Hong Kong		**Macau**
Gender	64% (female teachers)		62% (female teachers)
Age	36-40		31-35
Experiences	11-15		6-10
Subject	Science teachers		Science teachers
School type	Government subsidized		Private school
Rank	Teachers		Teachers
Travel	More than 7 times		More than 7 times
Birth order	In between		In between
Parents' education	Primary education		Secondary education
Parents' job	Manual worker		Manual worker

Table 2: One-way MANOVA of controlled variables with thinking styles

Source	Wilks' Λ	F	Hypothesis df	Error df	Sig.	η^2
Age	0.28	0.99	147	749	0.49	0.16
Gender	0.77	1.72	21	104	**0.04***	0.26
Teaching experience	0.35	0.95	126	604	0.64	0.16
School types	0.59	3.52	21	108	**0.00****	0.41
Traveling experiences	0.61	1.32	42	200	0.11	0.22
Ranking in school	0.65	1.21	42	214	0.20	0.19
Birth order	0.43	1.66	63	317	**0.00****	0.25
Parents educational level	0.56	0.77	84	401	0.93	0.14
Parents' occupation	0.35	0.86	126	552	0.84	0.16

*** p<0.001, ** p<0.01, *p<0.05

Table 3. Group differences in QTI and thinking styles ($N = 131$)

	HK (N=94)		**Mac (N=36)**				ANOVA
	Mean (S.D)	**alpha**	**Mean**	**alpha**	**t**	**Sig.**	η^2
Teacher Interpersonal behavior							
Leadership	5.55 (0.65)	0.68	5.28 (0.70)	0.63	2.11	0.45	0.04
Helping	5.65 (0.66)	0.67	5.76 (0.63)	0.60	-0.91	0.47	0.05
Understanding	5.77 (0.56)	0.63	5.69 (0.61)	0.61	0.74	0.20	0.04
Freedom	4.44 (0.64)	**0.48**	4.57 (0.66)	**0.21**	-0.98	0.62	0.00
Uncertain	2.47 (0.80)	0.62	2.52 (0.81)	0.65	-0.32	0.78	0.00
Dissatisfying	2.96 (0.82)	0.53	2.77 (1.05)	0.74	**1.05**	**0.04***	0.00
Admonishing	2.30 (0.67)	0.65	2.37 (0.62)	0.53	-0.55	0.28	0.00
Strict	3.94 (0.72)	0.57	4.19 (0.86)	0.61	-1.73	0.34	0.02
Thinking styles							
Legislative	4.94 (0.79)	0.77	5.16 (0.78)	0.76	-1.44	0.91	0.02
Executive	5.05 (0.66)	0.66	5.32 (0.81)	0.76	-1.98	0.07	0.03
Judical	4.57 (0.77)	0.74	4.39 (0.64)	0.68	1.24	0.09	0.01
Hierarchic	5.22 (0.85)	0.84	4.99 (0.74)	0.75	1.41	0.32	0.02
Monarchic	4.62 (0.79)	0.61	4.71 (0.61)	0.96	-0.66	0.23	0.00
Oligarchic	4.69 (0.87)	0.72	3.88 (0.75)	0.77	5.03	0.46	0.17
Anarchic	4.28 (0.90)	0.66	4.01 (0.73)	0.55	1.58	0.11	0.02
Global	4.41 (0.72)	0.64	3.89 (0.57)	**0.25**	**4.35**	**0.04***	0.11
Local	4.08 (0.88)	0.68	4.55 (0.70)	0.49	-2.91	0.08	0.06
Liberal	4.28 (0.93)	0.84	4.77 (0.46)	0.83	**-4.05**	**0.00****	0.07
Conservative	4.61 (0.81)	0.80	4.72 (0.89)	0.75	-0.71	0.61	0.00
Internal	4.12 (0.91)	0.78	3.65 (0.75)	0.80	2.84	0.26	0.00
External	4.90 (0.87)	0.83	5.18 (0.79)	0.69	-1.71	0.71	0.02

*** $p<0.001$, ** $p<0.01$, * $p<0.05$

Table 4. Partial Correlation Coefficients for TSI-R and QTI Scale Items, Controlling for Gender, Teaching experience, School types, Teachers' ranking in school, Traveling experience, Birth order and Parents' educational level (N = 131)

	Student centered interpersonal behaviour				**Teacher centered interpersonal behaviour**			
Factors	1	2	3	4	5	6	7	8
Type I Thinking styles								
Legislative	**0.21***	***0.40****	**0.23***	***0.40****	0.01	0.08	0.05	0.15
Judicial	**0.24***	***0.30****	**0.28****	***0.30****	0.08	-0.01	-0.15	0.12
Hierarchic	**0.21***	***0.42****	***0.36****	**0.23***	-0.13	-0.04	-0.11	**0.21***
Global	0.18	**0.22***	0.15	**0.25***	-0.06	0.16	0.17	0.16
Liberal	0.15	**0.29****	0.10	**0.19***	0.05	-0.08	0.02	0.16
Type II Thinking styles								
Executive	0.16	***0.49****	**0.22***	**0.26***	-0.02	**0.25***	0.06	***0.41****
Monarchic	0.14	**0.28****	**0.19***	**0.22***	0.06	0.07	0.13	**0.26***
Local	0.01	0.11	0.03	-0.03	0.15	0.00	0.08	**0.19***
Conservative	0.06	**0.26***	0.05	0.10	-0.03	**0.23***	0.11	***0.32****
Type III Thinking styles								
Oligarchic	***0.30****	***0.34****	**0.21***	**0.28****	-0.03	0.14	0.05	**0.22***
Anarchic	0.13	0.18	0.17	**0.19***	0.17	-0.11	-0.10	0.05
Internal	0.03	0.10	0.00	**0.28****	0.17	0.16	0.08	0.12
External	**0.20***	**0.29****	***0.34****	**0.21***	0.02	-0.08	0.02	0.04

(1) Leadership, (2) Helpfulness, (3) Understanding, (4) Freedom,
(5) Uncertain, (6) Dissatisfaction, (7) Admonishing, (8) Strict; *** p<0.001, ** p<0.01, *p<0.05

Table 5. Predictions of Teacher Interpersonal Behaviours from Thinking Styles, Controlling for Gender, Teaching experience, School types, Teachers' ranking in school, Traveling experience, Birth order and Parents' educational level (N = 131)

Scale	**Leadership**	**Helpfulness**	**Understanding**	**Student Freedom**
$R^2_{(GES-RTBE)}$	0.18	0.10	0.10	0.16
$R^2_{(TSI-R)}$	0.05	0.28	0.11	0.13
$R^2_{(total)}$	0.23	0.38	0.21	0.29
β	$0.26_{Oligarchic}$*	$0.40_{Executive}$***	$0.35_{External}$***	$0.37_{Legislative}$***
		$0.24_{Hierarchic}$*		
F	2.36*	4.52***	2.14*	3.24***
df	12/95	13/94	12/95	12/95
Scale	**Uncertain**	**Dissatisfying**	**Admonishing**	**Strict**
$R^2_{(GES-RTBE)}$	0.10	0.12	0.13	0.09
$R^2_{(TSI-R)}$			0.10	0.13
$R^2_{(total)}$			0.23	0.22
B			0.35_{Global}**	$0.39_{Executive}$***
			$-0.24_{Judicial}$*	
F			2.13*	2.25***
df			13/94	12/95

*** p<0.001, ** p<0.01, *p<0.05