Non-traditional Design and Development of Culture and Language Sensitive –Curriculum Material Evaluation Tool

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Abstract *- The study critically explored non-conventional processes on development and validation of an evaluation instrument entitled: "Culture and Language Sensitive-Curriculum Material Evaluation Tool." This is an evaluation tool intended to assess and evaluate culture and language sensitive curriculum materials in physics and other sciences. The non-traditional processes highlighted the use of empirical data from pilot study to come up with the statements and constructs for the instrument congruent to instructional congruence framework. Averages of ratings of experts of the evaluation instrument were found to be within the highest range of the 5-point Likert scale (4.74 and 4.98). Aiken's content validity coefficient ranged from 0.94 to 0.99. Inter-rater Kappa coefficient was 0.83 rated as excellent agreement of raters while inter-class coefficient was 0.71 (single) and 0.98 (average) rated as very strong (single) and almost perfect agreement (average) respectively. Reliability was established qualitatively and quantitatively. Over-all reliability measure was rated excellent using Cronbach's alpha with a coefficient of 0.99. Each of the construct's reliability coefficients was found to be 0.98 rated as excellent.*

Keywords: Cultural sensitivity, Instructional congruence framework, Evaluation tool

I. INTRODUCTION

A. Background of the Study

A large percentage of Filipino students cannot apply science concepts to real life. Most students, even high school seniors, can neither understand what they are reading nor do the necessary calculations to solve scientific problems. Students' ability to think conceptually and spatially is weak which may eventually worsen issues and problems related to scientific literacy of Filipinos [1], [2]. Efforts to improve the scientific literacy and science & mathematics achievement of Filipino students were initiated by UPNISMED [1] through science and mathematics curriculum enhancement integrating "community-based" enhancement of concepts and skills. Guided by the aims and goals of UNESCO's [3]scientific and technological literacy for all, the Philippines' new basic education curriculum is visualized to bring significant positive changes to the low level scientific and mathematics literacy of Filipino students [4]. This attempt to establish an educational system that is at par with international standards maintains a complete, adequate and integrated system of education relevant to the needs of the Filipinos and the society. Thus, the new curriculum also envisions education as "going global by being local".

This schema is in consonance with the claim of Jordan, Carlile, & Stack [5] that culture determines what is considered worthy of study. Learning according to cultural background promotes sustainability and preservation of indigenous knowledge. In the Philippines, Science Education Institute as a government agency promoting and managing learning science and science education has started to look at new footpaths to better scientifically literate Filipinos. The agency foresees a new theme focused on "learning according to cultural background" to promote sustainability and preservation of indigenous knowledge. It is a development planthat adopts to the major goals and aims of the 21st century framework [6] which included three key elements to learning. The first element promotes *21st century interdisciplinary themes* which subsume global awareness, financial, economic, business and entrepreneurial literacy, civic literacy, health literacy, and environmental literacy. The second element is *learning and innovation skills* which uphold communication, collaboration, critical thinking, and creativity. The third underscore *information media and technology skills* which include information literacy, media literacy, ICT literacy. Each one of these skills requires the development of the core academic subject knowledge and understanding among all students. Within the context of core knowledge instruction, students must also learn the essential skills for success in today's world, such as critical thinking, problem solving, communication and collaboration. Accordingly, this is along the trail of UNESCO's decade of education for sustainable developmentcentered on *indigenous knowledge.* Among the four *sustainable development* pillars, cultural pillar

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is emphasized with the following thematic priorities: Cultural heritage, cultural preservation and indigenous knowledge. This is the current theme known to many as life-long learning and learning for life.

Instructional congruence was found by Zain [7] to be an effective means to establish cultural integration in the sciences. The model was used to 214 students in pre-test-post-test research design. In a paired t-test, it was shown that instructional congruence in teaching science has a significant effect in the improvement of students' interest towards science, especially in the aspects of practical work, science outside of school, future participation in science, combined interest in science and over-all interest in science. The same framework was found to bring significant gains in the science achievement of students who are non-western or second language English learners [8] – [10].

Several researches [11], [12] were able to deduce good results in terms of student achievement using cultural integration. Thus, development of curriculum materials to promote integration of culture and language in the teaching and learning of physics concepts adopting instructional congruence framework can extend to being influenced by context-based learning and community-based learning. Accompanying these curriculum materials are curricular materials' evaluation tools thatare necessary for the validation and standardization processes.

B. Purpose

The aim for scientific literacy forms the integral part of the science framework promoted by the Philippines' enhanced basic education curriculum. To achieve this aim, one way is to utilize the indigenous knowledge of students as materials for learning and learning within culture. Culture and language sensitive curriculum materials should be developed to capture learning and learning within culture utilizing and developing as well the indigenous knowledge of the students. However, there are no available evaluation tools to evaluated and assess culture and language sensitive curriculum materials in Physics. Thus, the present objective of the study is the development and validation of culture and language sensitive curriculum material evaluation tool. This evaluation tool is intended to assess the quality, congruence and coherence of culture and language sensitive curriculum materials in physics.

Specifically, the present study aims to:

- Identify pre-deterministic constructs, criteria and indicators of a culture and language sensitive curriculum material in Physics based from literature reviews, expert's/teacher's views, course content and the Filipino culture;
- Develop and validate a culture and language sensitive curriculum material evaluation tool based on the pre-deterministic construct, criteria and indicators of a culture and language sensitive curriculum material; and
- Test the inter-rater and intra-rater reliability of the culturally-sensitive curriculum material in Physics

C. Conceptual Framework

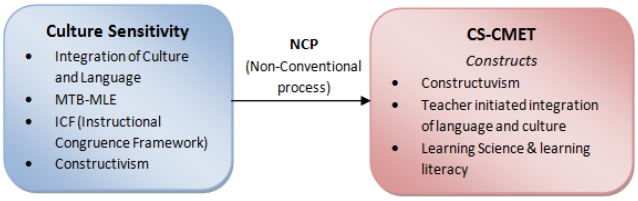

Figure 1: Conceptual Framework

The first attempt to develop the evaluation tool was guided by the principles of culture sensitivity. These include integration of culture and language in the curriculum materials, use of the mother tongue based-multi-lingual education, instructional congruence framework, and constructivism. Non-traditional process was used to come up with items for the evaluation tool. Identification of thematic constructs was also done to that thematically group the developed items. Non-conventional pilot study included as inputsteachers'views and literature reviews. These were gathered through focus group discussions, interviews, panel discussions and intensive research of literatures. These were used to determine specific items and features teachers would need to see in a culturally sensitive curriculum material.

1) Language: Focus on Mother-Tongue BasedMulti-Lingual Education (MTB-MLE)

Cultureis highly identified with languages and language diversity. Defending the languages and language diversity was one of the major goals of UNESCO's education for all. The same objectives were revealed in several researches [13]-[16] which gave evidences that the longer a child is taught in his or her home language, the higher is his or her academic achievement in school. In the Philippines, the Lubuagan first language component multilingual educationin 1998 provided the same insights on the success of Mother-tongue instruction on academic achievement [17].

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Our legislators, seeing the benefits of the native language in instruction had promulgated House Bill 3719 known as the multilingual education and literacy bill.Thebill aimed to promote literacy and learning by making the native language as the medium of instruction during the formative years of basic education. In response to this progress, the department of educationmandated the use of the native language in instruction through DepEd Order No. 74 (s. 2009). The agency through such an order envisioned to promote the use of more than two languages for literacy and instruction as a fundamental policy in the whole stretch of formal education including pre-school years. It was part of plan to fully implement DepEd Order No. 74 in the new curriculum wherethe native language of the learners will be taught as a separate subject from pre-school to Grade 3 and one of the media of instruction in the whole stretch of formal education.

2) Instructional Congruence Framework

Instructional congruence framework presents a process of mediating the nature of academic content with the students' language and cultural experience [10], [18]. In addition, cultural experiences were the knowledge that students have obtained from their community. Whereas students' language experiences were the languages used in their daily life. When the knowledge of science is incorporated with students' language and experiences, students would be more engaged in the learning process and science would be easier, meaningful and relevant to students. Learning environment that puts emphasis on instructional congruence could make students become bicultural, bilingual and bi-literate person not only in terms of knowledge, values and practice in science, but also in aspects of their language and culture.

Accordingly, the 4 main characteristics of instructional congruence framework [10], [19] were as follows:

- *Role of Teacher*. The teacher needs to identify what the students need, their culture and their daily language which are to be integrated in the instructional design.
- Instructional congruence is *subject-specific pedagogy of teaching model* based on particular cultural model where teachers need to give similar emphasis between scientific knowledge and the actual inquiry process with the students' language and cultural experience.
- *Learning Science and Learning Literacy* is believed to be able to improve students' mastery of writing skills, encourages more discussion and allows more sharing on cultural experience.
- Instructional congruence is *constructivist* in approach. Students develop knowledge by integrating their experiences with the environment which also promote academic achievement in science and literacy [20], [21].

3) Literature on development and validation of instruments

Evaluation of the curriculum materials is a necessary process if one has to ensure that quality and coherence are demonstrated by the developed curriculum materials. It is also necessary to detect whether developed materials will adhere to instructional congruence framework which formed the bases of the development as well as the envisioned process to enhance scientific literacy and preserve indigenous knowledge for sustainability. The intended evaluation instrument is highly influenced by the development of international evaluation and survey instruments. The development of this new evaluation tool would highlight quantitative analysis and qualitative approaches influenced by the non-traditional processesused in the development of Views on Nature of Science and Education (VOSE) and Colorado Learning Attitude Science Survey (CLASS). Adams [22] used literature reviews, existing survey instruments and pilot study which included student interview and face & content validation by experts focused on qualitative approaches to extract probable contents and pre-deterministic constructs of the intended survey instrument. Comparably, Chen [23] used quantitative design with qualitative approaches in the development of Views on Nature of Science and Education (VOSE). She further claimed that the results were dependable because the items originated from the respondents' point of view instead of from the researcher's presumption of reasonable answers, thus has a high reliability.

II. METHOD

Quantitative research design with a combination of qualitative approaches was used in the development of an evaluation instrument intended to assess culture and language sensitive curriculum materials in physics. Survey research was used to determine the feasibility of the instrument in the area of evaluation of culture and language sensitive learning packages in Physics. The study consisted of three major stages: Preparation and pilot study; item design and construction; and validation and reliability determination.

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D. Participants of the Study

Table 1. Participants of the Study

Stages of the Study	Participants/Sample	Sampling Process
Preparation and Pilot Study	• 5 Physics Teachers and 2 pre-service physics teachers	Purposive sampling
Item Design and Construction	• 3 Physics Experts • 1 Social Science Faculty/Expert	Purposive sampling
Pilot Testing and Data Analysis	• 21 Physics/Science Teachers of Pangasinan • 4 Physics Experts	Purposive sampling based on the sample culture and language sensitive curriculum material to be evaluated which used the native language of Pangasinan

In all the three stages, purposive sampling was done to identify the appropriate participant for each of the stages identified. In the preparation and pilot study, the identified participants were physics teachers of Cayetano Arellano National High school. Together with the focused group discussions with the five teachers, interviews with pre-service physics teachers of the Philippine Normal University were also conducted. The participants for the second stage were also purposively chosen on the bases of their being experts in physics and social science contents. Finally, the rest of the participants in the last stage of the study were identified to evaluate a sample curriculum material for Pangasinan learners. Since the curriculum material was designed for Pangasinan learners using the culture and native language of Pangasinan, the chosen evaluators were also natives of Pangasinan who are fluent in the native language.

E. Summary

Table 2. Summary of the Methodology

Stages of the Study	Data Collection	Data Analysis
Preparation and Pilot Study	• Interviews, literature search and review, focus group discussions	• Transcriptions
Item Design and Construction	• Focus group discussions and interviews • Checklist for content validity of the instrument	• Average ratings and Aiken's content validity coefficient • Inter-rater Kappa coefficient • Intra-class coefficient
Pilot Testing and Data Analysis	• Sample of a culture and language sensitive curriculum material in Physics for Pangasinan learners • Revised version of the culture and language sensitive curriculum material evaluation tool	• Cronbach alpha coefficient • Factor Analysis

F. Stage 1: Preparation and Pilot Study

Using literature reviews focused on cultural perspective of learning, scientific literacy and instructional congruence, pre-deterministic constructs of the intended evaluation instrument were identified. The instrument was highly influenced by the four major characteristics of instructional congruence framework:Role of teacher; subject-specific pedagogy of teaching model based on particular cultural model; learning science and learning literacy which is believed to improve students' mastery of writing skills; and constructivism. The pilot study included interviews of introductory physics teachers and students to determine their initial views on the integration of culture and language in the teaching and learning process of physics concepts. Both groups were asked what they were expecting in curriculum materials integrating culture and language. Data deduced from the pilot study and the information derived from literature were used as bases of the content and format of the evaluation tool.

G. Stage 2: Item Design and Construction

Initial design and format of items resulted toversion 1 or the draft version of the evaluation tool. This instrument was subjected to content and face validation by three experts. Physics faculty of the Faculty of Science, Technology and Mathematics of the Philippine Normal Universityformed the pool of experts. Panel interview with the experts who validated the instrument was conducted to clarify the content and design of the

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items of draft version. Their suggestions were incorporated in the revision of the draft version. A Focus-Group-Discussion with five Physics teachers of Cayetano Arellano National High School- Manila was conducted to determine the readability of the items, the appropriateness of the language used and the comprehension level of the items. The discussion provided information and insights on how physics teachers view the teaching and learning of physics concepts integrating culture and language. They also provided insights on the necessary criteria of what characteristics were they expecting from culture and language sensitive curriculum materials in physics. The data extracted from the focus group discussion were incorporated in the revision and finalization of the evaluation instrument resulting to the revised version. A second validation was done by four experts. Three of these experts were the same experts who validated draft version. The last expert was invited from the Social Science Department of the Philippine Normal University to look into the culture and language aspect of the evaluation tool. This validation was conducted to determine if all the comments and suggestions were properly implemented.

H. Stage 3: Pilot Testing and Data Analysis

Analysis of data gathered from the validation procedure included computation of evaluation averages of the experts and content validity coefficient. Agreement among raters and within raters was also determined using Kappa statistics and intra-class coefficient. Factor analysis was also used to determine the statistical constructs. Reliability of the instrument was based on the empirical process of the survey design as well as statistical tests of all the items and per category. This scheme of qualitatively establishing the reliability was adopted from the study of Chen [23]. It was part of the procedure of the research that the reliability was qualitatively established by conducting interviews with the would-be end-users of the instrument. In this case, the process ensured that there would be internal consistencies of the items in the instrument which were based from the possible arguments of the end users. The instrument was used by 21 teachers who have the following qualities: must have taught high school science or physics for at least 5 years, must be a science teacher in Pangasinan for at least 5 years, and is fluent both in oral and written discourse in the native language (Pangasinan dialect) and five physics experts to evaluate the sample culture and language sensitive curriculum materials for Pangasinan learners. This was done to quantitatively measure the reliability. From this, Cronbach's alpha which represents the reliability measure of the instrument was determined.

III. RESULTS AND DISCUSSION

The development project presents three major goals:to identify the pre-deterministic constructs of the instrument through a pilot study; to develop an evaluation tool intended to assess culturally-sensitive curriculum materials in physics, and to come up with a standardized culture and language sensitive curriculum material evaluation tool.

I. Draft Version of Culture and Language Sensitive Curriculum Material Evaluation Tool

The draft version of culture and language sensitive curriculum material evaluationtool was developed using literature reviews and empirical data provided by the pilot study where sixhigh school physics teachers of Cayetano Arellano National High School were interviewed. Accordingly, almost all the teachers interviewed expressed that the idea of integrating the culture and language or mother tongue in the teaching and learning was good. They said that it is very difficult for children to learn the concepts when taught in pure English. They said both groups of students (above average and slow learners) alike need translations in order for them to completely assimilate the concept. In the conduct of experiments the teacher needs to translate the instructions to the mother tongue for the students to understand and be able to follow.

Researcher: Ano po yong nakikita ninyong motivation nila kaya natututo sila? (What motivates kids to learn?)

Mrs. Lim: Yung medaling matututunan, activity. *(The one that is easiest to learn involves activity)*

Researcher: Activity poano, activity-based…(activity-based)

Mrs. Lim: Activity at tsakaitatransferposa tagalong yung words. *(Activity and everything should be translated to Tagalog)*

Mrs. Yakit: Bilingual talaga.*(Bilingual)*

Mrs. Lim: Oo, English muna*(English first)*

Mrs. Patate: Sunod agad yung tagalog *(Then translate everything to Tagalog)*

Mrs. Yakit: Yung mga books natin puro English eh. *(All our books, however are written in English.)*

From the transcribed excerpt of the interview, teachers used the mother tongue (Tagalog) to further explain the concepts or procedures for the students to understand. This practice was claimed to be done

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specially by those teachers teaching the students of low mental ability. They also claimed that students could not express themselves in English and are not participative in class discussion. Often, students request that they speak in the native language during discussion and even in written discourses. However, most of them claimed that they often use the bilingual system instead of using pure English or pure Tagalog. They usually start with the English instructions and introductions and then continue discussions and other oral discourse using the native language. But the teachers also said that they do not translate all the words to the native language. Technical terms were retained in their English format. From some other transcribed excerpts of the interview or focus group discussions, the researcher was able to identify what are the expectations of teachers with regards to curriculum materials that would integrate culture and language or the mother tongue as follows:

Mr. Santos: parang improvised. *(some improvisations)*
Mrs. Lim: 'yung ano, yung enough langang time. *(Consider time element. Activities can be done in about just enough time.)*
Mrs Lim: 1 hour and 30 mins.ngayon 1 hour nalang *(Before the contact time for science is 1 hr and 30 min. Now we have to make do with 1 hour.)*
Mrs.Yakit: 1 hour and 12 mins, tapos 1 hour nalang.

The interviewed teachers pointed out the use of locally available materials in the activities that would be developed. Some sort of improvised apparatus were suggested as part of the materials. Discussion flow would also be continuous and that the language used although basically the native language must also address the mental capability of the students in the lower mental ability spectrum. Finally, they were expecting that the activities that would be included in the would-be developed curriculum materials be within the 1 hour and 20 minute schedule. These expected characteristics of a culture and language sensitive curriculum material in physics were included as part of the items of the evaluation tool.

Literature reviews the pre-deterministic constructs, criteria and indicators of a culture and language sensitive curriculum material in physics, These pre-deterministic constructs were based from literature reviews, expert's/teacher's views, course content and the Filipino culture. Pre-deterministic constructs as highlighted in this study included the four constructs of instructional congruence framework: *Role of teacher, subject-specific pedagogy of teaching model based on particular cultural model, learning science and learning literacy, and constructivism.*

The draft version of the evaluation tool was subjected to two methods of content validation by the experts which were descriptive and quantitative content validation. Only descriptive validation was done for face validation. Descriptive validation highlighted the use of phrases or words to describe the assessment of the items. These were presented as comments, remarks or suggestions of the experts. Quantitative content validation made use of the 18-item validation checklist (Appendix A) adapted from instructional congruence framework and project rekindling tradition by [12].

Table 3. Content and Face Validity of CS-CMET v.1

Experts	**Average**	**Comments/Suggestions**
Expert 1	4.83	Corrections for typographical and spelling errors. There might be a missing word on item 26
Expert 2	4.56	Corrections for typographical and spelling errors. Item 2, Item 18, item 22, and Item 26
Expert 3	4.83	The evaluation checklist is very comprehensive to evaluate instructional materials
Average	4.74	

All evaluators had rated the developed instrument *4.74 out of to 5.0* (Table 3) indicative that the raters evaluated the evaluation tool within the highest range of the Likert scale. This suggested a good quality tool in construction and valid content wise. The third column provided the suggestion and comments of the experts. Panel interview with the three experts was done to clarify their suggestions and comments. It was expressed by the third expert that the instrument needs pilot testing to ensure that the developed instrument is a standard one in assessing culture and language sensitive curriculum material evaluation instrument. The first and the second experts identified the items that need some revision while the third expert commended the instrument as provided in the comments.

J. Revised version of Culture and Language Sensitive Curriculum Material Evaluation Tool

After the revision based on the first validation cycle, the revised version (*v.2*) was subjected to a second round of content and face validation. The rating improved with an over-all mean of *4.98 out of 5.00* by the four raters. This new rating was an improvement of

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the instrument from the first validation cycle. Each of the raters evaluated the instrument as very close to 5.0 (Table 4).

Table 4. Content and Face Validity of the Revised Version

Experts	Average	Comments/Suggestions
Expert 1	4.94	• All revisions suggested were integrated.
Expert 2	5.00	• All revisions suggested were integrated.
Expert 3	5.00	
Expert 4	4.94	
Average	4.98	

In addition to mean values of experts, content validity coefficient was determined per checklist item to ensure that the instrument was actually rated as a content valid instrument. These coefficients were shown in Table 5.

Table 5.Content Validity Coefficient (VI_K) the Draft and Revised Versions

Items	*Aiken'sVI$_K$ (Content Validity Coefficient) of the Draft Version*	*Aiken'sVI$_K$ (Content Validity Coefficient) of the Revised Version*
Average	0.94	0.99

The closer the Aiken's validity coefficient to one, the higher content validity an item had [24]. The experts who rated the items found the items valid in terms of content as shown in the values of content validity coefficients ($VI_K \approx 1.0$). The items in the evaluation tool are content valid in terms of instructional congruence framework.A second round of content validity coefficient computation was done and presented in Table 5. An improvement on the content validity coefficient ($VI_K = 0.99$) was obtained after second round of content validation. All the items in the checklist were rated much closer to one suggestive of a high content validity coefficient than the draft version.
Inter-rater agreement was established to be able to make sure that experts' evaluation or validation are consistent. The inter-rater coefficient for the first run of validation was provided in Table 6.

Table 6: Inter-Rater Coefficient of the Draft Version

Inter –Rater Coefficient	Expert 1-Expert 2	Expert 1-Expert 3	Expert 2-Expert 3
Kappa	0.83	0.40	0.28

Based from Table 6, an almost perfect agreement was observed between Experts 1 and 2. Moderate and fair agreement, on the other hand was exhibited by experts 2 & 3 and experts 1 & 3 respectively. Interpretations of the Kappa coefficients were based on the standards set by Landis [25]. Improved agreements of experts were shown in the second cycle of validation process for the revised version as presented in Table 7.

Table 7: Inter-Rater Coefficient of the Revised Version

Inter –Rater Coefficient	Expert 1-Expert 2	Expert 1-Expert 3	Expert 1-Expert 4	Expert 2-Expert 3	Expert 2-Expert 4	Expert 2-Expert 4
Kappa	0.83	0.83	0.83	0.83	0.83	0.83

As shown in Table 7, all experts agree that the instrument they were validating and evaluating was within the standard excellent category as also presented in the mean values of their ratings (Tables 3and 4) and in the Aiken's validity coefficients for the two versions of the instrument (Tables 5 and6).The Intra-class coefficient a descriptive statistics that provides the composite of intra-observer and inter-observer variability. Itwould refer to intra-observer variability which is the deviation of a particular rater's score as presented in Table 8.

From Table 8, the index of variability for one single rating is 0.71 classified as very strong agreement.

Table 8: Intra-Class Coefficient Revised Version

Kind of Measure	Intra-Class Correlation	p-value
Single	0.71	0.00*
Average	0.98	0.00*

** significant at 0.05*

While the index for the reliability or agreement of different raters averaged together is 0.98, close to +1 (perfect) agreement. In both cases (single and average), difference of measures of scores is significant ($p < 0.05$) which means that there were variable scores but these scores are still in agreement with each other both within

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the same rater or among raters. It can be deduced that intra-rater agreement is high that supports the validity and reliability of the instrument.

Reliability measures were used to determine the internal consistencies of the items included in the instrument. Factor analysis was conducted to identify which items formed common construct which were identified as the raw statistical data constructs. The instrument was used by about 25 physics teachers who were from Pangasinan and were fluent in the Pangasinan dialect as well as very competent in physics concepts and pedagogy. Twenty of which were high school teachers of Pangasinan, while the four others were experts in physics but were natives of Pangasinan practicing Physics teaching and/or research in other places or countries. The 21 high school teachers as set of raters assessed asample culture and language sensitive curriculum materials in physics for Pangasinan learners while the rest assessed two samples of culture and language sensitive curriculum materials in physics for Pangasinan learners. Results of these tests were included in Table 9.

Table 9. Reliability and Components of the Revised Version

Evaluation Instrument	*No. of Cases (n)*	*Cronbach's Alpha (α)*	*Components*
CS-CMET v.2*(31-Item)*	29	0.99	2 factors

Reliability indicates the stability of the data sets across applications or across time. Among the types of reliability *internal consistency reliability* is most appropriate for a test administered once. The suggested appropriate measure for a dichotomously scored test (i.e. correct or incorrect) is Cronbach's Alpha. Using the Statistical Package for Social Sciences (SPSS) software, the computed reliability (Cronbach's Alpha) was 0.99 (Table 9). There were 31 items automatically detected by the software. According to the standard set by University of Washington reliability (Cronbach's Alpha) within the range 0.9 and above is within the range of excellent reliability, at the level of the best standardized instrument.

Factor analysis' eigen values associated with each linear component (factor) before extraction, after extraction and after rotation were extracted. Before extraction, SPSS has identified 31 linear components within the data set. Accordingly, SPSS was able to extract all factors greater than 1, which were about two factors. The first factor already explained 76.549% of the total variance. Cumulatively, the two factors have already explained 80.99% of the total variance and only about 19% was attributed to other variables. After rotation, the variance leveled off to the two factors although still high variance was attributed to factor 1. Two components had been extracted for the revised version of the culture and language sensitive curriculum material evaluation tool.The two component matrices corresponded to the factors identified with the corresponding items subsumed in each factor. *Factor 1 (Items 2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 25, 26, 28, 29, and 30); and Factor 2 (Items 1, 3, 4, 5, 6, 9, 11, 12, 13, 17, 20, 21, 22, 23, 24, 26, 27, 30, and 31).* From analysis of the items included in factor 1, the common theme for these items was the principles of *constructivism* which were culture and language-based. In Factor 2, on the other hand, the items represent learning physics or science using the materials heavily influenced by culture and language and at the same time learning literacy as well. Table 10 provided the summary of the factors inclusive of sample items identified in these factors.

Table 10. Sample items per construct of Revised Version

Factor 1: Constructivism: Culture and Language-Based Principles
• Item 2: The worksheets provided are easy to use and understand by the student-users. • Item 5: The materials call for different learning strategies such as cooperative learning.
Factor 2: Emphasis on Learning Science and Learning Culture, Language, and Literacy
• Item 1: Ideas are expressed through unifying themes and big ideas focused on historical, traditions and culture of a particular ethnicity. • Item 3: Content presented was accurate and historical accounts are authentic.

Incidentally, these two constructs corresponded to the two of the four major characteristics of instructional congruence framework: Learning science and learning literacy; and constructivism [19]. The other two

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constructs: Role of teacher and subject specific pedagogy may have been subsumed in the two factors identified. Thus, using the revised version of the culture and language sensitive curriculum material evaluation tool as it was intended would provide results anchored on instructional congruence frameworkon which it was initially based. The reliability of the evaluation instrument was extended to reliability per construct of the revised instrument. This was done to ensure that internal consistencies among the items within the constructs exist.

Table 11. Reliability per Component of the Revised Version

Component	*N (No. of Items)*	*Cronbach's Alpha (α)*	*Remarks*
Component 1	21	0.98	Excellent
Component 2	19	0.98	Excellent

From table 9, all reliability coefficients (Cronbach's alpha) of each of the constructs fall within excellent category. This means that in each of the constructs, the items were found to have grouped to give consistent results for a particular set of respondents. The emphasis of this research was to develop an instrument intended to evaluate culturally sensitive-curriculum materials. Using literature reviews and pilot studies, the developed instrument had the following features: Likert-scale format for easier analysis; items were grouped according to constructs which were statistically identified; the statistically identified constructs matched the pre-determined constructs; qualities of an excellent evaluation instrument were exemplified by the developed instrument as evaluated by experts; anditems in the constructs were empirically determined. This means that the intended users were the selected participants of the pilot study prior to the development of the study.

A summary of the statistical characteristics of the evaluation instrumentis provided in Table 10.

Table 10. Summary of Statistical Characteristics of Culture and Language Sensitive Curriculum Material Evaluation Tool

Draft Version	*Revised Version*

• *n = 31
• Content Validity
• Over All Mean = *4.74 out of 5.00*
• Aiken's Content Validity Coefficient
• *(Vi_c)) = 0.94*
	• *n = 31
	• Content Validity
	  ○ Over All Mean = *4.98 out of 5.00*
	  ○ Aiken's Content Validity Coefficient *(Vi_c) = 0.99*
	• Cronbach's alpha (α) = 0.99
	• 2 Factors extracted from factor analysis:
	  ○ *Factor 1: Constructivism: Culture and Language-Based Principles*
	  ○ *Factor 2: Emphasis on Learning Science and Learning Culture, Language, and Literacy*
	• Reliability per construct/factor
	○ *Factor 1:* α = 0.98 *&Factor 2:* α = 0.98

The development of culture and language sensitive curriculum material in physics included two versions of the instrument. The revised was an improved edition of the first one with improved average ratings of the expert and Aiken's coefficient of validity, excellent internal consistency reliability, extracted factors and internal consistency reliability per construct. Thus, the instrument was a valid and reliable evaluation tool for culture and language sensitive curriculum materials.

IV. CONCLUSIONS AND RECOMMENDATIONS

The development of an evaluation tool to assess culturally-sensitive learning materials in Physics had come a long way from the pilot study using non-traditional approaches to the development and design of the items to item validation and finalization. The focus of the development process was to establish the real constructs or categories of the evaluation tool based on instructional congruence framework. Through pilot study conducted pre-deterministic constructs, criteria and indicators of a culturally-sensitive curriculum material in Physics were deduced. These served as bases in the design and construction of items that comprised the evaluation tool. The role of the teacher was basically chosen as one of the considerations of the materials. The teacher must be well versed in discussing the concepts in contexts as provided by the material. The learning materials should be something that models congruence between scientific knowledge and the inquiry process, with students' language and cultural experience. An emphasis should also be vivid in the improvement students' mastery of writing skills, encourages more discussion and allows more sharing on

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cultural experience. Finally, constructivist in approach where students develop knowledge by integrating their experiences with the environment.The developed evaluation tool should cater all these qualities and characteristics. The evaluation tool's validation and evaluation showed that the instrument constructs and criteria are content wise, culture-integration wise, and reliability wise both from the perspective of inter and intra-agreement of the rater(s).

However, there were some aspects of the study that needed to be polished. Good reliability can be very well established using a greater number of evaluators. Statistical comparison of the constructs and the constructs deduced after factor analysis usually known as the raw data construct may have been calculated to check the significant difference if any. The pilot study conducted may be extended to a greater number of respondents from different cultural groups to firmly establish the criteria of a culturally and language sensitive learning material in physics as expected by different groups of Filipino students. More intensive research on the Filipino culture may also be integrated.

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