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Mother-Tongue Based Multilingual Education (MTBMLE) Initiatives in Region 8

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Article Info	ABSTRACT
	With the implementation of Mother-Tongue Based Multilingual Education (MTBMLE) under the *Enhanced Basic Education Act of 2013*, this study set out to examine Region 8's readiness and extant educational materials. On the one hand, "L1 to L2 Bridge Instruction" has been shown by Hovens (2002) to engender the most substantive language acquisition, while the "Pure L2 immersion" approach displays the lowest results. Despite this, Region 8 (like other non-Tagalog speaking Regions) lacks primary texts in the mother tongue, vocabulary lists, grammar lessons and, more fundamentally, the references needed for educators to create these materials. To fill this void, the researchers created a 377,930-word language corpus generated from 419 distinct Waray texts, which led to frequency word lists, a five-language classified dictionary, a 1,000-word reference dictionary with pioneering part-of-speech tagging, and software for determining the grade level of Waray texts. These outputs are intended to be "best practices" models for other Regions. Accordingly, the researchers also created open-source, customizable software for compiling and grade-leveling texts, analyzing the grammatical nuances of each local language, and producing vocabulary lists and other materials for the Grade 1-3 classroom.

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1. INTRODUCTION

The implementation of Mother-Tongue Based Multilingual Education (MTBMLE) under Department of Education Order 74, series of 2009 created some practical challenges in its implementation to classroom grade school teachers in Grades 1 to 3. Many non-Tagalog languages, including Waray, were not taught in school for a number of years, so that there are virtually no reading materials, instructional materials, grammar materials, adequate dictionaries, vocabulary lists for Grades 1-3 teachers and students. Anecdotal evidence suggests that even the teachers themselves are not confident in terms of vocabulary competence in their own L1.

The Waray dictionaries of Makabenta (2004), Abuyen (2005), Tramp (1995), and Unruh (1993) classify Waray words by borrowing English-language grammatical structure, which unfortunately does not accurately represent the structure of Filipino-family languages [1]-[4]. For example, Makabenta (2004), Tramp (1995), and Unruh (1993) categorize the root *hugas (wash)* as a verb, while Abuyen (2005) does not have an entry [1]-[4]. None of these dictionaries contain an entry for *hugasan (a place where the washing is done* or, *things that needed to be washed),* for instance. The Alburo (2009) dictionary is limited to terms related to Bisayan arts [5]. The three dictionaries by Domingo Esguerra, SJ (1663)*,* Mateo Sanchez (1711)

and Antonio Sanchez de la Rosa (1914) are not readily available, and are written in Spanish [6]-[8]. The majority of Warays today do not speak Spanish.

There is, therefore, a need for a new paradigm to describe and grammatically categorize Waray. Once this is done, development of instructional materials, text readability instrument, language syllabus, grammar, assessment tools, etc. can now follow.

2. REVIEW OF RELATED LITERATURE

Although no two language structures are identical, language families share commonalities. Nolasco provided some of these common patterns among Philippine languages in his essay *Grammar Notes on National Language*. According to Nolasco, "a word in Philippine languages may consist of: (a) a root; (b) a root plus one or more affixes; or (c) a particle. A root is any unanalyzable form capable of taking an affix. [Roots have] the ability of combining with one or more affixes, as in *tumakbo* or *tumatakbo*. Particles like na `already', pa `still' and daw `reportedly' are not roots because they always occur without an affix. Roots may combine with affixes to form words. Words combine with other words to form larger constructions....In this sense; one might say that roots are neutral or pre-categorial" (i.e., *kaon, hugas*, etc.). Nolasco's and Foley's (1998 as quoted in Delos Reyes) conceptualization is our framework in part-of-speech tagging in the *First 1,000 Commonly Used Words in Waray* dictionary [9].

Fundamental to creating an accurate grammar for a language, and for building vocabulary at an appropriate grade level is the seminal work of Edward Dolch (1948), who pioneered creating lists of familiar or frequent words in a language [10]. These lists provide the basis for teachers to know what words to teach at a given grade level, provide a vocabulary for educators to create grade-appropriate reading materials, and are necessary for readability algorithms such as the George Spache Readability formula (1952) or the Dale-Chall Readability formula (1955), which despite being created half a century ago, still remain valid tools [11],[12]. This project aims at creating an accurate readability formula tailored to the idiosyncrasies of the Waray language. The main application of this formula would be for educators to know whether a given text is appropriate reading material for students.

3. THEORETICAL FRAMEWORK

Accordingly, "there are different types of language proficiencies, the Basic Interpersonal Communication Skills (BICS) is used to carry out daily activities, and it is different from the Cognitive Academic Language Proficiency (CALP) which is associated with understanding and following academic subjects" [13],[14]. In multilingual countries like the Philippines, "both linguistic minority students and majority children can react differently to the strategies used for the acquisition of these different types of linguistic proficiencies…When students from majority language groups begin school, they already have a great degree of the BICS type of linguistic proficiency, and they improve it with new words, phrases and structures learned at school. At the same time, they are ready to add the CALP type of linguistic proficiency to their existing linguistic repertory. However, when linguistic minority students begin school, they generally speak the language of instruction only a little or not at all. They are required to spend a long time trying to develop BICS. Therefore, they fall behind in the development of sufficient and effective CALP".

Furthermore, based on the studies by Ouane & Glanz (2011), Cummins (1999; 2011), Dutcher (1995; 2004), Baker (2006), and longitudinal studies by Ramirez, Yuen and Ramey (1991) and Thomas and Collier (2002), and also Hovens (2002), it was found out that "the effective transfer of cognitive and academic competences from the mother tongue to the second language is possible only when the learners have acquired adequate linguistic and academic competence in their mother tongues [15]-[23]. Studies show that it requires at least six years for the effective transfer to take place." Ouane & Glanz (2011) cited longitudinal studies (Ramirez *et al.*, 1991; Thomas and Collier, 1997, 2002) provided evidence that pupils who study in a second language from early on start losing ground in year/grade five when compared to first language learners and will not catch up later on [15],[21],[24].

According to Heugh (2011), "the transfer of cognitive and academic competence between mother tongues and second language takes place under specific conditions [25]:
1. Adequate instruction in the mother tongues as languages of instruction,
2. Effective teaching of the second language as subject matter,
3. Well-trained teachers,
4. Availability of quality educational materials in both mother tongues and a second language and
5. Overall well-resourced learning environments"

These initiatives that LNU are doing—*Waray Text Readability Instrument, First 1,000 Commonly Used Word in Waray, Waray Language Corpus*, among others are aimed at satisfying the conditions specified above, particularly items number (1), (3) and (4).

4.   STATEMENT OF THE PROBLEM

With the *Enhanced Basic Education Act of 2013* in place, what can a normal school like Leyte Normal University do to address the following in the successful implementation of MTBMLE in Region 8?

a.   lack of system of writing for the Waray language;

b.   lack of vocabulary lists for Grades 1-3 teachers;

c.   lack of assessment and validation tools for reading materials;

d.   teachers often have English terms but lack the corresponding Waray vocabulary;

e.   lack of grammar material/explanation;

f.   teachers have to accommodate different "mother tongues" within a single classroom; what LNU can do to address this?

In short, the current teachers of MTBMLE have no "best practices" for how to create educational materials in Waray or how to teach grammar, and this creates an existential stumbling block for high-quality, standardized MTBMLE instruction.

5.   METHODOLOGY

In other to gather data for this study, LNU created a corpus for Winaray. A corpus is simply a database of texts. Its value and use are defined by its contents. If the group of texts is discrete, specific to a time period or region, it can help researchers understand distinct historical or local linguistic traits. If it is expansive, collecting texts diverse in authorship and purpose, it can help researchers understand grammatical features of the language as a whole.

Specifically for educators in the Philippines, corpora in local languages would not only function as a repository of local culture but would provide the foundation for scientifically structured language instruction. A corpus can tell an educator what words are most commonly known by youth, thus enabling the creation of vocabulary lists. It can indicate difficult words, sentence syntax patterns, and grammatical irregularities. If, for example, a teacher needs to explain the usage of a linker in the local language, she can search the database and find hundreds of sample sentences. If a teacher wants to rate a student's reading comprehension level, he can select a text according to its average sentence length or percent of frequently used words

Building the Waray Language Database

In order to build the Waray language corpus, all extant written texts in Waray were collected, designated with the following genres: Bible, Blog, Comedy, Drama, Essay, Journalism, Lexicon, Poem, Song, Story, Susumaton, Uncategorized. All of these were uploaded to the database (waraylanguage.org). As of September 2013, 419 texts were collected, totaling 377,930 words. Metadata such as author, genre, and source were tagged for each text.

Determining Waray Text's Reading Comprehension Level

With the raw text database compiled, it was first sanitized to remove nonsense words as shown below:

```
$find = array('/\r/','/\n/','/\s\s+/');
   $replace = array(' ',' ',' ');
   $work = preg_replace('/[>][<]/', '> <', $work);
   $work = strip_tags($work);
   $work = strtolower($work);
   $work = preg_replace($find, $replace, $work);
   $work = trim($work);
   $work = explode(' ', $work);
   natcasesort($work);

// give a wordcount of the total corpus currently
   $wordcount = count($work);
   $sql = "UPDATE metadata SET corpuswordcount = '$wordcount' WHERE id = '1' ";
```

```
$results = mysql_query($sql)
  or die(mysql_error());
$i = 1;
foreach($work as $word) {
  $word = trim($word);
  $junk = preg_match('/[^abcdefghijklmnopqrstuvwxyz-]/', $word);
  if($junk == 1) { $word = ''; }
```

Each word in the database was cross-referenced against a database of 180,000 English language words, and if found, not counted, using the following code:

```
$sql = " SELECT word FROM englishdictionary";
            $result = mysql_query($sql)          or die(mysql_error());
            while ($row = mysql_fetch_array($result))
            {extract($row);
            $temp = strtolower($word);
            $englishwords[] = $temp;}
```

```
$intersection = array_intersect($frequency, $englishwords);
$difference = array_diff($frequency, $englishwords);
```

```
$ids = implode("','",$intersection);
$sql = "UPDATE frequency SET english = '1' WHERE word IN ('$ids') ";
$results = mysql_query($sql) or die(mysql_error());
```

```
$ids = implode("','",$difference);
$sql = "UPDATE frequency SET english = '0' WHERE word IN ('$ids') ";
$results = mysql_query($sql) or die(mysql_error());
```

Alternate or nonstandard spellings were identified manually by researchers and aggregated. Proper nouns were marked in a similar fashion. The sanitized data was then analyzed to determine each text's reading comprehension level, as well as the reading level of new texts. Two principle statistics were established:

1. **Average sentence length of texts in Waray.** To determine this, the researchers created a computer program to count the number words in the entire database (for computing purposes, a "word" was defined as a string of characters preceded and followed by a space, after all punctuation is excised from the database). Then the number of sentences was calculated by counting the number of periods, semicolons, exclamation points, and question marks in the database). The following formula was used to calculate average sentence length:

$$\frac{Total\ Number\ of\ Words}{Total\ Number\ of\ Sentences} = Average\ Sentence\ Length$$

2. **Frequency of each word in the database.** To determine this, the researchers created a computer program to count how many instances of each word (represented a X in the formula below) in the database. The following formula was used to calculate word frequency:

$$\frac{Instances\ of\ Word\ X}{Total\ Number\ of\ Words} \times 100 = Frequency\ of\ Word\ X\ per\ 1,000\ words$$

This calculation allowed the creation of the *First 1,000 Commonly Used Words in Waray* by statistically determining the top 1,000 most frequent words.

These two statistics formed the basis for a mathematical formula known as a "readability instrument." The researchers chose to model their readability instrument on the Spache Readability Formula (1953) instead of the more common Flesch-Kincaid Readability Formula (1975) [26],[27]. The latter calculates readability based on average syllables in words, but the Philippine family of languages are agglutinative; in other words, syllabification is not an accurate determiner of word difficulty in Philippine languages. Instead, the Spache model uses average sentence length and percent of frequent or common words to rate a text's reading level. The researchers followed these established axioms:

1. Texts with shorter average sentence length are easier to read than texts with longer average sentence length.
2. Texts containing more frequent or common words are easier to read than texts with many unfamiliar or infrequent words.

The following formula was created to determine readability level of a given text.

$$Grade\ Level =$$
$$(0.121 \times Average\ Sentence\ length) + (0.082 \times Percent\ of\ Unfamiliar\ Words)$$

Word Root Algorithm

A separate algorithm was written to isolate word roots in Waray. The researchers started by defining common affixes in Waray. If a word starts with "mag", "pag", "na", "um", etc. (ex. *napalit*), the program strips these from the beginning of the word. If "um" or "in" directly follows the first letter (ex., *pinalit*), these infixes are also removed. If words end with "a" or "i" (ex., *palita*), they are removed. Waray also changes form or tense by doubling initial syllables (ex. *palit* becomes *papaliton*). Fortunately, all Waray syllables are either two letters or three letters long (consonants are one or two letters, vowels are always one letter). The program checks if the first two syllables are the same, and if so, removes the duplicate. Another feature of Waray is that it has glottal stops. The typical way to represent these in writing is with hyphens (gab-i, hin-o). But hyphenation is not standardized. Thus, the dictionary checks for this: if a user searches for "gab-i", the dictionary also finds matches for "gabi", and vice versa.

The word root algorithm is displayed below:

```
$root = $search;
// DEFINE THE COMMON PREFIXES, SUFFIXES, INFIXES
   $prefixfour = array('igin');
   $prefixthree = array('nag', 'gin', 'pag', 'mag', 'tag');
   $prefixtwo = array('ma', 'na', 'ka', 'pa');
   $infix = array('um', 'in');
   $suffix = array('a','i');
// CHECK FOR PREFIXES; IF FOUND, REMOVE THEM FROM THE WORD
   $firstfour = substr($root,0,4);
   if (in_array($firstfour,$prefixfour))
      { $root = substr($root,4); }
   $firstthree = substr($root,0,3);
   if (in_array($firstthree,$prefixthree))
      { $root = substr($root,3); }
   else{
      $firsttwo = substr($root,0,2);
      if (in_array($firsttwo,$prefixtwo))
      { $root = substr($root,2); }
      }
// CHECK FOR INFIXES; IF FOUND, REMOVE THEM FROM THE WORD
   $infixb = substr($root,1,2);
   $infixa = substr($root,0,2);
   if (in_array($infixa,$infix))
      { $root = substr($root,2);}
   if (in_array($infixb,$infix)) {
      $start = substr($root,0,1);
      $end = substr($root,3);
      $root = $start.$end;
      }
// CHECK FOR SUFFIXES; IF FOUND, REMOVE THEM FROM THE WORD
   $suffixtest = substr($root,-1);
   if (in_array($suffixtest,$suffix))
      { $root = substr($root,0,-1); }
// CHECK FOR TENSE: IF THERE ARE DOUBLED SYLLABLES, (ex. nagTI-TI-
kang), REMOVE THE FIRST
   $first = substr($root,0,2);
```

```
$second = substr($root, 2,2);
if ($first == $second) { $root = substr($root, 2); }
```

Creation of a Predictive Dictionary

This word root algorithm allowed the researchers to make an online dictionary that finds exact matches from user input, as well as other words in the database that contain the root. An example of how the algorithm works is given below:

> 1. User enters the word "nagsusurat"
> 2. If the database has an exact match, all information about that word is shown; a link to all sentences that contain the word is given.
> 3. The program finds the prefix "nag" and truncates the word to "susurat".
> 4. The program finds the doubled syllable "su" and truncates to "surat".
> 5. The program searches the database for any words that contain "surat".
> 6. The program adds "in" and "um" as infixes ("sinurat" & "sumurat") and searches for any words containing the modified root.
> 7. Output: the program finds *ginsurat magsurat magsusurat masurat nagsurat nagsusurat nakasurat pagsurat pagsusurat sinurat sinusurat surat tagsurat*.

The algorithm is copied below:

```
// SEARCH THE DICTIONARY FOR ANY WORDS THAT CONTAIN THE ROOT
  $sql = " SELECT word FROM frequency";
  $result = mysql_query($sql)
  or die(mysql_error());
  $list = array();
  while ($row = mysql_fetch_array($result))
     { extract($row); $list[] = $word; }
  foreach($list as $needle)
  {
    $pos = strpos($needle, $root);
    if ($pos !== false)
       { echo "< span>. $needle ."">". $needle ." ";}
// INSERT INFIXES, (EX. palit BECOMES pumalit & pinalit) SEARCH FOR MATCHES
    $firstletter = substr($root,0,1);
    $therest = substr($root,1);
    $um = "um";
    $in = "in";
    $modroot = $firstletter.$um.$therest;
    $pos = strpos($needle, $modroot);
    if ($pos !== false)
       { echo "< span>. $needle ."">". $needle ." ";}
    $modroot = $firstletter.$in.$therest;
    $pos = strpos($needle, $modroot);
    if ($pos !== false)
       { echo "< span>. $needle ."">". $needle ." ";}
  }
```

The Waray Text Readability Instrument (WTRI) Validation

Instructional materials written in Waray will have to be developed by teachers, and teacher training institutes in the implementation of MTBMLE. These materials will have to be graded accordingly to fit the text with the learners. Therefore, a Readability Test tailored for the Waray Language needs to be developed and validated.

The WTRI was validated by three groups, namely the Grade 2 pupils of Marasbaras Central School (Group A), MTBMLE teachers of Tacloban City Division (Group B), and Reading Specialists of Leyte Normal University (Group C).

Group A : Grade 2 Pupils of Marasbaras Central School

Three selected stories/texts previously graded by the WTRI (Grade Level 1, 2 and 3) was read to the average section of Grade 2 pupils of Marasbaras Central School. After reading the stories to the group, comprehension questions will be given to determine if the student understood the texts. Their ability to answer will support the WRF's rating of the text.

Group B – Kindergarten, Grade 1, and Grade 2 teachers of Tacloban City Division.

This group was composed of selected Kindergarten and Elementary teachers from identified schools in Tacloban City Division who participated in the pilot implementation of the MTB MLE in school year 2011 – 2012. The same three selected texts that were given to Group A was presented to these teachers. They rated the Reading Level (Grade 1, Grade 2, Grade 3) each story according to their own judgment as veteran Kindergarten and Grade 1, or Grade 2 teachers.

Group C – Reading Specialists from Leyte Normal University

LNU convened a panel of Reading Specialist to validate the text graded previously by the WTRI. This body was composed of LNU Faculty with Master's and Doctoral Degree in Reading and Teaching Reading. As experts they will give their own independent rating of the text – which was then compared to the rating done by the WRF Software, pupils, and teachers.

6.   RESULTS AND DISCUSSION

On the lack of system of writing for the Waray language

In 2009 LNU commissioned the study entitled *Acoustic Properties of Waray Vowels* [28]. It aims to settle the major source of confusion in the writing of Waray vowels e and i and vowels o and u. In the following years a series of consultations with DepEd teachers, writers, students and the media were conducted: first, was in August 26, 2010 at LNU; second, was on May 17, 2011 at LNU. In 2012, the booklet *An Bag-o nga Ortograpiya han Winaray* (Oyzon, Ramos, & Nolasco, 2012) was issued by Leyte Normal University and was institutionalized by DepEd Region 8 [29].
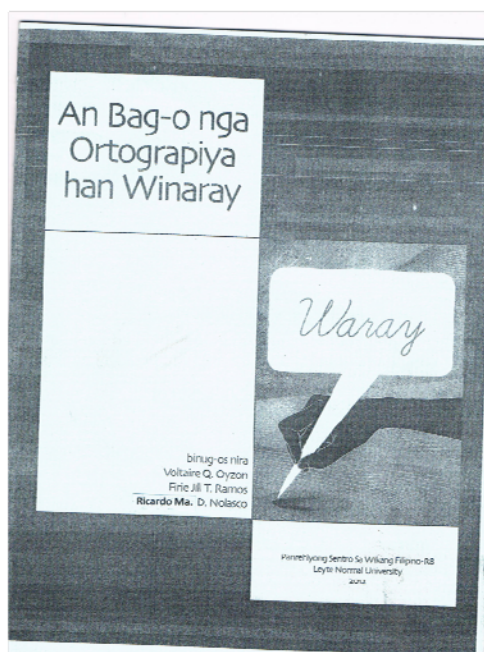

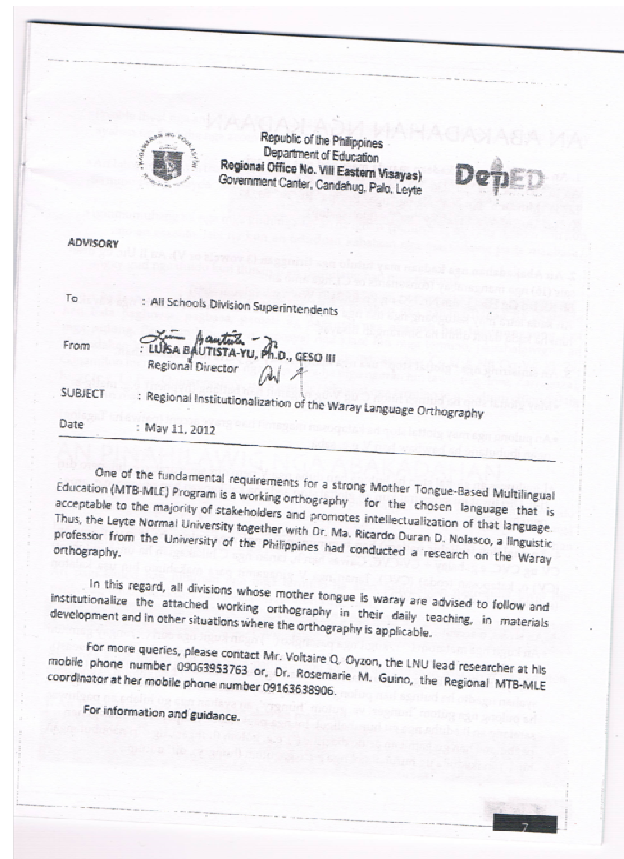Figure1. *An Bag-o nga Ortograpiya han Winaray* institutionalized by DepEd Region 8.

Figure 2. DepEd Region 8 advisory institutionalizing *An Bag-o nga Ortograpiya han Winaray*.
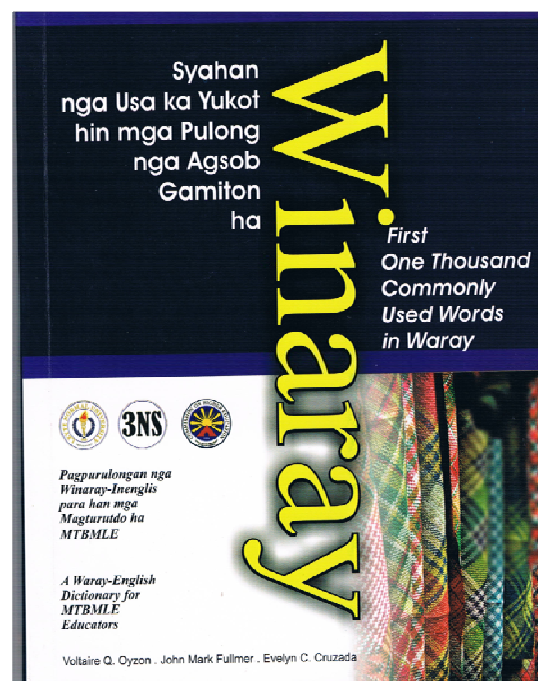

Figure 3. A Waray-English dictionary of High Frequency Words in Winaray.

On the lack of vocabulary lists for Grades 1-3 teachers

Last June 2013, the book *Syahan nga Usa ka Yuko thin mga Pulong nga Masukot Gamiton ha Winaray: Pagpurulongan para han mga Magturutdo ha MTBMLE* (First One Thousand Commonly Used Words in Waray: Dictionary for MTBMLE Educators) was launched at LNU.

The book aims to provide a High Frequency Word List in Winaray, which can be used by the teachers from Kinder to Grade 3. The same book can also be used in the development of reading materials. One factor that affects the readability of teaching or reading material is familiarity with vocabulary [30]. Development of reading materials must be based on the words in frequency list. The vocabulary list will guide the teachers what words should be taught in their classes.

Syahan nga Padugang: Listahan han Kaagsob han mga Pulong
(An ihap ha hil-ot nagpapakita han kaagsob han pulong ha sulod han corpus nga may 377,930 nga termino)

1	nga (9817)	37	anak (461)	71	babayi (217)
2	ha (sa) (7188)	38	ito (453)	72	hiton (siton) (217)
3	an (7054)	39	diin (447)	73	maupay (217)
4	han (san) (6221)	40	sugad (409)	74	ta (217)
5	ngan (6066)	41	tikang (407)	75	o (214)
6	mga (4152)	42	aton (399)	76	ada (211)
7	na (2346)	43	ito'n (399)	77	iba (211)
8	hin (sin) (2340)	44	baga (396)	78	ak' (210)
9	iya (2175)	45	didi (390)	79	mo (210)
10	kay (1807)	46	hini (373)	80	upod (200)
11	hi (si) (1585)	47	liwat (366)	81	daw (197)
12	hiya (1508)	48	ngadto (363)	82	hadto (194)
13	la (1345)	49	bisan (345)	83	kuno (189)
14	ka (1235)	50	para (341)	84	lalaki (181)
15	kun (1235)	51	tawo (334)	85	adlaw (177)
16	man (1132)	52	ug (328)	86	ayaw (162)
17	ako (1129)	53	kita (323)	87	basi (159)
18	Waray (1117)	54	pero (320)	88	diri (151)

Figure 4 . A screen shot of High Frequency Word List in Winaray.

The book also addresses the issue on part of speech tagging in Waray by proving autochthonous terms for part of speech and by offering new paradigm to describe and grammatically categorize Waray words. The words listed here also serve as model spelling in the writing of Waray language. This also answers our problem letter e in the statement of the problem (lack of grammar material/explanation), as can be seen in Figure 5. Each entry provides (1) the part of speech of the word; (2) meaning in English (3) Sample sentence/usage. Dialectal variations are also taken into consideration.

On lack of assessment and validation tools for reading materials

Aside from the fact that reading materials are insufficient in Waray, a teacher may create her own stories and other reading materials without any guidance. However, the teacher will have to hurdle another challenge—validity of her created reading materials. How can one teacher make sure that the stories/poems she wrote are suitable to the grade level of her pupils?

Together with the High Frequency Word List in Waray, a Waray Text Readability Instrument (WTRI) was created. WTRI is software that can be accessed online: http://waraylanguage.org/readability.php

All the teacher has to do is copy-paste a story/poem onto the panel, then click submit. The website screen looks like the Figure 6.
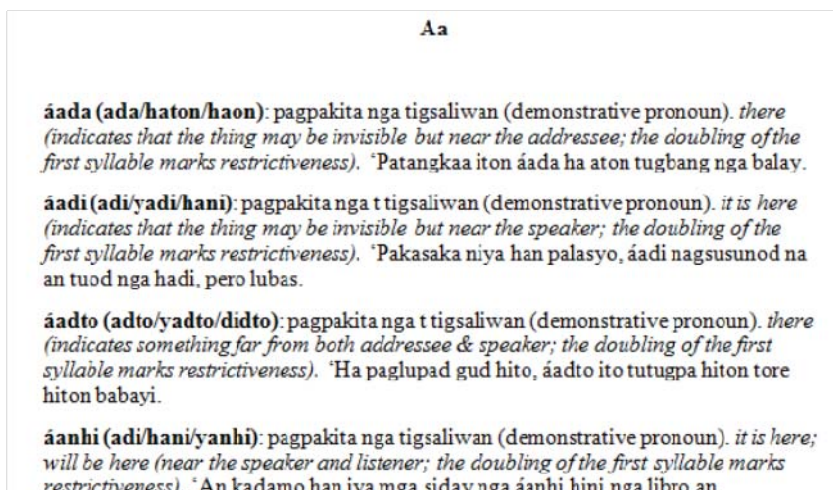
Figure 5 . Sample page of *Syahan nga Usa ka Yuko thin mga Pulong nga Masukot Gamiton ha Winaray: Pagpurulongan para han mga Magturutdo ha MTBMLE* (First One Thousand Commonly Used Words in Waray: Dictionary for MTBMLE Educators)
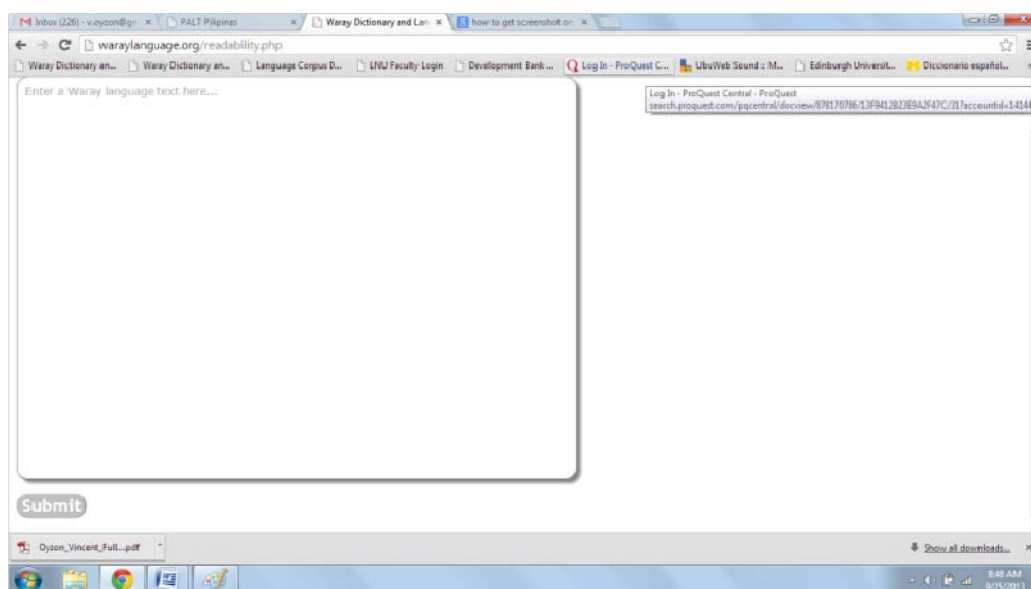

Figure 6. Screen shot in submitting a Waray text for determining readability level.

After pressing the SUBMIT button, something like this will come out on the screen, as Figure 7.

On teachers often having English terms but lacking the corresponding Waray vocabulary

This problem is currently being addressed in the redesigned website (launch date: November 2013) In addition to the Waray-to-English functionality (see Figure 8), the new website will cross-reference multiple Filipino languages with English equivalents and display all results in all languages.

On teachers having to accommodate different "mother tongues" within a single classroom

To address these concerns, LNU is now compiling the book entitled *Learner's Classified Dictionary for Learning English/Winaray/ Kana /Inabaknon/Filipino Vocabularies* (forthcoming), a five language classified dictionary. This book is intended "to make this dictionary usable by people whose vocabulary sophistication in Winaray, or Kana, or Inabaknon, or Tagalog, is low, whose traditional language is not in

regular use (meaning, it is not used in the domains of power), and who are relatively more competent in either English, and/or Tagalog vocabularies. It is also of value for sophisticated English speakers. It aims to "help the users to broaden his/her knowledge (in the language/culture under study)." This is also useful to MTBMLE teachers/ implementers, children's story writers, students and researchers in Region 8. This will also disseminate the approved orthography.
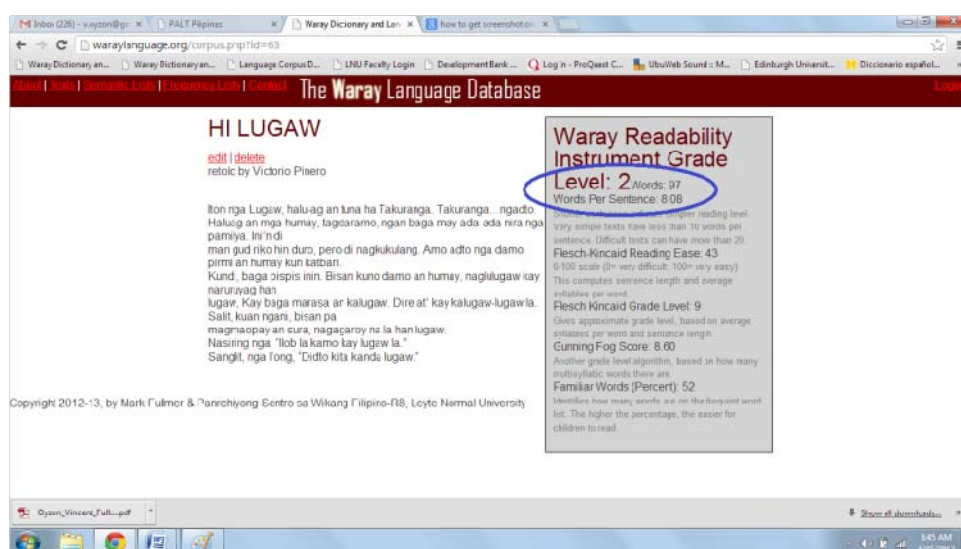

Figure 7. Results for readability level of submitted Waray text.

Figure 8. Current Online Waray-English Dictionary

Table 1. Sample page from the dictionary, showing entries related to "Time" in five languages

English	Waray	Kana	Inabaknon	Tagalog
afternoon	kulop	hapon	kuhap	hapon
Dawn	maagahon	kaadlawon	mananalong	Bukang-liwayway
Day	adlaw	adlaw	allaw	araw
earlier	kanina	ganina	inaan	kanina
Later	unina	unya	anan dina	mamaya
morning	aga	buntag	nalong	umaga
Night	gab-i	gabii	sangom	gabi
Now	yana	karon	inaanto na	ngayon
twilight	nagsisirom	kilum-kilom	agluluom	takipsilim

7.   CONCLUSIONS

The language corpus for Winaray initiated by LNU has resulted, but not limited, to the following outputs for MTBMLE:

1. A searchable online corpus currently consisting of 419 texts, made up of 377,930 unique word forms. This is the only corpus of its kind in the Philippines, and besides serving as an archive of the language, enables the below language analysis outputs.
2. An online dictionary that provides sample sentences of words and predicts words with the same root as those typed by the user. This provides a fundamentally different model than alphabetization for searching for words in a Waray dictionary.
3. Database of all individual words in the corpus, sorted by word count. This will allow researchers to know the relative frequency of words in the Waray language.
4. Searchable database of all sentences in the corpus. This allows researchers to analyze grammatical and syntactical usage in Waray.
5. Readability instrument which allows a user to submit a Waray text and be assigned a corresponding grade level. Educators can use this to determine what texts should be used with what classes.
6. Various word frequency lists, divided by part of speech (noun, verb, modifier, etc.). These serve as direct resources for teachers in Grades 1 to 3 seeking vocabulary lists, as well as indirect guides for creation of graded stories written in Waray.
7. *Syahan nga Usa ka Yuko thin mga Pulong nga Masukot Gamiton ha Winaray: Pagpurulongan para han mga Magturutdo ha MTBMLE* (First One Thousand Commonly Used Words in Waray: Dictionary for MTBMLE Educators)
8. *Learner's Classified Dictionary for Learning English/Winaray/ Kana/Inabaknon/Filipino Vocabularies* (forthcoming)

These projects and initiatives only help prepare the DepEd Region 8 and the elementary teachers in the successful implementation of MTBMLE. Much more has to be done.

RECOMMENDATIONS FOR IMPLEMENTATION ACROSS REGIONS

A. With minor modification to the original algorithms, the outputs 1-8 should be adapted for other Philippine-family languages. Once texts are collected in given local languages and common prefixes, suffixes, and infixes are listed, the computer algorithms can be applied.
B. To model corpus-based language material creation, a research working group should be established that includes experts on all languages within a given region, and the compilation of a classified language dictionary modeled on the one included in this study.
C. Frequency vocabulary lists should be distributed to teachers so they know what words should be taught in their classes. The lists should also be provided to educators planning to make reading material in the local language so that they will know which words should be emphasized for which developmental reading stage.

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