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The Development of Integrative Model for the Teaching of Indonesian Technical Vocabulary

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ABSTRACT: *The main concern of this research is to develop a teaching model which can promote students' vocabulary knowledge, especially the qualitative knowledge of the technical vocabulary. The problems underlying the research is that, despite its significance in language learning, vocabulary is methodologically neglected. This is especially true to the teaching of teachnical words. On that basis, this study sets out to generate a teaching model which is effective in boosting students' qualitative knowledge of technical vocabulary through a set of learning activities commensurate with the curricular requirements, namely, which deems language as a means of communication, which puts students in the core of all concerns and activities, and above all which is applicable for any classroom settings. Another result shows that despite its curricular demand, vocabulary is not taught by the teachers, while the teaching practice for other language areas is still dominated with the teacher-centered activities. The validation test results in significant finding: the model proves effective in evolving students' qualitative vocabulary knowledge in the experimental class. In other words, the model is effective in teaching the Indonesian technical vocabulary.*
KEY WORDS: *integrative, model, technical vocabulary, qualitative knowledge, and quantitative knowledge.*

Introduction

Unlike the teaching of other language competence, the teaching of vocabulary shows a great gap between the importance of words, how words are acquired and taught, and the objective situation in education context. As John Read (2000) says, one of the most consistent findings in the research on reading is the high correlation between the vocabulary test results and reading comprehension. Another study by Zimmerman also leads to the conviction that vocabulary is inevitable in the teaching of language (in Nurwenti & Read, 1999).

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The second language learners, for instance, are much facilitated by a curriculum which has a strong commitment to the development of vocabulary. In that case language development of the learners is positively affected. Vocabulary acquisition is indeed largely dependent upon so called incidental learning, namely through the exposure to the language use, such as in book reading, listening and discussion. And, of those communicative activities, reading is viewed as the most contributive one. However, in the case of adult students, including those of senior high, systematic learning plays a crucial role in not only providing lexical encounters but also in promoting interest in words.

In terms of vocabulary teaching method, Fran Lehr (2006) says that an effective method for the teaching of vocabulary should involve varied techniques and activities, which does not only entails reading but also listening, speaking and writing. In other words, an effective method employs not only one but also a number of supporting interrelated techniques.

Commenting on the issue, I.S.P. Nation (1992) suggests that in order to create autonomous learners, teacher should make them acquainted with three main techniques, namely guessing meaning from context, using mnemonic to memorize and recall learned words, and exploiting word morphology. And this last technique is mostly relevant to the teaching of foreign words containing affixes, especially the ones originating from Greek, which frequently appear in scientific texts.

The significance of, and ideal views to the teaching of, vocabulary as explained above do not go hand in hand with the contextual situation here in Indonesia. As revealed in the preliminary investigation, vocabulary has never been a teaching objective in classes studied. The teachers claim that the teaching of *Bahasa Indonesia* has by far emphasized developing language skills: listening, speaking, reading and writing. In an interview one of the teachers admitted that he had been using "systemic" curriculum through structural teaching approach, irrespective of the government imposed communicative curriculum. He believed that language skills could never be taught well when students he taught had not mastered the system, the grammar. Consequently, he reasoned the first and utmost job of a teacher to impart the knowledge of structures and grammar of the language with students. For him, grammar and structures make up a foundation of language, while other components serve as the building blocks, which can be added up after the foundation is there. What make things worse is that vocabulary, according to him, should not be formally included in the curriculum, since it can take of itself along the way.

With such a stance, it is quite understandable if a number of activities demanded even by the current curriculum are neglected by the teachers, among other things: (1) listening to recorded text reading; (2) searching meaning of difficult words found in books; (3) skimming non-literary texts; (4) reading nonliterary books out of the classroom; (5) discussing with teacher difficult words found in textbooks; and (6) classroom use of dictionary.

This kind of teacher's stance is by no means relevant with the currently implemented curriculum, which, though providing no methodological suggestions,

has given adequate room for vocabulary. And, the 2004 Curriculum has literally accommodated vocabulary in the standard competence for writing.

In the same document, one of the objectives of speaking instruction is "discussing issues (found in news, articles, or books), identifying difficult words, and commenting". Moreover, in the basic competence of writing, there exists an instructional objective to "develop a small dictionary", in which the learning experience it requires includes: (1) Listing subject specific terms; (2) Listing those terms in alphabetical order; (3) Finding the meaning of the terms; and (4) Developing the list into a small dictionary.

Hence I can say that both qualitatively and quantitatively the 2004 Curriculum has paid sufficient attention on the development of vocabulary of the students. In relation with the technical vocabulary, its instruction is increasingly crucial, especially for the higher levels of education. Hayes & Ahrens (in Lehr, 2006) shows that scientific texts rank the first in the ratio of low frequency words in every 1000, which is 128,0, compared to the newspaper with only 68,3, and the lowest come preschool books, which is 16,6 words in every 1,000. These low frequency words are dominated by the technical vocabulary, the ones usually spotted in academic texts.

Starting from the background, a study which leads to the development of vocabulary teaching model is needed. This model should not only be able to effectively present the technical vocabulary but also nurture communicative skills, raise interest in words among students, and hopefully enhance teacher's awareness to the importance of vocabulary instruction.

Statement of the Problem, Subjects, Design and Procedure

On the basis of the above background, this study wants to answer the following questions: (1) What is the quantitative knowledge of the Indonesian vocabulary of Year 10 students?; (2) What is the qualitative knowledge of the technical vocabulary of Year 10 students?; (3) What is the actual vocabulary teaching like in our schools?; and What teaching model can effectively present technical vocabulary?

The subjects of the study were students of one out of 9 Year 10 classes of one public school in Bandung Regency. There were 365 students in all classes and only 41 in the experimental class. The sample class was taken on purpose, considering the collaborative teacher's schedule. However, since the school employs heterogeneous class system, the distribution of high performing students was relatively even. In other words, the classes were relatively equal in academic performance.

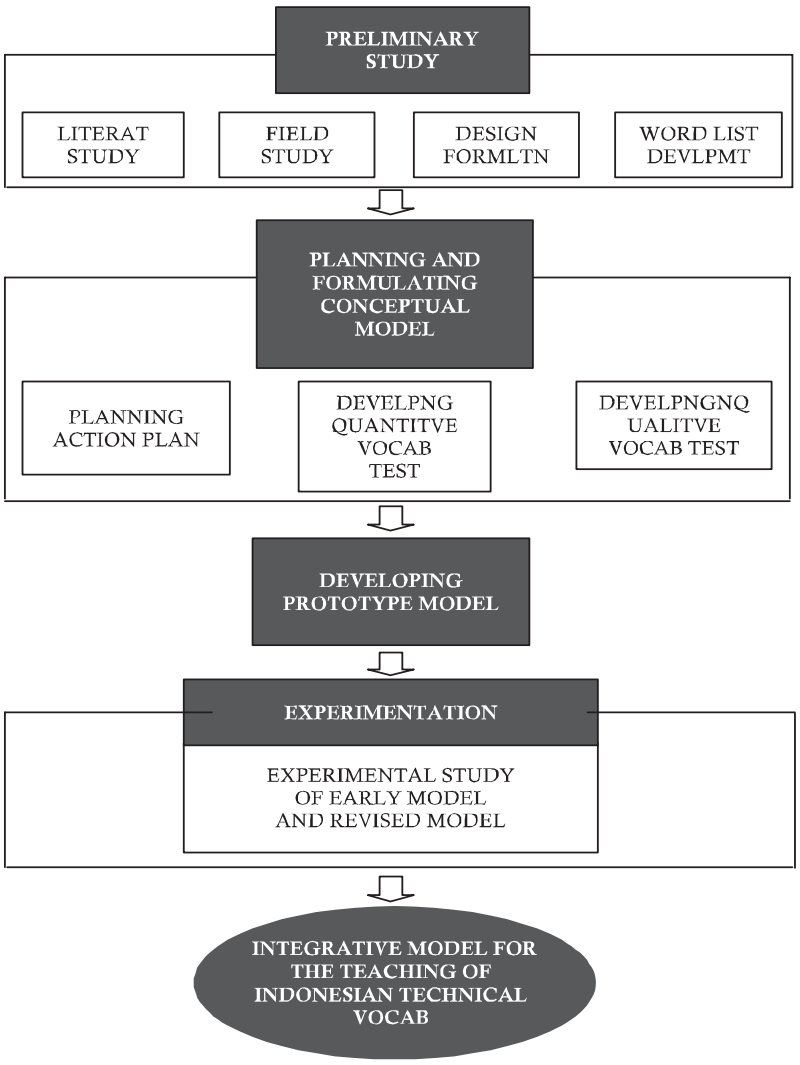
This study used W.L. Borg & M.D. Gall's Research and Development design (1979). According to this design, research and development is a process used to develop and validate educational products. Therefore, this study was carried out as an attempt to develop an educational product, namely an integrative model for the teaching of technical vocabulary, and to validate it as well.

In the design R&D (Research & Development) had of two stages: library and laboratory study stage; and experimental study stage. The first stage of the study consisted of library and field study which were aimed at developing conceptual

model. The process commenced from literature investigation, developing word lists from monolingual Indonesian dictionary, devising quantitative vocabulary test, identifying and listing technical vocabulary from Year 10 textbooks, and devising qualitative technical vocabulary test.

The first stage also included preliminary school observation, interviews with the Indonesian Language teachers, administering quantitative and qualitative tests, and conducting surveys to students using questionnaires. The second stage of the research was empirical test to validate the model through experimental study using randomized pretest-posttest with one experimental group.

This study thus followed the following steps.



DATA COLLECTION

This study used two kinds of data: major and minor data. The major data, which were primarily used to validate the model, were taken from the qualitative vocabulary test. The minor data, which were used to help design the model, were taken from document, observation, questionnaires, interviews and quantitative vocabulary test.

The quantitative (or, the breath) vocabulary test was constructed to estimate the number of basic vocabulary the students know. This test required the students to cross A, B, C, D, or E for the correct reply. The right option could be a synonym or association of the test word. This test was constructed in several steps. The first step was to arrange a basic word list which was based on J.S. Badudu & M.T. Zain's *Kamus Umum Bahasa Indonesia* (Indonesian General Dictionary). The second stage was to sort the first list to become a finished list.

Following Suzanne Hazenberg & Jan H. Hulstijn (1996) the sorting criteria was that the words could not be: (1) specific words for specific professions; (2) compound words whose meaning can be traced from the meaning of the parts; (3) low frequency foreign words; (4) archaic words; (5) dialect words; (6) acronyms; (7) proper nouns; (8) words which were refered by other words; and (9) homonyms.

The third stage was to put the words alphabetical order, from A to Z. The fourth stage was to randomly take one word at the 100th count. Because there were 16,000 or so words in the refined list, there chosen 160 items. The fifth stage was to arrange the words in a common vocabulary test format. The last stage was to provide the option and distractors for each item.

According to John Read (2000), to determine the estimated vocabulary knowledge using this kind of test is just multiply the correct reply by 100. For the reason, if a respondent obtained 120 correct replies, his estimated vocabulary size is 12,000.

The qualitative vocabulary test was designed to see how well respondents know the test words. In other words, this test attempts to identify whether a person: (a) knows the meaning of the test word; (b) knows the meaning and can use it in a sentence; and (c) know the meaning, can make a sentence and morphologically analyze it.

With this type of test, identification of deep knowledge problems can be made possible. The scoring system of this test was as follows: correct reply for word meaning was assigned 1; correct use of the word in self sentence was assigned 2; and correct morphological analysis was assigned 2. Therefore, from one item a respondent might get the maximum score of 5, and since there were 20 items in the test, the maximum score of the test was 100.

This test was designed in three steps. The first step was, read through Year 11 textbooks which the students considered difficult. The books were of two kinds: science and humanity. The second step was to identify and make a list of technical words. The third step was to choose 20 words from the list to be the test words. The 30 words were words which: (1) proportionally represented the 6 textbooks; and (2) represented all parts of speech and affixes.

As for the documents the writer obtained technical vocabulary list from Year 10 textbooks and basic word list from a general dictionary. From the documents too the writer developed a number of affix lists. Technical vocabulary list was used to construct the qualitative vocabulary test, basic word list to construct quantitative vocabulary test, and affix lists as teaching materials.

Questionnaires were used to tap the data on students' daily communicative activities, on school activities, on attitude towards vocabulary, on opinions about textbooks, and on the way they deal with difficult vocabulary.

Interviews were used to dig additional information related to the currently used the Indonesian teaching methods, the position of vocabulary in the methods, the obstacles in the teaching of, if any, vocabulary.

Observation was used to gather information concerning students' learning culture in school site, students' activities in the library, and the classroom teaching process. This technique was also used during the implementation of the model as a means of identifying its weaknesses and strengths for further improvement.

Results and Preliminary Study

Preliminary study shows textbooks in sciences are considered difficult by the respondents and low frequency words as the main cause. This perception is proved by the finding of the literature study, which reveals that textbooks in science contain more technical words than those in humanity. As the finding exhibits, technical vocabulary is mostly found in sample biology textbook with 1,333 words, chemistry 1,009, physics 994, and mathematics 504. Economy textbook contains 299 and civics education 701. These books are respectively considered the most difficult books for the students to discern. This finding is in parallel with Garcia's study (in Lehr, 2006) that most elementary and secondary school students encounter difficulty in reading their textbooks, and the main reason is the lack of knowledge of abstract words.

The quantitative vocabulary knowledge of the respondents was in average still low (8,228 words). The highest achiever obtained 11,500, very close to the curriculum demand of 12,000 words, and the lowest achiever 5,500. However, with the average knowledge of 8,228 words, the students were regarded as capable of actively taking part in this model (ELPA, 2002).

The qualitative vocabulary test also produced a bleak result, with the average score of 36.85 from the maximum score of 100, and the highest score was 63. Respondents were still weak in two areas of the qualitative knowledge: sentence structure and morphology.

It was also found that the teachers never taught vocabulary nor even mentioned it in the instruction. The cause might be the fact that the curriculum document did not offer methodological suggestions for the teacher to carry out the materials.

Theoretical study findings indicate that vocabulary teaching according to Meszynzky (in Templeton & Pikulski, 2003) is best presented through a teaching approach which entails: (a) wide reading, (b) direct instruction, and (c) building an

interest in words. From the students' perspective, vocabulary learning as stated by Shane Templeton & John J. Pikulski (2003) requires learners to: (a) try to pronounce the word; (b) think of other words that remind you of this one; (c) look for familiar prefixes, base words, roots, or suffixes; (d) look for context clues; and (e) use dictionary.

Besides, vocabulary instruction has also to include an effective vocabulary teaching strategy, which covers: (a) determining what students may already know about the word; (b) providing students with several experiences to the new word; (c) providing a significant amount of information about each word, including definitional information and how the word is used in context; and (d) providing activities that provide deeper processing of the concept unserlying new words. All available theories regarding vocabulary teaching and learning hint the need for active involvement of the students in the process.

From other perspective, vocabulary acquisition is divided into two ways: incidental and systematic. Incidental learning refers to the way a person get acquainted with a word without a planned effort on the part of the learner, while systematic learning refers to the way an individual acquirs a word with the help of, or a planned effort of, others or oneself.

In accordance with the above theoretical findings, vocabulary knowledge is in itself often divided into two types: quantitative and qualitative. The first refers to the how much vocabulary an individual knows. This knowledge is usually limited to the meaning of the word only. Quantitative vocabulary on the other hand refers to how well an individual knows about the words. This knowledge might range from knowing the meaning to knowing the origin of the word.

The Integrative Model: Development and Experimentation Study

The integrative model for the teaching of Indonesian technical vocabulary was developed on the findings of the preliminary study aforementioned and was aimed at improving the teaching of Indonesian vocabulary, especially the technical one.

In the first stage of the development, a conceptual or prototype model was shaped and put into practice in the class. From the beginning of the development, the writer intensively collaborated with the teacher. This was meant to make the model actually answer the existing needs and to avoid potential problems in implementation.

During the implementation, strengths and weaknesses of the model were recorded. At the second month of the stage, revision was carried out for the betterment of the initial model. The revised model was then implemented to see it worked.

The integrative model entails three core elements of instruction: teacher, students, and teaching objectives. The roles the teacher has to play in this model include planning, explaining, monitoring and evaluating. In "planning", the teacher plans what he is going to do in the class and put it in a standard lesson plan format.

The plan covers such elements as the competence he is going to teach, the indicators of teaching success, the materials to be used and the teaching scenario. At the beginning of the program, the teacher prepares sample presentation plan and presentation schedule. In "explaining" activity, the teacher at times helps clarify difficult concepts, and tells or informs students his experience with technical words, his interest in them, how important words are in dicerning messages, etc. At the outset he explains in details what and how important technical words are, what he and his students are going to do in relation with the matter. "Monitoring" is very vital in that it enables the teacher to know if help is needed, correction is required, reward is to be given, and what score is to be assigned. "Evaluating" is the teacher's job to see how well the class has run, how well the the students have performed, how well the materials have served reaching the teaching objectives, etc. However, of the evaluating jobs, the most important is to see how well the students have performed. Evaluation is carried out over students' presentation plan, their performance before the class, and period-end test. Information obtained from presentation plan and presentation performance would be used to adjust further stage, while data obtained from the period-end test would be used to compare with pre-test test result.

Students' activities can be classified into four, namely: (1) interest fostering, (2) extensive reading, (3) preparing a report, and (4) presenting the report. Interest fostering is done with the help of the teacher. Interest fostering is done first by the teacher by asking students questions related to technical words, ranging from the meaning, the base word or even the root, the afixes they have, to their origins or etimology. The next activity would be the part of the students by studying the affix lists and use them to analyse any technical terms found in textbooks.

Extensive reading is encouraged as students' daily activity, which is mostly done at home. Reading materials are for the most part school textbooks. This activity is extended to identifying difficult, unique, new, or interesting technical words. Extensive can be considered an entrance to the report preparation, as students are assigned to propose one of the teachnical words to the teacher for class presentation. This word be put in a notice sheet (called Presentation Word List) to avoid overlapping with other students' choices.

Report on word study contains: (1) student's name, (2) facts of the book in which the student found the word, (3) original sentence where the word appears, (4) the technical word, (5) morphological analysis, (6) self-made sentence containing the word, and (7) mnemonic. Facts on books comprise (a) title, (b) author, (c) publisher, and (d) page, in which the word appears. Morphological analysis takes in parts of speech, base word, affix, and if possible etymology. Mnemonic is a sentence or a word that students can use to remember it.

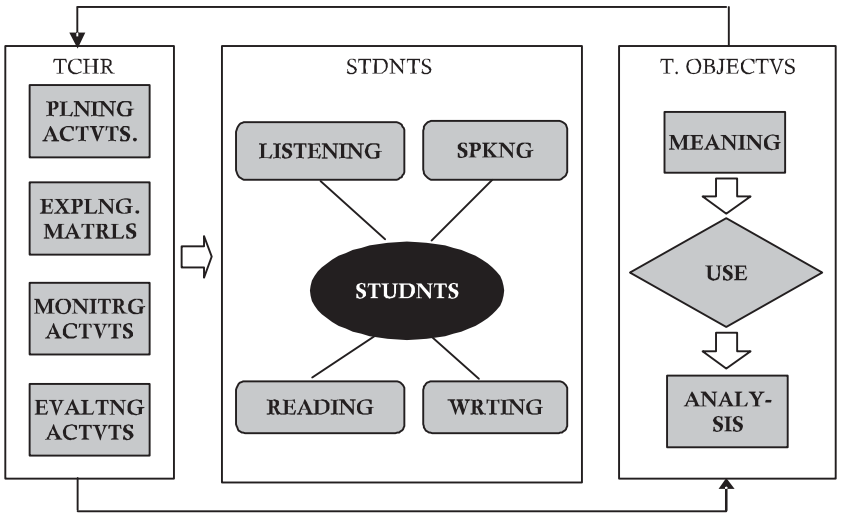
Presentation of the word is performed before the class. This activity is devided into three parts, namely (a) introduction, (b) presentation, (c) question and answer, and (d) closing. In introductory part, a student introduces him/herself and expresses what he/she is going to present. Presentation stage requires a student to read the report and write important facts about it, such as the word, meaning, and analysis.

When a student is performing, the rest of the class listen and write the information on the board. After this stage is over, he invites questions or comments from their mates. The last part is the closing, in which the presenter student shortly reviews the material, expresses gratitude, and says goodbye.

All these activities are designed to lead to three central objectives, that is students' competence in meaning, use, and analysis of technical words. Knowledge of word meanings refer to the dictionary meanings and field specific meanings. Word use refers to the ability of the students to use the words in students' own sentences. Word analysis refers to the ability to break down a word into their parts, and know the meaning of each part. This ability has foremost use in helping students guess the meaning unknown words, thus assisting them smoothly read academic texts.

A. Prototype Model

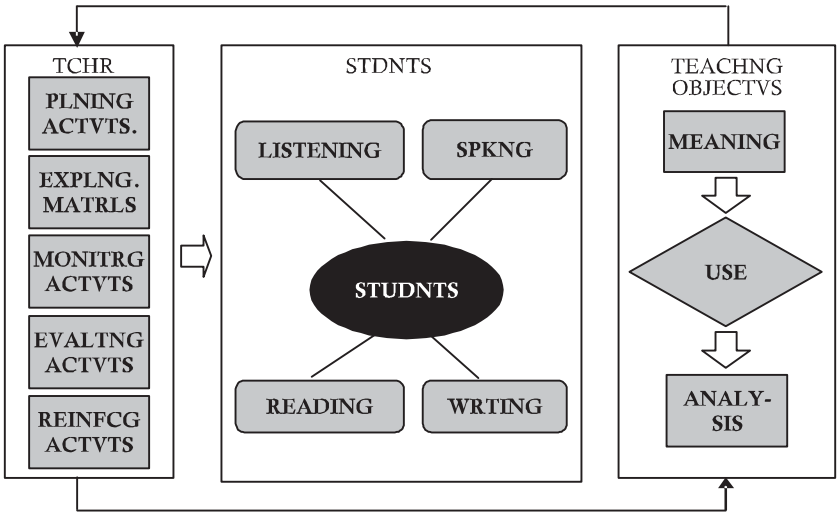
The prototype model was the conceptual model was implemented in the class for a period of two months. If illustrated in a picture, the model would look as follows:



B. Revised Model

During the two months of implementation, a number of weakness were still spotted, among other things the high frequency of students' unacceptable sentences, either grammatically, structurally, diction, and the use of parts of speech. These weak points of the prototype were overcome through the addition of teacher's job, namely reinforcement. What was meant by reinforcement was in activity in which teacher gave feedback to the mistakes made, practice of the desired skill or competence, and quiz on the materials. This was done at the end of every meeting.

Put in a picture, the revised model would look as the following:



In the class context, the revised model, which comprised objectives, materials, to scenario, looked as the following:

D. Indicators:
1) presenting a report on the study on technical vocabulary before the class.
2) membahas makna kosakata teknis.
3) giving response to the presentation.

E. Teaching Mmodel:
Integrative model.

F. Teaching Scenario:
1) Introductory Activity:
a) Teacher greets and call the roll.
b) Teacher tells a short recount of how he encounters difficult words when reading and how he overcame them by identifying the meaning of their parts.
c) Teacher reviews some technical vocabulary presented the week before.
d) Teacher asks some questions to students about the vocabulary.
e) Teacher asks if students are ready for the day's presenttation.

2) *Kegiatan Inti* (Main Activity):
a) Teacher announces five students that will present that day.
b) Students present their report (on the study of technical vocabulary) one by one before the class.
c) The presenter student writes the technical word, the sample sentence using the word, and its analysis on the board.
d) The rest of the class listen to the presentation and jot down all the information being presented.
e) At the end of the presentation, the presenter student asks his class mates if they have questions about the materials he has presented.
f) Other students ask questions or give comments.

g) The presenter student answer or give response to the questions or comments.
h) Other students may give feedback to the answers or responses of the presenter student.
i) The presenter student hands in the report format to the teacher upon the comppletion of the presentation.
j) Teacher gives score and makes remarks on the presentation when it is still in progress.

3) Closing Activity:
a) *Refllection:* (1) Teacher asks the students again the meaning of all the technical words presented that day; (2) Teacher asks the students the meaning of other technical words that have the same morphological features with the ones that were just presented; and (3) Teacher tells or asks how a certain word comes into being.
b) *Evaluation:* (1) process evaluation; and (2) performance evaluation.
c) *Assignment:* (1) read textbooks and dictionary; and (2) read and discern borrowed affixes in the list provided by teacher.

G.Recource, Materials and Media:
1) Indonesian and foreign affix lists.
2) Senior high textbooks and dictionary.

Source: (Depdiknas, 2000).

C. EFFECTIVITY OF THE MODEL

In the course of the implementation of the prototype model, the frequency of students' mistakes was very high, both in written and in spoken utterances, which amounted up to 68 times. And, during the revised model implementation period the frequency dropped significantly, which appeared only 26 times. The details of mistake frequency in both periods can be seen in the following table.

Utterances	Types of Mistake	Frequency		Percentage	
		Prottype Model	Revised Model	Prottype Model	Revised Model
Written	1. word clss	11	5	16,18	11,76
	2. structure	5	3	7,35	17,65
	3. diction	1	-	1,47	5,88
	4. mechncs	13	7	19,11	23,53
Spoken	1. word clss	11	4	16,18	17,65
	2. structure	6	2	8,82	5,88
	3. diction	21	5	30,88	23,53
	4. mechncs	-	-	-	-
Total		**68**	**26**	**100**	

Meanwhile, the qualitative knowledge of the students before the implementation of the model was very low. With the maximum score of 100, the average score gained was only 34.05, and the range was from14 to 63. After the implementation of the model the students' qualitative knowledge raised markedly. According to the posttest results, the average score reached 51.51, and the range was from 20 to 88. Therefore, the mean score difference between the pre- and the posttest was 17.46. The table below helps clarify the students' scores of the two tests.

CLS	VARIABLES	SCORES		MEAN SCORES		MEAN DIFFRNCE OF PRE- AND POSSTST SCORES
		MAX	MIN	PRETEST	POSSTST	
X-6	QUANTVE TEST	115 115	55 : 58	83,62	86,65	3,03
	QUALITTV TEST	63 88	14 : 20	34,05	51,51	17,46

T-test result for the mean difference between the two tests was 2.30, which was above the table value. That means the hypothesis that the model could increase the students' qualitative knowledge was accepted.

Conclusion

This study came to some conclusions. *Firstly,* there was a significant rise in the qualitative vocabulary knowledge of the respondents. The rise was observed in the improvement of knowledge of meaning, word class, morphology and use. The data was obtained from the tests and observation notes.

Secondly, there was improvement in language skills of the respondents, which was mainly seen from the decreasing number of mistakes made by the respondents and the increasing number of questions and comments made by the respondents.

Thirdly, there was recorded a slight increase in the quantitative knowledge of the basic vocabulary of the respondents. Though this aspect was not the focus of the study, and therefore a hike was not expected, a slight rise was a bit surprising, considering especially the fact that this study took the writer three months and that an increase in quantitative vocabulary naturally takes a long time.

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