Tensions between knowledge transmission and student-focused teaching approaches to assessment purposes: Helping students improve through transmission

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Abstract

This study surveyed 1,064 Chinese school teachers' approaches to teaching and conceptions of assessment, and examined their inter-relationship using confirmatory factor analysis and structural equation modeling. Three approaches to teaching (i.e., Knowledge Transmission, Student-Focused, and Examination Preparation) and six conceptions of assessment (i.e., Student Development, Teaching Improvement, Examination, Control, School Accountability, and Irrelevance) were identified. Teachers indicated they used Student-Focused most frequently and this positively predicted the assessment purposes of Student Development and Teaching Improvement, while loading negatively on Control, School Accountability, and Irrelevance. The Knowledge Transmission teaching approach, in contrast, positively predicted the assessment purposes of Examination, School Accountability, Control, Student Development, and Teaching Improvement. Thus, despite a predominantly student-focused approach to teaching, knowledge transmission was seen as a teaching approach that contributed positively to student learning. Possible explanations for this anomalous result are discussed.

Key words: Beliefs on Assessment; Teaching; Chinese teachers; Structural equation modeling

Introduction

How people perceive a phenomenon expresses, shapes, and influences the actions they take (Ajzen, 2005), and influences what students learn or achieve (Calderhead, 1996; Rubie-Davies, Flint, & McDonald, 2011). Pajares (1992) reviewed research on teacher beliefs and argued that "teachers' beliefs can and should become an important focus on educational inquiry" (307). Additionally, teachers' beliefs play an important part in mediating how educational reforms are implemented in schools and classrooms (Richardson & Placier, 2001). There is strong evidence that teachers' conceptions of teaching have affected their approaches to teaching (Chen, Brown, Hattie, & Millward, 2012; Trigwell, 2012; Trigwell & Prosser, 2004) and teachers' conceptions of assessment have an impact on their assessment practices in classrooms (Segers & Tillema, 2011). Therefore, explicit attention to teachers' two key conceptions—teaching (i.e., approaches to teaching) and assessment (i.e., purposes) is critical since much educational policy is implemented by and through school teachers.

It has also been shown that teachers' beliefs about different aspects of teaching activity are interrelated. For example, Brown (2008) found that teacher beliefs about teaching, curriculum, learning, and assessment intermixed to form coherent inter-relationships among the activities of teaching. Additionally, through socialization processes, teacher beliefs have been found to be context-dependent (Gao & Watkins, 2002) and ecologically rational (Brown & Harris, 2009). Hence, it is assumed that investigating the relationship of teachers' beliefs about two key activities (i.e., teaching and assessment) in a specific cultural context is more valuable than studying either construct in isolation or treating context as irrelevant. This paper evaluates the validity of two pre-existing models of Chinese teachers' approaches to teaching and conceptions of assessment and examines the relationship of those belief structures to each other. The research question of this study is: to which extent are Chinese school teachers' self-reported approaches to teaching related to their conceptions of assessment?

Theoretical Framework

Teachers' conceptions of approaches to teaching

Research has shown that there are two broad concepts or beliefs about teachers' thinking about the nature of teaching. These beliefs or 'approaches to teaching' can be either teacher-centered or student-centered (Biggs, 1999; Cuban, 2007; Kember, 1997; Trigwell, 2012). Teacher-centered teaching refers to teachers controlling what is taught, when, and under what conditions, and with instruction being predominantly a transmission of knowledge, skills, and values to students. The emphasis is on the teacher organizing, structuring, and presenting the course content in a way that is easier for the students to understand. On the other hand, teachers who adopt a student-centered approach tend to see students as more than passive recipients. Instead, teachers recognize that students bring to school an array of physical, psychological, emotional, and intellectual needs plus experiences that require both nurturing and prodding. Student-centered teachers focus on developing students' existing ideas, encouraging them to construct their own knowledge, and developing in their understanding (Trigwell, 2012). While conceptually opposite, it has been suggested (Brown, Lake, & Matters, 2009) that teacher-centered and student-centered orientations may be parallel emphases, meaning that teachers can simultaneously believe in being both teacher-centric and student-centric. This might arise in circumstances in which teachers are given high levels of professional responsibility and authority over what happens in classroom teaching, while at the same time having to give account for outcomes through formal school or teacher evaluation mechanisms.

Approaches to teaching in China seem to have strong features, such as being largely authoritarian, expository, text-based, and teacher-directed including drilling for externally-mandated, high-stakes examinations (OECD, 2011; Watkins & Biggs, 2001). However, there is also a strong Confucian tradition of viewing teaching as a student-centered means of developing engaged, life-long learners (Chen, 2014) in which teachers love their students and act as role models (Chen, Brown, Hattie, & Millward, 2012; Cortazzi & Jin, 1996). This mixture of teacher- centered and student-centered beliefs among Chinese teachers as to what makes good teaching is well established (Chen, Brown, Hattie, & Millward, 2012; Watkins & Zhang, 2006).

Teachers' conceptions of assessment

A recent major review of teacher beliefs about assessment (Barnes, Fives, & Dacey, 2015) has presented a continuum ranging from extreme pedagogical orientations to extreme accounting views along with irrelevance as the basis for understanding this topic. This work has relied heavily on Brown (2008) and Remesal (2011) which both suggest that, notwithstanding the many uses of assessment (e.g., Newton, 2007), all purposes of assessment reduce to one of four major options. These are: (1) assessment as improvement of teaching and learning (Improvement); (2) assessment as making schools and teachers accountable for their effectiveness (School Accountability); (3) assessment as making students accountable for their learning (Student Accountability); and (4) assessment as fundamentally irrelevant to the life and work of teachers and students (Irrelevance). The first three may loosely be categorized as 'purposes' and the last option an 'anti-purpose'. While the improvement purposes require teachers to be assessment capable, the continued use of high-stakes examinations or school accountability testing is likely to keep teacher thinking focused on the extreme accountability and evaluative purposes (Kennedy, Chan, & Fok, 2011).

Survey research from Brown and his colleagues in New Zealand (Brown, 2011), Queensland (Brown, Lake, & Matters, 2011), and Cyprus (Brown & Michaelides, 2011) has consistently shown that primary and secondary teachers endorsed most strongly the improvement of teaching and learning. Student accountability tended to be endorsed by secondary teachers somewhat more than primary teachers, while the use of assessment to evaluate schools elicited very weak agreement. In general, the improvement purpose was weakly correlated with the student accountability purpose. The studies give the impression that, in general, teachers believe that assessment is relevant for improved teaching and learning.

A number of studies into teacher beliefs about assessment have been carried out in the Chinese contexts. A survey of nearly 300 primary and secondary school teachers in Hong Kong showed that teachers, while endorsing the improvement purpose, had a strong and positive correlation between the improvement conception and the student evaluation conception (Brown, Kennedy, Fok, Chan, & Yu, 2009). Similarly, polytechnic lecturers in southern China (Li & Hui, 2007) agreed most strongly with assessment for teaching improvement and evaluation of schools and teachers. A large scale survey study of teachers in Hong Kong and south China found a strong positive association between assessment for educational improvement and assessment as accountability (Brown, Hui, Yu, & Kennedy, 2011). These three studies highlight that student accountability examinations are not only part of the assessment policy context, but are deeply embedded in how Chinese teachers conceive of assessment for improved learning and teaching. This association has been attributed to cultural features of the Confucian system which emphasize educational testing as a force for

improved learning, greater socio-economic benefits, and a mechanism for social equality (Brown, Kennedy, Fok, Chan, & Yu, 2009; Brown, Hui, Yu, & Kennedy, 2011; Chen, 2014).

The China context

To understand Chinese teachers' conceptions, it is necessary to familiarize the readers with educational reforms and policies and contextual features in China. China has a long tradition of high-stakes examinations to select students for limited opportunities in higher levels of education; indeed, "Chinese people have a tradition of changing their lives through examinations" (Dorgan, 2000, p. 15). Both Confucian tradition and contemporary policy place considerable value on high examination scores for both students and teachers (Li, 2009; Min, 1997).

The impact of these practices can be seen in the beliefs and attitudes of teachers. Teachers within Confucian heritage societies appear to see frequent summative assessment and practice for formal examinations as a means of motivating effort and as a means of guiding instruction (Kennedy, Chan, & Fok, 2011). They adopt an examination preparation model of teaching (Gao & Watkins, 2002), in accordance with parental expectations (Watkins & Biggs, 2001). However, dating back to the 1990s, the Ministry of Education of the People's Republic of China (MOE) has sought to reduce the impact of examinations in China (Han & Yang, 2001). The 2001 National Curriculum (MOE, 2010)attempts to transform current Chinese education into a more student-oriented experience by reducing the emphasis on examination results as the basis for evaluating schools, teachers, and students. These initiatives include the introduction of integrated quality teaching and assessment which emphasizes judging students' personal character along with their academic progresses (Liu & Qi, 2005; MOE, 2010). Hence, it is expected that the conflicting pressures of tradition and the new curriculum might make themselves evident in the beliefs of practicing teachers who have to reconcile the hard policy of examinations and the soft policy of the curriculum reform.

Method

Sample

On a convenience basis, the authors contacted 12 schools from four cities in two Northern provinces in China. A sample of 1500 Chinese teachers, from the 12 schools in four cities in China, was approached and 1064 valid questionnaires were returned (Table 1) giving a response rate of 71%. Almost half of the sample (47%) was from primary schools, a third (34%) were from middle schools, and less than a fifth (18%) were from high schools. About seven-eighths (85%) of the teachers were women. Over half of the teachers (61%) held a senior teacher certificate[1], a third (31%) held an intermediate teacher certificate, and only 5% held a junior teacher certificate. Four-fifths of the teachers (82%) held a Bachelor qualification, a tenth (10%) held a Master qualification, and only about a twentieth (6%) held a Diploma qualification. About a quarter of the teachers (26%) were relatively young, two-fifths (43%) were between 30 and 40 years old, and a third (32%) were aged over 40 years. The years of teaching experience were consistent with age; two fifths (39%) had taught less than 10 years, two-fifths (37%) between 11-20 years, and 24% more than 20 years. About a third (30%) taught sciences and two-thirds taught social sciences and humanities.

[1]In China, junior, intermediate, and senior teacher certificates are issued based on criteria related to years of teaching, academic degree, number of published articles, and teaching performance, etc.

Table 1. Teacher participants' democratic information

Demographic	Primary	Middle	High School	Total
Sex				
Women	443	317	129	889
Men	58	47	61	166
Teaching Certificate				
Senior	321	225	105	651
Intermediate	145	107	80	332
Junior	20	27	4	51
Qualification				
Masters	34	52	17	106
Bachelor	403	298	167	868
Diploma	55	8	2	65
Age				
>40	155	116	68	339
30-40	200	159	92	452
<30	151	92	30	273
Teaching Experience				
>20 years	141	65	48	254
11-20 years	162	181	53	396
<11 years	203	121	90	414
Teaching Subject				
Sciences	99	132	83	314
Humanities	404	230	107	741
Total	506	367	189	1062

Instruments

The self-report survey instruments used were the Approaches to Teaching Inventory (ATI) (Trigwell & Prosser, 2004; Trigwell, Prosser, & Ginns 2005) and the Chinese version of Teachers' Conceptions of Assessment (C-TCoA) (Brown, Hui, Yu, & Kennedy, 2011).

Approaches to Teaching Inventory. Trigwell and Prosser (2004) identified five different approaches to teaching in the Approaches to Teaching Inventory (ATI). These were: Approach A = teacher-centered strategy focused on transmitting facts and skills; Approach B = teacher-centered strategy focused on helping students acquire the concepts and relationships of concepts within a discipline; Approach C = an interactive strategy between teacher and students; Approach D = a student-centered strategy focused on students developing the worldviews or conceptions they already have; and Approach E = a student-oriented strategy focused on requiring students to re-construct their knowledge to produce a new worldview or conception independent of teachers. The Approaches to Teaching Inventory captures variations around these five approaches to teaching as either an information transmission/teacher-focused (ITTF) approach or a conceptual change/student-focused (CCSF) approach. This inventory has been utilized widely in different contexts (including China). Stable factor structure, with high reliabilities (> .80), has been reported in tertiary education settings in a variety of jurisdictions (Trigwell 2012; Trigwell et al., 2005). The TCAT has 22 items, with 11 items in the conceptual change/student-focused (CCSF) approach and 11 items in the information transmission/teacher-focused (ITTF) approach. Participants were asked to indicate how

frequently they utilized each approach during their teaching using the frequency scale with five response options.

Chinese—Teachers' Conceptions of Assessment. The Teacher Conceptions of Assessment in Chinese contexts (C-TCoA) inventory was developed in Hong Kong and southern China (Brown, Hui, Yu, & Kennedy, 2011; Hui, 2012; Wang, 2010). Statistical modeling found three inter-correlated major factors (i.e., Improvement, Irrelevance, and Accountability). Two factors had three sub-factors each; Improvement consisted of Accuracy, Student Development, and Help Learning, while Accountability consisted of Examination, Teacher and School Control, and Error. There was statistically equivalent responding between Hong Kong and China teachers, but there were large mean score differences with Hong Kong teachers endorsing both Improvement and Accountability more, while Chinese teachers agreed more with Irrelevance. The questionnaire used a balanced eight-point agreement rating scale, with four positive and four negative options.

Analysis

Confirmatory factor analysis was used to determine whether the responses of the participants fit the pre-existing factor models for the TCAT and C-TCoA. Upon discovering poor-fit for each model, exploratory factor analysis was used to develop an alternative model for each inventory (TCAT and C-TCoA respectively), and confirmatory approaches were used to establish the fit of the new trimmed model. A conventional approach was taken to determining the number of potential factors and their members: factors had to have (1) eigen-values>1.00, (2) at least three items which were conceptually aligned, (3) items with regression loadings of >.30, and (4) all cross-loadings had to be <.30 (Bandalos & Finney, 2010). Modification indices were also used to identify and remove items with strong cross-factor loadings. Structural equation modeling was then used to determine the relationship of the TCAT to the factors of the C-TCoA. Predictor paths were tested from each TCAT factor to the C-TCoA factors and statistically non-significant paths were removed. Note details of steps taken to revise models are omitted for reasons of space.

In line with current practice (Fan & Sivo, 2007; Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004), a multi-criteria approach for acceptable model fit was adopted; models were not rejected if gamma hat and CFI were ≥.90, root mean square errors of approximation (RMSEA) and standardized root mean residuals (SRMR) were ≤08, and the $\chi^2/\underline{df}$ ratio was statistically non-significant (p >.01). Models that met these criteria were not rejected.

Results

The original models were either inadmissible or very poor fitting, indicating that there were significant differences in responses to the inventories in this sample of teachers. Hence, we report a completely new analysis for these teachers from north-east Mainland China.

Approaches to teaching

The revised ATI model for teachers consisted of three inter-correlated factors (i.e., Examination Preparation, Knowledge Transmission, and Student-Focused) based on 12 items (χ^2=275.94; df=51; χ^2/df=5.41, p=.02; CFI=.93; gamma hat=.97; RMSEA=.064; SRMR=.048) (Table 2 provides items). The Knowledge Transmission factor focused on imparting knowledge to students. The Examination Preparation factor referred to examination-centred teaching practices. The Student Focused factor described how teachers support student and their learning using more student-centred teaching pedagogies.

Table 2. ATI and TCoA-C factors, items, and factor loadings

Scale and Items	*Factor Loading*
Approaches to Teaching	
AT1. Knowledge Transmission	
16. In this subject my teaching focuses on the good presentation of information to students.	.64
19. My teaching in this subject focuses on delivering what I know to the students.	.64
4. It is important to present a lot of facts to students so that they know what they have to learn for this subject.	.54
6. In this subject I concentrate on covering the information that might be available from key texts and readings.	.52
AT2. Examination Focused	
9. I structure my teaching in this subject to help students to pass the formal assessment items.	.70
11. In this subject, I provide the students with the information they will need to pass the formal assessments.	.67
2. It is important that this subject should be completely described in terms of specific objectives that relate to formal assessment items.	.59
10. I think an important reason for running teaching sessions in this subject is to give students a good set of notes.	.55
AT3. Student Focused	
18. In teaching this subject it is important for me to monitor students' changed understanding of the subject matter.	.72
17. I see teaching as helping students develop new ways of thinking in this subject.	.68
21. Teaching in this subject should include helping students find their own learning resources.	.61
20. Teaching in this subject should help students question their own understanding of the subject matter.	.56
Assessment Purposes	
A1. Student Development	
24. Assessment stimulates students to think.	.83
22. Assessment cultivates students' positive attitudes towards life.	.83
20. Assessment is used to provoke students to be interested in learning.	.81
52. Assessment identifies students' multiple intelligences.	.65
A2. Irrelevance	
4. Assessment is unfair to students.	.78
26. Assessment is an imprecise process.	.62
10. Assessment has little impact on teaching.	.54
A3. Teaching Improvement	
8. Assessment allows teachers to know if they achieve any breakthrough in their teaching.	.75
5. Assessment information modifies ongoing teaching of students.	.66
32. Assessment information is collected and used during teaching.	.62
A4. Examination	

Scale and Items	*Factor Loading*
38. Assessment sets the schedule or timetable for classes.	.82
33. Assessment teaches examination-taking techniques.	.74
39. Assessment helps students gain good scores in examinations.	.70
44. Assessment helps students avoid failures on examinations.	.67
A5. School Accountability	
15. Assessment is a good way to evaluate a school.	.82
28. Assessment measures the worth or quality of schools.	.77
19. Assessment provides information on how well schools are doing.	.75
A6. Control	
63. Schools use assessment to monitor teachers' work.	.76
57. Assessment results are used to reward and punish teachers.	.70
35. Assessment indicates how good a teacher is.	.68

The teachers claimed to use student-focused teaching approaches reasonably frequently, whilst the two more teacher-centred factors (Knowledge Transmission and Examination Preparation) were used just over about half of the time (Table 3). Note that the mean differences in frequency between student-focused and the two teacher-centred factors were large (d= 0.74 Knowledge Transmission and d=0.84 Examination Preparation).

Table 3. ATI and TCoA-C factor Means, SDs, and Cronbach α

Scale	*M*	SD	Cronbach α	Cohen's *d* effect sizes*				
Approaches of Teaching				AT2	AT3			
AT1. Knowledge Transmission	3.21	.74	.66	.14	.74			
AT2. Examination Focused	3.10	.83	.72	—	.84			
AT3. Student Focused	3.73	.67	.74		—			
Assessment Purposes				A2	A3	A4	A5	A6
A1. Student Development	5.18	1.53	.86	.66	.41	.39	.23	.63
A2. Irrelevance	4.21	1.43	.68	—	1.15	.26	.41	.01
A3. Teaching Improvement	5.76	1.27	.71		—	.85	.66	1.09
A4. Examination	4.59	1.49	.82			—	.15	.25
A5. School Accountability	4.82	1.55	.81				—	.40
A6. Control	4.20	1.57	.76					—

Note. * = effect sizes shown as absolute values

Factor inter-correlations were weak to moderate indicating relative independence of each approach from each other (Table 4).

Table 4. ATI and TCoA-C Factor Inter-Correlations

	Approaches of Teaching			Assessment Purposes					
Scale	AT1	AT2	AT3	A1	A2	A3	A4	A5	A6
Approaches to Teaching									
AT1. Knowledge Transmission	—								
AT2. Examination Focused	**.58**	—							
AT3. Student Focused	**.33**	**.22**	—						
Assessment Purposes									
A1. Student Development	.25	.16	.17	—					
A2. Irrelevance	.07	.10	-.02	**-.04**	—				
A3. Teaching Improvement	.22	.19	.27	**.57**	**-.11**	—			
A4. Examination	.30	.26	.05	**.44**	**.30**	**.36**	—		
A5. School Accountability	.25	.20	.11	**.69**	**.09**	**.53**	**.52**	—	
A6. Control	.22	.18	.01	**.47**	**.31**	**.29**	**.66**	**.63**	—

Note. Values in bold are inter-correlations within inventories; values <.06 are not statistically significant .

Multivariate analysis of variance (MANOVA) with main and all two-way effects for Sex, Age, School Level (i.e., primary, middle, or high school), and Teaching Subject found two statistically significant main characteristics and one interaction effect (see Table 5). The main effects differences applied only to the Examination Preparation and Student Focused scales.

Table 5. Statistically Significant MANOVA and Univariate results for ATI and TCoA-C scales

MANOVA & Univariate Effects	*df*	*F*	*p*
Approaches to Teaching			
School Level	9, 2519	14.32	<.001
Examination focused	3	28.52	<.001
Teaching Experience	6, 2070	3.06	<.01
Student focused	2	5.67	<.001
School Level by Subject	6, 2018	4.38	<.001
Chinese—Teacher Conceptions of Assessment			
Age	12,2064	1.96	<.05
Student Development	2	3.22	.04
Irrelevance	2	4.48	.01
Control	2	3.12	.04
School Level	18,2919	2.19	<.01
Teaching Improvement	3	3.10	.03
Examination	3	2.66	<.05
School Accountability	3	5.03	<.001
Subject	6,1032	3.88	<.01
Irrelevance	1	6.48	.01

MANOVA & Univariate Effects	*df*	*F*	*p*
School Accountability	1	4.45	.04
Teacher Certificate Irrelevance	4	2.74	.03
School Level by Subject	6,950	2.22	.04

Assessment purposes

The revised C-TCoA model for teachers consisted of six inter-correlated factors (i.e., Student Development, Irrelevance, Teaching Improvement, Examination, School Accountability, and Control) based on 20 items (χ^2=871.39; *df*=155; χ^2/*df*=5.62, *p*=.02; CFI=.93; gamma hat=.94; RMSEA=.066; SRMR=.051). The Student Development factor referred to using assessment to help students develop the characters and life-long learning skills and abilities (see item details in Table 2). The Irrelevance factor described assessment being unfair and imprecise and having little impact on teaching. The Teaching Improvement factor focused on how assessment monitors, guides, and informs teaching. The Examination factor suggests school-based assessment prepares students for success in examinations. The School Accountability factor states that assessment is a good indicator of school quality. The Control factor indicated that assessment could be used to monitor, evaluate, and reward teachers' work.

The teachers gave more than 'mostly agreed' ratings for two assessment purposes: Teaching Improvement and Student Development (Table 3). However, the means for the factors Irrelevance and Control were just over 4.00 'slight disagreement' and well below 'slight agreement', suggesting that, on average, these purposes were rejected, rather than endorsed. Effect size differences were large (*d* >.60) between Teaching Improvement and all other factors, except for Student Development. Like Teaching Improvement, Student Development had a large effect relative to Irrelevance and Control. Otherwise, effect sizes were small to moderate. Inter-correlations (Table 4) were also weak to moderate with the strongest connection being between School Accountability and Student Development (*r*=.69).

Multivariate analysis of variance (MANOVA) with main and all two-way effects for Sex, Age, School Level, and Teaching Subject found that three main characteristics had statistically significant mean differences (i.e., Age, School Level, and Subject) and one interaction effect (School Level by Subject) (Table 5). Univariate analysis showed that all six C-TCoA scales had statistically significant effects, with different fixed factors. For example, School Level had statistically significant mean differences on Teaching Improvement, Examination, and School Accountability.

Structural model

In order to address the inter-correlated nature of the ATI and C-TCoA inventories, with the former as predictors to the latter dependent factors, correlation paths were introduced among the factor residuals within each inventory. The average correlation between Knowledge Transmission with the assessment purposes was *r* = .22; whereas, it was just *r* = .10 for the Student Focused teaching approaches, indicating that Knowledge Transmission teaching approach had a generally closer association with assessment than the Student Focused teaching approach.

Then, in accordance with the assumption that teaching approaches would influence assessment purposes, a structural model (see Figure 1), with good fit (χ^2=1496.79; *df*=435; χ^2/*df*=3.44, *p*=.06; CFI=.92; gamma hat=.94; RMSEA=.048; SRMR=.045), had 11

statistically significant paths out of a possible 18 from the three TCAT factors to the six C-TCoA factors. All six C-TCoA factors had two predictors, except for School Accountability which only had one predictor (i.e., Knowledge Transmission). The TCAT Knowledge Transmission factor predicted five C-TCoA factors (i.e., all positive paths to Student Development, Irrelevance, Examination, School Accountability, and Control), the TCAT Student Focused factor also predicted five C-TCoA factors (i.e., positive paths to Student Development and Teaching Improvement, negative paths to Irrelevance, Examination, and Control), and the TCAT Examination Preparation factor only positively predicted the C-TCoA Teaching Improvement factor. The proportion of variance explained for each of the C-TCoA factors was small to moderate (f^2 ranged .02 to .20) (Cohen, 1992). Hence, while there are reasonably substantial and meaningful relations between espoused teaching approaches and conceptions of assessment, these relations explain at best a moderate amount of variance at the levels of endorsement of the assessment factors.

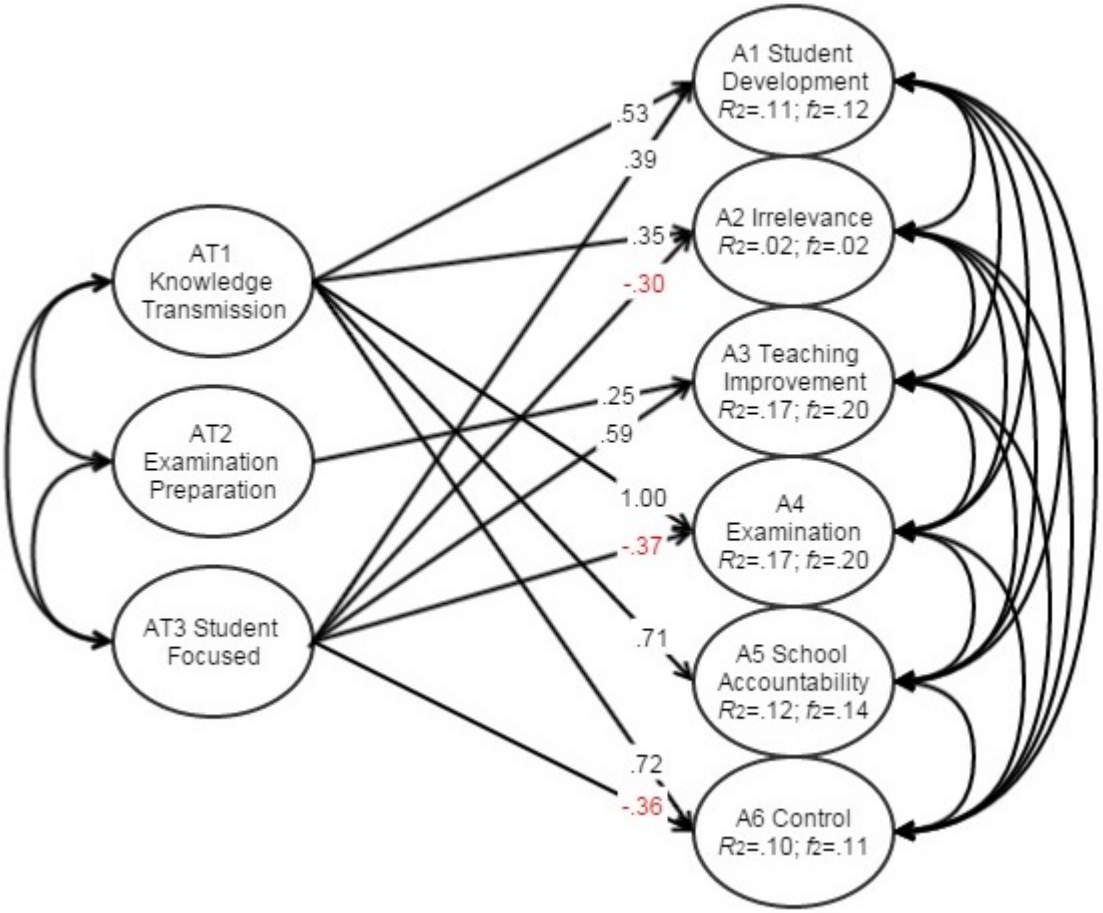

Figure 1. Schematic model of structural relations

Discussion

The discussion of the study reviews each model, before seeking to interpret the results in light of the strong examination culture of China.

Understating and comparing approaches to teaching

The ATI inventory normally identifies five teaching approaches. However, this study only identified three factors (i.e., Knowledge Transmission, Examination Preparation, and Student Focused). These may be caused by collecting data from K-12 rather than tertiary teachers and the persistent pressure of examinations as an evaluative mechanism (Gao & Watkins, 2002). Not surprisingly, strong examination-oriented and teacher-oriented practices have been

identified in current and older Chinese studies (e.g., Chen, 2014; Chen, Brown, Hattie, & Millward, 2012; Watkins & Biggs, 2001; Watkins & Zhang, 2006). The current result seems to be consistent with learning and teaching in the Chinese context. Large classes in China, with expository instruction, relentless norm-referenced testing, and a teacher-centred classroom climate, seem not to be conducive to optimal learning according to Western standards (Tatsuoka & Corter, 2004). However, Chinese students from Shanghai placed first in all areas of the PISA 2010 study (i.e., mathematics, reading, and science) (OECD, 2010). The image of Chinese students as rote memorisers being taught by authoritarian teachers but who score so well seems paradoxical (Watkins & Biggs, 2001). However, Chinese children are taught at early ages how to memorise texts (e.g., Tang Dynasty poems or Three Character Primer) by their parents using baby talk (Tardif et al., 1999). When children enter schools, they learn how to be active memorisers and how to use memorisation as a tool for concept development (DeHaan, 2008). According to Li (2001), rote learning as used in Chinese classrooms is not mere memorisation, but a consolidation of knowledge and a deepening of understanding. In this model, Chinese teachers train students using exam taking or mastery quizzes or knowledge transmission to enhance their memory for examination items, but also to deepen their understanding of conceptual knowledge. This provides a different rationale for the effectiveness of teacher-oriented approaches to teaching in the Chinese context.

Perhaps surprisingly given these teacher-centric conditions, the participants most strongly endorsed the more student-centered approaches, consistent with other survey studies (Chen, 2014; Chen, Brown, Hattie, & Millward, 2012). However, this seems consistent with the classic Confucian responsibility of a teacher to act as a warm, caring parent concerned for the best of each student (Chen, 2008). Interestingly, the two teacher-centered approaches were weakly correlated with the student-centered approaches in the current study, just as the examination-oriented approach was weakly correlated with conceptions of excellent teaching in an earlier survey study of middle school teachers in China (Chen, Brown, Hattie, & Millward, 2012). Almost half of the current sample was primary teachers and there was a statistically significant effect on the examination-focused approach in which primary school teachers were less endorsing of this approach, unlike less than their peers in middle and high schools. This seems to be consistent with the impact of secondary school and university entrance examinations for student selection purposes on teachers' teaching practices in Chinese middle and high schools (China Civilisation Centre, 2007). It may be a positive sign that, under influence of curriculum reforms, primary school teachers have shifted their self-reported teaching approaches towards a more student-centered style. Nonetheless, the reduced endorsement also reflects the reality that there are fewer high-stakes examinations in primary schools than in middle and high schools in China.

Understating and comparing assessment purposes

While the hierarchical structure of the C-TCoA was not recovered in this study, three factors were replicated (i.e., Irrelevance, Student Development, and Examination). The original School and Teacher Control factor has become two factors (i.e., School Accountability and Control). The final factor of this study (i.e., Teaching Improvement) is certainly related to conceptually to the overall notion of Improvement but these are different items. It is noteworthy that the Accuracy in Improvement and Error is absent in Accountability factors. Hence, partial replication is found for the C-TCoA. Indeed, both the Teaching Improvement and Student Development purposes of assessment were endorsed as top (1st or 2nd) priorities for this sample of Chinese teachers, like previous surveys of New Zealand (Brown, 2011) and Queensland teachers (Brown, Lake, & Matters, 2011), but unlike the Chinese teachers surveyed with this same inventory (Brown, Hui, Yu, & Kennedy, 2011).

The factor inter-correlations were moderate to high and positive indicating these Chinese teachers believed that control, examination, and evaluation purposes did not conflict with teaching and student learning improvement. These associations indicate that, insofar as this sample is concerned, teachers are persuaded that a powerful way to improve student learning and teaching is to examine students. Since the Chinese tradition of examination-merit decision-making is so long-standing and because it is so powerful in contemporary China and Hong Kong, it seems highly reasonable to believe that accountability and examination assessments function to improve teaching and learning. The message seems to be that Chinese teachers conceive of accountability and examination as being highly unified with educational improvement. However, a full-blown implementation of a western assessment *for* learning system (e.g., Queensland's no examination system [Cumming & Maxwell, 2004]) is unlikely to be successful, at least at this current stage.

Interestingly, the distinction this sample of Chinese teachers made between student learning and teaching improvement is consistent with views that distinguish improvement as either a teacher-focused or a student-focused (Remesal, 2011), but different to New Zealand and Queensland teachers (Brown, 2011; Brown, Lake, & Matters, 2011) for whom these two facets made up the general improvement conception. This result might be explained by the shifting focus of the Chinese curriculum reform from teaching for examinations to improving teaching quality to meet students' needs and maximizing their all-round development has only been relatively recent (MOE, 2010). In both New Zealand and Queensland, there is a long standing understanding that improvement involves both teachers and learners and assessment tends to be relatively low-stakes and supportive of diagnostic pedagogical practice.

Accountability in the Chinese context includes controlling schools, teachers, and students; not simply determining how good they are (Brown, Hui, Yu, & Kennedy, 2011). This would have suggested similarity rather than difference to the previous Chinese studies. However, previous studies have shown that teachers in Hong Kong and South China (Brown, Hui, Yu, & Kennedy, 2011) gave relatively low levels of endorsement to the School Accountability or Control purposes of assessment. In contrast, this sample of Chinese teachers put this purpose in the top half of endorsement. While entirely speculative, it may be that teachers in northern China are more inclined to accept a hierarchical, controlling view of education, in contrast to southern Chinese teachers. There is evidence that historical features of Confucianism in the north, in contrast to Taoism in the south, align with the discrepancy seen here (Young, 1988).

Understating and comparing the relationships between approaches to teaching and assessment purposes

The structural model indicated that assessment purposes in the current study were mainly explained by the student focused (i.e., caring) and knowledge transmission (i.e., telling) teaching approaches. Unsurprisingly, Knowledge Transmission increased four assessment conceptions (i.e., Student Development, Examination, School Accountability, and Control) and had a zero relationship with Teaching Improvement. Consistent with the relatively weak level of endorsement of Knowledge Transmission, it positively increased endorsement of Irrelevance of Assessment. In other words, Knowledge Transmission as a teaching approach predicted greater use of examination-oriented assessment that controlled and evaluated schools, while also helping students to develop. Again, there is a somewhat paradoxical notion, at least to non-Chinese eyes, in the idea that teaching by telling helps students improve, perhaps through its beneficial effect on examination performance, which in itself is an indicator of moral and personal worth (China Civilisation Centre, 2007).

In contrast, the Student Focused teaching approach, which also had five effects, positively increased Student Development and Teaching Improvement, while having negative effects on Irrelevance, Examination, and Control assessment conceptions. This set of paths reflects a more formative relationship in which being focused on the learner leads to using assessment predominantly for guiding student learning and modifying teaching practices for greater learning outcomes. Together with the relatively low level of endorsement for Knowledge Transmission, these paths suggest that the controlling and evaluative effects of high-stakes examinations are undesirable. In contrast, the Student Focused approaches, being positively endorsed, elicited a more formative anti-examination and anti-control perspective on assessment.

These two approaches were weakly correlated (r = .33) but had opposite effects on three factors and mutual effects on two factors. This indicates that the apparent logical inconsistency of transmitting (telling) and student-focused (caring) approaches become visible and interpretable by relating teaching practices to assessment purposes. Despite the hard policy of examinations, these teachers made clear that their preference was for a more caring and child-centered approach to teaching and assessment. Apparently, student-oriented approaches to teaching are associated with formative purposes of assessment, while teacher-centric approaches to teaching are associated with external evaluative purposes. However, both approaches are associated with assessment for improved teaching and greater student development; a result entirely consistent with survey studies in Hong Kong and southern China that had strong correlations between assessment for improvement and accountability (Brown, Hui, Yu, & Kennedy, 2011; Brown, Kennedy, Fok, Chan, & Yu, 2009). However, this apparently contradictory arrangement of beliefs suggests either that, from the teacher perspective, there is evidence that knowledge transmission leads to greater cognitive and personal development or that teachers use this belief to tolerate the negative effects of the examination system upon their values and ideals of teaching. While this study cannot provide an answer to this question, it does point out where research on teacher beliefs in China needs to focus its attention: how, if at all, can traditional, knowledge transmission practices actually help students to develop? Otherwise, we would have to consider the current results to represent a set of beliefs that shield teachers from the unpleasant taste of carrying out teaching practices that they do not actually believe in.

The Examination Preparation approach had a small positive effect on Teaching Improvement and no effect on any other assessment purpose. This result suggests that teaching for examinations makes teaching better quality; the weak association seems consistent with Chen, Brown, Hattie, and Millward's (2012) finding that teaching for examinations was only weakly correlated with other beliefs about excellent teaching. Since examinations dominate the Chinese education system, it was expected this approach would have had a stronger effect on the various assessment purposes. Perhaps this restricted role reflects the impact of the curriculum reform which has attempted to move Chinese education from teaching for examinations into the improvement of student qualities (MOE, 2010). These Chinese teachers may be aware of this policy change and have endorsed a limited and positive role for teaching to examinations. However, it is too early to suggest that Chinese teachers have moved away from examination-oriented approaches because this approach is still positively correlated with Knowledge Transmission approaches and is consistent with the Chinese notion that examinations serve to improve teaching (Brown, Kennedy, Fok, Chan, & Yu, 2009; Brown, Hui, Yu, & Kennedy, 2011).

Implications and Future Research

This sample reflects one of the key characteristics of excellent teaching associated with Chinese teaching; that is, high levels of care for the individual child (Chen, Brown, Hattie, & Millward, 2012). Of course, it cannot be determined from this self-report survey whether the results are a function of (a) espoused compliance with policy or (b) an accurate reflection of these teachers' beliefs about teaching and assessment. Direct observation of how teaching and assessment inter-relate in the classroom and student evaluations of teaching practice would both contribute to determining if these espoused beliefs are enacted. It may also be that the more than 400 teachers with less than 11 years' experience have contributed opinions consistent with the official policy framework. Indeed, more qualitative research approaches have the potential to examine causal factors behind the current results, which might include teachers' conceptions of what it means to be a teacher, the socialisation factors in being inducted into teaching through in-school professional development and mentoring, and the historical processes of learning to be a teacher by observing and experiencing their own teachers during schooling. Indeed, incidental apprenticeship into teaching through experience of being a school student was used to explain why Chinese teacher education students endorsed examination preparation as excellent teaching much more than practicing middle school teachers had (Chen & Brown, 2013).

A considerable challenge for our theorisation about teaching approaches is the joint and mutual effect of Knowledge Transmission and Student-Focused approaches to teaching on the improvement purposes of assessment. Empirical evidence is needed to determine whether these beliefs are both mutually and simultaneously true. If shown to be true, this poses a considerable challenge to teacher education and professional development, since the convention, at least in Western contexts, for the last few decades has been that student-oriented teaching is preferred over knowledge transmission or banking (e.g., Barnes, 1976). Nonetheless, it may be that, as Kember and Wong (2000) pointed out, what matters is not so much the style of teaching as the quality of it; Hong Kong university students indicated they could learn from high quality transmission teaching even when they had a passive role in it. Hence, it may be that these teachers have seen that their students do learn and succeed on examinations despite their transmission style teaching.

It may be even more difficult to move to a student-focused teaching approach during times of continuous educational reform. Chinese teachers are adjusting their individual acceptance of professional norms, teacher culture, school environment, and social expectations (e.g., greater accountability) in teacher socialization during a time of change (Cherubini, 2009). Lee and Yin (2011) noted that Chinese teachers are struggling to rebuild their professional identity and confidence and reconcile the tensions between their existing teaching beliefs (i.e., teaching and assessment) and those advocated by the reforms in a new teacher role. Therefore, policymakers and educational researchers need to consider these aspects in teacher education and professional development programmes. Nonetheless, preparing teachers to juggle these two quite different approaches to teaching and assessment practices will be difficult, especially as long as examination performance remains the socially accepted mechanism for attributing quality of schooling and student learning.

However, it may be that this positive belief about Knowledge Transmission may be used to disguise the relative powerlessness of teachers in face of the examination system that has dominated China for millennia. While it is plausible that this belief is a self-protective justification to handle the pressure of the Chinese system, this creates a serious problem for

policy makers who are seeking to enforce curricular reforms. The challenge will be how to release teachers from the tension that the reform and the examination system create.

The results from MANOVA show that most teacher characteristics (i.e., Age, Subject, and Teacher Certificate) had statistically significant mean difference on the Irrelevance purpose of assessment. It is clear that teachers on the whole rejected the Irrelevance assessment purpose. Brown and Gao (2015) suggested that teachers working with classes larger than 50 were least confident that assessment could be diagnostic and teachers who disliked the linking of teacher incomes to student examination performance were negative about assessment. Nonetheless, it was not possible from an anonymous survey to know which kind of participants agreed or disagreed with Irrelevance and their reasons for such a position. Rejecting Irrelevance makes sense since assessment matters for evaluation and improvement; whereas, endorsing Irrelevance is difficult to understand in a high-stakes examination society. Greater understanding of Chinese teachers in this matter may be useful to education research and development in other societies which share a similar public examination system, such as England or Hong Kong.

Nevertheless, the story in this study is that the Knowledge Transmission teaching approach is not completely 'evil'. While it contributes to traditional and conventional assessment purposes (e.g., Examination, School Accountability, and Control), it also contributes to the desired improvement purposes (i.e., Student Development and Teaching Improvement). The Student-focused teaching approach endorsed by this sample of Chinese teachers is entirely consistent with the deeply valued, traditional view of the Chinese teacher as a 'parent for life' and gives a strong indication of how teachers can be encouraged to do more to improve student learning outcomes. This study has reinforced our understanding that teacher beliefs are reflective of historical, cultural, and policy priorities in a system; that is, they are ecologically rational (Rieskamp & Reimer, 2007). The challenge for China remains: as long as educational policy has both soft and hard options (Kennedy et al., 2011), it is highly likely that the beliefs exhibited by these teachers will be dominated by the tension between those policies.

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