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Combining Chatbot and Social Media: Enhancing Personal Learning Environment (PLE) in Language Learning

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ABSTRACTS

Transformation of the global learning landscape in twenty-first century is shaped by the uptake of digital technology and social network applications, along with students' alteration of characteristics, needs, and demands. As an attempt to integrate digital technology and social network application, this study aimed to develop a chatbot-based application integrated with social media LINE to enhance language learning, specifically for learning Japanese grammar. The application, namely Gengobot, is a chatbot-based grammar application, consisting of Japanese Language Proficiency Test Level 5 and Level 4 (N5 and N4) grammar materials in three language: Indonesian, English, and Japanese. This study applied design-based research method with Waterfall application development procedure, and a questionnaire to gather feedbacks from fifty-three students regarding Gengobot features and contents. Gengobot application was successfully developed using code igniter framework, MySQL database, and webhook to integrate Gengobot application with LINE messaging API. Application testing confirmed that Gengobot is successfully developed and operated properly. The students agreed that Gengobot materials and features considered to be adequate, useful, user friendly, and suitable to support language learning. Gengobot is also highly accessible since it is integrated to social media LINE, allowing students to adjust its use to their own learning preference and needs, which is suitable to enhance students' personal learning environment.

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I. INTRODUCTION

Industrial revolution 4.0 urged education field to be able to keep up with the technology developments (Harkins, 2008; Puncreobutr, 2016), which required lecturers and educational practitioners to incorporate modern technology in their teaching (Hussin, 2018). Modern technology (including smart phone technology, artificial intelligence (AI), and technology of social media platforms) provides both challenges and opportunities for educational practitioners to utilize these technologies in developing advance learning media (Haristiani & Danuwijaya, 2019). In the latest decades, artificial intelligence utilization to develop applications is massively conducted, and its products is used in almost every aspects of people life (Thurlow et al., 2004). One form of technology that uses artificial intelligence is chatbot or chatterbot (also called as *talkbot*, *chatterbot*, *Bot*, *IM bot*, *interactive agent*, or *artificial conversational entity*). Chatbot is a computer program or artificial intelligence that facilitates interactions through audio or text (Shevat, 2017), and converses with users in a particular domain or topic by giving intelligent responses in natural language (Abdul-Kader & Woods, 2015; Azwary et al., 2016). C*hatbot* interacts with users by providing responses in the form of comments, answers, completing sentences, goal-oriented dialog, chit-chat dialogue, visual dialogue, or starting new topics (Goyal et al., 2018; Huang et al., 2007). Moreover, more sophisticated chatbot like *Lingubot* and Lucy is available as 3D character, able to conduct conversation with users in reading or writing to external systems, or the combination of these (Kerlyl, 2006; Wang and Petrina, 2013).

Being free and online, chatbots could provide opportunities for learners from all parts of the globe to actively use it in their learning (Fryer & Carpenter, 2006), as their presence on the internet continues to grow faster than ever (Dale, 2016). Chatbot-based application have been developed to support learning and teaching in various fields, such as in psychology learning and teaching (Heller et al., 2005), science and technology (Hobert, 2019; Danforth et al., 2009; Bii, 2013), language (Jia, 2004, 2009; Fryer et al., 2006, 2017, 2019; Wang & Petrina, 2013; Krassmann et al., 2018; Palasundram et al., 2019; Haristiani, 2019), as well as the utilization of chatbot in social media (Smutny, P., & Schreiberova, 2020; Haristiani, 2019). A chatbot named Freudbot was developed to enhance student-content interaction in distance education for psychology students (Heller et al., 2005), while Cleverbot and CSIEC (Computer Simulation in Educational Communication) are developed and utilized to support language learning and teaching (Fryer and Carpenter, 2006; Fryer et al., 2017; Fryer et al., 2019; Goda et al., 2014; Jia, 2009). Chatbot is also used and compared to humanoid robot in assisting science lecture class, proven that the visualization using chatbot helped students to understand the lecture effectively (Matsuura & Ishimura, 2017). In language learning and teaching, chatbot has been developed in the form of web-based chatbot system to support foreign language teaching as English and Germany (Jia, 2004). Chatbot is utilized as a partner in English courses for students (Fryer & Carpenter, 2006). It is also used as a chatbot-based computer assisted English learning to improve textual knowledge and reasoning (Jia, 2009), a pre-discussion tool that used before online EFL discussion to improve critical thinking (Goda, 2014), and compared with human task partners in English learning (Fryer et al., 2017). Chatbot is effective to support distance education (Heller et al., 2005; Song et al., 2017).

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Chatbot also successfully provides opportunities for students to improve their skills with instant, content-related, and quality interactions between learners and chatbot (Danforth et al., 2009; Song et al., 2017). This system improved students' confidence and motivation when interacting with chatbot than when interacting with human tutors (Jia, 2004, 2009; Fryer & Carpenter, 2006; Hobert, 2019).

On the other hand, the rise of Web 2.0 tools made social media very popular all over the world, and many people are spending hours using social media, made it became a major part of our lives (Eren, 2012; O'Reilly, 2007). Social media create a dynamic, complex information infrastructure that enables easier, faster, and more widespread information sharing (Hemsley & Mason, 2013), which caused researchers all over the world to examine the possibility to emphasize social media utilization in teaching and learning (Tilfarlioglu, 2011). Among social media services, Mobile Instant Messaging (MIM) is popularly chosen to be the primary means of communication method on smartphones (Quan-Haase & Young, 2010; Schwarz, 2011; Tang & Hew, 2017), and studies into the use of MIM for language learning have found positive results (Rosell-Aguilar, 2018). Moreover, learning in the context of social media reported to be a highly self-motivated, autonomous, and informal, as well as an integral part of formal learning (McLoughlin & Lee, 2010; Smith et al, 2003; Solomon & Schrum, 2007). Social media also claimed to have an enormous role for a high quality education corresponding to the social settings of learning and fostering critical thinking in students (Mason, 2006). It also suggested to have potential to enhance students' way of learning from an inactive participation in classroom learning, to a superior teaching (Ziegler, 2007). Social media also enables students to not only seek information regarding their learning, but also to strategically use it to share information (Dabbagh & Kitsantas, 2012), proven as a media platforms that offers unlimited communicative opportunities in the virtual world, and effectively used as supplement for language learning (Fewell, 2014). Social media is also reported successfully to facilitate the creation of Personal Learning Environments (PLE) that helps learners aggregating and sharing resources, learning achievements, participating in collective knowledge generation, and managing their own meaning making (Dabbagh & Reo, 2011).

A PLE is a new construct in the e-learning literature that is premised on social media and steadily gaining ground in the e-learning field as an effective platform for student learning (Dabbagh & Kitsantas, 2012). Researches on social media to improve students' PLE included using blogging platforms to the develop students' e-portfolios as an assessment tool (Rosen & Nelson, 2008), Twitter to stimulate student engagement in the classroom (Rankin, 2009), and wiki software to engage students in collaborative projects (Hazari et al., 2019). These researches found out that PLEs proficiently empower students to take charge of their own learning, prompting them to select tools and resources to create, organize and package learning content to learn effectively and efficiently (Rosen & Nelson, 2008; Rankin, 2009; Hazari et al., 2009; McLoughlin & Lee, 2010). PLE also suggested to be inherently self-directed placing the responsibility for organizing learning on the individual (Rubin, 2010). The 2010 ECAR study showed that students are integrating social media in their academic experience both formally and informally (Educause Learning Initiative, 2007; McLoughlin & Lee, 2010), and there is more growing evidences that social media is increasingly supporting students' PLE (Selwyn, 2007).

Despite many studies reported that social media and chatbot contributed significantly

in learning and teaching, as well as in students' personal learning environment, the development on application (combining both technologies) is still difficult to find (Haristiani & Danuwijaya, 2019). Hence, this study aimed to develop an application that combine both chatbot and social media technologies, and develop a chatbot-based application, namely Gengobot. Gengobot is a chat robot (chatbot)-based application which developed to support language learning, specifically Japanese grammar learning. While learning Japanese grammar is very difficult (Hidayat et al., 2016; Destiari, 2017; Oktaviany et al., 2020), the existence of Gengobot can increase level of students' understanding. The initial version of Gengobot has been developed and successfully operated (Haristiani & Danuwijaya, 2019). However, several developments were still necessary, and have been added to recent version of Gengobot application. The improvements were including refinement of application design, functions, and additional features. Gengobot application is integrated to one of the most popular social media worldwide, namely LINE. LINE is a Mobile Instant Messaging (MIM) service used by 90 Million active users in Indonesia, with user age range from 18 to 25 years old, which can be estimated that LINE users are mainly highschool and college students (Tehusijarana, 2018). Hence, LINE was selected as platform for Gengobot application in this study, since its utilization as a learning medium considered to be adequate, and expected to be potential to support students' personal learning environment (Widiaty et al., 2020).

2. METHODS AND MATERIALS

This study applied design-based research method with waterfall application development procedure consisting requirements analysis, system design, coding, testing, and operations (Royce, 1970; Balaji & Murugaiyan, 2012; Chari & Agrawal, 2018). Requirements analysis was conducted by analyzing the hardware and software required for application development, while the detailed explanation of system design, coding, testing, and operations of Gengobot application as reported further in Results and Discussion section.

Other than application development, this study also employed a questionnaire to examine and evaluate the developed Gengobot application. The questionnaire involves 24 items in a five-point Likert type from 1 (Strongly Disagree/SD) to 5 (Strongly Agree/SA), and aims to measure students' feedback regarding three aspects: 1) *Gengobot* application and features (5 questions), 2) Gengobot material contents (6 questions), and 3) *Gengobot* application and its' effect on students' learning environment (13 questions). The questionnaire was administered to 53 beginner level Japanese language learners in one of the public universities located in Bandung, West Java, Indonesia. The data obtained from the questionnaires were then analyzed descriptively using simple descriptive statistics (frequencies and mean scores), and tabulated to identify students' evaluation and feedbacks towards Gengobot application.

Materials for Gengobot application development including software and hardware. Software for Gengobot development was MySQL database management system, web hosting with 5 GB capacity of storage, and domain including SSL certificate for application web-hook, LINE social media as a *chatbot* platform, and Adobe Illustrator CC for application designing purposes. The hardware was in the form of PC units, laptops, and smartphone with special specifications.

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3. RESULTS AND DISCUSSION

3.1. Application development

Gengobot has 5 main components, namely the LINE messenger application programming interface (API), user interface, database, webhook, and application server. Gengobot development employed code igniter framework. Code igniter is a PHP-based application development framework used for application development to be more systematic and dynamic (Lancor & Katha, 2013; Pandey, 2016). By using this framework, developers do not need to write the coding from scratch, because code igniter has provided the libraries needed for PHP-based application development (Hustinawati et al., 2014).

This study applied code igniter, considering that it has several advantages such as its opensource framework which is free to use and modify. The size of code igniter is more compact compared to other frameworks. Code igniter also uses the Model-View-Controller (MVC) concept which facilitates the program to call the required database (Blanco & Upton, 2009; Fayyaz & Munir, 2014). The process of how the code igniter works in Gengobot application is shown in **Figure 1**. The model in **Figure 1** serves as a central application database setting. The controller functions to handle requests from the application, and pass them to the model to get the required database and then pass them back to the application. MVC mode allows the programmer to manually configure routes and redirect requests to the appropriate controller and method (Prokofyeva & Boltunova, 2016). The MVC concept in this framework support the program writings of Gengobot application to be more structured and systematic (Jacyntho et al., 2002).

3.1.1. LINE messaging API

API provides a set of functions for application developers to build software programs that automatically detect, download, and install desired software updates (Chow et al., 2011). API also enabled programmers to understand how a software works to be developed or integrated with other software. Meanwhile, LINE messaging API also provides programmers with an access to import applications to LINE short message application. When a LINE user writes a message/command on LINE messaging service, the message will be sent via API to the application server. Then, the application server processes the message and respond to the message based on the program created. The flow of LINE messaging API and its structure is as shown in **Figure 2**.

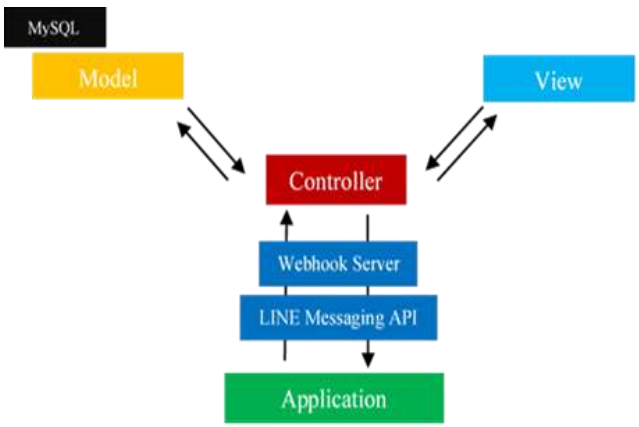

Figure 1. Structural work of Chatbot using code igniter (CI)

3.1.2. Gengobot user interface

Gengobot user interface has 4 main menus, namely, Grammar Dictionary menu, Exercise menu, Index menu, and Knowledge menu. Gengobot user interface coding process conducted using sublime 3.0 text editor application **Figure 4,** while the display design of the user interface is made using Adobe Illustrator CS6 (see **Figure 5).**

3.1.3. Gengobot Database

The database system used for Gengobot is MySQL. MySQL is a licensed relational database system, which is faster, more reliable, flexible, and better-than any other database system (Kofler, 2001). The database created for Gengobot application including: (1) User database, including name, language being used, training score, etc.; (2) Grammar database, consists of JLPT N5 and N4 grammar materials; (3) Exercise database, including questions and answers database. The database input processes conducted through several stages, including inputting the database into Excel, saving the database input results in CSV form, and imported the data into the MySQL database system.

Grammar database as the main database in Gengobot application consists of grammar materials based on internationally recognized Japanese Language Proficiency Test (JLPT/*Nihongo Nouryoku Shiken*) beginner levels, which are level 5 (N5) and level 4 (N4).

The database consists of grammar categories such as Tenses, Objectives, Adversative conjunctions, Conditions, and Comparisons, while the grammar pattern entries including 280 patterns for both levels in total.

The grammar database in this application consists of Japanese grammar, meaning in Indonesian and English, examples and their meanings, and explanations see **Figure 6**. Grammar database sources in Gengobot taken from several sources.

3.1.4. Webhook and Application Server

The final component of the development of the Gengobot application is the webhook and application server. Webhooks is an HTTP callback for applications to provide commands and information to other applications (Goyal et al., 2018; Ristemi et al., 2019). In Gengobot, webhook functioned to connect LINE messaging API and Gengobot application as seen in **Figure 7,** while webhook activation process for Gengobot can be seen in **Figure 8**. After LINE messaging API and Gengobot were integrated, *intents* or commands were input into a dialog flow, so when a user sends a message/command to Gengobot application, it will answer to the user automatically.

Figure 2. The structure of LINE messaging API

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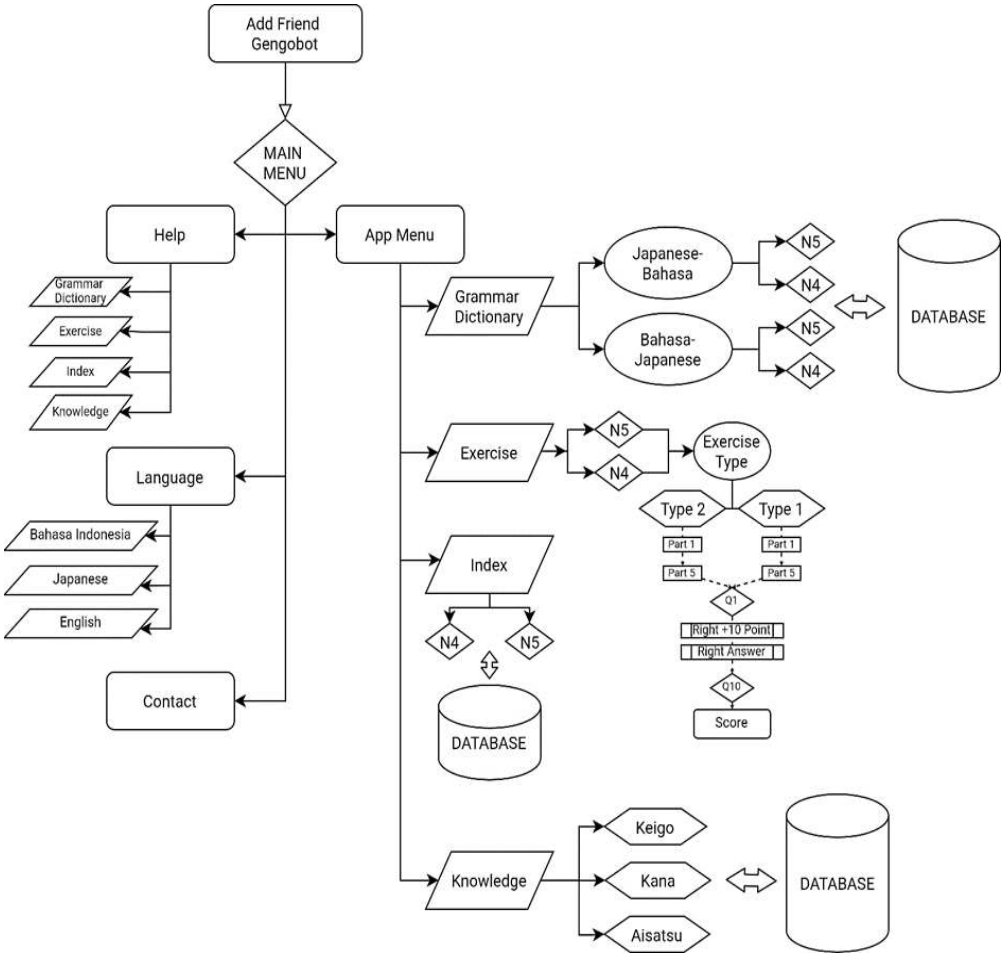

Figure 3. User interface of Gengobot application

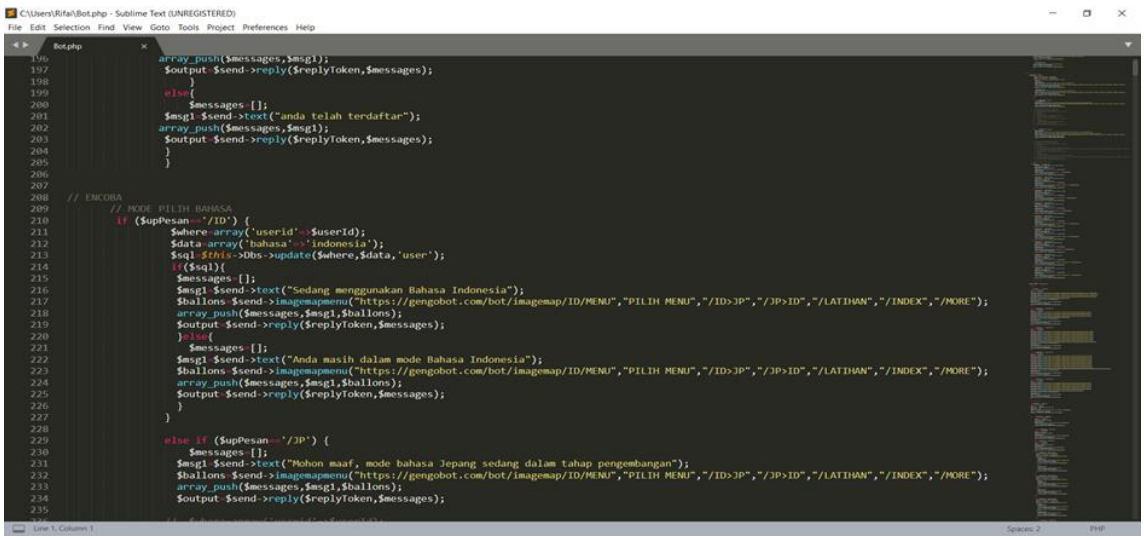

Figure 4. Gengobot interface coding process

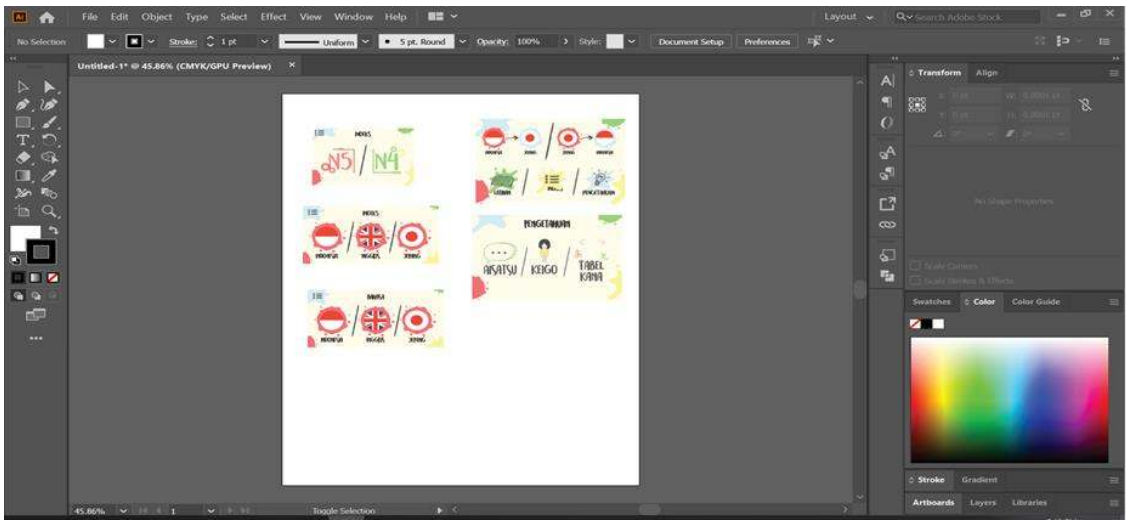

Figure 5. Gengobot interface design process

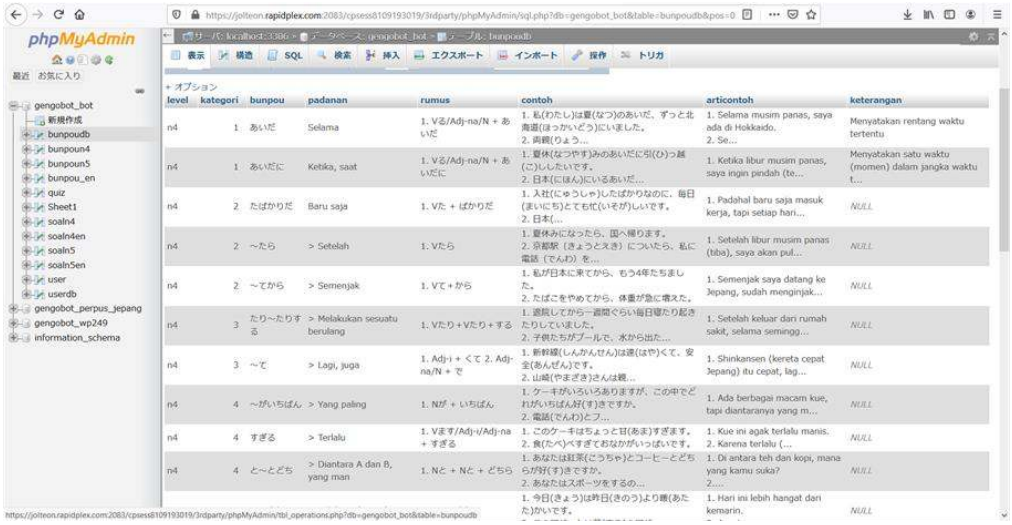

Figure 6. Gengobot database

Figure 7. Webhook application for Gengobot

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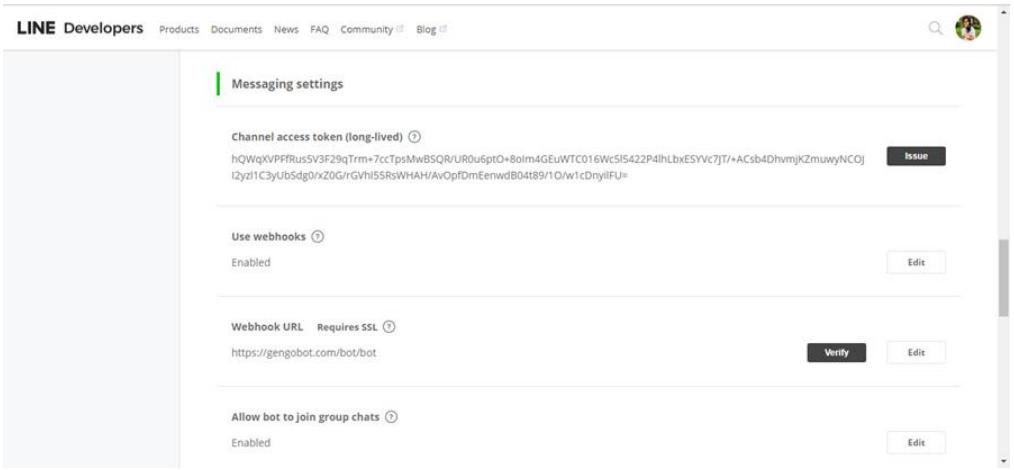

Figure 8. Webhook activation for Gengobot

3.2. Gengobot as language learning medium

3.2.1. Gengobot navigation pages and contents

Gengobot main navigation page includes four main menus, namely *Menu* (Menu), *Bantuan* (Help), *Bahasa* (Language), and *Kontak* (Contact) see **Figure 7**. Under 'Menu', there are three sub-menus including *Latihan* (Exercise), *Indeks* (Index), and *Pengetahuan* (Knowledge) as shown in **Figure 9**. Under 'Help' menu, user can find step-by-step instructions on how to use *Gengobot* and available features. While in 'Language' menu, users are able to access contents in three languages, which are Indonesian, English, and Japanese, and choose one preferable language. When a user chooses English as language preference, 'English→Japanese' and 'Japanese→English' translations will appear. And when a user chooses 'Indonesian' as language preference, the translation options appear are 'Indonesia→Jepang' and 'Jepang→Indonesia', while choosing 'Japanese' as language preference will show Indonesian and English translations automatically. Lastly in 'Contact' menu, user can find several guidance how to use the application and features available. 'Contact' also contains developer's website address, Instagram account, and email address.

Furthermore, under 'Exercise' sub-menu, users will be directed to two options of exercise levels, namely N5 and N4. There are two types of exercise in each level, and each type of exercise contains 5 sessions. Each question in 'Exercise' sub-menu is provided with four options of answers, while one exercise session consists of ten questions. After users complete one session of exercise, the result will be shown as score ranging from 0 to 100 as seen in Figure 10. Under 'Index' sub-menu, users can find the list of all grammars that consists in *Gengobot* database. While under the 'Knowledge' sub-menu, users will be provided with general knowledge about Japanese language consisting *Aisatsu* (greetings), list of *Keigo* (Japanese honorific style), and list of Japanese *Katakana* and *Hiragana* characters.

Figure 9. Gengobot user interface display

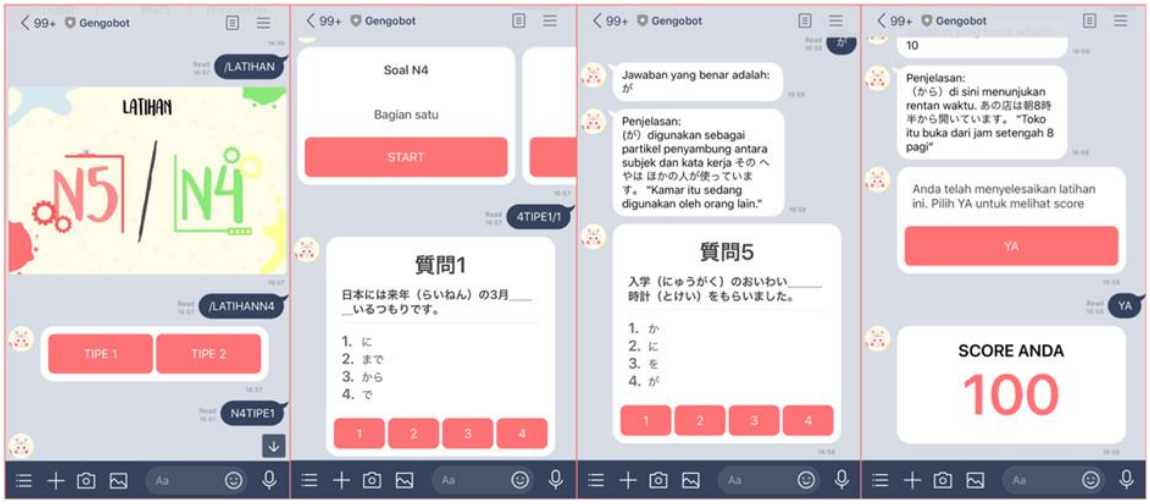

Figure 10. Gengobot 'Latihan' (Exercise) display and contents

3.2.2. Gengobot Testing

The initial version of Gengobot application was developed and successfully implemented (Haristiani & Danuwijaya, 2019). However, based on the feedbacks, more improvement of the features and functions was necessary. Hence, further developments were conducted in current version of Gengobot application. The improvement of the current version of Gengobot application including refinement on application design, additional features such as types of exercise, adding leaderboard on Exercise feature, improvement on grammar materials contained in application database, additional features in the Help menu, etc. After the improved version of Gengobot application was completed, several tests were performed to check whether each feature is running as expected.

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The tests also conducted to give reference for further improvement and development of each features and functions. Based on the test results, eight main components of Gengobot application were successfully functioned as expected, and ready to be implemented as seen in **Table 1.**

3.2.3. Gengobot and Students' Personal Learning Environtment

Gengobot is a chatbot-based application which integrated to LINE social media platform to provide a language learning medium that is highly accessible, user friendly, and compelling. The testing process of Gengobot application was conducted and showed sucessful results as reported in previous sub-section. However, this study also aims to find out students' feedback and evaluation of Gengobot application, which surveyed through a questionnaire. The feedbacks are regarding three aspects, namely 1) Gengobot applications and features, 2) Database material contents, and 3) Gengobot application and its' effect on students' learning environtment. The questionnaire used Likert scale ranged from 1 (Strongly Disagree/SD) to 5 (Strongly Agree/SA).

The questionnaire results of students' feedback and evaluation for Gengobot application and features is shown in **Table 2**.

Tabel 1. Gengobot application testing

Components	Expected results	Test results	Ratification
Add account	After user add *Gengobot* account, a greeting message and main navigation page appear.	confirmed	✓
Language Menu	Linked to language options, which are Indonesian, English and Japanese.	confirmed	✓
Help Menu	Linked to four steps help options, including 'language options', 'grammar search feature', 'exercise feature', and 'index feature'.	confirmed	✓
Menu	Connected to translation options display, 'Exercises', 'Index', and 'Knowledge' sub-menus.	confirmed	✓
Translation Menu (IN⇔JP, EN⇔JP, JP→IN/EN)	Connected to the choices of contents, which are 'All', 'N5', and 'N4'. The options directed users to chat interface with a space for user to type a grammar and its translation in chosen language.	confirmed	✓
Index	Linked to three language options (Indonesian, English, and Japanese. Language options directed users to level options (N5/N4), which direct users to all grammar contents consisted in database according to the level chosen.	confirmed	✓
Exercises	Linked to level options (N5/N4). Level option directed users to two types of exercise available. Each type of exercise directed users to five sessions of exercise, which each session containing ten questions.	confirmed	✓
Knowledge	Linked to *Aisatsu* (greetings), *Keigo* (Japanese honorific style) and list of *Katakana* and *Hiragana* letters.	confirmed	✓
	Conclusion	**Confirmed**	**Legitimate**

Tabel 2. Students' feedback and evaluation on *Gengobot* application and features

No	Statements	SA	A	N	D	SD	Mean	%
1	*Gengobot* application is user friendly and useful.	17	28	6	1	1	4.11	82
2	The design of *Gengobot* application is interesting and innovative.	31	18	3	0	1	4.47	89
3	The features in *Gengobot* application are useful.	28	22	2	0	1	4.43	89
4	*Gengobot* is a practical grammar learning medium.	21	19	10	2	1	4.08	82
5	*Gengobot* application still need to be improved.	26	16	9	0	2	4.21	84
Mean distribution number		**22**	**21**	**7.8**	**1.3**	**1.1**	**4.16**	**83**

As presented in **Table 2**, the feedback and evaluation on Gengobot application and features consists of five questions. From **Table 2**, 82% respondents agreed that Gengobot is user friendly and useful, as well as the practicality of Gengobot as grammar learning medium. While related to application design, 89% of respondents strongly agreed that Gengobot is interesting and innovative, and strongly agreed that Gengobot features were useful. However, 84% respondents agreed that Gengobot still need improvements in terms of application and its features. Eventhough the majority of respondents answered that Gengobot still needs to be developed further, the overall results regarding Gengobot application and its features indicated that Gengobot is user friendly, interesting, and features available is useful and practical for language learning (Fryer, 2006; Goda et al., 2014; Dahiya, 2017; Alman et al., 2020).

Further, the results of students' feedback and evaluation of Gengobot contents is presented in **Table 3**. As shown in **Table 3**, students' feedbacks according to the contents of Gengobot application were containing six questions, and the results showed that the respondents generally agreed that Gengobot contents is very good (84%). The results showed that 86% of respondents strongly agreed that the grammar contents in Gengobot is adequate to JLPT N4 and N5 materials, the explanations of the grammar contents are easy to understand, and that the explanation given in Exercise feature is easy to understand. Moreover, 84% respondents agreed that the Exercise materials given is adequate to JLPT N4 and N5 materials. However, only 78% respondents agreed that the grammar content is comprehensive, which corresponds to the result that 84% of respondents felt that the grammar and exercise contents still need to be developed. From these results, even though generally the contents of Gengobot database is fairly adequate and easy to understand, the contents still need to be developed further.

Lastly, students' feedback on the relation between Gengobot application and students' learning environment is summarized in **Table 4**, which consisted of thirteen questions. As presented in **Table 4**, the results showed that the respondents highly agreed that Gengobot application is suitable for self-study (90%), along with 88% respondents who agreed that Gengobot is compatible for learning grammar.

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Tabel 3. Students' feedback and evaluation on Gengobot application contents

No	Statements	SA	A	N	D	SD	Mean	%
1	The grammar contents included in *Gengobot* application are adequate to JLPT N4 and N5 level materials.	23	22	8	0	0	4.28	86
2	The grammar contents in *Gengobot* application is comprehensive according to JLPT N4 and N5 level materials.	15	22	13	3	0	3.93	78
3	The explanation of grammar contents provided in *Gengobot* application is easy to understand.	24	20	9	0	0	4.28	86
4	The explanation of answers in 'Exercise' feature is easy to understand.	23	25	4	1	0	4.32	86
5	The questions in 'Exercise' feature are adequate to JLPT N4 and N5 level materials.	20	23	10	0	0	4.19	84
6	Grammar contents and exercises still need to be improved.	23	17	10	1	2	4.09	82
	Mean distribution number	**21**	**22**	**9**	**0.8**	**0.3**	**4.18**	**84**

Tabel 4. *Gengobot* application and students' learning environment

No	Statements	SA	A	N	D	SD	Mean	%
1	*Gengobot* application is useful and practical for learning medium.	24	18	11	0	0	4.25	85
2	*Gengobot* application is suitable as a medium for learning Japanese grammar.	26	22	5	0	0	4.40	88
3	*Gengobot* application is suitable for self-study.	32	15	6	0	0	4.49	90
4	*Gengobot* application can increase motivation to learn Japanese grammar.	19	26	8	0	0	4.21	84
5	The grammar material contained in *Gengobot* application makes it easy for me to learn Japanese grammar.	23	24	6	0	0	4.32	86
6	The exercises contained in Gengobot application strengthen my understanding of Japanese grammar.	18	25	10	0	0	4.15	83
7	I compared my score with my friend.	13	9	19	9	3	3.38	68
8	I want to be first in the leaderboard.	14	9	21	5	4	3.45	69
9	I repeated exercising with *Gengobot* application if my practice results were unsatisfactory.	12	19	18	2	2	3.70	74
10	I repeated exercising with *Gengobot* application if my score defeated by a friend.	7	14	23	4	5	3.26	65
11	The exercises in *Gengobot* application are more fun than the exercises on paper questions.	12	19	18	3	1	3.72	74
12	My Japanese grammar skills improved after using *Gengobot* application.	12	20	18	2	1	3.76	75
13	I will use *Gengobot* application again to learn/practice Japanese grammar.	16	23	11	2	1	3.96	79
	Mean distribution number	**18**	**19**	**13**	**2.1**	**1.3**	**3.93**	**79**

Moreover, the majority of respondents answered that Gengobot help them learn Japanese grammar easier (86%), practical and useful as learning medium (85%), and helped them improved their motivation in learning grammar (84%). 83% repondents also agreed the exercise menu in Gengobot helped them understand the grammar materials better. Further, 74% of the respondents agreed to use Gengobot repeatedly if their exercise score is unsatisfactory, as well as the respondents that felt that Gengobot is more fun than paper exercise. While Gengobot provide leaderboard feature to show users' scores from Exercise menu, respondents showed slightly lower interest in the feature. Respondents agreed that they want to be the first in the leaderboard (69%), and compare their score with their friends (69%). Moreover, only 65% of respondents answered that they will repeat exercising if their score defeated by other friends, showing that the possibility of users' repentance in using exercise feature is probably lower than expected.

From above results, Gengobot application is generally considered suitable to support language learning (Fryer, 2006; Goda et al., 2014; Dahiya, 2017; Alman et al., 2020; Fewell, 2014; Haristiani & Danuwijaya, 2019), specifically for grammar learning. The ubiquitous aspect of Gengobot application which can be adjusted to each students' learning speed, needs, and demands also considered to be supportive for students' personal learning environment (Mc Loughlin & Lee, 2010; Dabbagh & Reo, 2011). The features provided also considered to be adequate, useful, and the grammar contents and exercise is relevant to the JLPT N4 and N5 grammar materials. The exercise feature in Gengobot also helps improve users' Japanese grammar skills (Danforth et al., 2009; Song et al., 2017), and can be used as an alternative for JLPT level N4 and N5 exercise tool. In addition, the scoring system and leaderboard feature expected to increase users' confidence and motivation (Jia 2004, 2009; Fyer & Carpenter, 2006; Hobert, 2019) to compete to get higher score, leading to users' recurrence in practicing their Japanese grammar skills using Gengobot. Furthermore, Gengobot which is a chatbot based application is very suitable because it is integrated to LINE chat application which is highly accessible (Heller et al., 2005; Song et al., 2017) and often used by users, especially students. Nevertheless, there are several aspects of Gengobot application that needs to be developed. The respondents expect additional contents of higher levels JLPT, audio feature, kanji learning feature, and improvements in the existing grammar explanations. Hence, the present chatbot-based Gengobot application is successfully developed as a practical, interesting and innovative application as a medium for learning Japanese grammar to support students' personal learning environment.

3. CONCLUSION

Gengobot is a chatbot-based application that developed with objectives as a learning tool to support Japanese language learning and to enhance students' personal learning environment. The contents and features in Gengobot application can be accessed in three languages, namely Indonesian, English, and Japanese. Gengobot is developed and equipped with several menus including grammar database index, exercise features, and information regarding Japanese basic knowledge. The results of Gengobot application showed that all the features were operated successfully. Feedbacks from the students showed that Gengobot is practical, user-friendly, innovative, and useful in supporting students' Japanese language

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learning, specifically Japanese grammar learning. Gengobot integrated to LINE social media is highly accessible, indicated to be able to improve students' motivation in learning Japanese grammar, and adequate to enhance students' personal learning environment. However, according to respondents, Gengobot needs to be developed further regarding its' contents and additional features, such as audio and kanji learning features to maximize its' function to support students' personal learning environment.

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5. AUTHORS' NOTE

The author(s) declare(s) that there is no conflict of interest regarding the publication of this article. The authors confirm that the data and the paper are free of plagiarism.

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