Castledown

OPEN ACCESS

Technology in Language Teaching & Learning
ISSN 2652-1687
https://www.castledown.com/journals/tltl/

Technology in Language Teaching & Learning, 5(2), 1–22 (2024)
https://doi.org/10.29140/tltl.v5n2.1187

Investigating the Life Cycle of Language Learning Applications: Going Beyond the Hype Cycle

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Abstract

As learning is more real and permanent when connected to learners' private lives beyond the classroom (Godwin-Jones, 2011), mobile-assisted language learning (MALL) has emerged as a good way to support language learning, especially in informal contexts. With thousands of language learning applications (apps) becoming available, more and more language learners have started to use them as a support for their language learning. The purpose of this research is to investigate the life cycle of language learning apps and the reasons why learners decide to start, stop and restart using apps to better understand the use of the apps outside formal education contexts. The data collected from a survey of 186 participants with experience using language learning apps were analyzed. The results showed that the language learning app has three different phases in its life cycle, which are the "increasing period," "decreasing period," and "reviving period" with three turning points. This life cycle is similar to the Hype Cycle, a model describing how a new technology develops. Furthermore, the reasons behind the three turning points were also discussed. Influence from teachers and friends was the most significant factor contributing to starting using apps. The reasons for abandoning apps can be divided into app-related ones such as dissatisfaction of apps, and learner-related ones, such as stop learning a language. Restarting to learn a language is the major reason for participants who chose to use apps again. The results also revealed that language learners had a positive attitude towards language learning apps, while the high abandonment rate of using apps also indicated that both apps and learning patterns could be improved if teachers can provide more sufficient and appropriate guidance to support the selection and use of apps, and app-designers can include more meaningful and interactive activities rather than just providing drills.

Keywords: Mobile-assisted language learning (MALL), language learning applications, apps, Hype Cycles.

Data Availability Statement: *All relevant data are within this paper.*

Introduction

With rich, real-time, and collaborative experiences provided for language learners, MALL has become popular among students, teachers, and researchers (Duman et al., 2014). Features of MALL such as portability, social interactivity and individuality make mobile devices ideal platforms to support language learning, especially beyond the formal context.

Mobile devices used in MALL are varied, including smartphones, tablets, MP3/MP4 players, electronic dictionaries, and game consoles (Stockwell, 2022). Of these devices, smartphones have become ubiquitous with improved mobile communication technologies and easier access (Kukulska-Hulme & Viberg, 2018; Wrigglesworth & Harvor, 2018). With the ability to effectively deliver materials of language learning to learners, MALL has become almost synonymous with the use of smartphones (Thornton & Houser, 2005). As Taj et al. (2016) stated, though any portable devices could be used for MALL, it has become more synonymous with smartphones.

The exponential growth of apps is another reason why smartphones have become the main device of MALL. For example, the Apple App Store offers nearly two million apps at the time of writing in 2023 (Apple, 2023), and it has taken just 15 years to reach this number since 2008 when the App Store started with only around 500 apps available. The apps designed for or used to support language learning also quickly emerged, covering different language areas, such as vocabulary and grammar, so language learners can choose an app that is fit for them based on their own needs and decide how to use it. These apps have become common in language learning (Pindeh et al., 2016). Previous research showed language learning apps could help with language development (Lin & Lin, 2019) and most language learners have positive attitudes towards them (Rosell-Aguilar, 2018; Viberg & Grönlund, 2013). Advantages like ubiquity, individuality, and social interactivity can also be found in previous research on using apps to learn a language (Ma, 2017; Mindog, 2016; Steel, 2012; Zou, 2018). However, most research on the effectiveness of apps is conducted in a short period of time (Burston, 2014), and using apps selected by teachers or researchers rather than the learners' themselves (Rosell-Aguilar, 2018). Although Rosell-Aguilar's study (2018) revealed a lot of information on autonomous language learning behavior outside formal education contexts, the study focused on only one app, Busuu (a language learning platform available on web, iOS and Android), hence learners' interaction with other apps remains unknown, and only 15% of participants are from Asia, it requires more research to reveal how learners in Asia select and use apps to learn languages. To the best knowledge of the author, using language learning apps under the informal learning context is not much explored among Chinese language learners. It's not fully understood how they choose apps and use these apps by themselves, nor what their modes of using apps are, such as whether they switch between different apps or focus on a particular one. To know more about how language learning apps are used beyond classes will better our knowledge about the affordance of apps in the less controlled environment and facilitate them as an effective tool for language learning.

Literature Review

Smartphone Language Learning Apps

Language learning apps are becoming increasingly popular among learners due to their specific advantages like convenience, multiple functions, and easy access. A survey by Steele (2012) showed that students used apps of dictionaries, translators, flashcards, and vocabulary games to support the knowledge learned in class. In the area of language learning, apps can be categorized into three groups: apps designed for language learning (LL), apps not designed for LL but useful for it, and dictionary

and translator apps (Rosell-Aguilar, 2017). With burgeoning apps available in app stores, researchers started to examine the apps designed for language learning (LL) to find the trends of the commercial apps (Heil et al., 2016) and the efficacy of apps (Ebadi & Ghuchi, 2018; García Botero et al., 2019). Heil et al. (2016) examined 50 commercial apps of the "top ranking" in Google Play and Apple iTunes App Store, and found English, French, and Spanish to be the top three target languages taught by the apps. They also found most apps (42 of 50) focus on vocabulary in an isolated way without providing context for learners. The strong focus on vocabulary is also found in other research (Dehghanzadeh et al., 2019). Apps designed for other areas in language learning such as grammar and pronunciation are far less than those for vocabulary. Besides these separate LL skills apps dedicated to a specific area of language learning, apps with full LL packages are also popular among learners, which offer a variety of exercises on vocabulary, grammar, listening, reading, and writing and also provide the interaction function to communicate or compete with other language learners. The most famous app with full LL packages might be "Duolingo". In previous research, it was used as a tool to investigate the influence of MALL on learners' attitude (Gafni et al., 2017), the use of apps in vocabulary learning in language learning (Guaqueta & Castro-Garces, 2018), the effects of apps on students' achievement in language learning and self-efficacy (Rachels & Rockinson-Szapkiw, 2018). These studies have revealed the positive effects of apps for LL from different aspects, which suggests the potential of apps to facilitate LL in a way that caters to individual needs of learners.

Besides dedicated LL apps, many language learners also choose apps not originally designed for LL to develop their language skills. The rapid development of the internet and the tools we use to access the internet like smartphones and tablets has greatly changed the way people obtain and search for information. Traditional reading, especially magazines and newspapers, are gradually being replaced by digital versions (Putro & Lee, 2017), so learners can use news and magazine apps, such as BBC News to develop their reading skills. These apps can provide learners with various authentic materials, and learners can choose their interested topics. They could also use apps like YouTube (Terantino, 2011), Podcast, or TED for language learning. Also, Social Networking Service (SNS) apps like Facebook, Twitter, and Instagram can be used as platforms where language learners can communicate with people using the target language and increase opportunities to use the language. Previous research also showed the SNS apps can be used to support language learning (Jia & Hew, 2019; Zou et al., 2018).

Dictionaries and translator apps could serve as tools for language learning and are very broad in their forms and functions. Dictionary apps are often designed for a specific target language; for example, in China, the popular ones include Eudic for English and Hujiang for Japanese. It is also not uncommon to see dictionary apps that are essentially an electronic version of traditional paper dictionaries. For translator apps such as Google Translator, users can enter text or audio to translate the source into the target language. With the development of machine learning and AI, there are increasing studies on how translator apps can be used in language learning (Bahri & Mahadi, 2016; Ducar & Schocket, 2018; Garcia & Pena, 2011).

Benefits, Limitations and Perceptions Regarding Learning Language Apps

Benefits of Language Learning Apps

With the portability of smartphones, learners can use apps with fewer limits of space and time. A survey (Steel, 2012) showed that convenience and portability were important factors perceived by students who considered mobile apps to be beneficial to their language learning even in the days shortly after

they were released. This feature is usually considered as the most distinguished one of MALL since it could extend the time and opportunity for learning language to a large extent. For instance, learners can use apps in fragment time such as during breaks or while commuting so they can fit learning into their life (Steel, 2012).

It is now widely established that smartphones can increase opportunities for social interaction between people in different places. For language learners living in places where the target language is not often used, opportunities to practice their language skills can be scarce (Wrigglesworth, 2020). However, they can use social networking apps like Facebook or Twitter to communicate with friends in target languages or make new friends who speak target languages, so an authentic environment for social interaction can be created for practicing language. Besides the opportunities for language use, the apps with social interaction functions could also serve as a platform where language learners exchange their learning experience and support each other. Zou et al. (2018) used Wechat, a social communication app, to build a class forum supporting students' learning outside class, which students found convenient, comfortable, and useful. Similar results were found in Wrigglesworth's study (2020) where students agreed that Kakao Talk discussions beyond the classroom did support their language learning.

In the research investigating how apps affect learners' language learning, one of the most noticed results is enhancement of learners' motivation. The new form and the gamefic design of apps could attract learners, so they might find learning language through apps more enjoyable and interesting. According to Mindog (2016), the intermediate language learners in their study preferred to choose apps making learning language fun, and the lack of outside pressure (e.g., tests) or fun factors would lead them to delete apps. A study by Gafni et al. (2017) showed that the gaming aspect of Duolingo makes the tasks more enjoyable and interesting.

Besides motivation, apps have also been attributed to enhancing language learners' autonomy (Goodwin-Jones, 2011). With a high degree of freedom in choosing apps and deciding how to use them, learners can use them as a tool to manage their language learning outside class and therefore develop autonomy. Chen et al. (2019) developed an English vocabulary learning app to help students build the ability of self-regulated learning. After two weeks of using the app, the performance and motivation of students using the app exceeded those who didn't use the app.

Limitations of Language Learning Apps

Although convenience is one of the most agreed upon advantages of apps, the "anytime, anywhere" is also a restricted term under MALL. This is because the brief time squeezed between other activities contrasts to traditional ideas about the requirements for learning, such as a specific period of concentration. This could lead to the feeling that learning with apps is not serious or not reliable.

Although education is an important purpose for students to use mobile phones (Yurdagül & Öz, 2018), most students use mobile phones for communication, entertainment and social networking, so these factors might be distractions when they use apps to learn a language, and these embedded impediments might be possible reasons for them to quit language learning apps. Another research study (Gafni et al., 2017) shows internet dependence might cause financial burden, such as fees for cellular data, or frustration when not accessible. The noisy environment when using mobile phones in public, the entertainment, messages, and push notifications also distract students from learning.

The highly individualized feature of smartphones makes MALL an ideal way of learner-centered learning because learners can choose which app to use and how to use it by their own preference and needs. However, a review of MALL (Kukulkska-Hulme & Shield, 2008) found that most uses of the device

do not take advantage of the features of mobility and interactivity. When applied to language learning, mobile devices are still used in a teacher-centered, pedestrian and uncreative way. Furthermore, the design of some apps usually just replicates the traditional ways of language learning, especially for vocabulary learning, most apps use the form of flashcards or quizzes. "It would be a shame to fall into only the same use patterns as in the past" (Godwin-Jones, 2011, p. 7). If so, using apps would be a hype, because it is expected to be a new way of learning with the affordance that traditional ways don't have, but in the end, it is not much different from how learners have learned before.

The Perceptions of Language Learning Apps

With all the potentials and criticisms discussed above, many studies addressed how apps help with language learning and to what extent they work, but the results are not conclusive. Some of them showed a positive relationship between the use of apps and learning performance, while some did not find significant differences from the traditional ways. A meta-analysis of studies of mobile-assisted ESL/ EFL vocabulary learning between 2005 and 2018 (Lin & Lin, 2019) showed that learning L2 words in a mobile-assisted way has a positive and large effect. Rachels and Rockinson-Szapkiw (2018) used Duolingo to teach elementary students Spanish, and they found the performance of students using apps equivalent to the students taught by the traditional face-to-face method. In general, learners have positive attitudes towards apps for learning language (Lin & Lin, 2019). Results of a survey (Viberg & Grönlund, 2013) of students' attitudes toward using mobile devices in language learning was very positive, especially in the aspects of individualization, collaboration and authenticity.

Besides investigating learners' attitudes toward MALL in a general sense, a lot of research also focuses on specific apps, and the results show that learners' perceptions toward apps could be largely influenced by the app itself. Barrett et al. (2021) conducted a study to investigate students' perceptions on an English oral presentation app. They found that 37% of students thought the app was useful and helpful, while 33% found it difficult to use due to its design. From the students' comments of the app, though there were complaints about app design problems, the most frequently mentioned theme was about unclear instructions, poor learning materials and contents. Among different factors affecting learners' perceptions on apps, the factors like instructions and contents that exist in the traditional ways of learning are still the main problems.

Hype Cycle

The Hype Cycle introduced by Gartner.inc in 1995 is a theory describing the five distinct phases of new technology as it develops: innovation trigger, peak of inflated expectation, trough of disillusionment, slope of enlightenment, and plateau of productivity (Fenn & Raskino, 2008). It offers an overview of stages a new technology goes through and expects that most technologies will experience the phases of disillusionment and overenthusiasm (Linden & Fenn, 2003).

Innovation trigger refers to the technological breakthrough which is demonstrated or released to the public and then attracts great attention (Linden & Fenn, 2003). In the rising phase, people start to become attracted by this new technology and expect it will bring more advantages in the future. When people's expectations toward the technology have inflated to the highest point, the technology has reached the peak. As this is a turning point to the following disillusionment, people start to realize they might have overestimated the advantages of the technology and exaggerated its actual productivity. Then the technology slides into the trough of disillusionment. Although the disillusionment and failure appear at this stage, improvement based on the feedback regarding problems could also keep going, and solutions to address the existing issues could also be provided. With the trails and improvement,

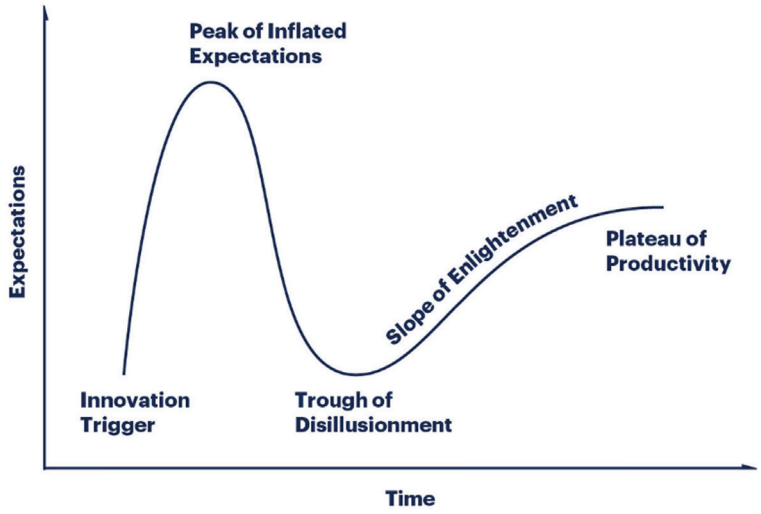

Figure 1 *Hype Cycle (Linden & Fenn, 2003).*

the technology's applicability, disadvantages, and benefits are better understood so it starts to climb the slope. Finally, it enters the plateau of productivity, a phase where the technology becomes mature and goes into a relatively stable stage.

Much research from the learners' side has been done to investigate the usage and learners' attitudes towards MALL and language learning apps (Niño, 2015; Steele, 2012; Viberg & Grönlund, 2013). However, the research about language learning apps is comparatively scarce. With the capacity of the hype cycle to foresee technological development, it would be meaningful to study the life cycle of language learning apps based on this model to see if they go through the process stated in this model and determine what the possible reasons are for the turning points of different phases.

RQ.1 What is the life cycle of language learning apps?
RQ.2 What are the reasons that trigger the change of phases in language learning apps?

Research Methods

Research Design

This research is designed to act as a quantitative study supplemented by qualitative data collected by open questions. A questionnaire designed by the author was used to investigate learners' experience in using language learning apps and their attitudes towards these apps. The questionnaire has 57 items in total, including multiple choice questions on learners' demographic characteristics, language learning background and their experience in language learning apps, 6-point Likert scale questions on their attitudes towards the apps, and an open question on their comments on apps. To collect more qualitative data, each multiple-choice question has an option of "Other", where participants can specify their answers if the options listed do not fit them.

The questionnaire was conducted in English, and participants were free to use Chinese in open questions and comments. Without the detailed knowledge of participants' background and circumstances, the interpretation of data could be incorrect. The open-ended question and options included in the questionnaire compensate for the concern that the data collected by questionnaires are superficial as they could help to better understand the circumstances of the participants.

To minimize measurement errors and enhance the content reliability and validity (Hair et al., 2010), pre-testing was conducted. The questionnaire was evaluated by a professor and eight Master students majoring in applied linguistics to assess the validity. Then, the questionnaire was distributed to 15 Chinese students from a Japanese university to ensure there was no ambiguity in questions. Finally, the questionnaire was released by a platform named Wenjuanxing, where participants could access it by a link or QR code.

Participants and Sampling Methods

Since the main objective of this study is to investigate the life cycle of language learning apps and the reasons why learners start, stop or restart using apps, the target participants are Chinese language learners with experience in using language learning apps. Also, because this study focuses on the autonomous language learning by apps in informal contexts, the first step is to reach as many language learners with experience in apps as possible. The main target group is Chinese college students as they are required to learn a second language in university, and they have more time and freedom in using smartphones when compared with high school students. Furthermore, they might be more motivated to learn a language outside class for further study or future career. Therefore, they are more likely to have experience in using language learning apps. Since the author is in Japan, for the diversity of samples, Chinese students living in Japan were also enrolled. As the experience with using language learning apps is what this study focused on, language learners who are not currently completing formal education were also included as long as they used language learning apps.

The sampling method was convenience sampling as it can reach more target participants in a less controlled way, and increase the diversity of participants. Therefore, the results can be generalized to a larger population and better answer the RQs. The author asked approximately 20 undergraduate students in Chinese university to fill out the questionnaire and then asked them to send the link to their classmates or friends, and the questionnaire was also sent to 50 undergraduate students majoring in English from two classes in a university in Beijing. The other participants are also drawn recruited from the researcher's classmates and friends both in China and Japan.

All the participants who accessed the questionnaire would first indicate if they have ever used language learning apps. If the answer is no, the questionnaire ends with a message thanking them for their help. If the answer is yes, they could continue to answer the rest of the questionnaire.

Data Collection and Analysis

The author sent the link and QR code to the target participants and they shared them with more people. A brief introduction of the research and the link of the questionnaire were also posted in the author's SNS accounts to get more possible participants. The purpose of the research was stated at the beginning of the questionnaire. All questionnaires were anonymous, participants did not need to provide their names or other information that could identify them, such as their student ID number. The data was deleted from Wenjuanxing after the data analysis was completed.

The responses from participants who had no experience in using language learning apps were excluded. IBM SPSS Statistics version 28 was used to analyze the data. Descriptive statistics were analyzed to examine the characteristics of participants' demographic information, language learning background, and their experience in using language learning apps, including usage patterns and reasons for starting, giving up, or restarting using them. Content analysis and categorization were used in the qualitative data collected from the open-ended questions.

Results

Results of Participants' Background

Participants' information. A total of 248 people answered the questionnaire, among them 188 participants have experience in using language learning apps. Two participants under 18 years old were excluded from the results. The responses from the remaining 186 participants with experience in using language learning apps were analyzed.

Participants' Language Learning Background. All participants' native language is Chinese. Most of them used apps for English learning. A small part of participants used apps for Japanese learning. As some participants live in Japan, the target language for them is Japanese. English takes up the highest percentage in the target language (83.3%), which corresponds to the previous results that English is the top target language taught in apps (Heil et al., 2016). The other target languages include American Sign Language (ASL), Russian, Spanish, and French.

Regarding the purposes of learning a second language, the participants could select all options applying to them, and the results indicate that most participants have multiple purposes in learning a language.

Table 1 *Participants demographics*

Category		Frequency	Percentage (%)	N
Age	18–22	39	21.0	186
	23–26	103	55.4	
	Above 26	44	23.7	
Gender	Male	44	23.7	
	Female	142	76.3	
Current education	High school	2	1.1	
	Undergraduate	101	54.3	
	Graduate and above	57	30.6	
	Not currently in education	26	14.0	
Residence	China	149	80.1	
	Japan	26	14.0	
	Other	11	5.9	
Target language	English	155	83.3	
	Japanese	20	10.8	
	Other	11	5.9	

Table 2 *Frequencies of purpose of language learning (LL)*

	Frequency	Percent
Academia	90	24.50%
Test	95	25.80%
Future Career	93	25.30%
Interest	90	24.50%
Total	368	100%

The responses were distributed averagely. The participants learned a second language out of extrinsic reasons such as requirement of the curriculum, tests for language proficiency, like TOEFL or JLPT and development in future career. The factor related to learners' intrinsic motivation, interest in the culture or language was also evident. For the participants who chose "Other," they gave detailed reasons like travel, entertainment, self-improvement, career requirement, and the need for both work and life in Japan.

Results of Language Learning Apps

RQ 1. What is the life cycle of language learning applications?

The number of apps used by participants were not normally distributed, and it was positively skewed (M = 1.84, skewness = 1.09) as the results showed nearly half of participants used only one or two apps. Confidence intervals, which is "a range of plausible values for the corresponding parameters" (Kline, 2004, p. 27), was reported here to show how practically important the results are. Bootstrap results indicate the results are reliable and representative. Although the number of participants choosing

Table 3 *Number of language learning apps used*

				Bootstrap for Percent[a]		
					BCa 95% Confidence Interval	
	Frequency	Percent	Bias	Std. Error	Lower	Upper
1~2	83	44.6	–.2	3.6	38.2	50.5
3~4	71	38.2	.1	3.4	32.3	44.1
5~6	11	5.9	.0	1.8	3.2	9.1
more than 6	21	11.3	.1	2.3	7.5	15.6
Total	186	100.0	.0	.0	.	.

[a] Bootstrap results are based on 1000 bootstrap samples.

Table 4 *Types of language learning apps used*

Types	Sub-types	Frequency (%)	N (%)
Apps designed for LL	Vocabulary	149 (43.57)	234 (68.42)
	Speaking	32 (9.36)	
	Listening	13 (3.8)	
	Reading	5 (1.47)	
	Test, textbook	16 (4.67)	
	Grammar	2 (0.58)	
	Full LL package	17 (4.98)	
Dictionary and translator apps	Dictionary	65 (19.01)	71 (20.76)
	Translator	6 (1.75)	
Apps not designed for LL	Online lecture	6 (1.75)	12 (3.51)
	News	2 (0.58)	
	Other	4 (1.17)	
Not specified		25 (7.31)	25 (7.31)

1~2 is largest, the other half of the participants used at least three apps, which means that these participants have relatively rich experience in using language learning apps. The results also indicated that learners are actively engaged with using different apps to help with their language learning.

All the participants answered the questions concerning the first app. For the second app, a total of 103 responses were obtained. A total of 52 participants responded to the questions on the third app.

Participants were required to write down the names of apps they used to study language. Each app was reviewed and then classified into different types of language learning apps as presented in Appendix B. In this research, most apps belong to apps designed for LL, followed by dictionary and translator apps, and apps not designed for LL only account for 3.51%. Most apps are for vocabulary learning, and this dominance of vocabulary apps is consistent with the previous research. The results indicated that when talking about using apps in the context of language learning, most learners focus on apps directly related to language learning, which are apps designed for LL and dictionary and translator apps.

Table 5 presents the period of time participants engaged in different language learning apps they used in chronological order. For the first app, over 40% of the participants used the app for more than 1 year. For the second and third one, though the numbers drop to around 30%, the category of "more than 1 year" still has the largest percentage. From these results, it can be concluded that language learning apps have become an indispensable way of learning language for many language learners. The length of over one year also indicates that it is a sustainable way of learning. The number of participants using the app for less than 1 month is the least in the first app, while the percentage of this category increased

Table 5 *Length time using language learning apps*

	The 1st app		The 2nd app		The 3rd app	
	Frequency	Percent(%)	Frequency	Percent(%)	Frequency	Percent(%)
Less than 1 month	17	9.1	22	21.4	14	26.9
2~3 months	47	25.3	25	24.3	8	15.4
3~4 months	24	12.9	9	8.7	5	9.6
6~12 months	20	10.8	11	10.7	7	13.5
More than 1 year	76	40.9	34	33	16	30.8
Other	2	1.1	2	1.9	2	3.8
Total	186	100	103	100	52	100

Table 6 *Frequency of using apps*

	The 1st app		The 2nd app		The 3rd app	
	Frequency	Percent(%)	Frequency	Percent(%)	Frequency	Percent(%)
Everyday	61	32.8	29	28.2	14	26.9
2~3 times a week	73	39.2	34	33	17	32.7
4~6 times a week	33	17.7	21	20.4	14	26.9
Other	19	10.2	19	18.4	7	13.5
Total	186	100	103	100	52	100

to 21.4% in the second app, and further increased to 26.9% in the third one. The increased percentage of participants using the apps for quite a short period suggests that for some participants, there were problems in using apps to learn a language, or they perceived apps not helpful, so they stopped using the app.

Most participants used apps 2 to 3 times a week. Across all three apps, the participants using apps every day and those using apps 4~6 times a week make up half of the samples, which indicates half of them use apps quite frequently.

From Tables 7 and 8, it is evident that most participants spent less than one hour engaged in language learning and using apps. From the data on the first app, 59.1% of participants spent less than one hour in language learning, while there are 80%of participants who spent less than one hour in the app, which means besides apps, they spent time on other ways of language learning. From the data on the third app, time spent on the app is identical with time spent on language learning.

Table 7 *Time spent on language learning*

	The 1st app		The 2nd app		The 3rd app	
	Frequency	Percent(%)	Frequency	Percent(%)	Frequency	Percent(%)
Less than one hour a day	110	59.1	62	60.2	31	59.2
1~2 hours a day	52	28	29	28.2	14	26.9
2~3 hours a day	18	9.7	9	8.7	5	9.6
Other	6	3.2	3	2.9	2	3.8
Total	186	100	103	100	52	100

Table 8 *Time spent on language learning apps*

	The 1st app		The 2nd app		The 3rd app	
	Frequency	Percent(%)	Frequency	Percent(%)	Frequency	Percent(%)
Less than one hour a day	149	80.1	79	76.7	31	59.6
1~2 hours a day	25	13.4	14	13.6	14	26.9
2~3 hours a day	8	4.3	4	3.9	5	9.6
Other	4	2.2	6	5.8	2	3.8
Total	186	100	103	100	52	100

Table 9 *Correlation between time spent on language learning and time spent on language learning apps*

			95% Confidence Intervals (2-tailed)	
	Pearson Correlation	Sig.(2-tailed)	Lower	Upper
App1	.364	<.001	.232	.482
App2	.558	<.001	.409	.679
App3	.696	<.001	.523	.815

The results of correlation analyses conducted between time spent on language learning and time spent on apps shows that these two variables are positively correlated with each other, though the degree varies in different apps (from 0.364 in the first app to 0.696 in the third app). In the third app, the positive relation is most obvious, as it might indicate the participants using the third app (in other words, the learners with more experience in using apps), rely on apps more, and apps play a significant part in their language learning.

For the first app, over half of the participants once stopped using it. The abandonment rates drop to around 40% in the second and the third app, but they are still high. From the responses to the question asking if they restarted using the app, only 20% of learners restarted using the app, and the remaining 80% users totally stopped using the app.

Figure 2 shows the change of the number of apps being used by the participants. The first points mean the number of apps used at the beginning. The second points are calculated by subtracting the number of abandoned ones, and the third points are obtained by adding the restarted apps. In general, the number of apps being used follows the trend that is highest in the beginning, lowers in the middle and rises a little in the end.

Table 10 *Responses for if stopping using an app*

	The 1st app		The 2nd app		The 3rd app	
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Yes	96	51.6	39	37.9	22	42.3
No	90	48.4	64	62.1	30	57.7
Total	186	100	103	100	52	100

Table 11 *Responses for restarting using an app*

	The 1st app		The 2nd app		The 3rd app	
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Yes	21	21.9	8	20.5	5	22.7
No	75	78.1	31	79.5	17	77.3
Total	96	100	39	100	22	100

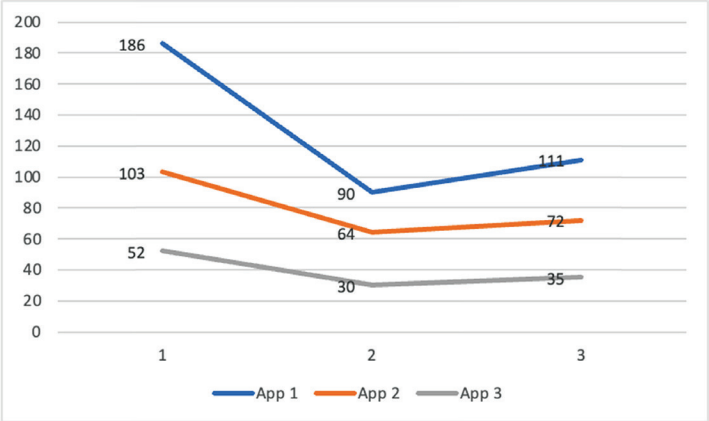

Figure 2 *Number of apps being used.*

RQ 2. What are the reasons that trigger the change of phases in language learning apps?

The top two reasons for participants to start using an app are influenced by their teachers and friends. "Recommended by teachers or classmates" and "friends were using it" accounted for over 65% of the responses. It can be concluded that the influence from people around the participants is an important factor guiding the use of apps.

The reasons specified in "Other" are presented in Table 13.

Regarding how learners select an app, many of them chose a particular app because of the design and recommendations from their teacher or classmates. Ranking of apps in the Apple Store or Google Play is also an important factor influencing if the participants choose the app. as indicated by the

Table 12 *Reasons for starting using an app*

Options	Frequency	Percentage (%)
Recommended by teacher/classmates	153	34.23
Friends were using it	140	31.32
Exploring in Apple Store/Google Play	82	18.34
Advertisement	53	11.86
Other	19	4.25

Table 13 *Participants' reasons for starting using an app (participants specified)*

Other	Frequency
Supplement for textbook (vocabulary and audio material)	2
Recommendation from an online article	1
Help students to remember vocabulary	1
Used the PC version before	1
Required by company	1
For language learning	1
Try a different way of learning	1
Not specified	11

Table 14 *Reasons for choosing an app*

Options	Frequency	Percentage (%)
Design of app	148	30.27
Recommended by teacher/classmates	141	28.83
Rank of an Apple Store/Google Play	108	22.09
Friends were using it	69	14.11
Other	23	4.70

23 participants that specified the is as the reason for their choice. The 23 participants gave their specific reasons for their choice. Some of them could be classified into the four listed reasons, for instance, the response "friend shared the app on SNS" could be regarded as "friends were using it," "the app is easy to use", "the way to memorize vocabulary is unique" and "the app is the best in the same kind" were classified to "Design of app". The contents of apps appeared to be a part that participants also cared about. They chose the app out of their own needs in language learning, such as "I wanted to improve listening", "the app exactly fit for my target because it includes GRE vocabulary" and "it is helpful for real communication."

In the question on reasons for stopping using an app, 36 participants (37.89%) selected "others" and 22 of them specified the detailed reasons (Table 17), which indicates that the factors influencing the use of apps are complex. According to the results, the reasons could be divided into two main categories; the app-related factors and the learner-related factors. The former ones include lack of feeling of learning, ineffectiveness of the app and preference of traditional ways. Participants also mentioned reasons such as "finding a better app," "disliking the design of the app," and "inconvenience of using a smartphone." The learner-related reasons are related to learners' own language learning progress. They stopped using the app because they "stopped learning a second language," "finished tests," "finished tasks in app," "had no time" and "were lazy."

Only a small number of participants restarted using an app after giving it up and most of them chose to restart using an app because they restarted learning a language. As the responses to this question are limited and no participants specify their own reasons, it is hard to generalize the findings to a larger population. However, it is still worth noting that learner-related reasons are dominant.

Table 15 *Other reasons for choosing an app (participants specified)*

Other	Frequency
Contents of app	7
Recommendation from online articles	2
Supplement for textbook (vocabulary and audio material)	1
Interest to know more about apps	1
Required by company	1
The only one app available for the target language (Spanish)	1
Convenience	1
Useful	1
Not specified	2

Table 16 *Reasons for stopping using an app*

Options	Frequency	Percentage (%)
Stopped learning language	49	26.49
Did not feel like I was learning	38	20.54
Not useful	21	11.35
Traditional ways of learning are more helpful	18	9.73
Other	58	31.35

Table 17 *Reasons for stopping using an app (participants specified)*

Other	Frequency
Finished the test	8
Found a better app	7
The design of the app is bad	6
Finished tasks in the app	6
Had no time	5
Laziness	3
Inconvenient to use smartphone	1
Just a drill	1
Required to pay	1
Incorrect contents	1
Vocabulary is too easy	1
Not specified	18
Total	58

Table 18 *Reasons for restarting using an app*

Options	Frequency	Percentage (%)
Restarted learning language	15	44.12
Thought it would be helpful this time	7	20.59
Prepared for tests for language proficiency	6	17.65
Other	6	17.65

Attitudes Towards Language Learning Apps

In general, participants' attitudes towards language learning apps are positive. In each statement, the frequency of "strongly agree" is always the highest.

Figure 4 shows the results of participants' first impressions of apps. The response with the highest frequency is "a useful tool for learning language" (44.99%). It seems that participants treat the apps in a serious way. The gamefic aspect of apps was also confirmed by some participants, as they agreed the app is "an interesting method of learning" (21.81%). When compared with other methods of learning language, a total of 19.06% of participants agreed that there is a big difference, and less participants thought there is a big difference compared to learning a second language by computer (9.04%).

Of the 26 participants who chose the option "Other", 10 participants stated that it was convenient to learn a language by using a smartphone, and three of them used "anytime, anywhere" to describe the convenience. Two participants commented on the contents. One participant said that "the resources on apps are abundant" and the other thought "the contents of the app are easy and don't require much time". Some more detailed advantages of the specific app are also mentioned. One participant thought "the sharing function in the app was good. The users of the app could share their methods in remembering vocabulary." Also, some participants thought the app could be used to support language learning in specific areas, for instance, "the app could be used to learn vocabulary or speaking." However, not all first impressions of apps are positive as complaints like the "design is complex" and "the form is old" also exist.

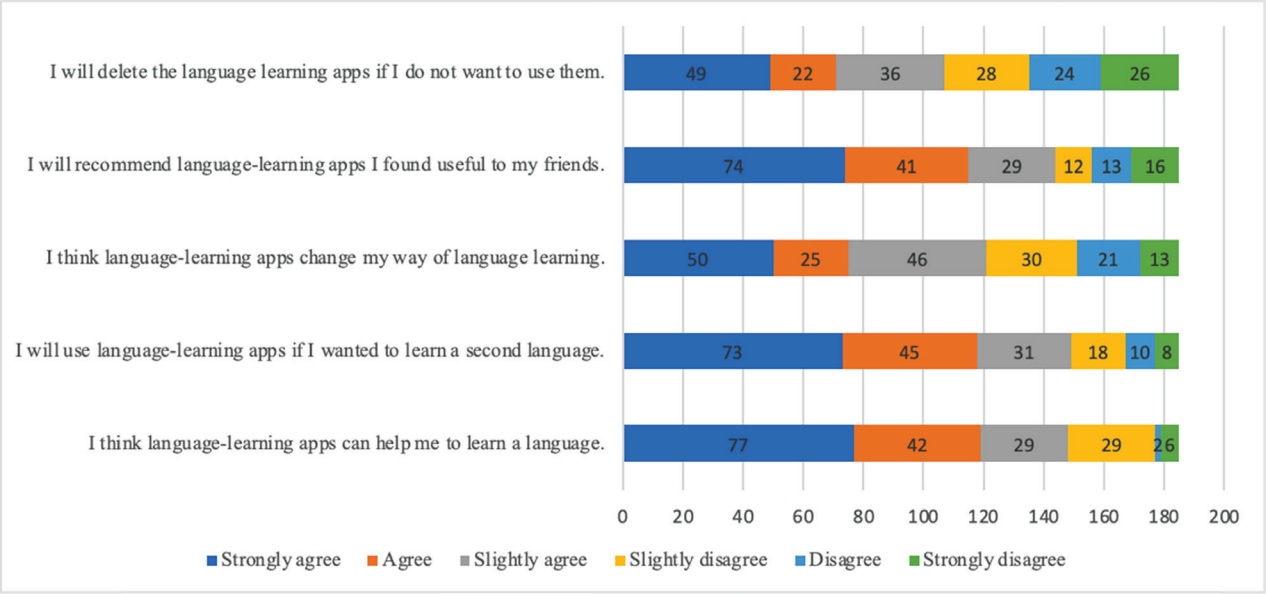

Figure 3 *Participants' attitude towards apps.*

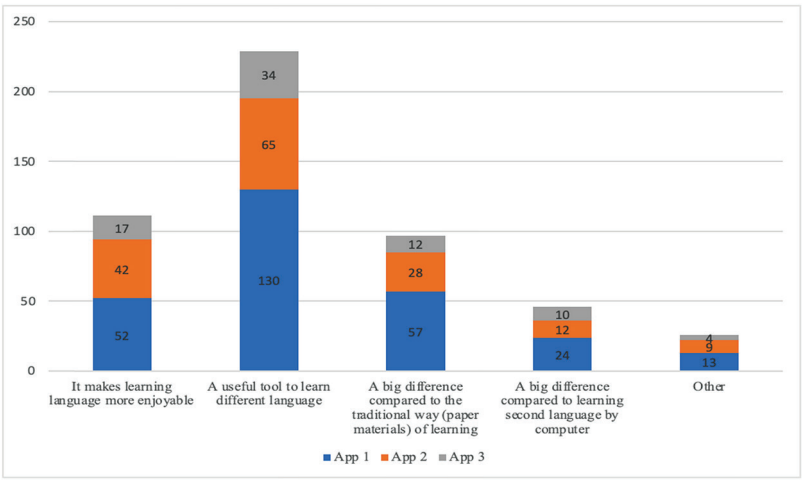

Figure 4 *First impressions on language learning apps.*

Discussion

To answer **RQ 1. What is the life cycle of language learning apps?** The data about participants' experience in using language learning apps was investigated. The results show that a language learning app has three phases in its life cycle with three turning or trigger points.

The life cycle of an app starts with the first trigger point, the *Starting Point*, when the app starts being used by learners, and the first phase could be called the *Increasing Period*. The users of the app increase because they shared it with their friends, and the learners without knowledge about the app before would gain interest in it after seeing their friends were using it or recognising it from advertisements (or when exploring in Apple Store/Google Play). This phase is not directly reflected in Figure 2 as the participants have already had rich experiences in using apps, so the stage of starting using different apps was not able to be traced and directly reflected in the results.

Many participants only tried one or two apps and then gave up or just used it for a short period of time, which means that the app finished the first phase in its life cycle. The time users stopped using the app is the *Disillusion Point* indicating the app enters the next phase, the *Decreasing Period*. The apps in this phase have two possibilities with the most common being totally abandonment by learners. The other small part would be reuse again by learners, and this phase could be called *Hibernation*. The app used again by learners enters the third phase with the third turning point, the *Reviving Point*, indicating users decided to restart using the app, and this phase could be called the *Reviving Phase*. However, from the data we could see the apps entering the third phase are the minority.

For different types of apps, each type follows the general life cycle concluded above, but they differ in the extent of fall and rise, which might be the result of the difference in response number. However, the dictionary and translator apps seem to be an exception. Unlike the other types of apps, the user number of dictionary and translator apps along the time is quite stable. It might because these apps serve as a substitute of paper-version dictionary and they are indispensable tools in language learning.

Although the life cycle of language learning apps in this research has similar phases of decreasing and revival periods as the Hype Cycle has, the increasing period and the Plateau of Productivity are not explicitly confirmed. As the technology of language learning apps has been available for years and the participants have already had rich experiences in using them, the very early stage of the increasing period was not able to be directly reflected in the current research. Because of lack of data from longitudinal observation on learners' use of apps, even though the length of time some participants engaged in using apps is long (over one year), it is unclear how long they will continue to use the apps. Therefore, whether or not the phase resembling the Plateau of Productivity exists in the life cycle of language learning remains to be determined.

To answer **RQ 2. What are the reasons that trigger the change of phases in language learning applications?** Besides the questions directly concerning them, the learners' language learning background, their impressions and attitudes on apps were also investigated.

For the participants in this study, the extrinsic motivation like the curriculum and language tests is almost equally important as the intrinsic motivation such as the interest in the culture or language, and it could be also interpreted that the participants with experience in using language learning apps were generally motivated to learn a language. When talking about the first impression of the app, most participants regarded it as a useful tool. The traditional image of apps that makes learning fun and relaxed only accounts for a relatively small part in the responses, which is a little different from Bachore's (2015) conclusion that the usability and the gamification of the mobile devices and apps are most important factors affecting the learning process. In other words, language learners regard apps in a serious way and they expect the app to be helpful in acquiring language knowledge. The participants didn't regard language learning apps as a quite different method from the traditional way or learning by computer, and this might be because learners have already been familiar with MALL and language learning apps, as Anderson (2015) said that people seem to have become used to using mobile devices with the growing use of them, so they do not treat it as a new technology or a new way of learning.

The most important factor for starting using apps is the influence from people around, especially friends, classmates, and teachers. The social influence cannot be underestimated in learning language, especially in the case of learning language apps. Many apps reported in this study have the function to share the learning progress with friends or could be posted in SNS. A participant specified "the function that different users can share their experience in memorizing vocabulary is really attractive." The current results are consistent with the results in Ahn's (2018) study that found social influences positively influenced the students' intention to use. Advertisement is another reason for learners to

start using the app. Furthermore, participants specified the convenience in their responses, which is generally regarded as the most significant feature of MALL as many studies mentioned (Steele, 2012; Viberg & Grönlund, 2013). The advantage of resourceful authentic materials also was mentioned. This result confirmed the statement of Martin-Monje et al. (2014) that the sound linguistic content suitable for language learning is a must for the apps to attract the users of MALL.

Although language learning apps have many advantages, and the attitudes towards these apps were positive in general, nearly half of the responses indicated that the apps were abandoned. As many participants specified their own reasons, the reasons behind the abandonment might be more complex than we thought. The reasons could be divided into two main categories; the app-related factors, and the learner-related factors. Learners stop using apps most because they do not learn the target language anymore or they cannot manage language learning well. The app-related reasons like "not useful," "traditional ways of learning are more helpful" and "lack of feeling of learning" were learners' perceptions towards apps. Unlike the first impressions that "it is a useful tool", learners might find the app is not as effective and helpful as they expected and finally give it up. Other reasons regarding apps include dissatisfaction with the design of apps and the contents of apps. However, the reason like "not useful" might not be the problem of the app, it could be caused by lack of instructions on how to use apps in an effective way or because of insufficient input, which needs further investigation. Although mobile devices provide growing possibilities of learning, learners do not change their learning habits at the same pace, which usually takes more time (Viberg & Grönlund, 2013) and requires more systematic and standard instructions.

Some apps would go through the period called *Reviving Period*, though it is a small part of the reasoning for abandoned apps (21.79% in this study). Although the number of responses explaining the reasons for this restarting stage is limited, it could still provide some information on this issue. The reasons could also be divided into the learner-related reasons and the app-related reasons, and most responses fall into the former ones. The main reasons for participants to restart using an app were because they "restarted learning a language" and "prepared for tests for language proficiency". They made the decision out of their own learning needs rather than the improvement of apps or the technological advances. For the app-related reasons, seven participants "thought it would be helpful this time," which seems they gave the app a second chance to see if it could help with learning language, but it is unclear if this related to the functions or affordance of the app.

When comparing the reasons for restarting using an app with that for starting using it, there are less reasons related to apps, and this could be explained by a comment from one participant, "the apps available do not have too much difference with each other. Just grab the one you see (in the app store)." Learners might try an app at first because it is new and interesting. Those learners choosing the app for the second time might not have the fresh feelings or the overly high expectations like before, so the app-related reasons decrease.

When compared with the Hype Cycle, the dominant factors contributing to the increasing periods differ. According to the Hype Cycle, media plays a significant role in the early raising stage, while in the life cycle of language learning apps, the importance of media, namely the advertisement of the apps here, is much less important than the influence from teachers and friends. In the Hype Cycle, the changes of phases are directly related to the affordance of technology, so people give up a technology because its functions and implements fail their expectations, while the factors not related to the affordance of apps are evident in this study, such as stopping learning language and finishing the test, and these learner-related factors are more significant in the Reviving Period. However, in the Hype Cycle, this similar phase, the Slope of Enlightenment, is due to the improvement of technology like the release of the second or third generation of products. The differences in the factors triggering

the changes of phases indicate that language learning apps cannot simply be regarded and analyzed as a new technology. There is more to investigate under the halo of an exciting new technology. As some participants indicated that the apps made learning languages more enjoyable and they are different from the traditional ways, language learning apps do have their unique affordance as a new technology. However, more participants regarded and used it as just another method to facilitate language learning. When investigating language learning apps, we are still talking about language learning. To better apply apps in language learning, it would be wise to consider the factors contributing to language learning in a larger context and then integrate them into the design of apps and instructions to use apps.

Limitations

The roles of teacher and friends were not separated in this questionnaire, so it is hard to see how they affect participants differently. Since participants answered the questions based on their experience, the self-reported bias exists, and as a whole, memories are not always reliable. According to Table 3, the number of participants using three or more apps should be 103, but only half of them responded to the questions on the third app. The inherent problem of unreliability of memory might be one of the possible reasons for the low response rate in the third app, as participants may not remember the experience clearly and therefore skip this part. It is also possible that the participants found the repeated questions a bit tedious, which was stated by some participants in the suggestion part at the end of the questionnaire. Therefore, the completeness of data was negatively affected due to these limitations. For further research, if accurate data across several years could be obtained, the results would be more reliable and significant. The current research didn't investigate the differences in the pattern of use among different groups of leaners. Further research can be conducted in a more controlled way to see how learners' differences such as gender, age, and language proficiency affect the use of apps.

Conclusions

This study focused on the life cycle of language learning apps and the reasons triggering the different phases. The Hype Cycle was introduced to allow comparison of the life cycle of language learning apps, which confirmed in this study that they are similar. In general, learners had positive attitudes and impressions towards language learning apps at first, which corresponded with the first stage, the *Increasing Period,* of the life cycle of language learning apps. Though, after a period of time of using it, nearly half of the learners abandoned using apps. Although some participants in this research chose to restart using apps, the rest of them just stopped using them. It is confirmed that learners have quite different preferences regarding language learning apps. When introducing this kind of app as a way of learning or including them in class, language teachers should realize that some students might not like or adapt to these apps well. Therefore, hearing learners' voices and being flexible with their differences and preferences are important in implementing MALL.

The results showed that the majority of learners started using apps due to the influence of their friends or teachers, and some participants specified that the sharing function of apps was attractive and motivating. Language teachers could play a critical role in leading learners to start to use apps and support them to use these apps to assist language learning more appropriately. For example, from the very beginning of the selection of apps, teachers could give learners more advice based on learners' needs and help them to build a more realistic view towards the affordance and effectiveness of apps. With the knowledge about the apps, learners could better use apps to learn languages. Teachers could also provide support in building communities of learners who use apps, creating an environment where they can share their experiences and support each other because as discovered in this research study, friends and classmates are one of the important factors motivating them to use apps.

Nearly half of the learners abandoned using apps for mostly app-related reasons, and complaints about the design of apps and the contents of apps were not scarce among the participants' responses. Since the design of apps was chosen by most participants as the reason for choosing an app, app developers and designers should hear voices from users and improve the apps accordingly. Besides the design, more meaningful tasks and interactive activities should be added to the apps. Otherwise, these apps are just another version of traditional drill practice. With regard to the reasons for restarting using an app, contrary to the reasons for the second turning point indicating the decreasing phase, more responses were related to learners' own learning needs rather the app-related factors, which could be interpreted as the positive hype effect diminishing and learners restarting use due to their actual needs.

This study on the life cycle of language learning apps shows that the high expectations and disappointment towards apps both exist. As language learning apps are not something new nowadays, how to apply them appropriately in language learning after the hype is gone becomes a new topic. This research also shows that different learners have different patterns of using apps, but the comparison between groups, such as differences between different age and education level, was not the focus in this research. Further studies could look into the different behavior among different groups so as to give more specific and detailed advice for both learners and teachers.

Ethical statement. All participants in this study took part voluntarily and were informed about the purpose and procedure of the study. The anonymity of all participants was maintained throughout the study. There are no competing interests.

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