An instrument for investigating Chinese language learning environments in Singapore secondary schools

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This paper describes how a new classroom environment instrument, the 'Chinese Language Classroom Environment Inventory (CLCEI)', was developed to investigate the nature of Chinese language classroom learning environments in Singapore secondary schools. The CLCEI is a bilingual instrument (English and Chinese Language) with 48 items written in both English and Chinese. The English version of the CLCEI was customised from the *What is happening in this class*? (WIHIC) questionnaire (Fraser, Fisher, & McRobbie, 1996) and its Chinese version was modified from the Taiwanese Chinese version of the WIHIC questionnaire (Huang & Fraser, 1997). A rigorous 5 stage translation process involving 7 different focus groups with the application of the 4 step Nominal Focus Group technique (Moore, 1987; Stewart & Shamdasani, 1990) was adopted to develop the CLCEI. The CLCEI was validated with a sample of 1460 secondary three (grade 9) students from 50 express stream (above average academic ability) classes in 25 secondary schools in Singapore. The validation results indicated that each of the scales exhibited high internal consistency reliability and satisfactory discriminant and factorial validity. The validation results also indicated that each scale of the CLCEI had the ability to differentiate between perceptions of students from different Chinese language classes. The detailed results were reported in Chua, Wong and Chen (2006). The purpose of this paper is to share the detailed procedures of each translation stage and the outcome obtained from each stage. A discussion of the findings of the translation process is also provided.

Background

Reviews of the classroom environment research (Haertel, Walberg, & Haertel, 1981; Fraser, 1986; Fraser, 1998; Chua, 2004, Fraser, 2007) have indicated that most of the studies on classroom environments used the perceptual measures approach to investigate the nature of classroom learning environments. This approach involved the use of various classroom environment instruments to measure teachers' and students' perceptions of their classroom environments in different classroom contexts. A rich array of validated and robust classroom environment instruments was developed in various classroom environment studies using the perceptual measures approach for different classroom contexts in many different countries (Fraser, 2007). A review of the literature showed that the number of new classroom environment instruments continues to increase in both Western and non-Western countries (Fraser, 2002, 2007) Among these new instruments, the *What is happening in this class*? (WIHIC) questionnaire (Fraser, Fisher, & McRobbie, 1996) was developed for use in any classroom environment context. It was developed with the best features of the existing instruments as it adapted the salient scales of the existing instruments. In addition, the WIHIC questionnaire also included new scales

which accommodated contemporary educational concerns. The final version of the WIHIC consisted of seven eight-item scales, namely 'Student Cohesiveness', 'Teacher Support', 'Involvement', 'Investigation', 'Task Orientation', 'Cooperation' and 'Equity' where the first six scales were adapted from the existing instruments and the 'Equity' scale was a new scale that addressed more recent educational concerns of equality. The WIHIC have also been translated into various languages, such as Taiwanese Chinese (Huang & Fraser, 1997), Korean (Kim, Fisher, & Fraser, 2000), Indonesian (Margianti, Fraser, & Aldridge, 2001) and Turkish (Oken, 2008).

A distinctive feature of a classroom learning environment instrument is that it usually consists of a number of scales for assessing different dimensions of a classroom learning environment. These scales have always been classified into one of the three basic dimensions according to Moos' (1974) scheme of scale classification. The three basic dimensions as defined by Moos (1974) are as follows.

1. *Relationship dimensions*: which identify the nature and intensity of personal relationships within the environment and assess the extent to which people are involved in the environment and support and help each other. They include such scales as 'Student Cohesiveness' and 'Teacher Support'.

2. *Personal development dimensions*: which assess basic directions along which personal growth and self-enhancement tend to occur. They include such scales as 'Investigation' and 'Task Orientation'.

3. *System maintenance and system change dimensions*: which involve the extent to which the environment is orderly and clear in expectations, maintains control and is responsive to change. They include such scales as 'Collaboration' and 'Equity'. In addition, an environment instrument may have scales with equal or different numbers of items in each scale. For example, the 'Learning Environment Inventory' (LEI) (Fraser, Anderson, & Walberg, 1982) consisted of 15 scales with 7 items per scale and the 'Classroom Environment Scale' (CES) (Fisher & Fraser, 1983) consisted of 9 scales with 10 items per scale. Whereas, the 'My Class Inventory' (MCI) (Fraser, Anderson, & Walberg, 1982) consisted of 5 scales with 6-9 items per scale.

Another distinctive feature of classroom learning environment instruments is that their items are written in different formats so as to assess the actual and preferred perceptions of different groups of respondents. The class form and the personal form of an environment instrument are used to assess the perceptions of teachers and students towards their classroom learning environment respectively. For example, an item in the class form of the WIHIC questionnaire would read 'Friendships are made among students in this class.', whereas the same item would read, 'I make friendships among students in this class' in the personal form. Instruments in both the class form and personal form also come in two different versions, the actual and preferred versions. The actual version is used to assess the perceptions of the respondents toward the actual classroom learning environment, whereas the preferred version is used to assess the perceptions of the respondents toward their preferred classroom learning environment. The actual and

preferred versions of an item are almost identical, but are slightly different in statement structure. For example, an item in the actual version of the WIHIC questionnaire would read 'I know other students in this class', whereas the same item would read, 'I would know other students in this class' in the preferred version.

The Singapore government has always emphasised the importance of learning the Chinese language (http://www.moe.gov.sg/). Since the research literature had indicated that there were associations between students' cognitive and affective learning outcomes and their perceptions of psychosocial characteristics of their classroom environment (Fraser, 1986, Haertel, Walberg, & Haertel, 1981), an understanding of the nature of the Chinese language classroom learning environments would be beneficial to both teachers and students in the teaching and learning of the language.

In order to carry out the investigation in Chinese language classroom, the instrument, the Chinese Language Classroom Environment Inventory (CLCEI), was developed for use in this study. It is a bilingual instrument with 48 items written in both English and Chinese, adapted from the *What is happening in this class?* (WIHIC) questionnaire (Fraser, Fisher, & McRobbie, 1996). It has been validated and found to exhibit high internal consistency reliability and satisfactory discriminant and factorial validity (Chua, Wong & Chen, 2006). For the student-actual form, the Cronbach alpha coefficients ranged from .82 to .91 when the individual student's score was used as the unit of analysis and from .87 to .96 when the class mean was used as the unit of analysis. The discriminant validity is described as the extent to which a scale measures a unique dimension not covered by the other scales of the instrument. The results indicated that the mean correlation of a scale with the other five scales ranged from .44 to .52 for the student-actual form of the CLCEI and from .56 to .68 for the student-preferred form when using the individual student's score as the unit of analysis. The factor structure of the CLCEI under a factor analyses (with varimax rotation) showed that all 48 items of both the student-actual form and student-preferred form loaded neatly into their six *a priori* scales with all items having factor loadings greater than 0.40 on their respective scale (Chua, 2004; Chua, Wong & Chen, 2006).

The WIHIC was chosen for this study to develop the CLCEI for two reasons. Firstly, The WIHIC had been developed with the best features of the existing instruments to include the salient scales of these instruments. Secondly it allowed the exclusion of irrelevant scale(s) to suit any classroom environment under study without affecting the reliability and validity of the instrument (Fraser, Fisher, & McRobbie, 1996). The English version of the CLCEI was adapted from the WIHIC and it was translated into Singapore Chinese for use in this study. Although there is a Taiwanese Chinese version of the WIHIC questionnaire (Huang & Fraser, 1997), it was not suitable for use in the Singapore context because of differences in culture and language use. The Taiwanese version was written in traditional Chinese characters whereas simplified Chinese characters are used in Singapore. Therefore the Taiwanese Chinese version of the WIHIC questionnaire was only used as a reference in the translation process.

The back translation technique was used by Huang and Fraser (1997) to translate the WIHIC from English to Taiwanese Chinese and by Okan (2008) from English to Turkish.

However, the translation procedures reported in these studies did not indicate the involvement of focus groups and Nominal Group Techniques which were also used in translating the WIHIC to the CLCEI. These procedures were included to help ensure that the original meaning and integrity of each item in WIHIC remained intact in the Singapore Chinese version. Thus, the purpose of this paper is to share the experience of using 'back translation', focus groups and the NGT when translating instruments from one language to another. The back translation, in this context, is a translation of a translated Chinese item back into the English language of the original item, made without reference to the original item. As the validation results showed that the CLCEI is a valid bilingual instrument written in both English and simplified Chinese characters developed through the 5 stage rigorous translation procedure, sharing of the results from each stage would also help those researchers from making similar mistakes when using the back translation method. In addition, the 4 step focus group technique used in this study, that is, the Nominal Group Technique (NGT) suggested by Moore (1987) and Stewart and Shamdasani (1990) has its significant application in decision making using focus groups.

Methodology

The English version of the CLCEI was customised from the *What is happening in this class?* (WIHIC) questionnaire (Fraser, Fisher, & McRobbie, 1996) and it was translated into Singapore Chinese using the Taiwanese Chinese version of the WIHIC questionnaire (Huang & Fraser, 1997) as a reference point. A rigorous 5 stage back translation process involving 7 different focus groups with the application of the 4 step Nominal Focus Group technique (Moore, 1987; Stewart & Shamdasani, 1990) was implemented to develop the CLCEI.

The 5 stage back translation process is as follows.

Stage 1: customising and drafting of Chinese items from the original WIHIC
Stage 2: focus group validation of the Chinese draft
Stage 3: back translation of the validated Chinese draft to English
Stage 4: appraisal of back translated English version with the original English version
Stage 5: redrafting the inappropriately phrased Chinese item(s)

The purpose of planning this 5 stage translation procedure was to decrease the likelihood of items being inappropriately translated and to increase the accuracy, reliability and readability of the bilingual CLCEI (Chinese Language Classroom Environment Inventory). After completing stage 1, the whole translation process was repeated from stage 2 to stage 5 until all the 48 items were satisfactorily modified. The 5 stage back translation procedure was slightly modified during the second and third cycles to improve the effectiveness of the translation. Detailed procedures of each stage are described in the following paragraphs.

Stage 1: Customising and drafting of Chinese items from the original WIHIC

Stage 1 was to customise and draft the Chinese items of the WIHIC for use in the Chinese language classroom in the Singapore context. Four modifications of the questionnaire were made.

Firstly, the original English version (Fraser, Fisher, & McRobbie, 1996) was customised for use in Chinese Language classrooms by adding the phrase 'Chinese Language' where appropriate. Secondly, the 'Investigation' scale was excluded because the 8 items in the 'Investigation' scale were more suitable for use in the scientifically related experimental environments rather than for language classroom environments. Thirdly, the Chinese characters in the Taiwanese Chinese version were converted from the traditional Chinese form to the simplified form because the latter form is used in Singapore. Fourthly, each English item was translated by using one of the two translation approaches, *translate literally* and *translate with meaning,* as suggested by Newmark (1988). *Translate literally* means direct translation of the English phrase to a Chinese phrase without changing the sentence structure whereas *translate with meaning* means that the translation focuses mainly on maintaining the original meaning of the item but the sentence structure may be altered.

In order to standardise the translation approach, Chinese language experts were consulted regarding the method of translation with reference made to the Taiwanese Chinese version of the WIHIC (Huang & Fraser, 1997). Each item was then translated literally if no grammatical error and misrepresentation of meaning was evident. Otherwise, the item was translated with meaning.

The outcome at the end of stage 1 was a preliminary draft Singaporean Chinese version of the WIHIC questionnaire. It consisted of six eight-item scales, namely 'Student Cohesiveness', 'Teacher Support', 'Involvement', 'Task Orientation', 'Cooperation' and 'Equity', with a total of 48 Chinese items and their corresponding original English items.

Stage 2: Focus group validation of the Chinese draft

A focus group comprising 5 secondary school Chinese language teachers who are effectively bilingual was formed to validate the 48 draft Chinese items (in simplified-Chinese form) from stage 1. The four steps of the Nominal Group Technique (NGT) used were modified and applied as follows.

1. *Silent generation of ideas.* Each teacher of the focus group was given a copy of the customised WIHIC questionnaire with the Chinese draft items which resulted from stage 1. Members of the focus group worked independently to vet each Chinese item against its corresponding customised English item. The purpose of this vetting exercise was to allow the members to rephrase the Chinese items if they had a different opinion from that of the translation. The use of NGT at this step was effective as individual participants had an opportunity to think, write and contribute to the translation task independently.

2. *Summarising of different ideas in translation.* After the vetting process, all the five vetted copies of the draft Chinese items with the written responses were collected. A summary of all the responses was prepared so as to facilitate the identification of items that needed to be discussed in the next step.
3. *Discussing the list of ideas.* A group discussion was held with the use of the summary sheet prepared in step 2. The purpose of this group discussion was to obtain consensus on the Chinese translation for every single item in the 48 item customised WIHIC questionnaire.
4. *Voting.* In the case when consensus could not be reached, the voting technique was used to decide on the choice of Chinese phrases to be adopted.

At the end of stage 2, all draft items were validated and one agreed version of the 48 item Chinese translation of the customised WIHIC questionnaire was produced, ready for use in the next stage of back translation.

Stage 3: Back translation of the validated draft from Chinese to English

Stage 3 involved the translation of the Chinese items produced in stage 2 back to English by another focus group. The back translated English version would then be used to compare with the customised English version (from stage 1) for the purpose of identifying those inappropriately drafted items for redrafting.

The four step NGT procedures were carried out at this stage with another focus group comprising five effectively bilingual educators. They had not been involved in stage 2 of the translation process. The outcome of this stage was a finalised back translated English version which would be used in stage 4.

Stage 4: Appraisal of back translation English version with customised English version

This stage was to appraise the back translated English items obtained in stage 3 by comparing them with the customised English items from stage 1. The purpose of this appraisal was to check whether the Chinese translations upheld the integrity of the meaning of the original English version. If not, then they would need to be redrafted so as to improve their suitability, accuracy and readability. Five English language experts, forming another focus group, were invited to conduct the appraisal by comparing each of the back translated items in English with its corresponding customised English item. The four step NGT procedure was again employed. An appraisal form with two response alternatives, *agree* and *disagree,* was used at this stage. The *agree* response indicated that the back translation and the original version were equivalent, and thus implied that a particular item was appropriately drafted in Chinese and would not need to be redrafted. The *disagree* response indicated that the back translation and the original version were not equivalent, and thus implied that a particular item may be inappropriately translated in Chinese and would need to be re-examined. The outcome of this stage was a consolidated copy of the five appraisal forms, on which some of the items were marked with the *disagree* option. These would be the Chinese items from stage 2 which would need redrafting.

Stage 5: Redrafting the inappropriately phrased Chinese item(s)

Data obtained from the appraisal form in the previous stage allowed the identification of the inappropriately drafted item(s). The identified items were redrafted and the procedures were repeated from stage 2 to stage 5 until all the items were satisfactorily translated.

Appendix 1 summarises the 5 stage translation procedure described above. Appendix 2 depicts the whole development process, which underwent three cycles of the 5 stage translation procedures.

Results and analyses

The results of each cycle are detailed and analysed in the sections below.

Results of the first cycle

The first cycle went through all the 5 stages of the planned translation procedures. The results indicated that only ten items were not satisfactorily translated into an acceptable Singapore Chinese language style. After the analyses of the results obtained together with the examination of the translation procedures, three errors in the translation procedures were identified: (a) *over interpretation* when drafting the Chinese items, (b) *over emphasis* on minor structural differences in sentences, and (c) *over emphasis* on linguistic differences between the two languages (English and Chinese).

Over interpretation meant that the original English item was translated using a Chinese phrase with 'stronger' meaning than its original. As a result, the back translated English version of the Chinese draft was different in meaning and probably different in sentence structure from the original English version. For example, the meaning of the original item 15, was 'The Chinese language teacher moves about the class to talk with me' and its back translated English item, read 'The Chinese language teacher will talk to me during his inspection of the class.' Apparently, the Chinese translation over interpreted and altered the meaning of 'move about' to 'inspection'.

The second and third errors were due to over interpretation when the translator underwent the English back translation. For example, the original item 1 'I develop friendship with the students in this Chinese language class' was translated appropriately into Chinese as '我和这华文班上的同学建立友谊' The English back translation reads, 'I can develop friendship with the students in this Chinese language class.' The error of the back translation is rather obvious because 'can' is not used in the Chinese version. This error was probably due to the intention of providing a literal English translation of the Chinese version. However, by so doing, the meaning of the sentence is slightly altered. This is one of the limitations of the back translation method. In this particular case, even though the Chinese was translated appropriately, due to the error introduced in the back translation, the item had to be re-examined. In other words, the back translation method is too strict to accept certain items.

The analyses of the overall procedures and findings indicated that these errors occurred mainly because inadequate instructions were given to the focus group members before they carried out their assigned tasks. Therefore, the ten inappropriately drafted Chinese items were redrafted and went through the second cycle of the translation procedure from stage 2 to stage 5 again.

Results of the second cycle

The modifications made in the procedures included a) the reduction of the number of focus group members from 5 per group for the first cycle to only 3 per group, and b) the preparation of verbatim instructions to provide detailed briefings to the focus group members before they carried out the assigned tasks at each stage. At the end of the second cycle, results showed that only item 38, 'I work with other students in this Chinese language class', was not translated satisfactorily. The analyses indicated that the problem could be due to the conceptual differences of how the word, 'work' is used in the Chinese and English languages (Potaka & Cochrane, 2004). The outcome of this second cycle called for the implementation of a third cycle.

Results of the third cycle

The third cycle was carried out with the use of only one focus group consisting of 5 effectively bilingual educators to decide on an appropriate Chinese phrase to translate the one remaining item. The procedure of back translation at stage 3 of the 5 stage translation procedure was eliminated because the analysis of the results obtained in the second cycle showed that the remaining item 38 would not be appropriately translated if the same procedures were used again. Item 38 was satisfactorily translated after a lengthy meeting in which all procedures that had been planned in Stages 2 and 5 were carried out accordingly using the four-step NGT procedures. At the end of the third cycle, the bilingual Chinese Language Classroom Environment Inventory (CLCEI) was ready to be checked for its validity and reliability. It had been validated with the sample of 1460 secondary three (grade 9) students from 50 classes in 25 secondary schools in Singapore (Chua, Wong & Chen, 2006) and found to be a reliable and valid instrument for investigating the nature of Chinese language classroom learning environment in Singapore secondary schools.

Discussion of the findings

The CLCEI was successfully developed after the implementation of the development process involving a 5 stage translation procedure. The whole process went through three cycles of the 5 stage procedure with some modifications to the procedures for the second and third cycles as discussed in this paper. The outcomes at the end of each cycle were analysed in order to identify the causes that contributed to the inappropriate translations. Four important findings surfaced after the analyses.

Firstly, the back translation method used in the modification process was useful and desirable as some inappropriately translated Chinese items were not detected before comparing the meanings of the back translated English item with its corresponding

original English item. Therefore, the use of the back translation method for counter checking the accuracy of the translations was useful.

Secondly, over interpreting the original meaning of an English item and neglecting the differences in the usage of the two languages would lead to an inappropriate translation of the items as was seen in this development of the CLCEI.

Thirdly, detailed verbatim instructions were essential when carrying out the four step Nominal Group Technique (NGT) used in the development of the CLCEI. Reading out a set of detailed verbatim instructions to the focus group members before they carried out the assigned tasks helped them understand clearly what had to be done so as to avoid making similar procedural mistakes that would incur unnecessary repetitions of the translation procedures.

Fourthly, the readability level of the CLCEI was found to be high, as students did not have problems in understanding the meanings of the items during the implementation stage. It could be because the items of the CLCEI were presented in both English and Chinese. At the end of the survey, students were asked about the usefulness of having the CLCEI presented in two languages. Many students reported that reading both versions helped them to understand the meaning of the items better. As a result the data obtained could be more reliable. This also indicated the usefulness of using a bilingual instrument in this study.

However, there are some limitations in the translation procedures used in the development of the CLCEI. For example, although the use of the back translation technique helps to make the translation process more rigorous as indicated at the end of the second cycle, appropriate Chinese translated items may be rejected due to poor English back translation rather than poor Chinese translation. It may have caused erroneous results requiring the implementation of the next cycle when it was actually not necessary.

There is also another concern regarding the structural and conceptual equivalence between two languages as suggested by Potaka and Cochrane (2004). Structural or semantic equivalence refers to the degree to which one language shares similar grammatical constructions with another language and contains words or phrases with similar or identical meaning. Whereas conceptual equivalence relates to the extent to which concepts and ideas are transferable between cultures. Concepts relevant to one culture may not apply to another culture, or may be thought of differently. The translation of instruments could be more effective if the researchers also take into consideration these structural and conceptual differences between two languages used by the two instruments concerned by conducting a pilot study to ensure instruments are culturally valid. Lastly, practical challenges such as adequate bilingual experts and technical reviewers may continue to be a problem for implementing the translation procedures suggested in this study. Overall, although the 5 stage translation procedures suggested in this study was found to be lengthy and required substantive manpower, the validation results (Chua, Wong, & Chen, 2006) do provide support for the confident future use of this translation

procedure to translate questionnaires for use in cross country studies where the educational cultures of the countries involved are quite different.

Conclusion

The CLCEI (Chinese Language Classroom Environment Inventory) was successfully developed for use in the Singapore Chinese language classroom using a 5 stage translation procedure. The procedure went through three iterations to ensure that the final translated version of the instrument is of a high level of accuracy. After its development the instrument was validated with a sample of 1460 secondary three (grade 9) students from 50 classes in 25 secondary schools in Singapore (Chua, Wong, & Chen, 2006) and found to be a reliable and valid instrument for investigating the nature of Chinese lanuage classroom learning environments in Singapore secondary schools. The CLCEI has also been used to examine the association between the Chinese language classroom learning environment and students' motivation to learn the language. The outcome of that study will be reported in a subsequent publication.

In summary, the development of the CLCEI has made several contributions to the educational research field. Firstly, the use of a bilingual instrument to investigate the nature of a particular language classroom learning environment could be useful because it could help students to cross-check the meanings of items when they are in doubt and this could help raise the integrity of the data collected. Secondly, the simplified Chinese form of the CLCEI could be used in other countries which use the simplified form of the Chinese language, for example China and Malaysia, to investigate the nature of classroom learning environments. Thirdly, the 5 stage translation procedure used in this study could be used for future cross country studies as a reference for translating questionnaires written in one country's language to another language used in another country. Fourthly, the whole process of developing the CLCEI has exposed the importance of achieving structural and conceptual equivalence (Potaka & Cochrane, 2004) in the translation process by taking into consideration the language and cultural differences at every stage of the development cycle. Lastly, the modified 4 step Nominal Group Technique (NGT) used in this study had also been proven as an effective focus group technique for use in making decisions.

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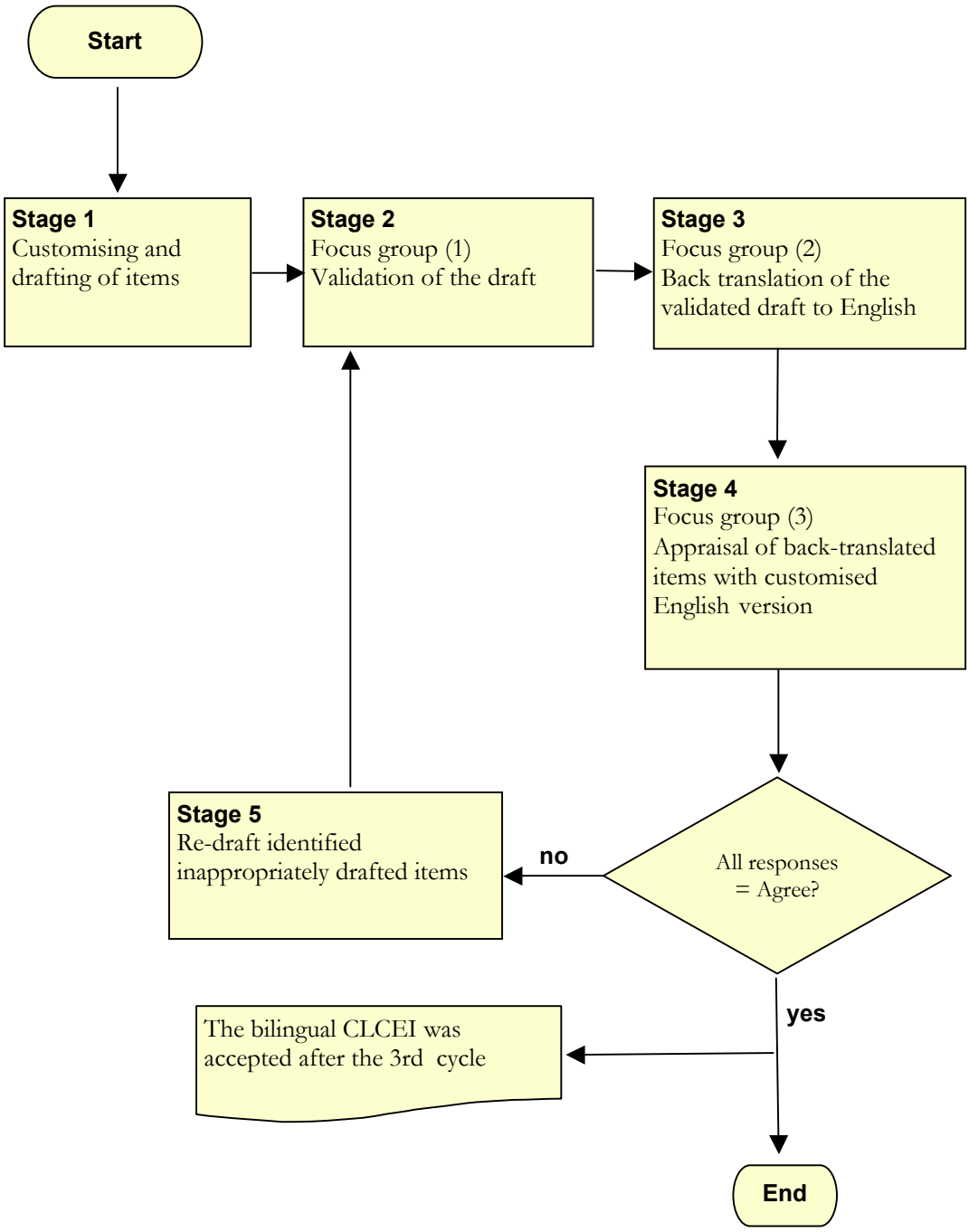
Appendix 1: The 5 stage translation process



CLCEI: Chinese Language Classroom Environment Inventory

Appendix 2: The translation process overview

Tasks	Cycle 1	Cycle 2	Cycle 3
Stage 1 customising and drafting of items	• customising the original WIHIC items (English version) for use in this study • drafting of the Chinese version (48 items)		
Stage 2 Focus group validation of the draft	• forming a focus group comprises of **5** bilingual Chinese Language teachers • applying *Nominal Group Technique (NGT) to validate the Chinese version	• forming a focus group comprises of **3** bilingual Chinese Language teachers • applying NGT to validate 10 redrafted Chinese items	• forming a focus group comprises of **5** effectively bilingual educators • The focus group decided a final translation of the item (item 38)
Stage 3 Back translation of the validated draft to English	• forming a focus group comprises of **5** effectively bilingual educators • applying NGT to translate the Chinese version back to English	• forming a focus group comprises of **3** effectively bilingual educators • applying NGT to translate the 8 redrafted Chinese items back to English	
Stage 4 Appraisal of back translation version with customised English version	• forming a focus group comprises of **5** English Language experts • applying NGT to appraise the back translation version with the customised English version • Outcome: 10 inappropriately drafted items were identified	• forming a focus group comprises of **3** English Language experts • applying NGT to appraise the back translation version with customised English version • Outcome: 1 inappropriately drafted items was identified	• Outcome: all the 48 items of the WIHIC questions were satisfactorily modified
Stage 5 Redrafting the inappropriately phrased items	• redrafting of the 10 identified inappropriately phased items	• redrafting of the one identified inappropriately phased item	

*NGT technique (Moore ,1987; Stewart & Shamdasani, 1990). The four-steps are (a) silent generation of ideas in writing, (b) round robin recording of ideas, (c) serial discussion of the list of ideas, and (d) voting.

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