

DEVELOPING SUPPLEMENTARY READING MATERIALS FOR THE COMPUTER NETWORKS ENGINEERING DEPARTMENT

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Abstract

This paper aims at exposing a reasearch conducted in SMK Institut Indonesia Kutoarjo. The objectives of this study are (1) to develop supplementary reading materials for the 11th Grade Students of Computer Networks Engineering (TKJ) Department of SMK Institut Indonesia Kutoarjo and (2) describe the efficacy of the supplementary reading materials for the 11th Grade Students of Computer Networks Engineering Department of SMK Institut Indonesia Kutoarjo. This research belongs to Educational Research and Development (R&D) using a simplified six steps of Borg and Gall's model (1983). The findings show that (1) it is necessary to provide special reading material to support the TKJ students' vocational competence in computer networks engineering. (2) The efficacy of the supplementary reading materials helps students achieve their specific purpose on their vocation, improves vocabularies, provides more information, and broadens the perspective in regards to activities in computer networks engineering. The development of the supplementary reading materials yields effective reading materials to enrich students' vocabularies in the term of computer networks engineering. It can attract students to actively involve in the teaching and learning process. Furthermore, the supplementary reading materials of this study provide additional learning resource for students to learn at home.

Keywords: *Supplementary Materials, Teaching Reading, R&D, Vocational High School.*

1 INTRODUCTION

Vocational High School or SMK (*Sekolah Menengah Kejuruan*) is a secondary school that focuses on developing specific skills. Due to its motto, "*siap kerja, cerdas, kompetitif*", the goal of teaching and learning in SMK is different from that in Senior High School (SMA). The orientation of SMA is preparing students to enter a college or university, while in SMK is preparing students to be able to take part in the business & industry work. During the study, SMKs require their students to improve knowledge and apply their soft and hard skills into practice by following an apprentice program or PKL (*Praktek Kerja Lapangan*). It is expected that the students will be skillful and competent to

enter the real working field soon after graduating.

In terms of foreign language, English is considered as the important part for supporting students' vocational competence. Being supplied with Vocational and English skills, the SMK students are expected able to work and compete not only in the national but also in the multinational company. To gain this goal, the Minister of Education and Culture issued the Regulation No. 68, 69, 10/2013 about the basic competences of English. It states that English teaching in SMK focuses on developing communicative competence to enable the students to communicate in the target language appropriately, both in speaking and writing, to support their vocational competence in a certain study program.

Based on the characteristic of SMK, English for SMK is classified as the theory of the English for Specific Purposes (ESP). Evans and John (1998 as cited in Jezo, 2012: 10) define ESP as absolute characters which meet specific needs of the students. ESP also should apply methodologies and activities which related to the discipline of the students and ESP should be centered on the language appropriate to these activities of the students.

Hutchinson and Waters (1989) categorized ESP into two divisions: English for Academic Purposes (EAP) and English for Occupational Purposes (EOP). EAP is subjected to the learners who need English for academic study such as English for Medical Study, English for Economics, English for Agriculture and the like. Whereas, EOP is intended for the learners who need English for work training such as English for Office Administration, English for Computer Networks Engineering, English for Marketing, English for Technician, English for accounting, English for Culinary Art, etc.

Unfortunately, most of SMKs in Indonesia still have problems related to the availability of English learning materials, based on ESP that meet to the students' need. English materials that are provided by the government and launched by some publishers are not specified to certain study programs of SMK that is needed by the SMK's students in their future job field. As an example, SMK Institut Indonesia Kutoarjo has five study programs, they are; automotive engineering, architecture, computer networks engineering, electrical engineering, and industrial engineering. Ideally, it should have five kinds of English learning materials for each program; English for automotive engineering, English for architecture, English for computer networks

engineering, English for electrical engineering, and English for industrial engineering. In reality, such kinds of materials are not available at school.

The changing of School Based Curriculum (KTSP) to curriculum of 2013 (K13) also contributes a problem for SMKs. Besides reducing the time allocation from four hours to two hours per week, the designers of Curriculum 2013 of English seem to neglect the main objective of SMK by paralleling English textbook for SMA and SMK. Textbook, for the foreign language learners such as in Indonesia, plays a very important role in supporting the process of learning-teaching English because it serves as sources of learning-teaching activities and materials. The use of inappropriate materials prevents SMK students to develop their English to support their vocational competence in communicating in the target situation.

The paralleling of English textbook for SMK and SMA in curriculum of 2013 does not provide appropriate reading material for SMKs' students. It raises at least three problems to the SMK students. First, the English textbook of K13 does not give students sufficient English exposures to boost students' expertise on Computer Networks Engineering, since there is no link between its reading materials and the Computer Networks Engineering that they learn. Second, the students got troubles in their target situation communication as they do not get adequate vocabularies related to Computer Networks Engineering. These make them hard to compete with the expatriate labors in the national or overseas companies. Third, the English textbook of K13 also burdens students with unnecessary task and text. As in fact, most of teachers tend to use the book from the government directly without doing self-revision or development.

English as one of adaptive subject in SMK must strengthen the students' vocational competence. Thus, developing reading material of English textbooks for the specific department of SMK is necessary. Therefore, this study has two goals. They are: (1) developing special reading material to meet the need of the 11th Grade students of TKJ department and (2) evaluating the developed reading material for the 11th Grade students of Computer and Networks Engineering department.

2 LITERATURE REVIEW

2.1 English Syllabus for Vocational High School

Based on the Curriculum 2013 (K13), English in vocational high school is categorized as a compulsory subject. It means that vocational high school students must learn English and achieve the competences that have been listed in the curriculum. The goals of English teaching in K13 are presented in the Core Competence (KI) and Basic Competence (KD).

Below is the example of KD 3.1 and 4.1 that refers to *Asking and Giving Suggestion* is on KD 3.1 and 4.1. The skill in this KD 3.1 is reading, while KD 4.1 leads to writing and speaking skill.

- **KD 3.1 Menganalisis fungsi sosial, struktur teks, dan unsur kebahasaan pada ungkapan memberi saran dan tawaran, serta responnya, sesuai dengan konteks penggunaannya** (analyze social function, text structure and language focus of text).
- **KD 4.1 Menyusun teks lisan dan tulis untuk menyatakan, menanyakan, dan merespon ungkapan memberi saran dan tawaran, dengan memperhatikan fungsi sosial, struktur teks, dan unsur kebahasaan yang benar dan sesuai konteks** (compose text for stating, asking and responding offer or suggestion based on the context).

As we can see in the basic competence above, that it is said to be met with the needs of each department. Although the topics are the same, but the materials should be different.

The complete English material based on the syllabus of SMK's students of grade 11th are listed as follows:

Table 1. English Syllabus for Grade IX

MATERIAL	KD	SKILL
1) Asking and giving suggestion	3.1	Reading
	4.1	Writing and Speaking
2) Asking and giving opinion	3.2	Reading
	4.2	Writing
3) Wish and extended hope	3.3	Reading
	4.3	Speaking
4) Formal invitation letter	4.4	Reading
	4.5	Writing
	4.6	Writing
5) Personal letter	3.5	Reading
	4.7	Reading
	4.8	Writing
6) Procedure text	3.6	Reading
	4.9	Reading and Listening
	4.10	Writing
7) Hortatory text	3.7	Reading
	4.11	Speaking and Writing
8) Conditional sentence type 1	3.8	Reading
	4.12	Writing
9) Report text	3.9	Reading
	4.13	Reading and Listening
10) Analytical exposition text	3.10	Reading
	4.14	Reading and Listening
11) Short biography	3.11	Reading
	4.15	Reading and Listening
12) Song	3.12	Reading
	4.16	Reading and Listening

2.2. Good Characteristics of a Textbook

A good characteristics of textbooks used for teaching students need to be known by teachers at the first beginning. After knowing the criteria of a good book, selecting which book teachers should use or evaluate their course book in order to develop or improve the quality of their course book can be done well by teachers, so it resulted in a good progress of teaching and learning process.

According to Nation and Macalister (2010: 165), the parts of the curriculum design process can be use in evaluating a course book. It also needs some process which can be described as follows. First, the course book should match the environment. Second, the course book should suit needs of the students. Third, the course book should apply appropriate principles of the teaching and learning process. Forth, the aims of the couse book should meet with the aim of the course. Fifth, the couse book should meet with the students' proficiency level. Sixth, the course book should be interesting. Lastly, the course book should be equiped with the test to monitor the students' progress.

Another criteria that will be use in this paper is from Cunningsworth (1995 as cited in Richards, 2001:258) who proposes four criteria of a good textbook: (1) they should correspond to the need of the students, and match the aims and objectives of the language-learning program (2) they must reflects uses (present of future) that the students will make of the language. Textbook should help students to achieve their purpose (3) they should take account of the needs of the students and must facilitate their learning process without forcing a rigid method (4)they must have a clear role to support the learning process. Like teachers, they become a bridge between the students and the target language.

As teacher, it is suggested that students should be given the materials which is not only inside the textbook but also materials from outside the textbook. One of those options is Supplementary material. Supplementary material is an additional material made to improve the quality or complement the textbook. Mc Grath in Udam (2005: 6-7) argues that, supplementary materials are the materials taken from other sources or materials designing for learning purposes.

In order to improve the quality of textbooks, the supplementary materials should be based on the students' needs and the basic competence. The suitable supplementary materials can motivate, facilitate, enhancing students to master specific skills needed by students. In addition, Reddy (2013: 145-146) believes that there are some advantages of supplementary materials listed as follows:

1. Activates the students' creativity
2. The activities can attract students to learn
3. Topples down monotony of the class
4. Encourages situational English
5. Empowers language and communication skills
6. Guides to group work
7. Provides a challenging task

2.3 Materials Development

Understanding curriculum is the base of developing material since the curriculum represents a set of desired goals or values of teaching and learning process. In Indonesia curriculum is distinguished from syllabus. Curriculum is a general framework of education program, while syllabus is specific and applicable to carry out the teaching and learning process.

In the curriculum model proposed by Nation and Macalister (2010), syllabus is an inner part of curriculum in which the goals are decided. Figure 1 shows the model of the part of curriculum design process.

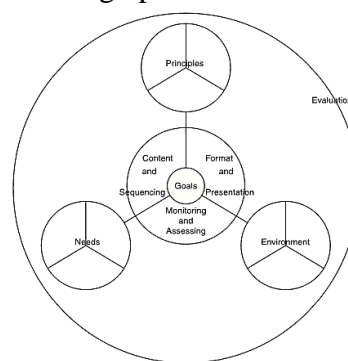


Figure 1. A model of the part of curriculum design process

Figure 1 shows that the curriculum model proposed by Nation and Macalister (2010) consists of three outside circles and a subdivided inner circle. For the outer circle, there are environment, learner's need and principles.

The environment will give an effect on the material development. The environment refers to the learners, the teachers, the situation. Learners' needs are also a resource that must be considered in material development. Needs are categorized into (a) wants, desire, expectation (b) what learners know, (c) learners' lack of knowledge. Principles refer to philosophical stance in language learning and teaching. They are such as the nature of language, the nature of learning and the nature of culture (Nation, 2010). The principles will color the material development.

For the inner circle, it represents the syllabus. The inner circle has goals as its center. This is meant to reflect the importance of having clear general goals for a course. In Curriculum 2013, the desired goals or values of teaching and learning has stated in its core competence and basic competence. The content and sequencing represents the items to learn in a course, and the order in which they occur, plus the ideas content if this is used as a vehicle for the items and not as a goal in itself. Next, the format and presentation part of the inner circle represents the format of the lessons or units of the course, including the techniques and types of activities that will be used to help learning. This is the part of the course that the learners are most aware of. It is important that it is guided by the best available principles of teaching and learning. Then, the monitoring and assessment part of the inner circle represents the need to give attention to observing learning, testing the results of learning, and providing feedback to the learners about their progress. The next on

the list is evaluation which is on the effectiveness of the course. It is about whether the courses are good for the students, teachers, sponsors and are respected by local or international community and meet the criteria in developing good curriculum.

3 METHODOLOGY

This research followed the procedure of R & D cycle. Gall, et al (1983:589) mentioned that the goal of R & D as " ... do design new products and procedures, which then are systematically field tested, evaluated and refined until they meet specified criteria of effectiveness, quality, or similar standard". This research adopted the model of Research and Development product. The process of Educational research and development is done by many stages, where every step that was developed always refers to the result of the previous steps. At the end, it will give a new product.

In developing the supplementary reading materials this study used Borg & Gall's model, but in order to pursue the research time limit this study is simplified into five stages in three phases. The explanation is as follows:

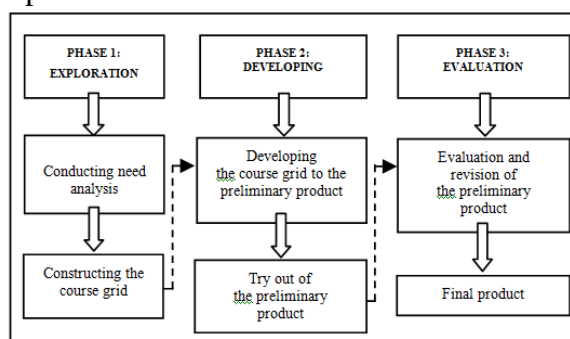


Figure 2. Simplified phases

1. Exploration phase

The aim of this step is gaining information about the students' target competances related to english and their vocational skill. It is conducting need analysis and conducting the course grid.

Conducting needs analysis aims to obtain information about students' needs and targets in learning English, especially reading skills for computer networks engineering department. The needed information is around what reading materials that related to the computer network, including vocabularies input, relevant topic, tasks, the difficulties in comprehending reading texts, etc. To obtain these information the steps below were done:

- a. Analyze Curriculum structure of the grade 11th Students of Computer Networks Engineering Department of Institut Indonesia Vocational High School of Purworejo to find out students' target skill.
- b. Analyze K-13 English syllabus of the grade 11th students of SMK to find out the English basic competence.
- c. Interview the Computer Networks Engineering teachers of Grade 11th to enrich the information of Curriculum structure of Computer Networks Engineering and their want wish related to English Subject.
- d. Interview the English teacher of Computer Networks Engineering teacher of Grade 11th to reveal her problems in using English textbook of K13 and her strains in teaching english and also to hear her suggesion related to English textbook.
- e. Interview the students' of Computer Networks Engineering teacher of Grade 11th to find out their goal, lack and want in learning English.
- f. Analyzed K-13 English textbook of the grade 11th students of TKJ to find out the inappropriate content and part.

The data from the K-13 English syllabus, curriculum structure was presented in the table and analyzed to determine the appropriate reading material for the TKJ student. The data from the interview was analyzed by discourse analysis.

The second step in exploration phase is constructing the course grid. In constructing the course grid the result of the need analysis was used to develop a course grid as the framework to design the materials each units. The developed course grid was developed based on the English syllabus and the TKJ students' need. The course grid covers of several aspects. They are Basic Competences (KD), unit and title name, topic, input text, and activities.

2. Developing Phase

The purpose of this step is developing reading material that meet to the grade 11th Students of Computer Networks Engineering Department. In this phase there are four stages of developing, its as following:

- a. Developing the course grid to the preliminary product (prototype)

The developing of the materials was adapted based on the KD of K13 combine with the result of the need analysis, while the design of task development was adapted from the components of task proposed by Nunan (2004) and K13 scientific approach.

- b. Tryout of the preliminary product

The tryout of the developed material was applied in the classroom teaching and learning activity to reveal the efficacy of the material. It was conducted on Tuesday, 23rd of May 2017. The tryout was followed by eighteen student of grade 11th of TKJ department of SMK Institut Indonesia Kutoarjo in duration 2 x 45 minutes. The tryout was delivered by researcher and observed by the English teacher.

- c. Product Revision of Prototype Materials

The data from validation and suggestion were used to revise to developed product. The evaluation from suggestions and opinion were

used to revise and improve the materials. In this case, the researcher gave to language expert and suggestion from teacher collaboration to revise content and lay out. The suggestions of strengthens and weakness of reading material to get perfect the prototype. The researcher will discuss and give outlines revise the prototype to the experts (observer) and teacher collaboration. Its outline based on result of observation and reflection in classroom.

3. Evaluation Phase

In order to get the efficacy, the preliminary product was needed to be evaluate the expert to get validation. It was evaluated and revised based on the tryout feedback and the experts' judgment to generate final product. The experts who evaluated the developed materials were 1) the lecturer of English Education Study program in Sarjanawiyata Tamansiswa University who has expertise in curriculum and material development. They are Dr. Imam Ghozali, M.Sc. and Yuyun Yulia, M.Pd., Ph.D. 2) an English teacher from SMK Institut Indonesia Kutoarjo who has experience in applying K13 curriculum and observed the tryout process, Dewi Nur Cahyani, S.Pd.

a. Evaluation and revision of the prototype material

The evaluation of the product was based on the criteria of good textbook proposed by Alan Cunningsworth (1995) with several adaptations, they are: 1) appropriate of language, 2) appropriate of content, 3) format and presentation and, 4) appropriate of lay out.

b. Final product

The final product is the developed material that was revised based on the feedback of the tryout and the experts' judgment to meet the criteria of good that was adapted from Alan Cunningsworth (1995)

4 FINDING AND DISCUSSION

Based on the research objectives, this chapter consists of two sub chapters that present two research findings they are 1) The development of reading supplementary materials for the 11th grade students of TKJ department, and 2) The efficacy of the supplementary materials.

1. The development of supplementary reading materials

The development of supplementary reading materials was conducted based on the 10 stages from Borg and Gall (1983) that was adapted into 6 stages, while the development material was based on Nation and Machalister (2010) and Nunan (2004). They are as follows:

a. Conducting need analysis

The curriculum structure of the 11th grade student content of six competences, they are: PC maintenance, Software installation, Local area network installation, PC networks troubleshooting, PC networks betterment, Networks system operation installation based on Graphic User Interface (GUI) and Command Line Interface (CLI). The teacher of TKJ department explained that numerous English vocabularies are used in those materials. Therefore, students will face problems if they do not comprehend those vocabularies. To supporting TKJ department, the vocabularies or idiom for computer must be provided in the English text for TKJ's students.

The 1st and the 2nd KD in K13 English syllabus of the grade 11th contain the characters, such as: be thankful for the opportunity of learning English, and developing self-confidence, responsible, cooperative in conveying functional communication. Those characters can be implied in the teaching and learning activities, such as group discussion, individual presentation or task in pairs. The 3rd and 4th KD consist of twelve

materials that refers to certain skill The KD in K13 is a general guideline for SMK and SMA so the topic of text have to be adapted based on the specific need of the students. For examples are KD 3.6 and 4.10:

KD 3.6 Menganalisis fungsi sosial, struktur teks, dan unsur kebahasaan dari teks prosedur berbentuk manual dan kiat-kiat (tips), sesuai dengan konteks penggunaannya (analyze social function, text structure and language focus of procedure, manual or tips based on the context).

KD 4.10 Menyunting teks prosedur berbentuk manual dan kiat-kiat (tips), dengan memperhatikan fungsi sosial, struktur teks, dan unsur kebahasaan yang benar dan sesuai konteks (edit the formal invitation letter based on its social function, text structure and language focus based on the context).

The phrase *sesuai konteks penggunaannya* at the end of KD 3.6 and 4.10 indicates that the topics of the procedure text must meet the need of each department, whether it is procedure text for Art and Culinary Department or procedure text for Computer Networks Engineering Department. They must need different topics although the material is same, procedure text.

The English teacher explained that the K13 textbook does not meet the need of the students of the TKJ department because of the inappropriate topics and the lack of grammar exercises and there is no listening activity. Students' problem in English is about vocabularies and grammar. Therefore, the teacher uses PPP model and translation in teaching.

In line with the teacher's explanation, the students of TKJ department told that their problem in learning English are about vocabularies, grammar and listening. Students' goals in learning English are able to speak in English, understand English text in order

to work in computer field in overseas company. Therefore, they want knowledge input of computer networks engineering is inserted in the English textbook to enrich their TKJ skill.

The K13 English textbook of semester two consist of six chapters. The textbook was already in line with the syllabus and curriculum. However, the content of the textbook was too general and did not meet the need of students of TKJ department. From the five chapters in the 2nd semester of the grade 11th, there were four irrelevant chapter topics inside of the textbook. They are presented as in the table 1 below:

Table 2. Inappropriate topic

Ch	Material	Topics	Sub topics
6	Procedure text	Story of Writing	How to make fried noodle, used and refill mechanical pencil, play snakes and ladders, make a kite, make fried rice, make miniature volcano, separate sand and water, make orange juice, plan jasmine, make Indonesian chicken satay
7	Report text	Natural Disasters	Earthquakes, tsunami, Solar System, flood, bears and their habitats, lions, tropical forest, endangered animals of Indonesia, endangered flora of Indonesia
9	Short biography	Father of Indonesian Education	Ki Hajar Dewantara, Cut Nyak Dien, RA Kartini
11	Analytical exposition text	Man Made Disaster	Global warming, the negative impact

on TV viewers,
Passive smoking
is a silent killer,
why is learning
English
important?,
innocent creature
that are killed by
poachers, dangers
of drug abuse and
cigarette smoking

Table 2 shows that the topics in the textbook does not enrich students' knowledge to support their vocational competence in TKJ.

b. Course grid

The course grid was constructed based on the need analysis. It is a guideline to develop the supplementary reading materials to achieve the goal of TKJ department. Therefore, the course grid covers of some aspects; KD, unit and title name, topic of text, input text, and activities. The topics were selected based on the TKJ need and the activities were formed based on the related *KD*. The sample of course grid is attached.

c. Developing preliminary product

The development of preliminary material was adapted from the material development model proposed by Nation and Macalister (2010), and the task development followed the components of task purposed by Nunan (2004), while the format and presentation followed the scientific approach of K13. The design of every unit is as follows;

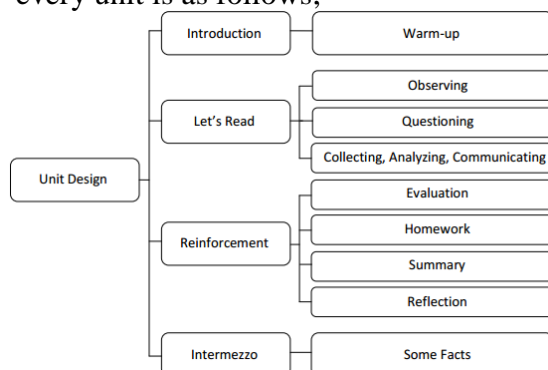


Figure 3. The unit design

Based on the finding of the need analysis, the content of the preliminary

material provided the text with the appropriate topics for TKJ department, more vocabulary and grammar input, reading and grammar exercises.

d. Tryout of preliminary product

Tryout is the activity to test the effectiveness of preliminary product in the classroom activity. The finding of try out showed overall the tasks in preliminary product could be applied and understood by the students. However, the students were difficult to deal with questioning task section because they get a lack of vocabularies and grammar. That also caused students difficult to conclude the main idea of each paragraph for labeling the generic structure of the report text.

e. Evaluation and revision of preliminary product

Based on the expert judgment, the content of the preliminary material were in line with the goals of TKJ department and English syllabus. The task and activities also could be understood by the students. However, there were three main aspects revised in this prototype product, they area:

1) Language Revision

Language Revision is the activity to revise the using of an inappropriate words choices as well as grammatical error that is exist the materials. The language that already revised in this product such as too long sentence, improper words choices, unclear instruction, mistyping, and grammar's mistake.

2) Lay out Revision

Lay out revision is the activity to revise the position of the materials, the page illustration and picture, and font size. There were some blank space on the pages and there was a crowded one in the prototype material. It also had inconsistent font size. Here, the unnecessary illustrations were deleted and the font's sizes are edited.

3) Content Revision

Content Revision is the revision to revise the content of supplementary reading materials whether the materials already appropriate with the students' need, level, or relevant with English syllabus of K13 and the goal of TKJ department. The expert suggested that task for writing phonetic symbol is not appropriate for the 11th grade student, therefore the instruction of writing phonetic symbol was deleted by providing the phonetic symbol of its vocabulary. The revision also provided more vocabularies to fulfill the students' shortage in vocabularies.

f. Final product

The final product is the developed material that was revised based on the feedback of the tryout and the experts' judgment. The final product meets the criteria of good textbook that was adapted from Alan Cunningsworth (1995). The tasks descriptions of the final product are as follows:

1) Warm Up

Providing picture and vocabularies that are used in the coming text

2) Observing

Providing the text with the vocabularies that was introduced in Warm Up section

3) Questioning

Providing a form to write students' question and their own answer based on the observation section

4) Collecting, analyzing, communicating

- Students collect vocabularies by translating into Indonesian, collect information in the task by answering true/false or essay question
- Students analyze generic structure of text and practicing it by labeling the mind map, arrange sentences or paragraph and complete the blank sentence with the provided words

5) Evaluation

Providing multiple-choice test with the question that was constructed based on macro and micro skill of reading, such as; finding main idea, specific information, synonym of certain word, inference, concluding a text or paragraph

6) Homework

Asking students to search certain type of text with certain topic from internet and analyze it based on its generic structure

2. The efficacy of the supplementary materials

Based on the result of the revision of materials development, the supplementary reading materials meets the specific need of the students of TKJ department and are in line with the Curriculum of 2013. The strengths of the final product of the supplementary materials are appropriate with the criteria of textbook proposed by Alan Cunningsworth (1995). The brief description of the strengths of this supplementary materials are as follows;

- a. The content is in accordance with the core and basic competence for Grade XI of vocational high schools.
- b. The topics of text are relevant with the field of computer engineering and networking.
- c. The materials cover the explanation of generic structure, social function and linguistics feature of texts.
- d. The materials cover vocabulary and pronunciation-learning tasks that are relevant with the topic of the unit.
- e. The language used in the instruction is appropriate with the students' cognitive development.
- f. The presentation of the supplementary materials are in accordance with the steps of scientific approach as required by curriculum 2013.
- g. The layout of the supplementary materials uses proportional font type,

illustrations, picture captions, and consistent page number.

The discussion in this part is a review of supplementary reading materials in the term of; 1) the development, 2) the content, 3) the implementation, 4) the strengths, and 4) the limitation of the product.

The development of supplementary reading materials must be conducted based on the comprehensive need analysis. If it fails, the research will have miss target in determining goal and planning. To achieve the goal, the prototype product needs to be applied in the classroom teaching activity and evaluated by more than one expert to ensure that it meet the students' need.

The content of supplementary reading materials must meet the specific needs of the students and in line with the English curriculum that has been stipulated by the government.

Implementation means the classroom teaching and learning activity. The supplementary reading materials should encourage students to have outside classroom activities and interaction with other students, teacher and bigger environment.

The content of this materials were based on the students' need and clear steps of scientific approach of K13. The materials in this product could improve students' ability to face their future job in computer networks engineering field. On the other hand, the activities inside of this product were vary (individual activity, in pair, group discussion, and the whole class activities) that made students easier to understand the materials.

There are some limitations of this supplementary material. The first, it was specifically designed for reading skill, therefore it will not accommodate listening as well as writing and speaking activities. The second, students were challenged to broaden their knowledge

and effort when using these materials, since these materials contain a specific purpose for computer networks engineering field. Third, this book is costly, as it should be printed in color form in order to attract students in using this textbook.

5 CONCLUSION

The aim of this research is to reveal the students' needs and develop the appropriate supplementary reading materials for Computer Network Engineering (TKJ) students of Grade 11th of SMK Institut Indonesia Kutoarjo. This conclusion describes two main points, they are:

1. It is necessary to provide special reading material to support the students' vocational competence in computer networks engineering (TKJ). Based on the need analysis, the TKJ material of grade 11th are about PC maintenance, software installation, Local Area Network installation, PC networks troubleshooting, PC networks betterment and networks operation system installation.
2. The efficacy of the supplementary reading materials helps students achieve their specific purpose on their vocation, improves vocabularies, provides more information, and broadens the perspective in regards to activities in computer networks engineering. The development of the supplementary reading materials using Borg and Gall's model yields effective reading materials to enrich students' vocabularies in the term of computer networks engineering. It can attract students to actively involve in the teaching and learning process. Furthermore, the supplementary reading materials of this study provide additional learning resource for students to learn at home.

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