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English Material Development for Three Departments of Chemistry Vocational School to Meet the Industrial Needs

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Abstract

Vocational school students, mostly have a great intention to have job immediately after finishing their study. In fact, industry will absorb the graduates if they have skills that match with the industrial needs. The competency of chemistry vocational school graduates that industry needs is not only on the chemical analysis skill but also the competency to communicate all aspects related to chemical industrial process in English. Therefore, there is the need to develop English materials that meet the industrial needs. The English materials are developed based on English for Specific Purposes (ESP) focusing on chemistry field. The objective of this research is to find the appropriate English materials that meet the industrial needs to increase students' language skills on reading, writing, and speaking for three departments: Analytical Chemistry, Food Industrial Quality Assurance, and Industrial waste Treatment. This research used questionnaire as the instrument which was distributed to industries, alumni, English teachers, and Chemistry teachers and was analyzed qualitatively. The result shows 30 selected English materials for each department that consist of 10 materials for reading, 10 materials for writing, and10 other materials for speaking which are considered can be used to develop the existing English materials.

Keywords: analytical chemistry, English material, vocational school, competency, ESP

1. Introduction

Industry needs to absorb the chemistry vocational school graduates who have competency that can be applied appropriately in industrial process. The competency is not only on the chemical analysis but also on the ability to communicate all aspects related to chemical industrial process in English. Based on data analysis obtained from industries, Politeknik AKA Bogor which is one of the chemistry vocational schools in Indonesia, gets the data that mostly the graduates have good competency in chemical analysis but they have lack of ability in using English, especially in understanding procedures, making data analysis report, and presenting materials in English.

English teachers at Politeknik AKA Bogor need to conduct industrial survey program which is done every year to know the graduates' English competency. The objective of this program is to get data describing the evaluation on English proficiency of graduates who have been working in the industry. The data derived from industries is very important to measure whether the students' skill standard has met the industrial needs. Then the data can be used as the reference to develop English materials that are designed based on ESP approach.

The English teachers of vocational schools have to know the skill standard that students must have. Because they must prepare the students to have ability to compete with others to get jobs. Besides that, the students must have appropriate competency that can be accepted by industry. Aragon et al. (2005: 11) in their study state that skill standards define the work to be performed, how well the work must be done, and the level of knowledge and skill required. More specific, Richards and Richard (2002: 489) explain that skill is an acquired ability to perform an activity well, usually one that is made up of a number of co-ordinated processes and actions. Many aspects of language learning are traditionally regarded as the learning of skills, such as learning to speak, or to read fluently.

The aim of this paper is to find the appropriate English materials to increase students' language skills on reading, writing, and speaking that meet the industrial needs, for three departments of chemistry vocational school: Analytical Chemistry, Quality Assurance of Food Industry, and Industrial waste Treatment. The content of the English materials are designed based on ESP approach focusing on chemistry field. The English teachers of chemistry vocational schools have to consider

that English materials which are developed based on the needs of industries are very important, because the graduates can achieve good competency in using English in their real work.

2. Literature Review

2.1 Language Skills

The four basic skills are related to each other by two parameters: the mode of communication: oral or written and the direction of communication: receiving or producing the message. Listening comprehension is the receptive skill in the oral mode. When we speak of listening what we really mean is listening and understanding what we hear. Listening comprehension is the receptive skill in the oral mode. When we speak of listening what we really mean is listening and understanding what we hear. Speaking is the productive skill in the oral mode. It, like the other skills, is more complicated than it seems at first and involves more than just pronouncing words. Speaking is often connected with listening (Aydogan, 2014:673). The four basic skills refer to the language skills. This paper focuses on three language skills: reading, writing, and speaking.

2.2 English Materials

Richards and Richard (2002:322) explain that materials in language teaching can be linguistic, visual, auditory, or kinesthetic, and they may be presented in print, audio or video form, on CD-ROMS, on the internet or through live performance or display. English materials that are developed in this study are the materials which can support and increase the students' English proficiency to meet the industrial needs. Thus the materials are designed based on English for Specific Purposes (ESP) as the bridge to connect the industrial needs and vocational school's curriculum. The characteristic feature of the language complexity of authentic texts used in ESP courses is that authentic texts reflect the real-life language containing a great diversity of grammatical and lexical elements which means that they are much more abundant in language forms than the texts constructed for language teaching purposes (Gilmore, 2007:97).

2.3 English for Specific Purpose

English for Specific Purpose (ESP) is an umbrella term that refers to the teaching of English to the students who are learning the language for a particular work or study related reason (Tomlinson, 2003:306). This study is concerned on the students of chemistry vocational school that uses English for Specific Purposes (ESP) as the approach to transfer the materials in class. Dudley and John (1998:1) state that main concerns of ESP have always been, and remain, with needs analysis, text analysis, and preparing learners to communicate effectively in the tasks prescribed by their study or work situation. Meanwhile, Strevens (1988:9) states the advantages of English for Specific Purposes (ESP) in four points: (1) being focused on the learner's need, (2) it is relevant to the learner, (3) it is successful in imparting learning, (4) it is more cost-effective than General English. English for Specific Purposes refers to the teaching and learning of English for work or study-related purposes (Byram and Hu, 2013:223). Another terminology is English for Academic Purposes (EAP). Jordan (1997:1) states that EAP is concerned with those communication skills in English which are required for study purposes in formal education systems.

3. Method

The method used in this research was questionnaire filled out by 15 industries, 20 alumni, 20 Chemistry and English teachers. The questionnaire used in this research was designed to elicit information about appropriate English materials that can increase the students' English skills in reading, writing, and speaking to meet the industrial needs based on the departments. The researchers provided open and closed questions in the questionnaire. There was a space in the questionnaire for respondents to write additional comment and suggestion. Bird (2009:1310) explains that questionnaire format, sequence and wording, the inclusion of classification, behavioural, knowledge and perception questions, and questionnaire length and output, need to be considered to ensure reliability, validity and sustained engagement of the participant. The data got from the respondents were analyzed qualitatively and classified in three language skills: reading, writing, and speaking for three departments in Politeknik AKA Bogor: Analytical Chemistry, Food Industrial Quality Assurance, and Industrial waste Treatment.

4. Results and Discussion

Based on data analysis derived from the questionnaires, it was found several topics of materials that are appropriate for three departments. The data were analyzed and classified based on the departments. The researchers selected 10 English material topics for each language skill in each department.

4.1 Analytical Chemistry Department

The data analysis shows that the students in the Analytical Chemistry Department need to learn English materials as described in the following table:

Table 1. Topics of English Materials for Analytical Chemistry Department

Reading Text	Writing Topic	Speaking Topic
1. Work Procedures 2. Material Safety Data Sheet 3. Chemical Symbols 4. Gravimetric Analysis 5. Volumetric Analysis 6. Chemical Analysis 7. Instrumental Procedures 8. Quality Management 9. Laboratory Quality Assurance 10. Product Quality Control	1. Writing Report of Analytical Result 2. Writing Hazardous Chemical Symbols 3. Writing Work Procedure 4. Writing Analytical Process 5. Writing Instrumental Procedures 6. Writing Description of Laboratory Management 7. Writing How to Handle Chemical at Laboratory 8. Writing Principles of Laboratory Work 9. Writing Application Letter and Curriculum Vitae 10. Writing Memorandum of Understanding (MoU)	1. Presenting Hazardous Chemical 2. Explaining laboratory Work Procedure 3. Describing Workshop Equipment 4. Presenting Laboratory Management 5. Clarifying Data 6. Leading Conference 7. Delivering Data Analysis 8. Making Cooperation, Networking and Negotiation 9. Interviewing 10. Promoting Products

4.1.1 Reading

Reading is perceiving a written text in order to understand its contents. The understanding that results is called reading comprehension (Richards and Richard, 2002: 443). As chemical analysts, the students are highly expected to have competency in reading. The texts must be designed based on ESP because the target is the students of chemistry vocational school. The students are expected to enrich vocabularies on chemistry terminology to understand the texts. For Analytical Chemistry Department, the respondents from industry state that the students must understand the texts focusing on work procedures, material safety data sheet, chemical symbols, gravimetric analysis, volumetric analysis, chemical analysis, instrumental procedures, quality management, laboratory quality assurance, and product quality control. The English teachers use the approach of English for Specific Purposes (ESP) to deliver the materials. The topics of the materials are very close to the students' major and the students will meet the analyses such as gravimetric and volumetric analyses at industry.

4.1.2 Writing

In the context of writing, the students are expected to have ability to write processes and analyses. Richards and Richard (2002:293) state that writing is called the active/productive skill. Mostly the students reveal that they face many problems in writing. According to Hamp and Heasly (2006:2) competent writing is frequently accepted as being the last language skill to be acquired for native speakers of the language as well as for foreign/second language learners. In this case, the students are expected to have ability in writing report of analytical results, hazardous chemical symbols, work procedures, analytical process, instrumental procedures, description of laboratory management, how to handle chemical at laboratory, principles of laboratory work, application letter, and writing Memorandum of Understanding (MoU) in English.

4.1.3 Speaking

Caroll (2008:5) explains that language production is an intrinsically more difficult subject to study than comprehension, because although speech is observable, the ideas that lead to production are more elusive. Juhana (2012:100) also explains that psychological factors such as fear of making mistake, shyness, anxiety, lack of confidence and lack of motivation hinder students from speaking in English class. These factors probably influence the students' performance in speaking. It is not easy to encourage students to speak using English as a second language. However, the industry demands that the graduates must have communicative skill in English because they have to make interaction with outsiders and stakeholders. They also have to be able to present the result of chemical analysis in English. Based on the result of questionnaire for analytical chemistry department, the industries state that the students must be able to present, explain, and describe hazardous chemical, laboratory work procedure, workshop equipment, laboratory management, data clarification, and data analysis. Besides that, the students are expected to have competency to lead conference, make cooperation, networking, and negotiation, conduct interview, and promote the products.

4.2 Food Industrial Quality Assurance Department

For Food Industrial Quality Assurance Department, the students need to learn the English materials as stated in the following table:

Table 2. Topics of English Materials for Food Industrial Quality Assurance Department

Reading Text	Writing Topic	Speaking Topic
1. Work Procedures 2. Material Safety Data Sheet 3. Chemical Symbols 4. Microbiology 5. Spectrophotometry 6. Bioassay Analysis 7. Hazard Analysis of Critical Control Point (HACCP) 8. Food Industrial Sanitation Method 9. Food Quality Management System 10. Clean Production	1. Writing Report of Analytical Result 2. Writing Procedure of Clean Production 3. Writing Work Procedure 4. Writing Instrumental Procedures 5. Writing Food Sanitation 6. Writing Food Quality 7. Writing Food Packages 8. Writing Principles of Laboratory Work 9. Writing Application Letter and Curriculum Vitae 10. Writing Memorandum of Understanding (MoU)	1. Presenting Food Quality 2. Explaining Food Sanitation 3. Describing Workshop Equipment 4. Presenting Laboratory Management 5. Clarifying Data 6. Leading Conference 7. Delivering Data Analysis 8. Making Cooperation, Networking and Negotiation 9. Interviewing 10. Promoting Products

4.2.1 Reading

The respondents from industries and Chemistry teachers filled out the questionnaire and stated that the students at Food Industrial Quality Assurance Department need to understand the English texts on microbiology, spectrophotometry, bioassay analysis, hazard analysis of critical control point, food industrial sanitation method, food quality management system, and clean production. While other materials such as work procedures, material safety data sheet, and chemical symbols are general topics that all students at any chemistry department have to learn the subjects.

4.2.2 Writing

In case of writing ability, the English teachers of Food Industrial Quality Assurance Department develop materials based on the students' major. The students' competency in writing on these specific topics is needed by industries. The students are trained to write report on analytical result, procedure of clean production, work procedure, instrumental procedures, food sanitation, food quality, food packages, and principles of laboratory work. The English teacher can also develop English materials and teach the students to write application letter, Curriculum Vitae, and make Memorandum of Understanding (MoU).

4.2.3 Speaking

In productive skill, speaking, all students are capable of describing workshop equipment, presenting laboratory management, clarifying data, leading conference, delivering data analysis, making cooperation, networking and negotiation, interviewing, and promoting products. Specifically, the students at Food industrial Quality Assurance Department learn to present food quality and food sanitation.

4.3 Industrial Waste Treatment Department

The students of Industrial Waste Treatment Department focus to learn English material topics as described in the following table:

Table 3. Topics of English Materials for Industrial Waste Treatment Department

Reading Text	Writing Topic	Speaking Topic
1. Work Procedures 2. Material Safety Data Sheet 3. Chemical Symbols 4. Physical Analysis 5. Environmental Impact Analysis 6. Waste Water Treatment 7. Air Pollution Treatment 8. Environmental Sanitation 9. Management System of Environment and Work safety 10. Laboratory Quality Assurance	1. Writing Report of Analytical Result 2. Writing Air and Water Pollutions 3. Writing Work Procedure 4. Writing Environmental Sanitation 5. Writing Instrumental Procedures 6. Writing Environmental Impact 7. Writing Work safety 8. Writing Principles of Laboratory Work 9. Writing Application Letter and Curriculum Vitae 10. Writing Memorandum of Understanding (MoU)	1. Presenting Air and Water Pollutions 2. Explaining Environmental Sanitation 3. Describing Workshop Equipment 4. Presenting Laboratory Management 5. Clarifying Data 6. Leading Conference 7. Delivering Data Analysis 8. Making Cooperation, Networking and Negotiation 9. Interviewing 10. Promoting Products

4.3.1 Reading

Based on data analysis, it was found that the students at Industrial Waste Treatment Department need to learn English texts focus on the following topics: physical analysis, environmental impact analysis, water waste treatment, air pollution treatment, environmental sanitation, management system of environmental and work safety, and laboratory quality assurance. It is like other departments, works procedures, material safety data sheet, and chemical symbols are considered as general topics.

4.3.2 Writing

In writing skill, the topics focusing on ability to write general issues for all departments are the same, such as writing report of analytical result, work procedure, instrumental procedure, principles of laboratory work, application letter, and Memorandum of Understanding (MoU). However, the students at Industrial Waste Treatment Department learn more on writing air and water pollutions, environmental sanitation, environmental impact, and work safety.

4.3.3 Speaking

In speaking ability, students at Industrial Waste Treatment Department are expected to have ability to present air and water pollutions, environmental sanitation, workshop equipment, laboratory management, and data clarification. It is the same with other departments, students are also capable of leading conference, delivering data analysis, making cooperation, networking and negotiation, interviewing, and promoting products.

5. Conclusion

The tables contain the appropriate English materials suggested by industries, alumni, English and Chemistry teachers. However, the specific materials are different based on the students' major. The findings obtained from this study can be described as follows:

1. The students of Analytical Chemistry Department focus on the English materials that are related to chemical analysis such as the texts on gravimetric analysis, volumetric analysis, chemical analysis, and product quality control.

2. The students of Food Industrial Quality Assurance Department learn the English materials that are related to the quality assurance of food industry such as food industrial sanitation method, food quality management system, microbiology, and food packages.

3. The students of Industrial Waste Treatment Department focus on the English materials that are connected to the analysis on environment such as environmental impact analysis, waste water treatment, air pollution treatment, and environmental sanitation.

English teachers of Chemistry Vocational Schools have to be able to develop English materials that can increase students' English skills which meet the industrial needs. The English materials should be based on English for Specific Purposes (ESP) since the students are learning in vocational school. The English materials must be close to the industrial field so that the students' competency can be applied in industries.

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References

Aragon, R. S., Woo, H. J., & Marvel, M. R. (2005). The Role of National Industry-Based Skill Standards in the Development, Implementation, and Assessment of Community College Curriculum. *Journal of Career and Technical Education, 21*(2). https://doi.org/10.21061/jcte.v21i2.659

Aydogan, H. (2014). The Four Basic Language Skills, Whole Language and Integrated Skill Approach in Mainstream University Classroom in Turkey. *Meditteranian Journal of Social Sciences, 5*(9), 673-680.

Bird, D. K. (2009). The Use of Questionnaires for Acquiring Infromation on Public Perception of Natural Hazards and hrttp://www.nat-hazards-earth-syst-sci.net/9/1307/2009/nhess-9-1307-2009-pdf.

Byram, M., & Adelheid, H. (2013). *Routledge Encyclopedia of Language Teaching and Learning.* New York: Routledge. https://doi.org/10.4324/9780203101513

Carroll, D. W. (2008). Psychology of Language. Pcychology of Language. Thomson Nelson, Canada.

Dudley-Evans, T., & John, M. J. St. (1998) *Development in ESP*. *A Multi-discipplinary Approach*. Cambridge University Press.

Gilmore, A. (2007). Authentic materials and authenticity in foreign language learning. *Language Teaching, 40*(2), 97–118. https://doi.org/10.1017/S0261444807004144

Hamp-Lyons, L., & Heasly, B. (2006). *Study Writing* (2nd Ed.). Cambridge: Cambridge University Press.

Jordan, R. R. (1997). *English for Academic Purposes. A Guide and Resource Book for Teachers. Cambridge University Press.* https://doi.org/10.1017/CBO9780511733062

Juhana. (2012). Psychological factors that Hinders Students from Speaking in English Class (A Case Study in a Senior High School in South Tangerang, Banten, Indonesia). *Journal of Education and Practice*, *3*(12), 100-110. http://www.iiste.org/journals/index.php/JEP/article/view/2887

Richards, J. C., & Richard, S. (2002). *Longman Dictionary of Language Teaching and Applied Linguistics*. Pearson Education Limited.

Strevens, P. (1998). *ESP after Twenty Years: A Re-appraisal.* In M.Tickoo (Ed.) ESP:Stae of the Art. Singapore: SEAMEO Regional Langauge Centre.

Tomlinson, B. (2003). *Developing Material for Language Teaching*. New York. Cromwell Press.