



Developing English Teaching and Learning Materials for Mathematics Study Program

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Abstrak

Penelitian ini bertujuan untuk menghasilkan bahan ajar Bahasa Inggris untuk Program Studi Matematika, Universitas Flores di mana kelayakan telah di uji untuk meningkatkan prestasi belajar dalam belajar bahasa Inggris. Metode yang digunakan dalam penelitian ini adalah metode *Research and Development method* (R&D) dengan model desain pengembangan dari Sugiyono. Langkah-langkah dalam desain pengembangan bahan ajar terdiri dari: 1). Analisis kebutuhan, 2). Koleksi data, 3). Desain produk, 4). Validasi, 5). Revisi, 6). Uji coba lapangan, 7). Revisi, 8). Produk akhir. Hasil validasi dari ahli isi materi dan media menyatakan bahwa bahan ajar bahasa Inggris sudah dikembangkan sesuai dengan kebutuhan mahasiswa. Kedua ahli memberikan respon yang baik terhadap bahan ajar. Berdasarkan hasil validasi, skor yang di peroleh adalah 0,85 dan dikategorikan sangat baik. Total rata-rata skor yang di peroleh dari kuisisioner yang diberikan kepada mahasiswa adalah 4,48 dan di kategorikan sangat baik. Hasil kuisisioner menunjukkan bahwa bahan ajar dikategorikan baik. Tes juga di berikan kepada siswa untuk mengetahui hasil belajar sebelum dan sesudah mempelajari bahan ajar yang dikembangkan. Hasil *pretest* menunjukkan skor rata-rata 66,11. Kemudian pada *posttest* memperoleh skor 86,15. Pemerolehan skor pada pretest dan posttest dapat disimpulkan bahwa bahan ajar yang dikembangkan baik untuk digunakan.

Kata Kunci: Pengembangan, Pembelajaran Bahasa Inggris, Bahan Ajar, Program Studi Matematika.

Abstract

This research aims at producing teaching and learning materials for students of Mathematics Study Program, Flores University. This research was the Research and Development method (R&D). Researcher took Sugiyono's model in designing the products. The development steps were as follows: 1). Need analysis, 2). Data Collection, 3). Designing Product, 4). Validation, 5). Revision, 6). Field Experience/tryout, 7). Revision, 8). Final Product. The result of the expert's validation the content of materials and media stated that the materials had been developed according to the students' needs. The experts' give a good response to the material. The result of validation, is 0.85 and it is categorized as excellent materials. The total average of students' questionnaire is 4.48 and it is categorized as excellent material. The result of the questionnaire, concluded that the material is categorized as good material. Test was also given to the students in order to know their achievement before and after learning the materials. It is also shown that in the pre test, the average score was 66.11. Then, in the post test is 86.15. The increasing of the score in the pre test to the post test could be concluded that the material is good to be used.

Keywords: Developing, English Teaching and Learning, Materials, Mathematics Study Program.

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INTRODUCTION

Education is a process for people in the world, in which every individual can improve and explore their abilities, skill and acquire knowledge. People will get much about the knowledge step by step, and later after the process end, they will be able to implement it in the actual field. Education in Indonesia is divided into three main lines, formal, non-formal.

Those aims can achieve if there is good cooperation between academicians. Civitas Academic is the academic community consists of lecturers and students. Article 12 (*Undang-Undang Nomor 12 Tahun 2012*) describes three tasks should do as a lecturer, namely first, as a member of civitas academic have the task of transforming the science and technology to students by creating an atmosphere of learning so that students active to develop their potential; second, lecturers as scientists have to develop a branch of science and technology through the reasoning and scientific research, and then redistribute it; third, lecturer either individually or in groups to write a teaching book or textbooks, published by universities and scientific publications as a source of learning and to develop of academic culture and acculturation of reading and writing for civitas academic.

Dealing with the description of the lecturer tasks in the point three, it is important for lecturers to develop the learning materials as learning resources in the higher education shall be provided, facilitated, or owned by universities in accordance by study program that was developed. A lecturer is expected to develop their own teaching materials covering the breadth, adapted to the conditions of the surrounding sociocultural environment not in accordance with the subject matter that have a significant effect in designing learning strategies. Prabdari et al., (2021) in the teaching and learning process, students are expected to do the activities like physics and mental to get the learning outcome. The teaching and learning process will be joyful, active, creative, and innovative if support by teaching materials. Prastowo (Faizah, 2018) said that the quality of teaching and learning process will be lack if a teacher just focus on the conventional material without the creativity to develop the learning material innovatively. The argument tends to the innovation and creativity of the teacher to develop the learning material to increase the students' quality.

Richards & Richards (2010) says that materials design is also a case of applying the sophisticated thinking that expert teachers possess, which is sometimes called pedagogical reasoning skills. These are the skills that enable language teachers to do the following: To analyze potential lesson content (i.e., a piece of reality, a text, an advertisement, a poem, a photo, etc.) and identify ways in which it could use as a teaching resource; To identify specific linguistic goals (i.e., in the area of speaking, vocabulary, reading, writing, etc.) that could develop from the chosen Content; To anticipate any problems that might occur and ways of resolving them; To make appropriate decisions about time, sequencing, and grouping arrangements; To develop appropriate instructional tasks as the basis for the lesson.

English language is one of the important languages that must be mastered by Indonesian people because English language has a very strategic position, that is, apart from being a tool of communication and language association between people. English language also the first foreigner deemed important for the purpose of information access, absorption, and development science, technology, and cultural arts. In relation to foreign languages, this is the case target language that is being studied and wants to be mastered. The target language form can be in the mother tongue first language (L1), second language (L2), or foreign language (FL). The definition of second language is difference to foreign language. In Indonesia for example, students learn first language by mother tongue, then second language is Bahasa. The competence in languages is essentially a skill, not just knowledge. There are four skills in language learning; listening, speaking, reading, and writing. For each skill, a language component is required in the form of knowledge vocabulary, grammar, pronunciation (for spoken language), and the spelling system (for written language) (Nova Mustika, 2019). Further, Sirait et al., (2019), argue that the quality of college graduates in general can also be seen from the ability to speak English. Mastery of English as a communication tool will actually be able to support other

aspects of quality, such as aspects of professionalism, communication skills, and aspects of self-development. From this it is clear that English proficiency is still one of the important indicators of the quality of higher education.

English for Specific Purposes (ESP) is a branch of English teaching and learning. It had emphasized the learners' abilities to use language as a tool for communication and concerned with the learners' needs. Linguistic studies that can solve other problems namely English for Specific Purposes (ESP). Popescu (2010) states that ESP is a course within the wider professional framework of the English language teaching (ELT), with implications for the design of syllabus and materials as well as its presentation and then evaluation. Thus, Bilokcuoglu (2012) define ESP has generally come along with needs analysis and training learners to establish effective communicative ground in the tasks related to their branch of study or work settings. Thus, the teaching of ESP has been a separate activity within ELT. The main distinguishing property its own methodological base as well as its own research from different disciplines including applied linguistics. Generally speaking, the learners' needs-related knowledge and the need for teaching that specific knowledge are what form the nature of ESP.

Latest research conducted by M. Arif Rahman Hakim (2019) in the Sharia economics study program of Sharia Economics Studies College of Nahdlatul Ulama (STIESNU) Bengkulu, the lecturer and students still have problems in the teaching and learning process in English subject. The main problem that they often face is that they still felt difficult to find the teaching materials based on expectations of the lecturer and students. So based on the results of the analysis of the researchers, they have to apply a development research to solve the problems. The results of this study is a modul as the teaching materials for English subject based on the principles of English for Specific Purposes (ESP) and with the Contextual Teaching and Learning (CTL) approach which developed by using the ASSURE model that followed the stages of analyze learners; state objectives; select, modify media, or design materials; utilize technology, media, and materials; requires learner participation, and, evaluate and revise. In addition, at the final stage, this teaching material product also validated by two experts.

Based on the interview with the Chair of Mathematics Study Program and the students, researcher need to conduct a study of the design of materials that are suitable for the needs of the students majoring. Dealing with the information given by the Chair of Mathematics Study Program in Mathematics Study Program does not have an English syllabus and teaching materials. The absence of syllabus and teaching materials may result in lecturers not teaching according to student's needs and not well organized. So, there are three purposes of research : a). To develop the kinds of English teaching and learning materials that is required for mathematics study program; b). To develop the topics needed for English teaching and learning materials for mathematics study program; c). To find out the quality of English teaching and learning materials for Mathematics Study Program, Flores University.

METHOD

This study used Research and Development method. Setyosari define Research and development in Education (educational research & development) is a process used to develop process steps that aim to: test its research findings relating to the product being developed; develop products based on findings; field testing products with a natural setting to be used; and make revisions above field trials. One contribution development is determining methods to bridge the gap between the results of research and practice (Adi, 2017). Research and development model used in this study is Sugiyono's model which being the most popular model in schools and educational environments. (Sugiyono, 2009) states that Research and Development (R&D) is the research method which is used to produce a product and examine the effectiveness of product. This study is a qualitative and quantitative research taken from the research instruments are described systematically and clearly in words based on specified criteria of good materials prosed by Badan Standar

Nasional Pendidikan (BSNP, 2006) and Tomlinson (1998). This study was conducted at mathematics study program, Flores University. Because of the limited time, this study is elaborated.

The object of this study were teaching learning materials that was implemented in the mathematics study program. Thus, the subject of the study are expert judges and the students of semester 2 at mathematics study program. In this study, researcher took 1 class as the sample class for applying the teaching and learning materials. There are consist of 27 students of mathematics study program and 2 experts' judges. The procedures of the research based on the elaboration of Sugiyono's Model, such as: researcher use document analysis of English Curriculum in mathematics study program to find out the competencies needed to be achieved by the students in a semester. There are some problems found since of the some reasons, such as : 1) in the curriculum of English lesson, there are not describe the goal of teaching and learning English in mathematics study program; 2) there are not English syllabus and teaching materials; 3) lecturers are the teacher of Senior High School; To find out the resources in order to get the criteria of good materials and books and/or reading materials by selecting from the internet based on the students need in learning English. Considering with the criteria of good materials, researcher took the criteria given by Badan Standar Nasional Pendidikan (BSNP, 2006).

There are 4 aspects, namely the aspect of contents eligibility, the aspect of presentation eligibility, language assessment, and graph eligibility. From 4 aspects then divided into 17 components of indicators. Then, to know the students' basic competence and learning character, researcher also distributing the questionnaire. Besides distributing the questionnaire, researcher also giving the interview to students and head of mathematics study program as the stakeholder. Below are the result of data collection taken from the interview with students and the stakeholder.

Based on the result of the questionnaire given to the students and stakeholder of mathematics study program, Flores University, there are 100% choose text book as teaching and learning materials. Before develop a text book, researcher develop a syllabus firstly as guidance. Syllabus which is developed by researcher is content syllabus. In content syllabus, the content of language learning might be defined in terms of situations, topics, themes, or other academic or school subjects. Considered to the topic, there are 2 kinds of topics given such as specific topics which includes of some topics related to mathematics and then general topics which includes of some topics about nominal and verbal sentence. Since there are only 5 topics, the students and stakeholder also asked to give the additional topic which is used in daily life. Considered to that additional topic, researcher develop the topics into some sub topics in the syllabus. Further, the materials gave to the expert judges to evaluate in order to get the good quality by using the instrument. To get the validation of the material instrument is used the standardization of good materials based on BSNP (2006).

Before implementing the materials, researcher analyze the validation of materilas by using Gregory table;

Validator		Expert I	
		D a	A
Expert II	A	A	B
	D a	C	D

Source ; Gregory (2000)

The coofecient of Gregory :

$$\text{Coofecient Gregory} = \frac{D}{A + B + C + D}$$

The coofecient moves from 0.00 to 1.00.

Researcher revised the materials based on the comments and suggestions given by expert judges. Although the result of validation is categorized as excellent material, researcher also revised the materials based on the comments and suggestions given by expert judges. There are some comments related to the materials, such as: (1) the picture in the cover of the book is not clear; (2) the title of the book is too smaller; (3) in writing the materials researcher must be consistent; (4) the materials need to give more exercises on language use in each lesson; (5) need more example case in Indonesia; (6) need to tidy up the layout. After revising, researcher make a field try out the materials at mathematics study program. To know the quality of the materials, researcher used pre-experimental design with One-group pretest-posttest design. In implementing the design, researcher uses one class. Test given to the students at the beginning activity (pre-test) and posttest at the last activity.

Product testing for every unit was 2 ×45 minutes and/or 4 ×45'. The time allotment given based on the level of difficulties of the material. Since there were limited time, testing product given for students were three meetings per week. Researcher divided the one or first two meetings for teaching and learning process. Testing product was done at 30th June 2019- 8th July 2019. After implementing the product, at 9th July 2019 the researcher administering the questionnaire to the students which purposed to get student's opinion on the material being implemented. And the last activity done was giving the test at 10th July 2019. Based on the students' response and comment in the instruments given, there are no revision of the materials developed. The last procedure is producing the product of English teaching and learning materials for mathematics study program, Flores University.

RESULTS AND RESEARCH DISCUSSION

The kind of syllabus developed for mathematics study program is topical syllabus. Researcher used Badan Standar Nasional Pendidikan (BSNP) (2006) as the reference in developing the syllabus. Before developing the syllabus, researcher also find out the students' needs by using questionnaire and make an interview with the head of the mathematics study program. Then, English teaching and learning materials which is developed by researcher is text book. There are contains of the cover, introduction and content of the materials. It refers to the BSNP (2006) which consist of oral text and written text (dialog and monolog).

Researcher provided the questionnaire and pretest for students in mathematics study program to know the student's basic competence, cognitive development and the skills to reach the goals of the study in order to develop the teaching materials. The result shows that students' basic competence in learning English are low.

The results of interview and questionnaire provided to students and stakeholder, it is developed 10 topics should be taught during the semester, they are.

Table. 1 The Topics in the Syllabus that should be taught in 1 semester

Lesson 1	Numeral
Lesson 2	Procedure Text
Lesson 3	Time and Date
Lesson 4	Recount Text
Lesson 5	Mathematical Symbol
Lesson 6	Shapes
Lesson 7	Nominal Sentence
Lesson 8	Verbal Sentence, Simple Tense
Lesson 9	Verbal Sentence, Progressive Tense
Lesson 10	Verbal Sentence, Perfect Tense

In order to know the quality of the English teaching and learning materials, there are two steps used, they are experts judgment and field test. Firstly, researcher made a blue print of the questionnaire based on the BSNP's criteria of good materials. There are 73 items of criteria which synthesized into 4 aspects, namely the aspect of contents eligibility, the aspect of presentation eligibility, language assessment, and graph eligibility. From 4 aspects then divided into 17. To know the content of validity, the materials is analyzed by using Gregory table; Based on the result of validation, the score is 0,85 and it is categorized as excellent materials.

After getting the validation from experts, students and stakeholder, all the topics of material then try out in second semester of student in mathematics study program. Researcher took 1 class with 27 students as respondents. Because of the limited time, product testing for every lesson was 2 ×45 minutes and/or 4 ×45 minutes in a week. The time allotment given based on the level of difficulties of the material. It can be concluded that testing product given for students were 3 meetings per week. Researcher divided the one or first two meetings for teaching and learning process. Testing product was done at 30th June 2019- 8th July 2019. After implementing the product, at 9th July 2019 the researcher administering the questionnaire to the students which purposed to get student's opinion on the material being implemented. And the last activity done was giving the test at 10th July 2019. During the try out, researcher observed that students interest towards learning English is look unequal, because while learning in the classroom only a few students pay attention to the lecturer's explanation, then while the rest are chatting with a friend and takes the opportunity to use mobile phones.

The findings of this study also showed the result of questionnaire and also test administered to students towards the quality of English text book for mathematics study program. The first result obtained from students' opinion on the questionnaire in which most students most agreed that the feature of the text book were interesting while the content of textbook were easy to understand, useful, relevant and based on their level. Based on the result of validation from the experts, the score is 0, 85 and it is categorized as excellent materials. The result of the test administrated after the use of text book in which the average score of students in comprehending the material could improve to be 86,15 which meant that the passing grade was achieved and it also implied that the text book were affective to improve English achievement of the second semester of students in mathematics study program, Flores University.

As Sukra(2015) in his research aims to provide an instructional book, which can improve the English communicative competence of the students. It was conducted at the Accounting Department of Bali State Politeknik in the year 2014. That research applied the research and development by Dick & Carey and was planned for 2 years. In the first year, the needs analysis was done in order to result in the prototype of the instructional material. In the second year, the research will be continued to provide the instructional book. The documenter data and the result of questioner in form of information then analyzed descriptively. The result of the analysis identified 12 standards of competences and 44 basic competences. The average age of the first semester students of the Accounting Department 208 were 18-19 years. They graduated from SMK and SMU. However, they did not have high motivation and good English concept yet. Their evaluation to the English instructional was less fulfilled as the lecturers often applied a conventional teaching method and seldom did instructional orientation. The books used by the students did not meet the criteria of an instructional book yet. Based on the result of the need analysis and the characteristics of an instructional book, the prototype of the instructional book, as the final product of this first year research, was developed with a reference to standards of competences and basic competences and the indicators of the achievement. The basic material of this book are listening, speaking, reading and writing with constructivist approach and Student Center Learning oriented. The steps of the instructional activity consist of introduction, which envelops orientation, eliciting idea, and prior knowledge; main activity envelops reconstruction and application of ideas; and closing envelops questioning and answering, conclusion, and evaluation by using formative test of competence.

In short, it can be concluded that the material developed by using BSNP's criteria got the positive feedback from both judges as the material expert and students as the learner. It can be seen from the score of

experts validation and students' test Using Gregory's model of analysis on the quality of the material could be categorized as excellent material. Therefore, English material was suitable for the students' needs in second semester of mathematics study program. Other research of Faridah, F., and Sulistiono (2018), in their research is aimed at developing English learning materials for the first semester of Informatics Study Program. The researcher applied Research and Development as the research method. In the research method the researcher implemented five of Borg and Gall's Research and Development (R&D) stages. Then, those five stages were combined with Kemp's theory of instructional model to develop and design the English materials, the steps included were: collecting the students' need, planning, developing the materials, writing the final draft, and trying out the materials. Based on the research finding, the students learn English Learning material includes seven units and in every unit cover three Basic English competence reading, speaking and writing, and also consists of several sections, namely introduction, main lesson and reinforcement.

CONCLUSION

The major purpose of this research was to know the materials developed, namely English syllabus and text book with the title "LET'S PRACTISE ENGLISH, FOR MATHEMATICS". The materials were developed based on the assessment by Tomlinson and BSNP (2006). Researcher uses some procedures of Dick and Carey model. To find out the topics needed by students of Mathematics Study Program, researcher develop 5 topics for a semester, they are Numeral, Time and Date, Shape, Nominal Sentence and Verbal Sentence. Those topics are acceptable to use in 2nd semester of student in mathematics study program, Flores University since English lesson only gets 2 credits point in a semester. Meanwhile, those topics then develop into such sub topics, they are Procedure Text in first topic (Numeral); Recount Text in the second topics (Time and Date); Simple Tense, Progressive Tense, and Perfect Tense in the fifth topics (Verbal Sentence). All the topics then drawn into the syllabus of mathematics study program. Considering to the quality of materials by experts' judgment showed that the score of the material is 0, 85 and the result of the test administrated after the use of the text book in which the average score of students in comprehending the material could improve to be 86, 15. Thus, it can be concluded that the material developed by using BSNP's criteria got the positive feedback from both judges as the material expert and students as the learner. It can be seen from the score of experts' validation and students' test Using Candiasa's model of analysis on the quality of the material could be categorized as excellent material. Therefore, English material was suitable for the needs of the students of second semester in Mathematics Study Program.

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