

CREATING AI-POWERED CHATBOT FOR LEARNING JAPANESE: DEVELOPMENT AND IMPLEMENTATION

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Abstract

This research investigated the development of an Artificial Intelligence (AI)-based Chatbot tailored for Japanese language learners, employing the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) method as its guiding methodology. The study systematically addresses the needs and preferences of Japanese language learners in the Analysis phase, conceptualizes the Chatbot in the Design phase, and implements it in the Development phase. The AI-driven Chatbot is subsequently deployed in the Implementation phase, allowing for user interaction and continuous evaluation of learner engagement, user experience, and overall effectiveness. Through this research, we aim to demonstrate the potential of AI-based Chatbots as valuable tools for language learning, utilizing the structured approach of the ADDIE method to inform and inspire future developments in the field of Japanese language education.

Keywords: Artificial intelligence, Chatbot, Gengobot, Japanese language learning, Language learning media.

1. Introduction

Artificial Intelligence (AI) is one of the technological developments that can replace the role of humans in various fields [1-6]. An AI system can imitate a function that can be performed by humans requires external data such as big data to function optimally [7, 8]. Chatbot is one of the developments of AI that can carry out conversations with users using AI [9]. The first Chatbot was the ELIZA Chatbot [10], a program developed to imitate independent therapy (Rogerian therapy) in which the patient's discourse is directed back to the patient by the therapist in the form of questions [11]. ELIZA is also used as a medium for Computer Assisted English Learning. As a medium for learning English, the ELIZA Chatbot with its dialogue format has good benefits in learning English. Apart from ELIZA, another very successful Chatbot is the Artificial Linguistic Internet Chat Entity (ALICE). ALICE was even awarded as a Chatbot that is very close to the human conversation in 2000, 2001, 2004 [12]. In language learning, ALICE is said to be an interesting tool to practice language and enjoy conversation with ALICE. Starting from ELIZA and ALICE, recently Chatbots have developed in e-learning platforms to support student learning. Chatbots are an important innovation in the e-learning field because they can be an innovative solution to filling the gap between technology and education [13, 14]. One of the applications of AI is in language education. Language education has been one of the interesting subjects, making it to be researched and well-published. Table 1 shows examples of publication in language education.

Table 1. Example of papers published in International Journal of Language Education in 2024.

No.	Title	Ref.
1	Interlanguage pragmatic competence of university students: An error analysis of apology speech act strategies in Japanese learners	[15]
2	Contributing factors and challenges in mastering academic writing skills: Multiple case studies of deaf students in inclusive universities in Indonesia	[16]
3	Arabic language implementation viewed from a social and cultural perspective at Maitreechit Withayattan school Bangkok	[17]
4	The endangered central Malay folklore: A medium for internalizing character values in Indonesian language and literature	[18]
5	Understanding the dynamics of materials adaptation in an English-Chinese bilingual storytelling curriculum for first graders	[19]
6	Indonesian textbooks oriented on social integration and 21st century skills in higher education: Validity, practicality, and effectiveness	[20]
7	Enhancing ASEAN students' cross-cultural adaptability in higher education: Exploring the issues of applying bilingual education in China panorama curriculum	[21]
8	Investigating the classroom implementation of Mandarin teachers' pedagogical content knowledge (PCK): Exploring effective strategies and practices for teaching Chinese as a foreign language in the Philippines	[22]
9	Enhancing paragraph writing proficiency: A study of students' performance post global English textbooks exposure	[23]

In language learning, Chatbots are very popularly used, especially in learning English such as ELIZA and ALICE, and it is proven that the use of Chatbots can improve English language skills. Apart from learning English, there are still many Chatbots that are used in learning other foreign languages, such as Arabic, French, Mandarin, and other languages [24]. However, there is almost no report on Japanese.

One of the difficult languages is Japanese, making research in this language has attracted tremendous attention. Many reports on the Japanese language have been well-documented, as shown in Table 2. This table shows the examples of reports in the Japanese Education journal.

Table 2. Example of papers published in JapanEdu in 2023-2024.

No.	Title	Ref.
1	Gairaigo derived from English in Japanese Advertising: Benefits, drawbacks, and global implications	[25]
2	Sherpur's students perception of Yeats themes representing Ireland and its' connection to Japan's noh	[26]
3	Slang abbreviation in Japanese and Indonesian written language: Origins, process, similarities, and differences	[27]
4	Advancing 21st-century creativity and innovation into Japanese educational system	[28]
5	The construction of complex sentences with predicative phrases of transitive verbs in Japanese language learners utterances: A transformational generative grammar study	[29]
6	Yoga: An exploration of its cultural adaptation and practice in Japan	[30]
7	The use of padlet to enhance Japanese learners' collaborative learning of basic composition writing skills (sakubun)	[31]
8	The acquisition of Japanese case particles by Indonesian learners of Japanese: Focusing on the concept of kou "Argument" of verb	[32]
9	The concept of Japanese culture in lean production of the Toyota automobile company: Its scientific development and application in higher education and agriculture	[33]
10	Discourse structure analysis of making request in Japanese conversation	[34]
11	Japan's success story in fostering collective responsibility in suicide prevention: The power of unity	[35]
12	Utilizing Japanese community engagement: Understanding Malaysian traditional music therapy for children with special needs	[36]
13	Morphological analysis of compound form (Fukugoudoushi) Verb+Ageru in Japanese	[37]
14	A critical discourse analysis on the representation of female idols in the "idol" song lyric by Yoasobi: From the Feminism Point of View	[38]
15	A comparative analysis between neural and statistical systems of Japanese-English machine translation outputs: Google Translate vs. Systran	[39]
16	Multilingualization on the current Japanese prefectural government web pages: The support status of easy Japanese for foreigners	[40]
17	Indonesian grammatical interference in relative clauses translation on japanese comic strips	[41]
18	Japanese language education and examination for Indonesian specified skilled worker (SSW) candidates: An analysis of the pre-departure program	[42]
19	The utilization of OJAD website to improve Japanese speaking skills in vocational high school	[43]
20	The development of "manabu bunpou" smartphone application for basic Japanese grammar learning	[44]
21	Utilizing cognitive illustration as kanji memorization strategy in kanji learning	[45]

In learning Japanese, a Chatbot with the name Gengobot has been developed [46-50]. Gengobot is a Chatbot application developed to improve learners' Japanese skills by utilizing AI technology. The main feature that Gengobot has is the practice of using Japanese grammar. This study aims to develop Chatbot-based learning media (Gengobot) by utilizing AI. By integrating Natural Language Processing (NLP) technology, Gengobot will not only be able to provide good Japanese grammar correction but can also be a place to practice user conversation. This development can improve the user's learning experience to be more interactive and interesting.

2. Method

Analytical methods and design charts used for the prediction of zero-lift drag Gengobot were developed using the ADDIE development method (Analysis, Design, Development, Implementation, and Evaluation). The ADDIE model is one of the most widely used instructional design models [51, 52]. The process of the ADDIE learning design model is shown in Fig. 1.

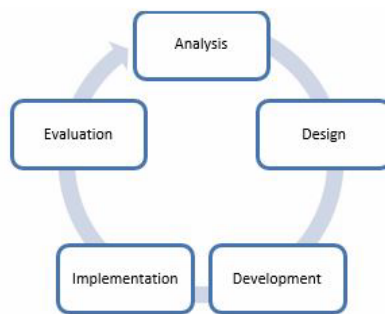


Fig. 1. ADDIE model.

2.1. Analysis stage

The analysis stage in this research is an important stage to understand the needs of Japanese language learners, especially in the context of utilizing AI in learning. A survey is needed to identify the specific needs of the target users. The survey questionnaire is shown in Table 3.

Table 3. Survey questionnaire about Japanese language learning medium.

No.	Questions
1.	What is your last Japanese Language Proficiency Test (JLPT) level?
2.	Do you find learning the Japanese language challenging?
3.	What are the difficulties you encounter in learning the Japanese language?
4.	In your opinion, what makes for an effective media for learning Japanese language?
5.	What media do you use to learn the Japanese language?
6.	Have you ever used a Chatbot application?
7.	Have you used a Chatbot as a learning medium?
8.	In your opinion, how should a Chatbot be utilized in learning the Japanese language?

Furthermore, during the analysis stage, we assessed the Gengobot application and other AI-based language learning tools to find out how effective methodologies in learning using Chatbots are. From the disadvantages and advantages of Chatbots, Gengobot should at least have advantages in terms of practicality, innovativeness, and development [53].

2.2. Design stage

The design stage in the development of an AI-based Chatbot for Japanese language learning is a pivotal juncture where the conceptualization of the educational tool takes shape. This phase operates on the insights garnered from the meticulous analysis of learner needs and the exploration of existing language learning solutions. Drawing upon the findings from the analysis phase, the design stage begins by outlining the architecture of the Chatbot. This includes defining the user interface, functionalities and features that align with the specific requirements identified during the needs assessment. The design process emphasizes user-centric principles to ensure an intuitive and engaging learning experience.

2.3. Development

The development phase in the creation of an AI-driven Chatbot for Japanese language learning marks the shift from conceptualization to actual construction. The process begins with the actual coding and programming of the Chatbot, employing sophisticated Chatbot algorithms. The development team works collaboratively to build the backend infrastructure that enables the Chatbot to understand user input, respond contextually, and adapt to individual learning trajectories.

2.4. Implementation

The development phase in the creation of an AI-driven Chatbot for Japanese The implementation phase represents a crucial turning point as the designed AI-based Chatbot for Japanese language learning shifts from conceptualization to practical deployment. During this stage, the Chatbot is intentionally introduced into controlled educational settings, providing learners with the opportunity to interact with this innovative language-learning tool. The initial interactions, whether in traditional classrooms or online platforms, act as a testing ground, allowing for the evaluation of user engagement, performance, and the collection of valuable feedback from learners.

Through this iterative process, the Chatbot is fine-tuned to seamlessly integrate into various learning environments, effectively addressing technical challenges and refining its interface based on practical usage. Beyond its deployment, the implementation stage is an opportune moment for collaborative exploration between developers, educators, and learners. This collaboration facilitates the adaptation of innovative teaching methodologies, wherein the Chatbot becomes a supplementary resource in language instruction. Continuous monitoring of learner progress and the impact on language acquisition contributes empirical data, shedding light on the Chatbot's strengths and weaknesses. The implementation stage not only validates the practical viability of the AI-based Chatbot but also sets the stage for a comprehensive evaluation, refining the tool for optimal effectiveness in Japanese language education.

2.5. Evaluation

The evaluation stage is a comprehensive examination of the AI-based Chatbot's effectiveness in facilitating Japanese language learning, drawing insights from real-world applications in educational contexts. This phase is not only about assessing the tool's impact but also refining its features and functionalities based on empirical data and user feedback. One of the primary objectives during the evaluation stage is to measure the learning outcomes achieved by learners who engaged with the Chatbot. Quantitative metrics, such as proficiency improvements and retention rates, are analysed alongside qualitative data, including user satisfaction and perceived effectiveness. This dual approach provides a holistic understanding of the Chatbot's contribution to language acquisition.

3. Results and Discussion

This article will only discuss three stages, namely the analysis stage, the design stage, and the development stage with the following results.

3.1. Analysis stage

At the analysis stage in the development of Gengobot, a survey was conducted among 64 Japanese language learners. The survey aimed to understand the learning experiences and difficulties that learners face. The respondents were learners of various Japanese proficiency levels, with 28.13% being at N5 (basic level), 46.88% at N4 (intermediate basic level), 20.31% at N3 (intermediate level), and 4.69% at N2 (advanced level). This difference in proficiency levels shows the importance of a learning tool that can provide learning for every level of Japanese language ability. The survey results also show that most of the respondents, around 85.94%, feel that learning Japanese is difficult, which is also the basis for the need for more effective learning tools. This finding is in line with existing research that recognizes the complexity of grammar teaching, especially in the context of Japanese language learning.

The learners' focus on Japanese grammar difficulties demonstrates the effectiveness of the Drill and Practice method, which is well known for its systematic approach to language acquisition. The success of this method is in line with the principles of Computer Assisted Language Learning (CALL), which encourages learners to have an engaging, interactive, and meaningful learning experience. Furthermore, it is known that all respondents (100%) have used the Chatbot application, but only 51.56% have used it for learning purposes, with 48.44% never using Chatbot as a learning medium. This indicates the opportunity for Gengobot in the field of education. This survey also shows how Chatbots should be used in Japanese language learning, specifically the need for dialog features and Japanese grammar correction functions. Therefore, Gengobot can be built with functionality that suits the specific needs of learners.

Analysis of this survey data, combined with CALL theory inspired the design and development stage of Gengobot. The goal is to create a Chatbot that can address identified learner difficulties and use effective language learning strategies to improve mastery of Japanese grammar. The high percentage of students who face difficulties in learning Japanese and the low use of Chatbots as a learning medium makes Gengobot potentially an effective Japanese grammar learning medium.

3.2. Design stage

3.2.1. Gengobot chatbot application design

In the design stage of Gengobot, utilizing the results of the Japanese learner survey in the analysis stage, each feature developed was integrated to create a comprehensive and easy-to-use Japanese grammar dictionary application. Gengobot is designed as an interactive Japanese learning Chatbot equipped with a grammar search feature. This feature allows students to search Japanese grammar easily using keywords in Japanese or their equivalent in Indonesian, so it can be used by students of different proficiency levels. To overcome difficulties in mastering Japanese grammar, the app is equipped with an interactive grammar practice feature.

This feature is aligned with the Drill and Practice method, which is supported by CALL principles to strengthen grammar comprehension. In addition, Gengobot's design includes various additional features such as skill vocabulary search, kana letter learning, and basic Japanese greetings (*aisatsu*). Furthermore, a significant development in Gengobot is the integration of the Grammar Correction feature powered by Chat GPT AI. This feature not only corrects grammar errors in real time but also provides contextual explanations, helping learners understand complex grammar rules more effectively. Gengobot's application is designed by prioritizing intuitive navigation and clear presentation of information, ensuring accessibility and ease of use by learners. The application design is shown in the flowchart diagram in Fig. 2. In the diagram, all features are integrated so that they can be used easily by users.

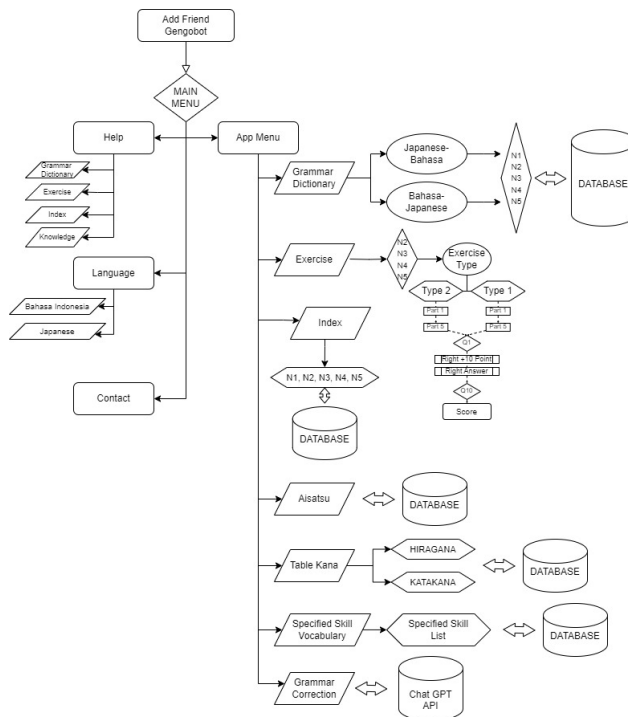


Fig. 2. Gengobot application flowchart.

3.3. Development

3.3.1. LINE messaging API integration

Gengobot was developed by utilizing the capabilities of the LINE Messaging API. LINE itself is a short message application that is widely used by students. LINE's Messaging API has flexibility that makes it an ideal platform for integrating Chatbot applications such as Gengobot. The working system of the Chatbot or Messaging API is to connect the Chatbot server created with the LINE platform, when a user sends a message to the Chatbot LINE will send it to the application server to respond to the user. This is what makes the LINE Messaging API able to provide developer access with LINE users to carry out two-way communication with the help of Artificial Intelligence. Figure 3 is an overview of the LINE Messaging API system.

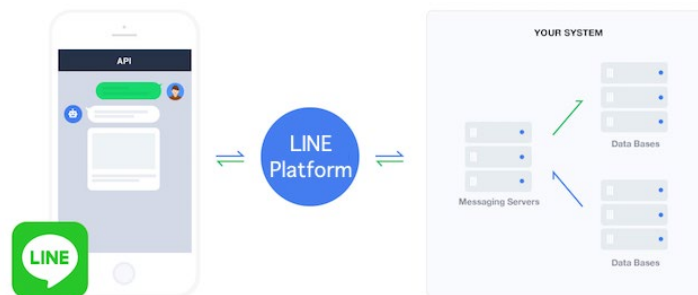


Fig. 3. LINE messaging API system illustration.

In Fig. 3, we can see the interaction between the LINE Messaging API and the system we develop (Chatbot), by displaying the communication flow between the mobile device and the LINE application, Chatbot, and systems (databases and others) that use the LINE API. In the LINE application, users communicate by sending and receiving messages. The LINE Messaging API acts as a mediator that facilitates the exchange of information between the Chatbot, the LINE app, and the created systems such as commands, databases, and others. Meanwhile, the LINE platform itself acts as the main centre, responsible for processing API requests as well as handling and sending messages. In operation, when a LINE user sends a message, the message is channelled through the LINE platform, which then communicates with the system servers through the API. These servers process the requested message by searching from the database already available in the system and can then generate a response. This response is sent back through the LINE Platform and delivered to the user through the LINE application.

The system from the LINE Messaging API is what is commonly called the LINE Chatbot. This LINE Messaging API will later be connected to the Gengobot application that has been created using a webhook. Webhook is a communication method between the API and the developed application [Wang]. The webhook can provide zero latency and handle multiple requests simultaneously during communication within the LINE Chatbot. The process of integrating Gengobot with the LINE Messaging API is shown in Fig. 4. The webhook URL is where the system is stored. In conclusion, connecting the webhook enables LINE to access the system.

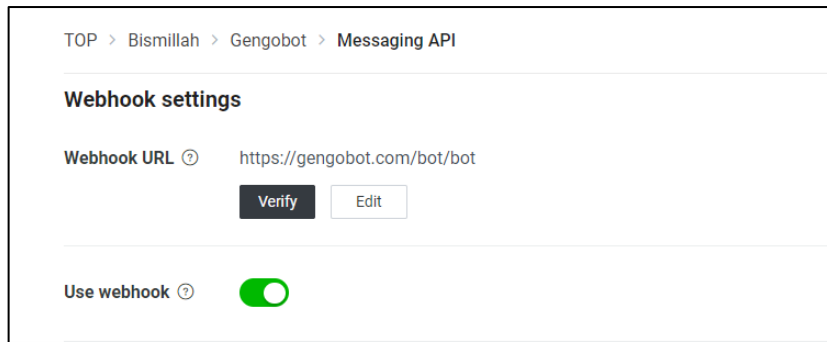


Fig. 4. LINE messaging API webhook integration.

3.3.2. Gengobot programming framework

Gengobot was developed using the PHP programming language, utilizing the CodeIgniter (CI) framework. CodeIgniter is an open-source web application framework developed to facilitate rapid PHP application development. It aims to enable developers to create applications more efficiently by providing commonly needed features and documentation, without having to write code from scratch [54]. CodeIgniter is based on the MVC (Model, View, Controller) development approach which organizes the application logic into three interconnected components, as shown in Fig. 5.

The MVC concept separates the development of the main components that build an application, such as data configuration (Model), Interface (View), and processing algorithms (Controllers) [55]. Model layers have the function of managing application data. It handles data retrieval and storage, interacting with databases and other third-party services to fulfil the application's data needs. The view layer consists of user interface elements such as HTML, CSS, and JavaScript files. This layer can be a web page, page fragment, or RSS page. Controllers connect views, models, and any resources needed to process and respond to user requests. The controller is the entry point that provides the required view layer and model layer.

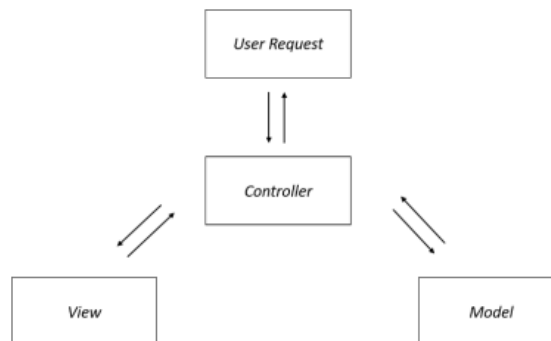


Fig. 5. Architectural model view controller (MVC).

The integration of the Model-View-Controller (MVC) model into the development of Gengobot has an important role in the development of the

application in a way that divides the development focus into three layers. The Model layer in Gengobot development is needed to organize the application's data structure. This layer directly manages the data flow and logic of the application. In Gengobot Chatbot, the code in the Model layer interacts with the database to retrieve, store, and manipulate Japanese grammar data, user data, training content, and more. For example, when Gengobot needs to retrieve a list of grammar rules, the request is passed to the Model, which queries the database and retrieves the relevant data to send to the user. This Model layer ensures that data management and application logic are centralized, making the application easier to manage and update (see Fig. 6).

```
function getdata_frombunpou4($keyword){
    $sql="SELECT * FROM `bunpoudb` where `level` = 'n4' AND `bunpou` LIKE '%$keyword%'";
    return $this->db->query($sql);
}
function getdata_frompadanan4($keyword){
    $sql="SELECT * FROM `bunpoudb` where `level` = 'n4' AND `padanan` LIKE '%$keyword%'";
    return $this->db->query($sql);
}
```

Fig. 6. Model layer code example.

The code in Fig. 6 is an example of logic in the Model layer that interacts with the database to retrieve data according to commands from the Controller layer. The code in this example queries the database to find grammars that match the keywords received. After that, the Controller will send the data as requested and will be sent to the user. As for the use of the View layer, which has a function to display the user interface in MVC-based applications, the role of the View layer in Gengobot has an unusual role. Since the Chatbot function is accessed through the LINE platform, the View layer function is structured messages and content delivered within the chat interface. However, this does not involve the usual View layer functions that go through HTML, CSS, or JavaScript. Instead, the Chatbot response is formatted according to the specifications of the LINE platform.

In Gengobot, the Controller Layer functions as an intermediary between the Model and the LINE Platform to handle user input and interaction. It processes all requests from users, such as searching for grammar explanations, starting a new practice session, or learning kana letters including requests for learning materials that may require visual presentation such as kana images, illustrations, or interactive menus. Based on these requests, the controller layer writes code to retrieve data through the Model layer and then sends responses according to the database. The controller is essential for interpreting user messages sent through the LINE Messaging API. The controller decides what response should be sent according to the programmed commands. An example of code in the controller layer is shown in Fig. 7. The code is written to perform a database query or retrieve data from the database when the user sends a message. After that, it will check whether the message received exists or not in the database and send a formatted message reply according to the data retrieved from the database. Most of the logic code is written in the controller layer, as all the command logic is in this layer such as menu separation, image retrieval, grammar search commands, practice feature programming, and more.

```

else{
$loadDb=$this->Db->getdata_frompadanan4($upPesan);//Database Query trough Model
$check=$loadDb->num_rows();//Checking number of data
if($check>0){
$get=$this->Db->getdata_frompadanan4($upPesan)->row();//Get the data when founded
$message=[]; //Formatted message according to the data requested
$msg1=$send->text("Tata Bahasa : \r\n".$get->bunpou); //Grammar
$msg2=$send->text("Struktur : \r\n".$get->rumus); //Structure
$msg3=$send->text("Contoh : \r\n".$get->contoh); //Example
$msg4=$send->text("Arti Contoh : \r\n".$get->articontoh); //Example translation
$msg5=$send->text("Keterangan : \r\n".$get->keterangan); //Additional explanation
array_push($message,$msg1,$msg2,$msg3,$msg4,$msg5);
$output=$send->reply($replyToken,$message); //Send the reply
}
}

```

Fig. 7. Controller layer code example.

3.3.3. Gengobot user interface and user experience

Gengobot UI (User Interface) and UX (User Experience) design is the process of creating user-friendly visual elements on the LINE messaging platform. This process is crucial to ensure that users get the expected experience visually as well as the ease of using the Chatbot. The UI was designed by Adobe Illustrator. Using Adobe Illustrator various illustrations such as kana characters, menu graphics, and other Illustrations for UI purposes are created. These illustrations are essential for visual learning, as they help users improve their memory of the material and make the learning process more interesting. The illustrations created are character sets, which help in teaching the kana letter writing system, icons that visually represent the various menu options and features of Gengobot, and Menu items for navigating users. This process is shown in Fig. 8.

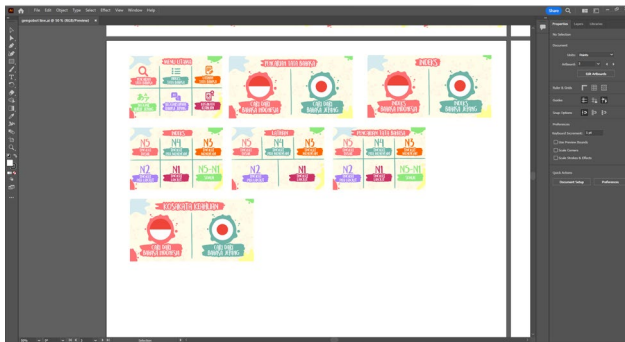


Fig. 8. Designing process in adobe illustrator.

Once the visual elements are designed, LINE BOT Designer simulates the use of the Chatbot and builds a user-centred conversation flow as shown in Fig. 9. The application ensures that it is not just about how the Chatbot looks, but also how users use it. The UX design process includes setting up the Chatbot menu interface and Chatbot message flow to be continuous, logical, and proportional to the needs. By using LINE Bot Designer developer can ensure that every user interaction is purposeful and contributes to a good learning experience before translating it to the

code logic. After the UI and UX design process has been completed and translated through the programming process Gengobot can be used. An example of the User Interface of the Gengobot application is shown in Fig. 10.

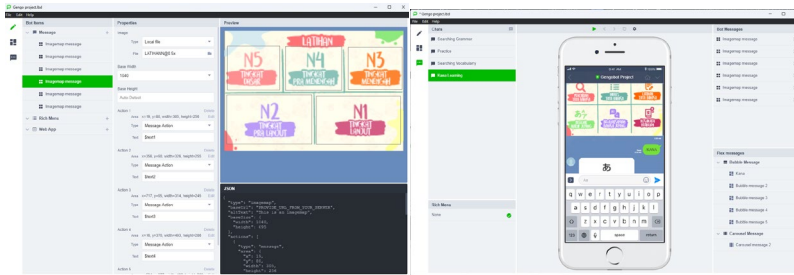


Fig. 9. Design process in LINE bot designer.



Fig. 10. Gengobot Chatbot interface.

3.3.4. Gengobot artificial intelligence integration

One of the latest features of Gengobot is the grammar correction feature. This feature is the result of Gengobot's integration with the Chat GPT API. The grammar correction feature has its process different from other features. When a user sends a sentence in Japanese with the command “*koreksi kalimat berikut* (Japanese sentence)”, Gengobot will process the sentence, and then Chat GPT API analyses the sentence structure, vocabulary, and syntax to identify the sent grammar for errors and corrections. Chat GPT API will analyse this sentence using the API algorithm. The system is trained by analysing a corpus of Japanese texts available on the internet so that the system can recognize various grammar patterns and common Japanese usage errors. Once the analysis is complete, Gengobot uses the GPT API Chat to provide corrections and explanations of the sentences and sends them to users. This feature not only helps correct grammatical errors but also provides learners to the user how to use the related grammar.

The integration process begins with obtaining the API key, to authenticate the AI used and maintain the security of Gengobot itself. After that, the programming code required for the Chat GPT API integration is written. In the code, we translate the AI response into feedback that can be understood by the user. For the model itself, Gengobot uses the GPT-4 Chat model, which is the most advanced version

of the current GPT chat. AI from the GPT 4 model was chosen because its AI response is more natural and contextual, although its response is slightly slower than previous models. In the AI integration process, AI tuning is important as it governs how the AI responds to the requests received. Tuning is done by writing prompts and testing them until you get the desired response, including how the AI message format will respond later. AI Tuning code is shown in Fig. 11.

```

141 if ($isGrammarCorrectionRequested) {
142     // Prompt Tuning for grammar correction and translation into Bahasa Indonesia
143     $openAIInput[] = ['role' => 'system', 'content' => 'The following conversation is in Bahasa
        Indonesia and Japanese'];
144     $openAIInput[] = ['role' => 'user', 'content' => "Tolong perbaiki kalimat berikut. Tandai
        bagian kalimat yang diperbaiki dengan tanda (). Berikan penjelasan kenapa kalimat tersebut
        harus diperbaiki. usahakan format perbaikannya sebagai berikut Perbaikan: Arti dalam bahasa
        Indonesia: Penjelasan: dalam penjelasan tidak perlu arti bahasa Indonesia gunakan langsung
        kalimat bahasa Jepangnya.: $messageText"];
145

```

Fig. 11. Chat GPT AI tuning code.

3.4. Discussion

The development of the Gengobot app integrated with AI is significant in language learning technology [55, 56]. By harnessing the power of artificial intelligence, our application aims to provide a personalized and interactive learning experience for individuals who wish to learn Japanese. Unlike in the past, Gengobot now utilizes natural language processing (NLP) to simulate conversations with real people, allowing learners to practice and improve their language skills, especially grammar, in real time [57]. The purpose of Gengobot is to make Japanese language learning more accessible, engaging, and effective for learners, especially those who want to improve their grammar skills [58].

Gengobot is designed to adapt to each user's pace and way of learning, by providing feedback when doing exercises or correcting grammar [59]. Through interactive dialogs and practical exercises, Gengobot also aims to improve language comprehension, vocabulary, and conversation. Moreover, being accessible using only a smartphone, Gengobot ensures that learners can practice anytime, anywhere. This removes the limitations of traditional classroom learning. Gengobot is also expected to revolutionize self-learning methods. With an interactive conversation feature that can be accessed anytime, learners can overcome the fear of making mistakes and continue to try using known grammar, and vocabulary [60]. This continuous interaction is expected to boost confidence, motivate them to keep practicing, and ultimately produce more meaningful learning outcomes [61, 62].

It is undeniable that there are many challenges and difficulties in the development of Gengobot, which is integrated with Artificial Intelligence technology. A significant difficulty is integrating Chatbot with AI in a way that maintains the "human" in the Chatbot interaction. Many Chatbot applications have response systems that are too robotic and unnatural. This can discourage learners from continuing to use the Chatbot. Another goal of Gengobot's development is to create a Chatbot that not only understands and responds appropriately to user input but also ensures that interactions with Gengobot feel like human conversations. Although the development of Gengobot presents many technical and pedagogical challenges, the developers will continue to be committed to improving the application through continuous feedback and technological advancements.

A further development of Chatbot with AI in many different language avenues is a significantly important issue. For example, there are areas such as language and assessment [63], language and entrepreneurship field [64], Japanese language and interlanguage pragmatics [65], language and metacognitive practice [66], and language and interest with the assistance of AI [67]. The application of Chatbots with AI in many areas of language development may assist the learners in mastery of language and may further develop language competence. This paper also adds new information in the education, as reported elsewhere [68, 69].

4. Conclusion

From this development, Gengobot is expected to make a significant contribution in the field of language learning technology by showing that Gengobot as a medium of Japanese language education can be integrated with AI and NLP. Through the development of the ADDIE model, this development not only conceptualizes and implements a learning tool that prioritizes user experience, but also makes it easier for developers to map the development of Gengobot so that it can be more useful in Japanese language education. Future research is expected to focus on analysing the effectiveness of using Gengobot in independent learning.

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