

# Developing a social media-based Chatbot for English learning

M Sarosa<sup>1,\*</sup>, M Kusumawardani<sup>1</sup>, A Suyono<sup>2</sup> and M H Wijaya<sup>3</sup>

<sup>1</sup>Electrical Engineering Department, State Polytechnic of Malang, Jl. Soekarno Hatta 9 Malang

<sup>2</sup>Business Administration Department, State Polytechnic of Malang, Jl. Soekarno Hatta 9 Malang

<sup>3</sup>Telkom Vocational High School Malang, Jl. Danau Ranau Sawojajar Malang

\*msarosa@polinema.ac.id

**Abstract.** The increasing number of foreign companies offering job vacancies in Indonesia is a blessing for new graduates. However, they could not use the opportunity due to their limited English skill. This condition may occur because there is a lack of human resource providing direct, gradual, and continuous assistance to improve their English skills. Nowadays, social media are very popular among various groups of people but they are mostly used for information exchanges. This study aims to develop an application inside Facebook as an English learning media to help students learn English more efficiently. This application is in the form of a Chatbot (an answering robot) as a substitute for a teacher to help those who have difficulties in learning English. The Chatbot integrated in the social media is expected to provide an easier adoption as the users are already familiar with its interface and navigation. This application has been applied to students of Telkom Vocational High School Malang and D3 English Study Program, State Polytechnic of Malang. With this application, students can learn English independently and utilize a rich collection of information and organized exercise items to get help or find more challenges whenever needed to avoid learning boredom.

## 1. Introduction

English proficiency is one of the factors to increase the competitiveness of students, including in the competition for workplace. This ability will be formed if supported by a good education system. Lack of supporting facilities in English in an educational environment will greatly affect the number of students who have the ability to communicate in English. During this time, English language skills for State Polytechnic of Malang students have only been trained classically in English courses or in English clubs that are managed independently by students. There is no specific training that aims to improve and measure the ability of students to communicate. Other factors that play a role in the lack of English language skills are the lack of facilities and infrastructure that attract students to practice.

The development of technology and lifestyle allows English training to be conducted online (chat) through social media. Communication can be in the form of text (text chat) or voice (voice chat) so as if the user is talking with tutor. The advantage of this system is that users who need to practice English can be served virtually 24 hours a day so there is no time limit in learning.

Based on the facts above, this research is aimed at developing English learning media that can be used independently so that they do not depend on lecturers / teachers / tutors anymore. Using social media as a learning medium makes users more familiar because they already use it on a daily basis.

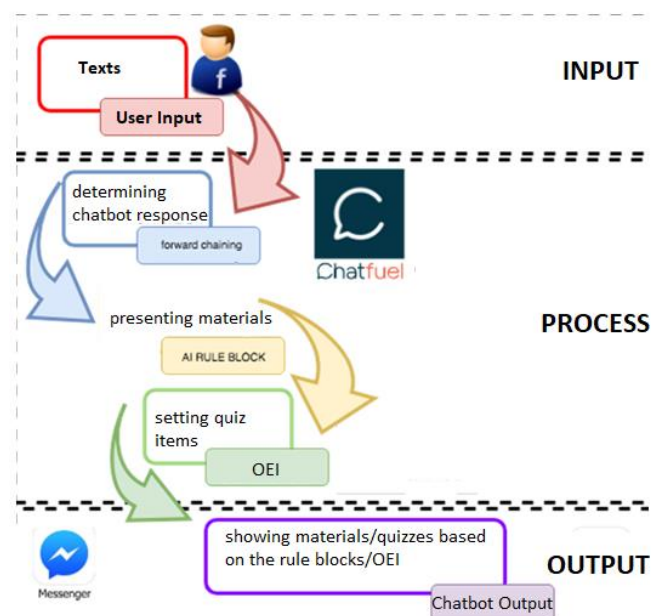


The urgency of this research is the creation of an English language learning media Chatbot media application. The focus of the discussion is about the characteristics of Chatbots that can develop English learning material.

Supporting theories needed include Chatbots installed on cloud-based chat platforms, artificial intelligence, Software Development Life Cycle (SDLC), algorithms, and Organizing Exercise Items (OEI) methods. Chatbot or can be known as bot is an interactive and automatic program that provides various functions to its users, ranging from shopping assistance, news reading to get information about the weather through a personal weather forecast. The core part of Artificial Intelligence (AI) is the knowledge base, which is an understanding of how to obtain subject areas through learning and experience [1]. SDLC is needed in the process of making or modifying software systems with various models and methodologies [2].

## 2. Methods

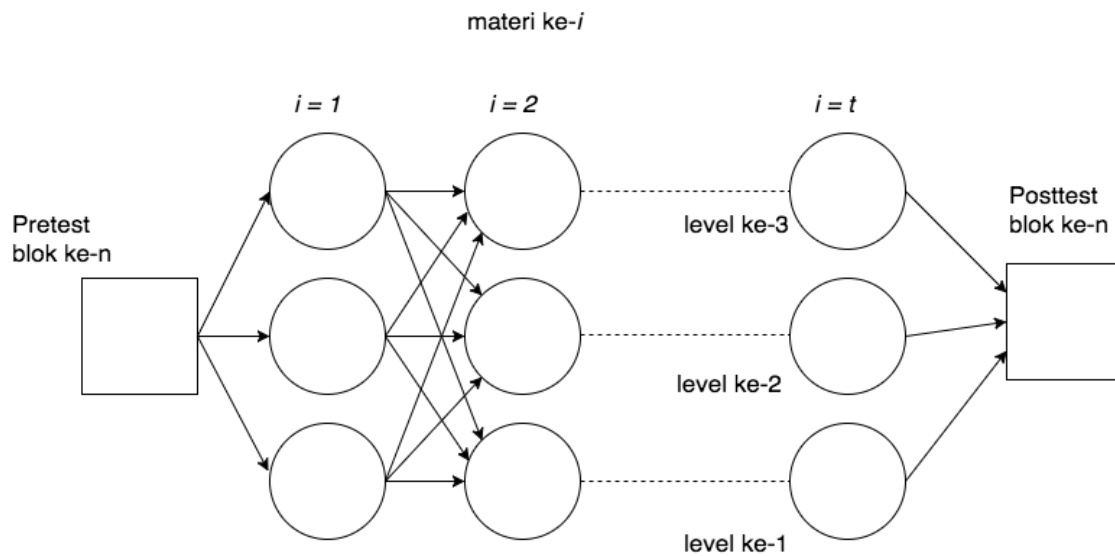
Figure 1 explains the concept of developing science in making Chatbots for learning English. The text input used is from user input keywords that will search for pairs of patterns with NLP techniques and expert systems.



**Figure 1.** Flow process.

The development stage of knowledge used in the preparation of Chatbots involves expert systems and Natural Language Processing (NLP). In the expert system there is a knowledge base (with vocabulary material as a knowledge base derived from keywords entered by the user), inference engine (using forward chaining with the if-then rule method and Organizing Exercise Items-OEI), and the interface using Chatfuel Chatbot builder.

OEI is used to divide the level of questions at 3 levels, namely level 1 (low), level 2 (middle), and level 3 (high) while the tests are designed in order of difficulty level. Each section always starts with the easiest test and ends on the most difficult test. Figure 2 show the determination of the level of student competency is based on the results of the pretest.



**Figure 2.** Organization exercise items flow [3].

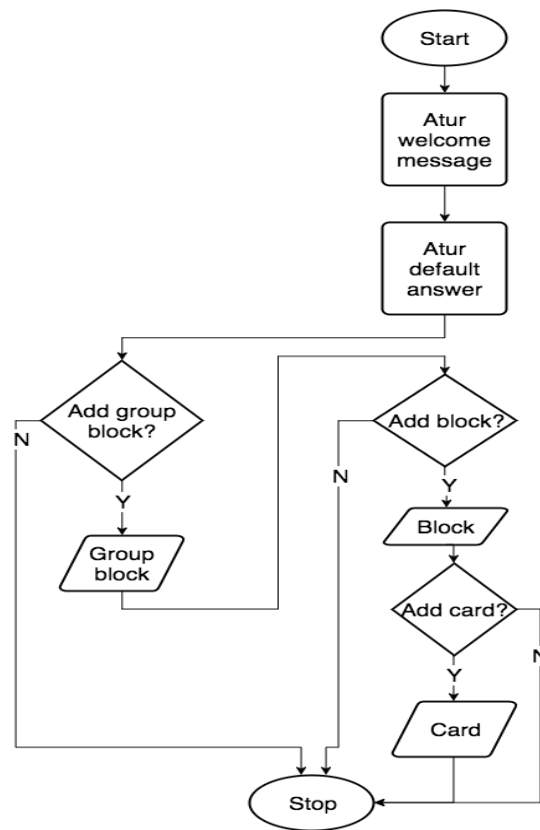
If any of the answers given are wrong, the computer will report the answers which are wrong and will give students another opportunity to be able to answer the exercise. Within a certain time period, if no answer is input, the computer screen will show instructions. Step by step instructions to complete the exercise independently. Instructions are given step by step to give students adequate opportunities to develop their teaching have been received. When the time allotted to complete the exercise ends and the student has not entered an answer, the computer will give a message so that students can work at the right speed. The number of practice items given is greater than the number of exercise items students can complete so items can be presented randomly and students cannot memorize the answers to the exercises.

Determination of question level (easy, medium, and difficult) on the presentation of questions by Chatbot will be formulated in the cognitive level. The cognitive process in taxonomy is divided into several dimensions, namely memorization, understanding, applying, analyzing, evaluating, making or creating [4-10].

The proposed knowledge base for Chatbots is shown in Figure 3. The admin will set the Chatbot message sentences when the user first enters. Then set the default answer when the user gives known or unknown input to Chatbot, that is the process of matching entries on the Chatbot knowledge base. The Chatbot response rules are arranged on blocks that are created as needed. Blocks that have the same realm of conversation can be grouped in groups of blocks. In each block there are cards that can be added according to functions and needs.

### 3. Results and discussions

The following is the OEI algorithm applied to Chatfuel: students work on the pre-test presented by Chatbot so that they will get a score to go to the quiz and the first section with the level according to the score category. In each section students can work on several quiz items that are presented according to the level of the score. This is repeated until the last section and leads to the post test.





**Figure 3.** Flowchart proposed knowledge base block.

The number of questions used is 100 questions. Distribution of that questions are 20 pre-test questions (consisting of 2 sections that each have 10 questions), 20 easy level questions, 20 medium level questions, 20 difficult level questions and 20 questions for post test.

1. Having \_\_\_\_\_ every morning keeps people strong during the day.
  - A. dinner
  - B. shower
  - C. breakfast
  - D. smiles
2. How many \_\_\_\_\_ do you need for all that trash?
  - A. bags
  - B. love
  - C. bananas
  - D. chairs

**Figure 4.** Examples of pre-test questions.

1. 
- A. jump  
**B. run**  
 C. fall  
 D. carry
2. 
- A. drive**  
 B. ride  
 C. wipe  
 D. clean

**Figure 5.** Examples of level 1 questions.

1. \_\_\_\_\_ is a place where you buy medicine.  
 A. a bookstore  
 B. a restaurant  
 C. a library  
**D. a pharmacy**
2. A \_\_\_\_\_ is an animal which makes honey.  
**A. bee**  
 B. spider  
 C. fly  
 D. bear

**Figure 6.** Examples of level 2 questions.

1. Inflation \_\_\_\_\_ the buying power of the dollar.  
**A. affects**  
 B. effects  
 C. deletes  
 D. completes
2. We will have to \_\_\_\_\_ a new marketing strategy to sell that product overseas.  
 A. adept  
 B. adapt  
**C. adopt**  
 D. edict

**Figure 7.** Examples of level 3 questions.

The main menu in the Chatfuel bot builder is build (build group blocks that contain blocks in the form of quizzes, scores, score calculation, responses if true or false), if-then routes in quiz section and level), AI setup (Add several keywords from users to be paired with bot feedback responses in the form of a few words, sentences or blocks), and attributes (i.e. quizzes and scores), as shown in figure 8. Quizzes are accommodated on variables given the same name as the user's position when answering quizzes,

namely ExLxSx (Exercise, Level, Section) x = position: In addition to the score a per position is obtained until the last quiz in the next section at a certain position and level so that it can be directed to the quiz.

**Figure 8.** User attribute with the value.

#### 4. Conclusions

The design of conversation responses with students in this English Learning Chatbot can be done on vocabulary material that provides set of exercises based on the scores obtained. The design of knowledge base components for presenting information and questions at different levels in Chatbots namely blocks and cards can be built with Chatfuel bot builder on the AI Rule menu by applying the forward chaining method.

From the analysis of the results of Chatbot test has reached 100% accuracy in the accuracy of responding to the presentation of questions according to the score and level with the Organizing Exercise Items (OEI) method using Messenger as a presentation of material and quiz items with the OEI method according to the level or score obtained by students.

#### Acknowledgments

This research is supported by the Directorate General of Higher Education Indonesia through the “Leading Applied Research Universities” (PTUPT) grants.

#### References

- [1] Kristanto A 2003 *Perancangan Sistem Informasi dan Aplikasinya* (Jakarta: Gava Media)
- [2] Rosa A S and Shalahudin M 2013 *Rekayasa Perangkat Lunak Terstruktur Dan Berorientasi Objek* (Bandung: Informatika)
- [3] Widjajanti K, Sarosa M and Kusumawardhani M 2015 Organizing Exercise Items in Mathematics Learning *International Journal of Science and Research (IJSR)* **4**(5) 2162-2167
- [4] Widodo A 2006 Taksonomi Bloom dan Pengembangan Butir Soal *Buletin Puspendik* **3**(2) 18-29
- [5] Alencar M and Netto J M 2011 Improving cooperation in Virtual Learning Environments using multi-agent systems and AIML *2011 Frontiers in Education Conference (FIE)* F4C-1
- [6] Athira P M, Sreeja M and Reghuraj P C 2013 Architecture of an Ontology-Based Domain Specific Natural Language Question Answering System *International Journal of Web & Semantic Technology (IJWesT)* **4**(4)
- [7] Fatnuriyah M, Sarosa M and Santoso P B 2012 Implementasi Chatterbot Berbasis Program O Menggunakan Web Crawler Dan Web Service *Jurnal ELEKTRAN* (Jurusan Teknik Elektro, Politeknik Negeri Bandung)
- [8] Mikic F A, Burguillo J C, Rodríguez D A, Rodríguez E and Llamas M 2008 T-Bot and Q-Bot: A couple of AIML-based bots for tutoring courses and evaluating students *2008 38th Annual Frontiers in Education Conference* S3A-7
- [9] Lende S P and Raghuwanshi M M 2016 Question answering system on education acts using NLP techniques *2016 World Conference on Futuristic Trends in Research and Innovation for Social Welfare (Startup Conclave)* 1-6
- [10] Tanwar P, Prasad T V and Datta K 2014 An effective reasoning algorithm for question answering system *International Journal of Advanced Computer Science and Applications* 51-57