Develop tools and softwares for the assessment of ethnic minority Vietnamese primary school students

Ngo Thi Thanh Quy1*, Nguyen Thi Thu Thuy1, Tran Thi Ngoc Anh1, and Dao Kien Quoc2

1University of Education - Thai Nguyen University, Vietnam

2Institute of Information Technology – Vietnam National University, Hanoi Vietnam

* Corresponding author’s email address: ngothanhquy@dhsptn.edu.vn

Abstract. Language education has been considered a crucial issue by many countries and there have been studies on this area. By applying research achievements in the modern language of the world, this article focuses on the issue of Vietnamese language education for ethnic minority students at primary schools in Northwest Vietnam by a set of standards, tools and assessment software. In order to handle the problem, we use a mixed method in the study of the social sciences and humanities together with quantitative and qualitative research methods. We survey some typical primary schools in which ethnic minorities are living and studying, such as Thai, Muong, Dao, Mong, and Tay ethnic groups. After that, we develop a set of standards, tools and Vietnamese language proficiency assessment software for ethnic minority students in the Northwest of Vietnam. The data, which is composed of four skills including reading-writing-speaking-listening with a total score of 100, is designed by a software that has both online and offline features. Our team made an experimental research with 5000 test times. The research results will contribute significantly to the enhancement of Vietnamese language proficiency for ethnic minority students in the Northwest region of Vietnam in particular and those who learn Vietnamese as a second language in general.

1. Introduction

The Northwest of Vietnam is a key mountainous region with thousands of kilometers bordered by China and Laos. This is home to many ethnic minorities whose educational standard is still limited. In order to improve the quality of education and training as well as develop human resource of this area, it is necessary to enhance Vietnamese language proficiency of the students, especially in primary schools. Educational experts have also spent a great deal of effort developing a program of local integration to improve the quality of education in this multicultural area. These efforts, however, have not yet made a real difference in Vietnamese language proficiency of the students. Attaching to the Northwest region for a long time and deriving from the real teaching situation, the research team proposed a set of tools for assessing Vietnamese language proficiency in reading, writing, speaking and listening skills. We hope to make considerable contribution to the improvement of Vietnamese language skills for ethnic minority students in the Northwest Vietnam. In order to address the issue, we use the interdisciplinary approach of the social sciences and
humanities with the combination of the qualitative and quantitative research method. In addition, the quantitative research method is employed to process and analyze data that has or can be quantified, such as the processing of test scores and assessments of Vietnamese language proficiency of primary students. Assessment tools are designed and analyzed according to the modern measurement theory. Additionally, other specific methods are employed, such as Sampling method. Oriented sampling was carried out in the provinces of Dien Bien, Son La, HoaBinh, Yen Bai and Lao Cai, etc. These selected provinces are representative of multi-cultural regions in the Northwest Vietnam. Based on the approach and specific methods, we use the comparative method to design a set of tools and Vietnamese language proficiency assessment software for ethnic minority students in the Northwest of Vietnam.

2. Methodology

2.1. Target group

In recent decades, the world has revolutionized the field of language competence assessment and measurement of learners with typical examples of the introduction of the Common European Framework of Reference for Languages (CEFR) in 2001 and the adaptation of the TOEFL test (Test of English as Foreign Language). Language educators hope to assess learners’ ability from the focus on grammatical knowledge to communication competence in a variety of academic situations. In the field of language measurement and assessment in Vietnam, there has been a shift from knowledge testing to competence assessment of the learners. The theoretical basis for these changes is derived from the development of models of competence and language proficiency in the field of linguistics and language assessment. Researchers are interested in Lado’s component mode; Communicative competence model of Canale and Swain [9], Farhad’s functional competence model; Bachman’s language competence model; Celce Murcia’s model of interactive elements of the communication competence. Language competence models have become the basis of language theory for us to develop a set of standards, tools and Vietnamese language proficiency assessment software for ethnic minority students in the Northwest of Vietnam. We have agreed to use six criteria to design Vietnamese language proficiency standards for ethnic minority students in the Northwest region.(1) Reliability for all stakeholders, especially for teachers, parents and students. Reliability depends on: The authenticity of the product and the rationality of the measurements. The criteria are rational and valid, which means that teachers’ measurements and standards must be parallel to the values established by the regulators or recognized on a large scale. (2) Usefulness. Assessments must be useful to make a positive contribution to students and teachers. (3) Method balancing, which is linked to practical tasks/ assignments/ tests. (4) Honesty and fairness are required to ensure that each student follows the important criteria. (5) Intellectual and emotional Seriousness - focus on ideas, questions, issues, tests and core knowledge; tests are designed so that the questions/ tasks/ exercises/ exams stimulate students’ learning pleasure. (6) Feasibility in terms of resources, preparation, politics, and time to design, adjust, use, evaluate and report students’ results / products / assignments.

2.2. Methods of inquiry

The core content of the Vietnamese language proficiency standards for ethnic minority students focuses on the following issues:

1. Communication: Standard 1.1: Students participate in conversation, provide and collect information, express feelings, emotions, and exchange ideas in Vietnamese; Standard 1.2: Students understand, explain in writing and spoken language about a range of topics. Standard 1.3: Students present information, concepts, and ideas about a variety of topics to the listeners or readers.
2. Culture: Students gain knowledge and understanding of the Northwest culture; Standard 2.1: Students demonstrate their understanding of the relationship between the Northwest culture and reality; Standard 2.2: Students express their understanding of the Northwest culture.

3. Connect: Students connect to other fields to get information; Standard 3.1: Students consolidate and acquire knowledge of other subjects in Vietnamese; Standard 3.2: Students are informed and aware of different perspectives through Vietnamese language and regional culture.

4. Comparison: Students develop their understanding of the nature of Vietnamese Language and Culture; Standard 4.1: Students demonstrate their understanding of the core characteristics of Vietnamese through comparison with their mother tongue; Standard 4.2: Students represent their knowledge of Vietnamese culture in general through comparison with their ethnic culture.

5. Community: Students participate in multilingual communities; Standard 5.1: Students use Vietnamese both in and out of school; Standard 5.2: Students show that they are lifelong learners by using Vietnamese for their personal interests and profession.

From the standards and criteria above, we have developed a set of tools for assessing ethnic minority students at primary level with 5 parts, total = 100 points/ 25 questions.

1. Knowledge (10 points/ 3 questions); 2 questions with 2 points each and 1 question with 4 points;
2. Reading comprehension (30 points/ 8 questions): 4 questions with 3 points each, 2 questions with 4 points each and 2 questions with 5 points each;
3. Listening comprehension (17 points/ 5 questions): 3 questions with 4 points each, 2 questions with 4 points each and 2 questions with 5 points each;
4. Writing (28 points/ 3 questions): 2 questions with 3 points each, 1 question with 8 points and 1 question with 10 points;
5. Speaking (15 points/ 4 questions): 2 questions with 3 points each, 1 question with 4 points and 1 question with 5 points.

3. Research Findings
To assess Vietnamese language proficiency by testing method, the quality of the question bank is of crucial importance. Therefore, it is necessary to evaluate whether the set of questions is relevant to learners’ competence. There are some important indicators in the assessment of learner competency such as the level of difficulty and distinction. The level of difficulty is a factor that needs to be taken into consideration because it reflects the general level of students. Too easy or too difficult tests may not bring about the desirable results. The level of difficulty is shown on the percentage of students who have a correct answer. To be more detailed, the high percentage of correct answers means that questions are too easy and vice versa, if the percentage of correct answers is too low, questions are difficult. After evaluating the results, it is possible to statistically measure the percentage of correct answers to the questions. The level of distinction indicates that the test results have a reasonable similarity to the student's academic performance. Therefore, the software should provide tools to calculate the correct answering frequency of the students and, once provided with the students’ classification of academic performance, can also calculate the correlation between the test and the students’ academic performance to determine whether the test is relevant or not. In order to improve the effectiveness of the set of standards, criteria and assessment tools to improve the Vietnamese language proficiency of ethnic minority students in the Northwest, we believe that it is necessary to design and develop a software system to support the assessment of Vietnamese language proficiency of ethnic minority students at the primary level when they learn the second language. The software system should provide complete functions that enable the user to perform all assessment tasks, such as test formation, attendance list, enrolment number, online examinations, automatic evaluation of results, making reports for online exams. During the research, we found that most ethnic minority students in the Northwest are new to computers. Therefore, in order to meet the requirements of the teaching and learning process as well as the assessment of Vietnamese language proficiency of primary students, the software should also consider some criteria, namely easy to understand and easy to use to meet the requirements of teaching Vietnamese. In terms of testing methods, although there
are many variations such as choosing right -wrong, matching, arranging and gap filling, etc. choosing the right answer in multiple choices is the simplest. Students are required to select the appropriate option rather than enter data or perform complex tasks. The software should support the ability to display multimedia data such as audio, video, and photo to assist students take the test conveniently and smoothly. In terms of features, the software should have a user-friendly interface which is suitable for the skills of teachers and students. The online software must run on the WEB, can be installed on the LAN of the school and the WAN on the Internet. The assessment of Vietnamese language proficiency through the software system will be implemented comprehensively in terms of: (1) Knowledge of students; (2) Reading comprehension skill; (3) Listening comprehension skill; (4) Writing skill; (5) Speaking skill. With such testing content, the software is designed to be able to create tests with structure and marking distribution as specified, which can be customized according to specific requirements. For the test, the software is able to create an interface for students to do online tests, record the results reliably and accurately, provide teachers with assessment of Vietnamese language proficiency.

With the current infrastructure of the Northwest primary schools, it is included that online tests cannot be conducted on a large scale. For this reason, it is necessary to add a paper-based test. However, instead of being manually marked, it will be using the image-processing method which will scan and transfer the students’ answer into the computer. In this way, it is possible to evaluate a large number of students in schools with a DR scanner that can scan a variety of pages at a high speed. This should also ensure the link between the online assessment system and the paper-based exam software. For direct paper examination, the software must have the function of printing answer sheets, importing candidate lists (directly or from the online export software), entering answers, configuring the scanner, scanning tests, identifying tests, correcting students’ errors (related to the form of the answer sheet) and reporting results (direct use or transfer to online software for analysis). Along with it is the question banks, test items, list of candidates, answer sheets created by the online system. If the paper-based test is required, the software will mark and then transfer the results back to the online system for storage. For this reason, there is data available to assess the suitability of the question banks.

Thus, the development of software for assessing the Vietnamese language proficiency of ethnic minority students in the Northwest of Vietnam follows the general principles of software engineering. The process of software development includes the following stages: Requirement survey; Overall design; Detailed design; Programming/ testing (module test, integration test, system test and operational test); Transfer/ Maintenance. The detected defects will be corrected and upgraded. Online software is installed on Windows via ISS with SQL/ Server database. Client software runs on popular browsers such as IE, FireFox, Chrome, Safari, Opera, etc. The software is built on the Web with MVC, Unicode support and ASP.NET programming language.

The functions and features of the software meet the requirements of supporting the testing and assessment of Vietnamese language proficiency for ethnic minority students as follow: Online test software. The online test software is designed with the following functional groups: Functional group of examinations: a) Managing examination: Add, Delete, Edit exams; b) Managing students of an exam using various methods such as importing students from excel spreadsheets or directly updating the student list; c) Numbering registration, including complete numbering, partial numbering, complementary numbering or existing registration re-using; d) Dividing examination rooms and printing students list; e) Issuing accounts for students to take the test; f) Assigning sets of tests to an exam and activating the official test set. Functional group of managing question banks, tests and sets of tests; a) Questions management: Questions are in the form of multiple choice so that they can be used consistently in the form of online or paper-based test forms. Other types of multiple choice questions, such as matching, arranging and gap filling, etc. are all about choosing the best option. This ensures that students only need to choose rather than perform complex keyboard typing. The functions include: Adding a single question (direct editing)/ Adding a series in the format of the table set in a word file; Deleting a single question/ Editing a single question; Adding a new group question/ Deleting a group question; Updating component questions (single questions of a group); Editing
context; Seeing details. b) Question bank management. Questions bank management not only aims at categorizing content, skills, knowledge, but also automatically generates tests by selecting the questions from the repositories and re-coordinating them in a particular structure which is consistent with the method of assessment. Each test has 25 questions with a 100-point scale. There is a difference in knowledge among classes 1, 2, 3, 4, 5 with 5 parts: knowledge, reading comprehension skill, listening comprehension skill, writing skill and speaking skill. Each of 25 questions is to evaluate a skill and cannot be able to coordinate arbitrarily. For this reason, each set of interchangeable questions must be placed in a repository. When a test is formed, only one question of each repository can be selected. For reading and listening comprehension skills, questions have a specific context. Therefore, it is necessary to select a group of questions with the same context. In other words, there needs to be a repository of questions that stores both the context and the component questions in a unified whole. Based on the assessment method, the software must create 65 repositories and then lock the update function to avoid modification that may affect the creation of tests. Management functions include: adding, removing, editing, viewing questions, adding questions to the repositories by either direct editing or importing from a word file. c) Test structure management; The software must have a function to update the structure of the test to determine the number of parts, the name of each part, the number of questions, expected time of allowance; Each section is created by selecting a specific number of questions from one repository. Design functions include: creating, deleting, editing, updating the list of the repositories from which the questions are selected for the structure (also known as the test matrix) locking the structure so that it cannot be modified. d) Test matrix management: Once the structure has been set, it is possible to automatically generate tests from the repositories by stating the number of questions selected from each bank. The test matrix can be defined as a table to indicate the number of questions selected from the repositories to form a specific part of the test. The test matrix is the basis for producing the chosen structure. Functions related to the management of the test matrix include: Creating/ Deleting; Modifying/ Printing. In this research, the test matrix requires that every single question be withdrawn from one repository. The structure and test matrix after being created will be locked to avoid modifications. e) Test management: Tests are generated in each set, with relevant functions including: Adding a new set of tests with a specific test matrix/ Deleting/ Editing/ Creating/ Printing/ Viewing: Exporting a multiple-choice test for students (only 19 questions). For each class, if there are 16 questions in each bank and one question is selected from 13 banks, there will be 16 13 (about 256 trillion) different sets of tests; Producing a full test (25 questions) with key for the teacher. There are three types of generating tests, including independence, permutation and mixed type. For independence type, the system creates enough "n" tests which are named Test 1, Test 2 ... For permutation type, the system produces only one test which is named Test 0 (the original test) and then it is permuted to create Test 1, Test 2 ... For mixed type, the process is the same as in independence type, but when editing, it is possible to delete or select one test and permute from it. In addition, the research team built an interaction between the online test and offline test software. a) Exporting information. When performing this function, the information about the exam code, exam name, number of tests, test code, number of questions, answer key, list of candidates and registration number is exported into a file to be transferred to the offline test software so that the software can identify information about the examination to export test sheets, making candidate lists, scanning, identifying, marking and sending the results back to the online software. b) Entering score: The score chart of offline test software with the exam code is returned and automatically entered into the results of the online software. c) Functions related to taking online tests of students. Log in: Students sign in with their registration number and a provided password. If students enter correct information, the system will display their full name. The system must take control over students so that they cannot log in more than once or from one or more than one computers. Interaction with the system: Because there are few questions, there is no need to show up in part to get students to gradually download as in the large-scale exams. Layout: On the left side is the question and the options to choose, on the right is the list of questions and test status. If students choose a question, it will be displayed on the screen for students to do or re-do. In the case of a question from a group of questions, the left part is divided so
that the context will be displayed on the left. It can be a text, video or audio. At the top of the screen, there is information about the test, test part, connection status and countdown time of the timer. Students can log in again when problems occur. While students are taking the test, the software periodically saves the results. The software not only saves the results but also saves the time remaining. Therefore, students can log back in after problems occur. After the system recognizes students who have been granted the right to revisit the unfinished part, it will restore the clock, test status, and let students do the next task. The software for assessing the proficiency of primary school students in the Northwest is also developed with the function of controlling the exam: monitoring the list of candidates and the status of the test; monitoring technical status (such as network connection); closing the examination and stopping all test activities. The software is capable of analyzing results, calculating indicators of difficulty and distinction. Regarding the feedback on the test status, the number of people answering each question, the number of people choosing options A, B, C, D are updated to the question bank (sum, accumulative) and locked to return only one time. For directly answered questions, the correct answer is recorded; Regarding statistics, grading and point scales, the number of candidates with 0 points and the number of candidates with 1 to the maximum point are also calculated. However, point scales are only meaningful when doing the permuted test. Statistics on the percentage of correct answer for each question are used to assess the level of difficulty; the distinction of the question can be calculated when it comes with students’ academic performance. Besides, the software also includes system administration functions, including user management functions such as: adding, deleting, adjusting users, granting permissions; data backup and data recovery. For the paper-based test software with marking by image processing, functional groups include: managing test terms, automatically updating the test data or receiving test data from the online software; monitoring students directly or by data exported from online test software; Printing/scanning answer sheets; pre-processing photos and correcting students’ answers; Identifying/Marking; Extracting the results to transfer to the software online; Managing the system.

In spite of predicting situations which may occur in reality, the research team encountered a lot of difficulties during the study since the facilities for teaching-learning process in remote areas and ethnic minorities in the Northwest are still limited. In the best schools, only about 10 computers can operate stably. In many places, computers have not yet been connected to the network. The bandwidth for Internet connection is still low. Most computers are not equipped with headphones, which makes it difficult to test listening comprehension skill. For these reasons, the online test software must ensure to be able to run on low-configuration computers. Furthermore, it should be very light in order to be used on a normal computer as a server. In the future, when the Internet bandwidth is improved and servers are equipped on the Internet, the system can be installed in one place and communicate with users over the Internet. The software has been tested twice. The first time was in April, 2017 on a small scale in Yen Mong Primary School, HoaBinh City, HoaBinh Province, Vietnam. The second time was in May 2018 in Cao Phong district, HoaBinh province, and Sa Pa district, Lao Cai province, Vietnam with 5000 test times. Due to the limited number of computers in these schools, only a small number of students can participate in the online assessment. The rest is tested by answer sheets which are then scanned and marked by the software. The results are quite good and the spectrum is quite wide.
4. Conclusion and Recommendation
Thus, the development of a set of standards, tools and assessment software for Vietnamese language for ethnic minority students in the Northwest with specific standards and criteria will help teachers and learners to calculate the amount of knowledge and Vietnamese language skill. This makes considerable contribution to the improvement of Vietnamese language skills for ethnic minority students at primary level and the foundation and basic conditions for them to study and integrate into general education. The development of a set of standards, tools and assessment software helps us have orientations in changing curricula, textbooks and methods of teaching Vietnamese at the primary level to improve the proficiency of ethnic minority students. It is also a useful reference guide for teachers to develop exercises, tests, and activities for Vietnamese students. This is also an effective tool for teachers to teach Vietnamese to ethnic minority students in the Northwest./.

| Mark statistics |
|------------------|
| Mark             | Number of candidates | Account for |
| 0.00             | 4                  |              |
| 1.00             | 1                  |              |
| 1.50             | 6                  |              |
| 2.00             | 9                  |              |
| 3.00             | 19                 |              |
| 4.00             | 16                 |              |
| 5.00             | 15                 |              |
| 6.00             | 16                 |              |
| 7.00             | 20                 |              |
| 8.00             | 30                 |              |
| 9.00             | 55                 |              |
| 10.00            | 63                 |              |
| 11.00            | 54                 |              |
| 12.00            | 47                 |              |
| 13.00            | 4                  |              |

Average mark: 6.63
Number of candidates with excellent mark 168 Account for 35.97%
Number of candidates with good mark 133 Account for 28.48%
Number of candidates with average mark 91 Account for 19.49%
Number of candidates with below average mark 51 Account for 10.92%
Number of candidates with poor mark 24 Account for 5.14%
References

[1] Bachman L F and Palmer A S 2010 Language Assessment in Practice Oxford: Oxford University Press

[2] Bachman L F, Nunnan A, Vanniarajan S and Lynch B 1988 Task and ability analysis as a basis for examining content and construct comparability in two EFL proficiency test batteries Language Testing 5 pp 128–159

[3] Canale M 1983 From communicative competence to communicative language pedagogy J. Richards & R. Schmidt (Eds.) Language and Communication (New York: Longman)

[4] Canale M and Swain M 1980 Theoretical bases of communicative approaches to second language teaching and testing Applied Linguistics 1 pp 1–47

[5] Farhady H 1983 New directions for ESL proficiency testing J. W. Oller, Jr. (Ed.) Issues in language testing research pp 253–269

[6] Fulcher G and Davidson F 2007 Language Testing and Assessment (London & New York: Routledge)

[7] Hoang H B & Nguyen M T 2012 Method of teaching Vietnamese language from primary schools Vietnam Education Publishing House.

[8] Le A, Nguyen Q N and Bui M T 1997 Methods of teaching Vietnamese (Vietnam Educational Publishing House, Hanoi)

[9] Le P 2004 "Standard language" and "Speech culture" for primary school students Education Journal No 1/2004

[10] Ministry of Education and Training 2006 Methods of teaching Vietnamese to ethnic students Teacher training materials (Vietnam Education Publishing House)

[11] Ministry of Education and Training 2012 Training materials for teaching model of new school in Vietnam (Hanoi)

[12] Nguyen C H and Vu D N 2015 The set of criteria for evaluating the Vietnamese language proficiency of international students (VNU Publishing House)

[13] Oller J W (1979) Language Tests at School (London: Longman)

[14] Swain M 1985 Communicative competence: Some roles of comprehensible input and comprehensible output in its development S. Gass& G. Madden (Eds.) Input in Second Language Acquisition (Rowley, Massachusetts: Newbury House) pp 235–253