MOIN BERTA!: AI CHATTERBOT FOR PRACTICING BASIC SPEAKING IN GERMAN LANGUAGE

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LAPORAN PROJEK TAHUN AKHIR DIKEMUKAKAN BAGI MEMENUHI SYARAT UNTUK MEMPEROLEH IJAZAH SARJANA MUDA KEJURUTERAAN PERISIAN (PERISIAN PENDIDIKAN) DENGAN KEPUJIAN

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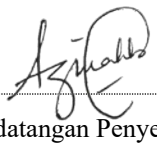
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(Dr. Azniah Binti Ismail)

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ABSTRAK

Tujuan projek ini adalah untuk membangunkan aplikasi yang menggalakkan pelajar mempraktikkan bahasa ketiga mereka di luar bilik darjah. Aplikasi Mudah Alih Moin, Berta! dibangunkan sebagai penyelesaian untuk membolehkan pelajar yang belajar bahasa Jerman mempraktikkan kemahiran bertutur mereka dengan bot sembang bernama Berta. Pembelajaran Mudah Alih, khususnya yang dipanggil Pembelajaran Bahasa Secara Mudah Alih *(MALL)* telah diaplikasikan di dalam Aplikasi Mudah Ahli Moin, Berta!. Metodologi yang digunakan untuk membangunkan aplikasi mudah alih ini ialah Prototaip Evolusi *(EP)*. Fleksibiliti yang ditawarkan oleh metodologi tersebut membolehkan perubahan dibuat sepanjang pembangunan. Keperluan untuk aplikasi mudah alih ini telah dikumpulkan dalam fasa Keperluan Permulaan. Seramai 16 orang responden yang terdiri daripada 14 orang pelajar universiti dan dua orang pelajar sekolah menengah telah terlibat. *Value Proposition Canvas (VP Canvas)* digunakan untuk menganalisis keperluan untuk mengenal pasti ciri yang sesuai. Terdapat enam *pains* dan enam *gains* telah dikenal pasti semasa analisis, yang mana tujuh *pain relievers* dan enam *gain creators* telah dicadangkan untuk ciri aplikasi. Untuk membangunkan aplikasi mudah alih ini, *Android Studio* dan *Dialogflow* telah digunakan. Fungsi dalam aplikasi mudah alih boleh dibahagikan kepada tiga kategori, umum, khusus dan fungsi sampingan. Selain daripada bot sembang, fungsi lain termasuk nota asas bahasa Jerman disertakan dengan audio untuk perkataan Jerman yang tertentu. Selepas pembangunan aplikasi mudah alih selesai, Skala Kebolehgunaan Sistem *(SUS)* telah dijalankan untuk menilai kebolehgunaan aplikasi dan ujian fungsi dilakukan. Hasilnya, aplikasi ini mendapat A (83.9%) pada ujian SUS. Keputusan juga menunjukkan bahawa pelajar tertarik untuk menggunakan bot sembang pasangan mereka dalam mempraktikkan kemahiran pertuturan mereka dalam bahasa Jerman. Kesimpulannya, kami membangunkan aplikasi yang sesuai yang boleh membantu pelajar berlatih bahasa Jerman mereka di luar bilik darjah pada bila-bila masa sahaja. Kami berharap setiap pelajar akan menggunakan bahasa Jerman sebagai bahasa ketiga mereka.

Kata kunci: Bahasa Jerman, Bahasa Ketiga, Bot Sembang, Kemahiran Bertutur, MALL, Pembelajaran Mudah Alih, Prototaip Evolusi

MOIN BERTA!: AI CHATTERBOT FOR PRACTICING BASIC SPEAKING IN GERMAN LANGUAGE

ABSTRACT

The project aims to develop an app that encourages students to practice their third language outside the classroom. The Moin, Berta! Mobile App is developed as the solution to enable students who learn German to practice their speaking skills with a chatbot named Berta. Mobile learning, specifically its branches called Mobile Assisted Language Learning (MALL) is applied on the mobile app. The methodology used to develop the mobile app is Evolutionary Prototyping (EP). The flexibility offered by that specific methodology allowed changes to be made throughout the development process. The requirements for the mobile app are collected in the Initial Requirement phase. 16 respondents, consisting of 14 university students and two high school students were involved. Value Proposition Canvas (VP Canvas) is used for the requirements analysis to identify suitable features. There are six pains and six gains were identified during the analysis, for which seven pain relievers and six gain creators were proposed for the app features. To develop the mobile app, Android Studio and Dialogflow were used. The functions in the mobile app can be divided into three categories, general, specific, and side functions. Other than the chatbot, other function includes basic German notes with audio for specific German words. After the mobile app development was completed, the System Usability Scale (SUS) was conducted to evaluate the app's usability and functional testing is done. As a result, the app scored an A (83.9%) on the SUS test. Results also show that students are attracted to using chatterbot as their partners in practising their speaking skills in the German language. In a conclusion, we developed a suitable app that can help students practice their German outside of the classroom whenever they want. We hope that every student will be encouraged to take German as their third language.

Keywords: German Language, Third Language, Chatterbot, Speaking Skill, MALL, Mobile Learning, Evolutionary Prototyping

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VR	-	Virtual Reality
AR	-	Augmented Reality
SBP	-	Sekolah Berasrama Penuh
MRSM	-	Maktab Rendah Sains Mara
UPSI	-	Sultan Idris Educational University
FSLA	-	Foreign Language Speaking Anxiety
AI	-	Artificial Intelligence
VP	-	Value Preposition
CS	-	Customer Segment
PV	-	Product Value
M-Learning	-	Mobile Learning
MALL	-	Mobile–Assisted Language Learning
SDM	-	Software Development Methodology
RAD	-	Rapid Application Development
SDLC	-	Software Development Life Cycle
SRS	-	Software Requirement Specification
SDD	-	Software Design Document
NLP	-	Natural Language Processing
API	-	Application Programming Interface
UI	-	User Interface
SUS	-	System Usability Scale

CHAPTER 1

INTRODUCTION

1.1 Introduction

The introduction for the conducted research will be discussed in this specific chapter. This chapter contains the Research Background, Problem Statement, Research Objectives, Research Scope and the Significant of Research for Moin, Berta! Chatterbot Mobile Application.

The research that will be conducted is about learning or practising speaking in German (as a foreign language) using Chatterbot as the technology in the form of a Mobile Application. The goal of this research is to develop a mobile application that can help university and high school students to practice their basic speaking skills in the German language without having to talk to a real person. Other than university and high school

students, other people who want to practice their speaking skills in German can also use this mobile application.

In Moin, Berta Chatterbot Mobile Application, there are conversation themes that the user can choose to practice speaking with. Most of the themes in the mobile application are related to daily lives conversations so that users can relate to them more. The conversation will be conducted by Berta, the Chatterbot that will help engage users in the conversation. Using a Chatterbot to practice speaking in a foreign language is not uncommon any more. In fact, users will feel more comfortable talking or conversing in a foreign language with Chatterbot than talking to a real foreigner. The evaluation for this mobile application will be conducted by university and high school students from selected universities and schools.

1.2 Research Background

There are so many old and new technology out there that can help people to learn a foreign language without going out of their houses or even contacting a real person. Thanks to the rapid changes and growth in the world, they are springing up around us like mushrooms after the rain. Some of the technology that can help people in learning a foreign language is Virtual Reality (VR), Augmented Reality (AR) and Chatterbot.

For an instance, VR is a technology that required specific tools to help simulate an experience that either can be similar to the real world or the opposite. Using VR as a system, various users can have the feeling that they are in a virtual world and they are also able to interact with that world (Serin, 2020). AR on the other hand provides its users with an

interactive experience of a real-world environment, where the objects in the real world are enhanced by computer-generated perceptual information and the use of digital elements like sounds or other sensory stimuli. AR is a technology that combines reality with reality (Chen et al, 2019). Next is Chatterbot or widely known as Chatbot. Chatterbot is a computer program that has the ability to process and simulates human conversation either written or spoken, allowing humans to interact with it like conversing with a real person. Chatterbots are designed to mimic human conversation to enable automated guidance and support (Caldarini & McGarry, 2022).

Nowadays, having the ability to speak in another foreign language other than English and mother tongue brings many benefits. It is like additional skills that can help enhance a person's life. Using the knowledge of that foreign language, travelling to the country that implied that language would not be a problem. A platform that can be used by anyone who is interested in learning to speak a foreign language needs to be created. Chatterbot is the best technology that can be used as a foreign language learning platform because not all people can afford VR tools and have a good device to run AR. Besides that, Chatterbot can help create this environment as if the user talks to a real person who uses that foreign language but actually that person is a bot. Therefore, the idea of creating a mobile application that can help people to learn to speak a foreign language by integrating the use of Chatterbot and mobile learning comes to life. Hence, Moin, Berta! Chatterbot Mobile Application that focuses on learning to speak in the German language will be developed. The user will converse with Berta, the German bot.

Although the targeted user for this mobile application is a university and high school student, anyone who is interested in learning to speak in basic German language can also

use the app. They can be novice, intermediate or expert users in using a mobile phone. The reason the user needs to have the knowledge of using a mobile phone is that the Moin, Berta! Chatterbot is a mobile application. In these years and age, most people have mobile phones. So, this project can help people who are interested in learning to speak German to use their mobile phones to learn German with Berta and have fun and gains exciting experiences in the process.

1.3 Problem Statement

These days, the demand for people who can speak a foreign language has arisen. When job hunting, people who have the ability to speak another foreign language like Japanese, Korean or Chinese will get more attention from the interviewer. This is due to the ability of people who is trilingual. They can relate to different cultural groups in a personal manner. Most people in the world are bilingual speakers. The common bilingual speakers know how to speak in English and their mother tongue only. Having a third foreign language can bring more advantages in the future.

Most schools and universities in Malaysia offer a variety of foreign language classes to their students. Schools like Sekolah Berasrama Penuh (SBP) and Maktab Rendah Sains Mara (MRMS) teach foreign languages like German, Japanese and French to their students. Universities like Sultan Idris Educational University (UPSI) also offer courses to learn foreign languages as an additional subject that their students can enrol too. Some of the foreign languages offered by UPSI are Japanese, French, Spanish, Chinese and Arabic. Students can join the courses offered to learn a third language that can be used in the future.

Like learning other crucial subjects, students also face some difficulties in learning a foreign language. From speaking, listening, writing and reading which is the pillar of learning languages, the area that most students struggle with is speaking. They were either shy and nervous (Bashori et al., 2020; Djahimo, 2018; Hong & Ganapathy, 2017; Leong & Ahmadi, 2017; Oflaz, 2019), afraid to make mistakes (Bashori et al., 2020; Djahimo, 2018; Hong & Ganapathy, 2017; Leong & Ahmadi, 2017; MacIntyre, 2017; Oflaz, 2019; Ozdemir, 2018; Setiyanti et al., 2022), or do not have opportunity to speak in the language (Hong & Ganapathy, 2017; Leong & Ahmadi, 2017; Ozdemir, 2018). There are also students who have Foreign Language Speaking Anxiety (FSLA) which is anxiety in speaking in a foreign language (Bashori et al., 2020; Haristiani, 2019).

Studies show that students feel more comfortable speaking in a foreign language with machines rather than the real person (Bashori et al., 2020; Haristiani, 2019). In order to ensure that each student has the opportunity to practise speaking in a foreign language outside of the classroom and lessen their shyness when speaking in a foreign language, mobile applications that apply Chatterbot technology can be used as a platform for them to practice their speaking skills. While practising with the Chatbot, they also can have fun and gain interesting experiences from it.

1.4 Research Objectives

The objectives for this project have been identified in order to ensure the success of the project. These are the objectives for the project:

i. To identify the problem faced by students in speaking in a foreign language.

ii. To develop an interactive mobile app using Artificial Intelligent (AI) Chatterbot called Moin, Berta! based on problem discovery.

iii. To test the usabilities and functionalities of AI Chatterbot that have been developed.

1.5 Research Questions

These are the research questions:

1. What is the suitable design and features that help the application that can help attract university and high school student's interest in learning German as a foreign language?
2. How to develop the Chatterbot application that can interact between user and application?
3. How to test the functionality and usability of the application that can be used by university and high school students?

1.6 Research Scope

The scope of this research focuses on university or high school students that want to learn to speak in German or students that already have basic skills in speaking in German to use Chatterbot to enhance their speaking skills in that specific language. The conversation content between the user and Berta will be things that are said on a daily basis or in daily life conversations. This is to ensure that the user can feel the connection with Berta, the German chatbot. Other than conversing with Berta, other content for this project is basic notes for the German language. The basic notes are Basic Greeting Note, Pronounce Note, Definite Article Note, Indefinite Article Note and Verb TO BE Note. Platforms used to

develop the Moin, Berta! Chatterbot Mobile Application are Android Studio, Dialogflow, Canva and Microsoft Word. The targeted area that will use the mobile application is Tanjong Malim, Klang and Shah Alam.

1.7 Significant of Research

The use of Chatterbot in a foreign language learning (German) can help students to practice their knowledge of that language outside of the classroom anywhere and anytime. The only requirement to use the Moin, Berta! Chatterbot Mobile Application is they need to install the mobile app on their mobile phone. Practising phrases and what they have learnt in class is important. This is because language learning will only remain theoretical and their knowledge of that specific language will be weakened if they did not try to find a practical way to practice what they have learned (Ozdemir, 2018). The more they practise what they learn using Berta the German chatbot, they can understand the usage of certain sentences better.

When conversing with a real person who speaks in a foreign language that they learn, students are worried about making mistakes and they are also afraid of criticism. Besides that, they are also ashamed when other students' give attention to them for their mistakes (Leong & Ahmadi, 2017). Conversing with a bot can help shy students to involve in the conversation. This is due to the use of a chatbot, Berta, that replaces the real person on the other side. In addition, students will not have to feel afraid of making mistakes because no one will judge them. Conversing with a chatbot also can help provide a safe place for students that have Foreign Language Speaking Anxiety (FSLA).

The teachers can use this mobile application as one of the new methods of teaching and learning using Chatterbot to assist their student's foreign language learning in the German language. Research that has been done in the past few years indicates that certain methods and approaches can truly enhance the learning skill of their students (Kalyani & Rajasekaran, 2018). By integrating Chatterbot and mobile learning, students' attraction towards using the mobile app can be grabbed and they also can get engaged with Berta, the Chatbot. The more they get engaged, the more they learn (Kalyani & Rajasekaran, 2018).

All these significances show that this project is fulfilling the statements stated in the research background.