

L2 learners' perceptions of a chatbot as a potential independent language learning tool

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Abstract: Independent language learning is paramount for those wishing to develop proficiency in a second or foreign language. Language learners often have few opportunities to communicate and interact actively in their target language. In this two-phase study, a chatbot was developed to assist second-language learners at a tertiary education institution in Hong Kong with independent language learning. I employed a questionnaire ($N = 128$) followed by semi-structured interviews ($N = 12$) to gain holistic insight into learners' experiences with the chatbot. The results suggested that the participants enjoyed interacting with the chatbot both in and out of class and perceived that it improved their English skills. These findings have implications for language teachers and the future development of chatbots.

Keywords: chatbots; L2; EAP; tertiary education; independent language learning; language learning; dialogflow.

Reference to this paper should be made as follows: Kohnke, L. (2023) 'L2 learners' perceptions of a chatbot as a potential independent language learning tool', *Int. J. Mobile Learning and Organisation*, Vol. 17, Nos. 1/2, pp.214–226.

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This paper is a revised and expanded version of a paper entitled 'Designing a chatbot to teach English: transforming learning spaces' presented at Proceedings of the International Conference on Education and Artificial Intelligence (ICEAI), The Education University of Hong Kong (EdUHK), 9–11 November 2020.

1 Introduction

Sustaining and stimulating language acquisition is essential for second language (L2) learners in tertiary education. In Hong Kong and beyond, technology has become an integral component of language learning (Terauchi et al., 2019) and a preferred way for tertiary education students to learn (Broadbent, 2017; Weiser et al., 2018). Technologies such as interactive software applications can promote independent language learning (Lai et al., 2018). Inherently, technology affords exciting opportunities for authentic language teaching and learning anywhere and at any time. At tertiary institutions, significant emphasis is placed on independent and effective language learning to supplement the limited hours of scheduled classes. Accordingly, educators have investigated the potential of natural language processing tools and educational chatbots (Kohnke, in press). Such tools can create new and exciting avenues for interactive, independent and effective language learning (Fryer et al., 2019; Kessler, 2018). Chatbots are 'text-based, turn-based, task-fulfilling programs, embedded within existing platforms' [Jain et al., (2018), p.904]. As such, they simulate intelligent, human-like conversations; respond to questions and provide answers; and offer support and tutoring synchronously (Kerly et al., 2007; Pereira and Diaz, 2018). Since the 1970s, they have been used as pedagogical agents in educational settings (Laurillard, 2013). They can contribute to second and foreign language learning by simulating human speech patterns.

Across Asia, there are few opportunities for students to practice communicating in English, which is a second or foreign language for most Asians. The lack of effective feedback leads to pronunciation problems and poor understanding of cultural differences. Insufficient language input and output is the paramount challenge for L2 learners who want to become proficient in English. Recently, chatbots have attracted increased interest from researchers and educators for their potential as language partners (Fryer et al., 2020). Although previous studies have investigated the use of chatbots in learning a second or foreign language (Dale, 2016; Fryer et al., 2019), many questions remain about their ability to facilitate language learning. The purpose of this study was to gain insight into a chatbot that was designed as an independent language learning tool in the second/foreign language context of Hong Kong.

2 Literature review

In many L2 contexts, learners have limited opportunities to interact and communicate with native speakers of English. In the last two years, virtual reality, augmented reality, mobile apps and interactive have attracted interest for their potential to provide meaningful input and output to L2 learners (Godwin-Jones, 2016; Kohnke and Ting, 2021; Kohnke et al., 2020). While there are hundreds of technological tools available to language learners, perhaps the most difficult challenge is sustaining independent language learning outside of scheduled class time. Chatbots allow L2 learners to communicate and interact in the target language (Kessler, 2018).

Language learning occurs through interaction with classmates and teachers. Interaction provides comprehensible input, feedback on output, and the opportunity to modify output (Mackey, 2012). Chatbots act as pedagogical agents, providing conversation on demand and necessitating communicative exchange. In traditional English language teaching, instruction is teacher-centred when tutoring the four language

skills (writing, listening, speaking and reading). In contrast, chatbots use artificial intelligence techniques to provide students with dialogue-based learning (Thompson et al., 2018). They augment and personalise teaching through a natural language interface. Instant availability and the capability to reply to students and answer their queries through a communicative exchange is perhaps the primary language benefit of chatbots. Additionally, they can be leveraged to sustain engagement, learning goals and strategies by incorporating programmed responses to learners' queries (Cinglevue, 2017; Kim, 2017). Shawar (2017) argued that chatbots open up new possibilities and are uniquely suitable for language learning. Accordingly, teachers and researchers have focused on developing engaging, useful and pedagogically sound chatbots, ensuring that learners are actively expanding their language capabilities while sustaining their motivation (Smutny and Schreiberova, 2020).

In 1956, the world's first chatbot, ELIZA, was developed to facilitate communication and authentic interaction via text-based input and output using keyword-matching techniques (Weizenbaum, 1966). Since then, there has been rapid development in chatbots with text and natural language interfaces. Wallace (1990) created ALICE, one of the largest open-source chatbots, using an artificial intelligence mark-up language consisting of topics and categories. The chatbot has a set of answers for each topic that are branched into categories, and it can match the best response to the input. Another large chatbot is cleverbot. It imitates human conversations using an artificial dialogue system with over 200 set questions (Shah et al., 2016). Cleverbot uses small textual input clues to provide optimal answers. Recently, chatbots such as Andy English Bot, with which users can have everyday interactions, and Mondly, which employs flashcards to help users to memorise words and pronunciation, have become popular. Perhaps the most popular chatbot for language learning is Duolingo, which can detect user context and respond with contextually suitable answers. Today, chatbots are common on the internet (Dale, 2016). They offer a free and omnipresent source of linguistic input and output anytime and anywhere.

Previous research on technological aids to language learning has concentrated on software-based intelligent tutors or pedagogical agents (Burns and Capps, 1988; Graesser et al., 2005). Studies have found that chatbots can support learner autonomy (Shawar and Atwell, 2007), present an inquiry-oriented frame of mind (Goda et al., 2014), act as interactive interlocutors (Chang et al., 2010) and intrinsically motivate learners (Jia and Chen, 2008). Moreover, studies have found that chatbots make learning tasks more manageable (Heller et al., 2005; Huang et al., 2019) and suggested that students enjoy conversing with a chatbot more than talking to other students and teachers (Fryer et al., 2020). As engaging and stimulating tasks are important to sustain learning for L2 learners (e.g., Lightbown and Spada, 1994), the growing capability of chatbots to enhance or trigger interest in language learning is promising.

However, two main limitations have been reported in studies assessing the use of chatbots for language exercises (Coniam, 2008; Fryer and Nakao, 2009). First, the necessity of spelling each word correctly can be challenging for language learners. Second, the inability of the chatbot to stay on topic and to follow the conversation can be frustrating. While these two aspects perhaps limit their usefulness to language learners, chatbots can be intriguing for language learners to play with, and they can make L2 learners more comfortable talking in the new language (Fryer et al., 2017). This perspective is especially relevant for second/foreign language learners, as play and

having fun is an indispensable element of the learning process (e.g., Piaget, 1976; Vygotsky, 1978) and can sustain motivation (Dörnyei, 2001; Mercer and Dörnyei, 2020).

Given the emergence of chatbots as pedagogical agents, this study examined whether students thought that a chatbot enhanced and sustained their learning.

3 Methodology

3.1 Participants

Data for this study were collected during the autumn term of the 2020–21 academic year. The participants were 128 L2 learners ($M = 64\%$, $F = 36\%$) attending an English-medium university in Hong Kong. They were from Hong Kong and mainland China, 17 to 18 years old and enrolled in a mandatory first-year English for academic purposes (EAP) course. Their English proficiency was equivalent to IELTS 6.5. Ethical approval for the study was provided at the university level. All participants were informed about the purpose of the research and signed a consent form to participate.

3.2 Data collection and analysis

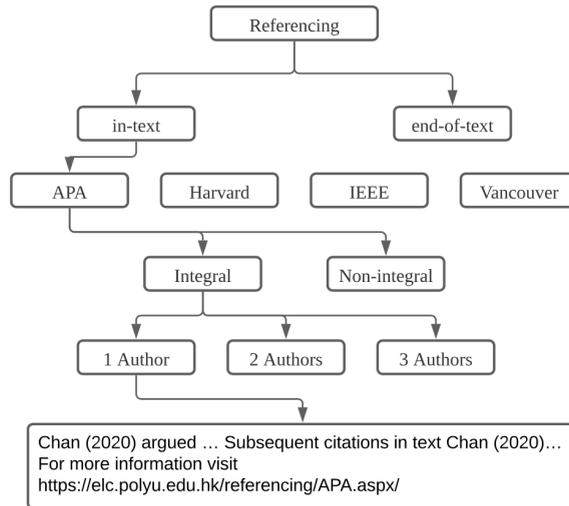
This study adopted an exploratory, qualitative approach, with two phases of data collection. In the first phase, an online questionnaire ($N = 128$) provided an overall picture of the participants' perceptions and informed the data collection that occurred in the next phase of the study. The questionnaire contained 12 multiple-choice Likert-type questions, one true or false and one openended question. In Phase 2, in-depth semi-structured interviews ($N = 12$) were carried out to obtain a holistic understanding of participants' experiences (Cohen et al., 2011). 12 students volunteered to be interviewed. An interview guide was developed based on the answers to the questionnaire. The interview questions concerned the participants' experiences with the chatbot, specifically their perceptions of the merits and shortcomings of using chatbots for independent language learning. The interviews lasted 21 to 33 minutes and took place via Zoom. The interviews were audio-recorded and transcribed. The questionnaire data were subjected to descriptive analysis and compared and contrasted with the interview responses to gain rich and holistic insights (Creswell, 2008). The students were asked for their thoughts about using a chatbot for language learning in general; what topics they found particularly useful; and whether the bot helped them in language learning and if so, how much. Participants received a copy of the transcriptions of their interviews, and they were shown quotations as member checks (Merriam and Tisdell, 2016). They were coded as S1, S2, S3, etc.

3.3 Materials

I created a chatbot using dialog flow and deployed it on Facebook Messenger to enhance independent language learning outside scheduled classes for students enrolled in a first-year EAP course. Language learning needs to be contextual, so the chatbot served two purposes: chatting and guiding learners to appropriate resources for language study. It contained a variety of inputs, including academic referencing skills, tenses and links to

language-learning tools (e.g., MOOCs, SPOCs, apps). Figure 1 illustrates the branching for an APA 6 single-author integral in-text citation in the chatbot:

Figure 1 APA 6 branching



The chatbot contents were created with L2 learners' needs in mind through a needs analysis of previous students enrolled in the first-year EAP course. It acted as a conversation partner and answered questions such as 'how do I write an integral reference in APA,' 'how do I write topic sentences' and 'where can I learn more about grammar.' Students were encouraged to use the chatbot to direct their language learning outside of class. Thus, the learners' focus was on communicating and receiving messages and using the language productively in meaning focused output.

4 Results and discussion

4.1 Questionnaire results

The questionnaire and interviews revealed that students were motivated to use the chatbot for independent language learning because they found it useful and enjoyable. None of the participants had previously used a chatbot for language learning. As Table 1 shows, the students indicated that the chatbot was useful for developing their English skills ($M = 4.12$, $SD = 0.706$). They found it most useful for developing writing skills, ($M = 3.89$, $SD = 1.037$), followed by reading ($M = 3.39$, $SD = 1.138$), speaking ($M = 3.11$, $SD = 1.218$) and listening ($M = 2.80$, $SD = 1.118$) skills. They considered it a convenient tool for learning English ($M = 4.09$, $SD = 0.509$) that improved their skills ($M = 3.88$, $SD = 0.749$).

Students were more enthusiastic about using the chatbot as a language learning supplement outside class ($M = 4.01$, $SD = 1.220$) than in the classroom ($M = 3.13$, $SD = 1.104$). In general, using the chatbot was a positive learning experience. For example, students reported that the chatbot made English learning enjoyable ($M = 4.01$,

$SD = 0.808$) and created a comfortable learning environment ($M = 3.79$, $SD = 0.848$). They indicated that they were willing to use the chatbot to learn English in the future ($M = 4.02$, $SD = 0.753$).

Table 1 Descriptive statistics ($N = 128$)

| | <i>Minimum</i> | <i>Maximum</i> | <i>Mean</i> | <i>Std. deviation</i> |
|--|----------------|----------------|-------------|-----------------------|
| The chatbot is useful to develop my writing skills | 1 | 5 | 3.89 | 1.037 |
| The chatbot is useful to develop my reading skills. | 1 | 5 | 3.89 | 1.138 |
| The chatbot is useful to develop my listening skills | 1 | 5 | 2.80 | 1.118 |
| The chatbot is useful to develop my speaking skills | 1 | 5 | 3.11 | 1.218 |
| The chatbot is useful to develop my English skills | 2 | 5 | 4.12 | 0.706 |
| Using the chatbot to learn English is convenient | 3 | 5 | 4.09 | 0.509 |
| My English skills have improved due to using the chatbot | 2 | 5 | 3.88 | 0.749 |

Table 2 Descriptive statistics ($N = 128$)

| | <i>Minimum</i> | <i>Maximum</i> | <i>Mean</i> | <i>Std. deviation</i> |
|--|----------------|----------------|-------------|-----------------------|
| I like using the chatbot to practice English outside the classroom | 1 | 5 | 4.01 | 1.220 |
| I like using the chatbot to practice English inside the classroom | 1 | 5 | 3.13 | 1.104 |
| The chatbot makes learning English enjoyable | 2 | 5 | 4.01 | 0.808 |
| The chatbot is a comfortable learning environment | 2 | 5 | 3.79 | 0.848 |
| I am willing to use the chatbot to learn English in the future | 2 | 5 | 4.02 | 0.753 |

It is not surprising that students engaged positively with the chatbot, given that earlier studies of chatbots in language learning reported similar reactions (Fryer et al., 2019). But it was notable that there was a clear consensus on the questionnaire that the chatbot was useful, convenient and conducive to developing English skills. These views were expressed during the interviews as well. The four main themes that emerged during the interviews are discussed below with the help of extracts from the transcripts.

4.2 Interview results

4.2.1 Convenience and accessibility

Most of the participants mentioned convenience and accessibility as major reasons for their appreciation of the chatbot, contrasting the experience with the more formal environment of the classroom. According to S3, “I am always using Facebook, so this is

perfect for me to use.” Similarly, S7 said the chatbot is something he is ‘able to access anytime’ when he ‘needs help.’ Furthermore, interviewees mentioned that technology was effective as a tool for language learning. S11 said she preferred using her tablet to reviewing printed course notes, so ‘this was a much better way to study.’ S9 agreed that “it is more convenient and faster than looking through notes,” and S1 added, “I do not have to wait for an email reply from my teacher or do a Google search.” This anytime-anywhere availability of chatbot tutelage (see Smutny and Schreiberova, 2020) increases the accessibility of learning and highlights how integral technology is to modern education (Broadbent, 2017; Godwin-Jones, 2016) and how it promotes independent language learning (Lai et al., 2018).

Generally, students were satisfied with the chatbot’s instant suggestions and programmed responses to their queries. S5 addressed this point: “I find it very helpful to use iELC because once I enter my question, I receive an answer, and I know how I can continue”. This suggests that the flexible learning the chatbot offered increased some students’ willingness to study. These comments also suggest that participants preferred the chatbot’s convenience and accessibility to relying on course notes, internet searches or emails to the instructor. It motivated students and heightened their interest in language learning. As a convenient, useful and comfortable way for learners to practice English, it could lead them to spend more time studying out of class.

4.2.2 Students’ preferred usage and chatbot usefulness

All of the participants commented that the chatbot was useful and provided instant language feedback on both input and output, improving their English skills. Eight of the students said that they used the chatbot to review content covered in class and complete homework on referencing styles and grammar. S4 said that the chatbot helped her to notice errors when she was unable to remember how to write an integrated citation using three authors, enabling her to self-correct her work. Such feedback prompted students to look carefully at language forms and observe differences between the target language and their own. These observations confirm the benefits of language output (Swain, 1985; Swain and Lapkin, 1995) and support the validity of the noticing hypothesis (Schmidt, 1990; 1994).

Several other students also indicated that chatting helped to improve their language skills. S8 shared: “I can chat here more freely and it’s better to improve my English. I typed in [the] present tense, and I got [an] explanation plus examples. This helped me to write my paragraph.” The students felt that the chatbot helped them to identify errors in their writing and to resolve any confusion, echoing the findings of Lin and Chang (2020). Additionally, their responses demonstrate the feasibility of chatbots to supplement in-class input synchronously.

When questioned about the aspects of the chatbot that were particularly helpful, students noted that the content of the chats was related to what they learned in class. This motivated them. As S10 expressed: “I thought it was good that the stuff related to [what] the teacher covered in class was also on the chatbot. This made it easy to [learn] how to write a thesis statement and connect ideas.” Thus, for the language learner with few opportunities to ask questions and employ the target language outside class, the use of a chatbot provides important opportunities to practice (Coniam, 2008; Goda et al., 2014).

The chatbot’s programmed responses included answers to questions about English grammar and word usage (e.g., definitions of reporting verbs) and general

English-writing content (e.g., how to write an essay; topic sentences). The chatbot could contribute to language learning by answering questions directly related to the course material as well as by guiding learners towards additional language resources (e.g., SPOCs and MOOCs). S9 said she liked using the chatbot to discover additional resources and mentioned she 'was really happy to find out about the MOOC on job interviews.' Three of the interviewees mentioned the ease of signing up for additional language learning opportunities. S3 said: "Actually, I didn't know I [could] book one hour with an English teacher by myself. You know, in 1 hour I can really get a lot of help with my writing." In a similar vein, S12 mentioned: "I signed up for the mentoring program because of this. It made the whole process easier and all the information was just there." As these comments illustrate, the chatbot's ability to focus on multiple aspects of language learning encouraged students and was especially conducive to out-of-class learning. The findings correlate with the results of previous studies in which chatbots triggered interest in language learning (Fryer et al., 2017; Yin and Satar, 2020).

Most researchers believe that automated, human-like dialogue-based learning stimulates engagement and enhances opportunities to learn (Thompson et al., 2018). But not all students will be interested in chatbots immediately. Several interviewees said that they began using the chatbot only because their teacher mentioned it in class and they received email prompts. S6 revealed:

Actually, at first, I was not interested, but as my teacher kept mentioning it to us ... I decided to try it. I used it a little bit to ask questions about our midterm essay and it did give me some ideas of how I could organise my writing.

This suggests the necessity of instructor guidance in the adoption of a chatbot for language learning, echoing Fryer et al. (2019) and Fryer and Bovee (2018) and confirming Kim et al.'s (2020) conclusion on the need for pedagogical strategising in the usage of chatbots for language education.

4.2.3 Comfortable and safe learning environment

In the process of learning a new language, it is important to be able to take risks without fearing mistakes. Students said that they felt more at ease when interacting with the chatbot than they did in the classroom. As S1 noted: "Chatting with the chatbot is more relaxed, I'm not nervous at all, which [I am] when talking to my teacher." Other students expressed similar sentiments. S12 said: "I think that asking the same question to my teacher will make him think I'm not very smart. So, you know, I [would] rather not ask any [stupid] questions." S1 agreed: "Um ... I think asking a question here [chatbot] is more comfortable and motivating." S2 shared: "You know, I can feel awkward to ask a question, but here no one will know, so it's a lot safer. I don't feel like someone will make fun out of me." This was a common thread in the interviews and is consistent with previous research (Fryer and Carpenter, 2006; Goda et al., 2006). These are encouraging comments, as students valued the opportunity to chat with the chatbot—S3 emphasised that 'it is an exciting and fun experience.' Earlier authors (Fryer et al., 2019) have discussed the novelty effect of the use of chatbots in learning stimulation and engagement. Participants in this study felt more at ease with practicing a new language and asking questions when they used the chatbot. They appreciated being introduced to new language resources, and they were willing to use the chatbot after class, indicating a positive effect on independent language learning consistent with the findings of Lin and Chang (2019) and Shawar and Atwell (2007).

4.2.4 *Too many technological options*

A few participants commented negatively about the chatbot. Despite its ability to answer questions and provide additional language resources, one respondent was ‘not interested’ in using it. When asked to elaborate, S6 clarified: “there is so much already, websites, apps, you know.... We can’t use everything, and when should we use them?” Thus, some students feel overwhelmed by the technological tools already available and consider that adding another could lead to decision paralysis, echoing Kim et al.’s (2019) discussion on English learning using chatbots.

Three participants said that the chatbot could be more exciting if it included features such as emojis and a variety of font sizes and colours. Although participants thought that the chatbot was novel and provided opportunities for learning and practice, it lacked some of the bells and whistles of other technological tools that they used.

5 Limitations

The findings indicate that chatbots could be leveraged in independent language learning, but the present study has some limitations. Because it employed a qualitative research design with an emphasis on rich data, the findings were based on student perceptions alone. Additionally, only students enrolled in the EAP course participated in the study, and they did not use the chatbot for the full length of the term. Performing studies with more diverse student populations and assessing individuals with different levels of English proficiency would improve the generalisability of the findings. Also, researchers should consider adding further refinements to chatbots tested in future studies and should program responses specifically for independent language learning.

6 Conclusions and recommendations

This study explored the introduction of a chatbot as an independent language learning tool in an EAP course. The purpose of the research was to understand the current and future potential of chatbots for language learning. Technology is an integral component of tertiary education (Allen et al., 2016), is attractive to students (Bergdahl et al., 2020) and has proven beneficial for second language acquisition (Chappelle and Sauro, 2017). Chatbots are, therefore, aligned with modern educational trends. The findings of this study suggest that the use of chatbots for foreign language education can provide interactive, flexible and individualised learning.

Although learners in the study had previous experience with technological tools, this was their first exposure to a chatbot for language acquisition. The majority of the participants enjoyed interacting with the chatbot, as confirmed by the fact that they used it both in and out of class.

The results of the study suggest that the chatbot helped students to observe and correct language-related errors. Moreover, students indicated that the feedback they received from the chatbot provided not only comprehensible input but also an opportunity to modify language output. This study reinforces earlier findings (Fryer et al., 2019) that students are more likely to experience supplemental language input as a meaningful task when shown its relevance to their previous language study.

Based on the participants' comments, the chatbot should be integrated into the course material so that learners may benefit from it immediately. As a result of the highly positive student feedback indicating that the chatbot was convenient, intuitive and useful, it should be introduced in other courses as well. Employing such chatbots on a wider scale could benefit students in the process of language acquisition. However, the use of chatbots should be combined with guidance and meaningful linked activities that encourage chatbot-human conversation.

Developers of future language-learning chatbots should ensure that they include abundant language input related to coursework and direct students towards additional resources to promote autonomy and facilitate experiential education. Not all chatbots are intelligent enough to adapt to the proficiency levels of individual learners, but incorporating programmed answer sets for each topic—branched into categories that can best match responses with proficiency level—is key to providing clear and contextualised feedback that will facilitate, stimulate and sustain learning.

This study established chatbots as a practical approach to increasing exposure to target language input and output. They foster autonomy and encourage students to learn outside the classroom setting.

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