

The Effectiveness of Self-study English Reading Apps (Mint Reading) on Chinese University Students' English Reading Abilities

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Content

Abstract	3
Introduction	4
Literature review	5
Methodology	10
Data analysis	14
Results	14
Discussion	33
Conclusion	36
Appendix	37
References	39

Abstract

This paper reported on how Chinese university students use the Mint Reading App to improve their English reading abilities. Eight university students were invited to participate in a case study, which recorded their detailed learning processes and tested their improvement in reading ability. The results demonstrated that the students had clear improvement on their reading speed and overall comprehensive abilities. Some also improved their vocabulary and syntactic analysis abilities. The improvement of these abilities was proportional to the effort they put on learning in this app. Fifty students who had completed the “100-day reading” were invited to do a questionnaire on how this app benefited their reading ability. The results showed the advantages of this app and several improvements of users' reading ability. Based on the results, suggestions for English reading lessons in Chinese universities were discussed.

Introduction

With the popularity of the Internet, many online educational applications appear in recent years. Most of existing English learning apps aim at cultivating English skills in a certain aspect and have high requirements for students' self-consciousness and self-directed learning. For many English skills, such as vocabulary and four basic skills, English reading is the core of English learning. Zhao (2013) refers that the purpose of university English learning is to develop students' reading ability and ability to listen, speak, translate and write in English. However, due to the fewer credits and less class hours of English lessons, the proportion of reading in university English teaching has been declining year by year, causing the input of college students' English learning is insufficient (Yan, 2018). This research selects Mint Reading app, focusing on improving reading abilities, to study its effectiveness for university students' English learning. The aim of the research is to test whether this app could improve the reading ability of English learners and to find ways to maximize students' English reading ability via this app.

Introduction of Mint Reading App

Mint Reading is an app for reading original English books. It divides the content of the book into 100 parts for the 100-day reading. Users who purchase the same books join a Mint Reading WeChat group in order to supervise each other and share reading experience. After completing the daily reading, users must answer three multiple choice questions about the content to detect whether they really read it. If users complete these three questions before 24 o'clock, they finish the daily sign-in successfully. Sign-in for more than 80 days is considered as finishing a reading a book and users will be rewarded with a printed book. In order to give users a better reading experience, this app provides audio for listening during reading and in-text dictionary where you query the meaning by double-clicking the words. It also provides daily after-reading notes for the content which includes explanations of complex sentences and some background knowledge.

Literature Review

L2 reading

According to Grabe (2012), reading was purposeful and many of these purposes required distinct combinations of skills in order to achieve reading purposes. Therefore, defining L2 reading needed considerations of various skills and purposes. Hameed (2008) pointed that L1 and L2 reading had similarities. They both involved the readers, the text and the interactions between these two. Current research on L2 reading had been criticized as being marginal and derivative from L1 reading, while neglecting factors such as cultures, linguistics and readers' educational backgrounds which were important for L2 reading.

Theory integrated in reading Apps

The initial reading theory proposed by Kintsch (1983, 1988) emphasized on readers' cognitive and general knowledge. The earlier concepts about comprehension preferred the knowledge-driven (top-down) process and ignored the word-based (bottom-up) process to some extent. Based on the previous reading theory, Perfetti and Stafura (2014) added the lexical subsystem in the reading theory and put forward a revised reading system framework. They pointed out that comprehension of the text relied on understanding words and combining the meanings into a mental model of the text. Also, the paragraph effect was worth noticing, because expressing ideas in words may be different from the simple explanation of the words' meanings. Therefore, interpreting the meaning of words or understanding the use of phrases in texts were the key points of comprehension.

Shang and Chen (2018) summarized the autonomous learning theory in their research of the impact of online learning. Autonomy, associated with motivation and self-direction, was a significant element in foreign language learning process especially in self-directed learning. Autonomous learners were as those who set their learning goals,

plan and monitored their learning processes and reflected on their learning results. Their research showed that for learners, the use of autonomous learning tools and materials would promote their learning effectiveness and cultivate their autonomy.

Impact of using apps for learning English

Mindog (2016) conducted a case study targeting at using apps to promote English language learning. The research surveyed the English-related apps, including language learning apps, social apps, etc., used by intermediate Japanese English learners, and explored the reasons for their choices and the ways they used the apps to learn English. The result showed that the use of apps could give learners access to English content and provided regular opportunities to authentic English communication contexts, which were important for a country where English was a foreign language and infrequently encountered in real life. Although this research did not address the development of English reading abilities, it systematically investigated the positive effects of various English-related apps on English learning.

Ishikawa, et al. (2013) took the learners of English for international affair as the research objects and designed an online reading app which includes a dictionary function and a term-query function for vocabulary learning, so as to explore the improvement of learners' reading abilities. The result showed that the online self-directed reading mode greatly improved learners' reading speed without a loss in comprehension and promoted their reading motivation. However, there was little evidence showing that the use of this app contributed to an improvement in the vocabulary aspect.

Shang and Chen (2018) studied the impact of online autonomous learning on EFL students' reading skills. The research divided participants into an experimental group (integration of online reading and teacher-guided learning) and a control group (only teacher-guided learning). The pre- and post- comprehension test were chosen from General English Proficiency Test (GEPT). The result showed that the overall reading

ability (score) of the learners in both groups improved, but the progress of the experimental group was more obvious. They pointed out that the combination of teacher guidance and the use of online reading app was an effective way to promote learners' comprehensive reading abilities.

Studies aim at Mint Reading and related technology of this app

Yan (2018) analyzed the strengths and weaknesses of the online reading course "Mint Reading" and indicated the origin of English reading lessons in mainland universities. She summarized three merits of Mint Reading. First, it followed Krashen's (1977) input hypothesis that learners progress in their knowledge of the language when they comprehended language input that was slightly more advanced than their current level. It assessed students' vocabulary levels before the course to ensure that the students can read books that were slightly higher than their reading levels. The second was to segment the books into small chunks, which catered to the characteristics of "fragmented learning" in the internet age. The "fragmented learning" broke through the limitation of time and space, which emphasized the fragmentation of learning time and content, as well as the specific learning goals (Liang, et al, 2018). The third was to insert the dictionary, the audio text and daily after-reading notes to assist students' understanding and learning of vocabulary and sentence patterns. As for its weakness, Mint Reading ignored the assessment of reading results since there was no clear test to examine the learning effects and reading abilities. Yan (2018) put forward that in the university English reading class, teachers could use the Mint Reading app as a tool to arrange offline in-class discussion and reading tests, even apply the Whole Language Approach (Gunderson, 2013) to combine various skill trainings such as speaking, writing skills to comprehensively improve students' overall English language proficiency.

Reading with assistance was also applied in the design of Mint Reading app. The app provided the audio of the content and instant dictionary for learners. Rochdi and Eppard conducted a study on whether assisted reading (reading while listening) could affect

people's reading abilities in 2007. The experimental data was still being analyzed, but the experiment focuses on the reading fluency and rate, which was not covered in previous reading ability research. It predicted that reading with audio input would have a positive effect on comprehension of the text.

Learners' perception towards online reading apps

Based on the previous research that emphasized on users' initial acceptance of reading apps, Hu and Zhang (2016) explored the factors that affected Chinese university students' loyalty towards mobile book-reading apps, which emphasized on users' intention to continue their use of the reading apps. The result showed that users' satisfaction and perceived usefulness play crucial roles in continuing usage. This study helped to understand users' attitude and behavior in using reading apps for sustainable services.

Huang (2013) investigated students' perceptions of e-reading for English learning. The research recorded of EFL learners' perceptions of the e-reading website (how they choose books), the reading process and experience, and the learning effects of e-reading. The result showed that learners believed that online reading was more convenient and environmentally friendly than printed books, and the technology included could help them comprehend texts and develop reading habits. But the disadvantage was that it was not convenient to taking notes and it increased their screen time.

Methods that the previous researches use

In the previous researches, interview, survey questionnaire and case study were the three most popular research methods. The researchers tended to use interviews or questionnaires to collect learners' perspective towards using apps for English learning and reading. For example Shang & Chen's (2018) research included both questionnaire and interview, Mindog (2016) and Huang (2012) used interviews. Ishikawa, et al.(2013) and Hu. & Zhang. (2016) used questionnaire.

As for the assessment of English reading abilities, researchers (Ishikawa, et al., 2013) designed their own English reading apps based on participants' learning needs. Then, they recorded users' learning process and evaluate users' learning effects. Some researchers (Shang. & Chen., 2018) conducted comparative studies by dividing participants into an experimental group providing online resources and a control group without online resources.

Gaps in the literature

Previous studies surveyed existing English learning apps and evaluated the effectiveness of some English reading apps. There were also many studies on the attitude of the learners/users to online reading. The Mint Reading was one of the most popular English (reading) learning apps among Chinese university students. There was still a lack of research on this app and its effect on mainland university students. In the representative studies reviewed earlier, only the overall detection of reading ability was mentioned, and the evaluation of some skills subsuming under reading such as vocabulary, grammar and sentence structures and comprehension was lacking. Because words and syntax were the necessary conditions for constructing a paragraph, and they were also the basis for our understanding of the meaning. Sometimes, the significant change of an overall reading ability was difficult to detect, we could use the vocabulary, sentence analysis ability, reading speed and other aspects to detect whether there were changes in these micro-aspects of reading. Therefore, in my research, I focused on which specific reading ability improved by using this reading app and how to use the app to amplify the learning outcomes.

In light of the above literature review and the analysis of the research gaps, this study was guided by these research questions:

1. What do they think of using Mint Reading App?
2. How do they use Mint Reading to practice English reading?
3. What aspects of reading ability can be developed (Vocabulary, grammar and sentence structures, comprehension)?

4. To what extent have they improved their reading ability?

Methodology

This research selected a “100-day Mint Reading” as the research content. It applied a convergent mixed method. Using this method was based on an assumption that two methods may produce different results, while they could be used to check for each other (Creswell & Guetterman, 2019). The qualitative data was collected through a case study including interviews and comprehension tests, and the quantitative data was collected through a questionnaire. The purpose of qualitative data collection was to study the use of this app by individual learners, and to explore how the app specifically promoted the learner's reading ability by exploring their learning processes. Interviews could collect participants' more subjective opinions, including their feelings about improving their English reading abilities, or their experience with the app. While, the reading comprehension test objectively evaluated their reading ability, so as to test whether the app really promoted their reading ability.

The purpose of the quantitative data collection was to broadly collect students' opinions and attitudes about whether this app could improve their English reading skills and hoped to understand most people's attitudes or to examine different opinions. However, the potential risk of using this approach was that the results of the two methods may vary, so there were many factors that need to be weighed when analyzing the results.

Participants

Eight mainland university students who would take the CET-6 exam were selected to participate in the case study. The experimental subjects promised to finish the “100-day reading” and allowed the researcher to track their learning processes. Then, fifty mainland university students who had completed the 100-day reading in Mint Reading WeChat groups were randomly invited to fill out the questionnaire.

Instrument

Interview

Eight selected subjects were separately interviewed to record their detailed learning processes in the “100-day Reading”. Every ten to fifteen days was a learning phase when each participant received one interview; altogether each of them received eight interviews during the 100-day research. The content of the interview consisted of three parts. One is how to use this App for daily reading, the other is users' learning goals and attitudes, and the third is the benefit of using this App. The concrete interview questions are in the appendix 1 of this report.

Comprehension test

Each of the eight selected subjects were required to complete a time-counted pre and post comprehension test before and after participating in the “100-day Reading”. The comprehension tests aimed at testing their improvement in concrete reading abilities. The reading articles and questions in the tests were from CET-6 (year 2017-2018) which is a compulsory and authoritative test for mainland university students. The questions including summarizing general ideas of paragraphs and content analysis were all multiple-choice questions. The researcher divided the reading articles of CET-6 from 2017 to 2018 into three themes, namely science and technology, social issues, and culture, education and history. According to the subject's choice of the theme of the book in the Mint Reading App, the researcher provided them with test articles under the corresponding theme. Therefore, participants who chose different themes of books received different comprehension tests (shown in Table 1). The test link is in the appendix 2 of this report.

Table 1: 8 students' choices of books and tests

Stu	Book Name	Topic	Pre-test	Post-test
1	Real humans	Science and Technology	1. 06/18-paper 2 Section C Passage 1	1. 12/17-paper 2 Section C passage 1

			2. 06/18-paper 2	2. 12/17-paper 2
			Section B	Section B
2	How to Stop Worrying and Start Living	Social Issues	1. 06/18-paper 3 Section C Passage 1	1. 12/17-paper 3 Section C passage 2
			2. 06/18-paper 1 Section B	2. 12/17-paper 3 Section B
3	Angels and Demons	Culture, Education and History	1. 06/18-paper 3 Section C Passage 2	1. 06/17-paper 3 Section C passage 2
			2. 06/18-paper 3 Section B	2. 06/17-paper 2 Section B
4	Gone Girl	Social Issues	1. 06/18-paper 3 Section C Passage 1	1. 12/17-paper 3 Section C passage 2
			2. 06/18-paper 1 Section B	2. 12/17-paper 3 Section B
5	The Alchemist	Culture, Education and History	1. 06/18-paper 3 Section C Passage 2	1. 06/17-paper 3 Section C passage 2
			2. 06/18-paper 3 Section B	2. 06/17-paper 2 Section B
6	Sherlock Holmes	Culture, Education and History	1. 06/18-paper 3 Section C Passage 2	1. 06/17-paper 3 Section C passage 2
			2. 06/18-paper 3 Section B	2. 06/17-paper 2 Section B
7	Pirates of the Caribbean	Culture, Education and History	1. 06/18-paper 3 Section C Passage 2	1. 06/17-paper 3 Section C passage 2
			2. 06/18-paper 3 Section B	2. 06/17-paper 2 Section B
8	Sherlock Holmes	Culture, Education and History	3. 06/18-paper 3 Section C Passage 2	3. 06/17-paper 3 Section C passage 2
			4. 06/18-paper 3	4. 06/17-paper 2

Section B

Section B

Questionnaire

According to Creswell and Guetterman (2019), this questionnaire is a criterion-referenced type which examines individual's performance in comparison to a criterion or score. There were 13 items in the questionnaire. The first two items were used to explore the users' attitude towards the App, including the advantages and disadvantages in their views. Item 3 to 6 focused on how users used the App to read, and item 7 to 13 required users to self-assess whether their reading ability had improved. The questionnaire included a 5-point Likert scale which ranked from 1 (strongly disagree) to 5 (strongly agree). The questionnaire sample is in the appendix 3 of this report.

Expected Results

RQ1&2: What do they think of using Mint Reading App? How do they use Mint Reading to practice English reading?

The researcher predicted that participants would give positive feedback mostly through the questionnaire. The advantages of Mint Reading should be similar to those mentioned in Yan's (2018) study. The experiment predicted that more than half of the autonomous learners would use the audio text and after-reading notes for assisted reading, since the people who voluntarily chose to use this app for learning were mostly autonomous learners.

RQ3 &4: To what extent have their reading abilities (vocabulary, sentence structure and comprehension) been developed?

Although the 10 participants may have different English proficiency, they may have different degrees of improvement in reading abilities after completing the 100-day reading. If the participants strictly adopted the assisted reading mode and persisted in reading and sorting out knowledge points every day, their sentence analysis ability and comprehensive ability would improve, even the abilities of interpretation of the words

in sentences may be improved. This improvement could be reflected in the time needed to do the test and their accuracy.

Data analysis

The researcher conducted a case study of eight mainland university students through interviews and comprehension tests. The researcher recorded and summarized their 100-day reading experience with Mint Reading, then combined their comprehension test results before and after the 100-day reading to analyze whether Mint Reading app could help improve students' English reading abilities. Then, the researcher collected 50 users' opinions and using experiences of the Mint Reading App through questionnaire, and then analyzed their answers to each question.

Results

Interview Results

Summary

The researcher summarized the learning process of each subject in 100 days in a paragraph. Also, the researcher summarized 8 interviews of 8 subjects over 100 days. Each summary includes usage methods, learning objectives and benefits. (Table 2)

Student No. 1

The initial reading time was longer (more than 30 mins), because he read daily after-reading notes carefully. Then the time and frequency of reading notes decreased. Making up for reading occurred after 70 days of reading. In the process of reading, he listened to the audio and checked the unfamiliar words in time, but he wouldn't specifically review the words. He thought his English listening skills improved. English reading ability, especially the ability to understand long and complex sentences, improved. The vocabulary may improve a little. The overall understanding of a text improved, that is, he could quickly get the main idea of the paragraph, so also felt that the reading speed became faster.

Student No. 2

His reading attitude showed a significant downward trend, and he made up for reading for over 30 days. He felt that his reading speed and English language sense improved, and his vocabulary didn't increase significantly. He didn't care too much about syntactic analysis because understanding the content is the only purpose. He thought that this app could be used to cultivate English reading habits. Students who were not English majors could have the opportunity to learn English regularly.

Student No. 3

He just listened to the article. he would listen or read repeatedly only when he didn't understand the parts. He insisted on reviewing the word list and reading after-reading notes. His reading speed and listening skills increased significantly. His vocabulary greatly improved because he could basically understand 80% of the words in the article by the end of the reading period. He could quickly locate the key sentences; his syntactic analysis ability improved a lot. He felt that his overall English ability also improved.

Student No. 4

He listened to the audio and check words during reading. He decreased the time and frequency of reading notes since the 30th day. He speeded up the audio after 60 days of reading. Listening skills improved. He learnt more words due to the repeated occurrence of them. He increased his reading speed and he could still understand the general content and get the main idea. For complex sentences, he could analyse them and locate the main sentences to understand.

Student No. 5

He reviewed word list, then listened and read the article. He checked words while reading. He would read notes when he didn't understand the content. He tried to listen only but failed, but he speeded up the audio since the 40th day and adapted to the faster

audio. His reading speed increased significantly, and he could understand the main idea of a paragraph quickly. Maybe his vocabulary and syntactic analysis ability also increased.

Student No. 6

He reviewed word list, then listened and read the article. He checked words while reading. He would read notes when he didn't understand the content. His reading speed improved, and he could understand the content better (confusing parts became less). Other parts of improvement were not so obvious.

Student No. 7

He reviewed word list, then listened and read the article. He checked words while reading. The time and frequency of reading notes decreased. He made up for reading for 10 days. Understand the reading content was the main purpose, so studying complex sentences is not so important for him. His reading speed and vocabulary increased because the frequency of checking unfamiliar words decreased. For complex sentences, he could get the rough meaning after reading.

Student No. 8

He listened and check words during reading. He speeded up the audio after 70 days and adapted to that speed. His reading speed improved because he spent less time for reading the content. His ability to understand the content increased a lot. He could also understand the complex sentences better even if he didn't care much about the grammar and sentence analysis. He thought this was maybe due to his improvement in vocabulary and comprehensive ability.

Table 2: Summary of Interview

Student	1	2
Interview 1 (10 Day)	<ul style="list-style-type: none"> - 30-40 min, read then listen, check words, take notes. - To expand vocabulary. - Know more about drama. 	<ul style="list-style-type: none"> - 20 min, listen and check words, sometimes read notes - To enjoy reading rather than learn vocabulary or grammar. - Audio can help understand the long sentences.
Interview 2 (20 Day)	<ul style="list-style-type: none"> - 30 minutes, listen and read, take notes. - To expand vocabulary and learn native expressions. - Enjoy the content. 	<ul style="list-style-type: none"> - 10 min, listen and check words, make up for reading sometimes - To insist on reading and improve overall reading skills. - No obvious effect.
Interview 3 (30 Day)	<ul style="list-style-type: none"> - Less reading time, read notes 2-3 times a week. - To finish an English book. - Learn more native expressions. 	<ul style="list-style-type: none"> - 15-20 min, make up for reading 2-3 times a week. - To increase language sense. - Understand the content better even if there are many new words
Interview 4 (40 Day)	<ul style="list-style-type: none"> - 10-20 min, listen and check words, hardly read notes - To ensure daily English input. - A sense of achievement when insisting on reading. 	<ul style="list-style-type: none"> - 10 min, make up for reading 2-3 times, read notes twice. - To increase reading speed and language sense. - Increase vocabulary due to the existence of repeated words.
Interview 5 (55 Day)	<ul style="list-style-type: none"> - 20 min, check words and listen, no notes. - To practice listening and increase vocabulary. - Read faster and have a better understanding. 	<ul style="list-style-type: none"> - 10 min, make up for reading 3 times a week. - To improve reading speed. - Improve reading speed, unfamiliar words become less.



Interview 6 (70 Day)	<ul style="list-style-type: none"> - 10 min, check and listen, seldom read notes. - To increase vocabulary and understand the content better. - Read faster and have a better understanding. 	<ul style="list-style-type: none"> - 10 min, make up for reading for over a week. - To improve fast reading ability. - Improve reading speed and get main idea faster.
Interview 7 (85 Day)	<ul style="list-style-type: none"> - Make up for reading sometimes. - To increase vocabulary and understand sentences better. - Improve listening and locate topic sentences faster. 	<ul style="list-style-type: none"> - 10 min, just read article. - To keep an English input. - Improve reading speed and understand long sentences better.
Interview 8 (100 Day)	<ul style="list-style-type: none"> - Make up for reading sometimes. - Improve listening skills, read faster, understand better and increase vocabulary. 	<ul style="list-style-type: none"> - 10 min, listen and check words. - Reading speed and language sense improve a lot, maybe vocabulary also increases.

Student	3	4
Interview 1	<ul style="list-style-type: none"> - Review word list, listen then read, check words, read notes. - To know more about translation and native expression. 	<ul style="list-style-type: none"> - 20 min, listen and check words, read notes (10 min) - To keep language sense and improve reading speed. - No obvious improvement



	<ul style="list-style-type: none"> - Form a habit of daily English reading. 	
Interview 2	<ul style="list-style-type: none"> - Listen only, read text when he doesn't understand. - To form a long-term reading habit. - Improve listening skill and syntactic analysis skill. 	<ul style="list-style-type: none"> - Insist on reading routine. - To keep language sense and understand long sentences better. - Increase understanding of long sentences.
Interview 3	<ul style="list-style-type: none"> - Insist on reading routine. - To improve overall English using skills. - Improve reading speed, listening and vocabulary. 	<ul style="list-style-type: none"> - Insist on reading routine. - To improve speed of understanding long sentences. - Increase understanding of long sentences.
Interview 4	<ul style="list-style-type: none"> - Insist on reading routine. - To improve overall English using skills. - Improve listening and vocabulary. 	<ul style="list-style-type: none"> - 15 min, only read notes about sentence analysis. - To improve understanding of long sentences. - Improve the understanding of the article.
Interview 5	<ul style="list-style-type: none"> - Insist on reading routine. - To improve overall English using skills. - Analyse and understand sentences better. 	<ul style="list-style-type: none"> - 10 min, seldom read notes. - To know more words and keep language sense. - Improve reading speed and understand long sentences better.
Interview 6	<ul style="list-style-type: none"> - Insist on reading routine. - To improve overall English using skills. - Can understand the content faster and better. 	<ul style="list-style-type: none"> - 10 min, speed up the audio. - To improve listening and reading ability. - Understand the content even if there are many new words.



Interview 7	<ul style="list-style-type: none"> - Insist on reading routine. - To improve overall English using skills. - Get main idea faster. 	<ul style="list-style-type: none"> - 10 min, adapt to faster audio. - To understand the content with a faster reading speed. - Improve the listening skills.
Interview 8	<ul style="list-style-type: none"> - Insist on reading routine. - Overall English using skills improve a lot, including vocabulary, syntactic analysis, reading speed and listening. 	<ul style="list-style-type: none"> - Insist on reading routine. - To keep reading ability. - Overall reading ability improves, learn more words, syntactic analysis ability and listening skills improve.

Student	5	6
Interview 1	<ul style="list-style-type: none"> - Word list, listen and check words, read notes - To insist on daily English reading. - Enjoy the daily reading. 	<ul style="list-style-type: none"> - 10 min, listen and check words, read notes when he doesn't understand the content or sentences. - To improve English reading ability and language sense. - No obvious
Interview 2	<ul style="list-style-type: none"> - Insist on reading routine. - To keep language sense for CET-6 exam. - Improve language sense. 	<ul style="list-style-type: none"> - Insist on reading routine. - To keep an English input and improve English reading ability. - Understand the content better and faster.



Interview 3	<ul style="list-style-type: none"> - Read notes when don't understand the content. - To keep an English input. - Can understand the sentences when reading them. 	<ul style="list-style-type: none"> - Insist on reading routine. - To improve overall English reading ability. - Confusing sentences become less.
Interview 4	<ul style="list-style-type: none"> - Try to listen only but failed, sometimes read notes - To improve overall reading ability - Form daily reading habits. 	<ul style="list-style-type: none"> - Insist on reading routine. - To improve overall English reading ability. - Read faster and can understand most of the content.
Interview 5	<ul style="list-style-type: none"> - Speed up audio, sometimes read notes - To improve reading speed. - Adapt to the quicker audio. 	<ul style="list-style-type: none"> - Insist on reading routine. - To improve overall English reading ability. - Can understand most of the content even if there are new words.
Interview 6	<ul style="list-style-type: none"> - Insist on reading routine. - To improve overall reading ability. - Can understand the general content with quicker audio speed. 	<ul style="list-style-type: none"> - Insist on reading routine. - To improve overall English reading ability. - Can get the main idea of the article faster.
Interview 7	<ul style="list-style-type: none"> - Insist on reading routine. - To keep language sense and reading ability. - Can understand long sentences. 	<ul style="list-style-type: none"> - Insist on reading routine. - To improve overall English reading ability. - Have better understanding of the content.



Interview 8	<ul style="list-style-type: none"> - Insist on reading routine. - Increase reading speed, can understand the content better, maybe syntactic analysis ability improves 	<ul style="list-style-type: none"> - Insist on reading routine. - Increase overall reading ability, including reading speed, vocabulary. Understand almost all the content.
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Student	7	8
Interview 1	<ul style="list-style-type: none"> - Listen, word list, read notes - To improve reading ability and understand content. - Not so obvious 	<ul style="list-style-type: none"> - 10-15 min, listen and check words, roughly read notes - To improve listening and reading skills for CET-6. - Maybe improve reading speed.
Interview 2	<ul style="list-style-type: none"> - Above 10 min, read notes every day, check words. - To improve reading speed and know long sentences - Have a better understanding of the content. 	<ul style="list-style-type: none"> - 15 min, sometimes read notes, check words frequency increases. - To keep a reading habit and language sense. - Can locate the key point in the content.
Interview 3	<ul style="list-style-type: none"> - 10 min, read notes twice a week, review word list. - To insist on reading and improve reading ability. - Increase vocabulary. 	<ul style="list-style-type: none"> - 15 min, check words, sometimes read notes. - To keep reading habit and language sense. - Improve reading speed and can understand the overall content.
Interview 4	<ul style="list-style-type: none"> - Make up for reading for a week, seldom read notes. - To increase vocabulary and reading ability. 	<ul style="list-style-type: none"> - 10-15 min, check words, no notes. - To improve reading ability (can locate main idea).



	- Not obvious	- Keep reading speed and understand the content better.
Interview 5	- 10 min, make up for reading 3 times. - To improve reading ability and insist on reading. - Not obvious.	- 15-20 min, check almost every unfamiliar words. - To improve reading ability for exam. - Maybe vocabulary increases and language sense keeps.
Interview 6	- 10 min, sometimes review words, no notes. - To understand article even if there are new words. - Improve overall reading ability a little.	- 10-15 min, only read notes to understand complex sentences. - To improve reading ability for exam. - Vocabulary increases because unfamiliar words become less.
Interview 7	- 10 min, listen and check words, review words. - Understanding long sentences is to better understand the content. - Vocabulary increases, can understand content.	- 10 min, just read the content, speed up the audio. - To insist on reading and read faster. - Overall reading ability may improve.
Interview 8	- 10 min, listen and check words, review words. - Reading speed and understanding of the content improve, frequency of checking words decreases.	- 10-15 min, listen and check words. - Understanding of longer sentences and reading & listening speed improve, maybe vocabulary increases.

2. How do they use Mint Reading App?

Based on the interview summary, of the eight case study students, five persevered reading every day (student No. 3,4,5,6,8) and only student No. 2 missed his reading for over thirty days. Student No. 3,5 and 7 insisted on previewing and reviewing the “word list” provided before daily reading. All eight students used the same methods to assist their reading which were listening to audio and checking unfamiliar words while reading. The time they used depended on the audio duration which was around ten minutes. Student No. 3 and 5 had tried listening to audio only to improve their listening skills at the same time, while only No. 3 succeeded. No. 4, 5 and 8 had tried to accelerate the audio speed at around 50th days so as to help improve their reading speed, and they all adapted to the faster speed in the end.

Except for No. 2, all of them had the experience of reading after-reading notes in the 100-day reading, while only student No. 3 insisted on reading and taking notes every day. Student No. 1, 4 and 7 insisted on reading notes for the first twenty to thirty days, but gradually reduced the frequency of reading notes and finally gave up at around the 70th day. Student No. 5,6 and 9 read notes irregularly and only did this when they had problems in understanding the content.

In general, all the eight students insisted on this 100-day reading project. Among them, student No. 3 fully utilized all the learning resources provided by the app, and student No. 2 was the one with the worst motivation and attitude.

3. What aspects of reading ability can be developed? To what extent have they improved their reading ability?

The data collected showed that the improvement of users' reading ability was in four aspects, namely overall comprehensive ability, reading speed, vocabulary and syntactic analysis. Among them, the progress in the first two aspects was more obvious and

testable.

Overall comprehensive ability and reading speed

According to the case study data, their reading speed and overall comprehensive ability all improved more or less. These two points could be reflected from both their self-evaluation in the interviews and their pre and post comprehension test results.

Table 3: 8 students' pre and post comprehension test results and improvement

Stu	Pre-test 1	Post-test 1	improvement	Pre-test 2	Post-test 2	improvement
1	8 min, 5/5	7 min, 5/5	-1 min,	15min, 7/10	10min, 9/10	-5 min, +2Q
2	9 min, 3/5	9 min, 4/5	0 min, +1Q	10min, 5/10	7min, 6/10	-3 min, +1Q
3	9 min, 4/5	5 min, 5/5	-4 min, +1Q	12min, 7/10	8min, 10/10	-4 min, +3Q
4	8 min, 5/5	8 min, 5/5	/	12min, 8/10	8min, 10/10	-4 min, +2Q
5	8 min, 5/5	5 min, 4/5	-3 min, -1Q	13min, 5/10	9min, 6/10	-4 min, +1Q
6	10min, 5/5	5 min, 5/5	-5 min,	15min, 7/10	12min, 10/10	-3 min, +3Q
7	8 min, 4/5	8 min, 5/5	0 min, +1Q	15min, 8/10	10min, 9/10	-5 min, +1Q
8	8 min, 5/5	6 min, 5/5	-2 min	16min, 8/10	10min, 10/10	-6 min, +2Q

From the test results, the reading speed and accuracy rate of the eight students improved after 100 days of reading. Although the accuracy rate of student No. 5 in Reading Test 1 declined a bit, his reading speed still increased. This special case may due to his carelessness in doing the test. It was worth comparing the reading experience and improvement of Interviewee No. 2 and 3. No. 2 had the lowest reading task completion and the lowest reading motivation among the 8 students. Comparing his test results with other students', he also had the lowest improvement in reading speed and accuracy. Interviewee No. 3 was the only student who insisted on reading passages, memorizing words, and studying complex sentences in the after-reading notes. He had the largest improvement in the overall reading speed and his correct rate of questions even reached 100%. In the reading process, No. 4, 5 and 8 deliberately improved their reading speed.

Their test results showed that their reading speed had been significantly improved compared with other students. At the same time, the accuracy of No. 4 and 8 also increased while improving reading speed.

According to the interview transcript, there may be two reasons for the improvement. One was reading along with the audio input.

“听着读感觉阅读速度快很多，因为你会跟着他的节奏，你就不会读着读着走神。

通过他朗读的断句，让我知道大概哪些是一个部分要放在一起理解。

It seems that your reading speed is much faster when you read and listen together, because you will follow his rhythm to read and you won't lose your concentration. Through the pause in his reading, I can know which parts should be put together to understood."

(Student No. 2)

Student No. 4, 5 and 8 showed that speeding up the audio was to speed up their reading.

“能够听更快的语速，听读可以同步。

I hope to listen to faster audio. During this period, my reading and listening can match."

(Student No. 4)

“我加快了听力的速度，然后发现自己还可以跟得上我阅读，我就明显感觉自己的阅读速度真的进步了。

I accelerate the listening speed and find that I can still follow that audio to read. This is the moment that I believe my reading speed really improve a lot." (student No. 5)

“加快了听力速度，又想提高阅读速度，因为你要一直跟着他的说话去阅读，所以听的快了，读也“被迫”加快。

I accelerate the listening speed so as to accelerate reading speed. You always follow the audio to read. When the audio become faster, your reading is 'forced 'to be faster."

(Student No. 8)

The second reason was that they adapted to the English input and their English language

sense improved during the 100 days reading process. Therefore, they could find the key information faster while reading an article. This comprehensive ability also helped them find important points when doing comprehension tests. “对叙事性文章的理解变强了，就是说阅读的时候很容易把握重点或者主题句。

The understanding of narrative articles has become better, which means that it is easy to grasp the key points or topic sentences when reading.” (Student No. 1)

“虽然看不懂的词一直都挺多，但影响整体阅读的情况少了，可能真的是语感原因吧。

Although there are many unfamiliar words during reading, they won't disturb my reading and understanding of the content. Maybe it is because my language sense improves?” (Student No. 2)

Vocabulary

Student No. 2, 3, 4, 5, 7 and 8 in the interview said that their vocabulary may increase. Although the frequency of searching for words decreased during their latter reading period, they could still understand most of the content during the reading. Among them, No. 2, 4 and 7 said that the repeated occurrence of many new words helped them learn more words.

“生词会查询，但不会刻意记录，但随着阅读量的增加和内容范围固定化，还是潜移默化学习到了一些新的词语。

I will check unfamiliar words while I won't review it after reading. However, with the increase in amount of reading and repeated words in the fixed context, I still learn some new words unconsciously.” (Student No.4)

Some students indicated that the increase in their vocabulary may also promote their ability to comprehend the content of the article. Because they could understand the meaning of sentences by concatenating the meaning of words. It would be easier to comprehend the meaning of the sentences if they knew more words.

“可能词汇量提高了，反正能看的懂阅读内容，我理解文章就是大概看一段，发现意思基本连贯下来就可以，不会深究的。

Maybe my vocabulary increases? I just know that I could understand the content. I won't seriously study the sentences and paragraphs I read, as long as the meaning is coherent, and I can roughly understand it.” (Student No. 7)

Syntactic analysis

In general, the eight students had relatively vague views on their ability to syntactic analysis. This ability was also difficult to measure by testing. Student No. 1, 3, 4, 6 and 7 in the interview who insisted on reading notes at times admitted that their ability to analyze complex sentences may also increase, because their reading speed and understanding of complex paragraphs had improved. Four of them thought that it was more important to comprehend the meaning of the sentences than to analyze their structures. As long as they could roughly understand the meaning, they would not take the syntax analysis very seriously. Only student No. 3 had deliberately learned the sentence analysis skills through the notes. Because one of his learning objectives was to improve translation skills, he paid more attention to the training of this syntax analysis ability. Student No. 3 said:

“希望掌握一些翻译的技巧，所以我学习的时候会关注每个句子怎么去拆分理解会更好。

I hope to master some translation skills. Therefore, when I study, I will notice how to split each sentence so as to explain it better.”

Questionnaire Results

1. What do they think of Mint Reading App?

Analysis found eight advantages, shown in Table 4 below, three of which concerned the reading content, that is, the app provided authentic English materials and after-reading notes for the content and chose suitable books for users of different English levels. The

other four were for the unique features of this reading app: the supervised reading, the dictionary function, convenience, and fragment learning. The last was that users could improve their English reading ability through the usage.

Table 4: Advantages of this App

Advantages	No. of users
The app's after-reading test and sign-in mechanism supervises the completion of daily reading.	11
Dividing the content of a book into multiple sections to reduce the amount of daily reading.	9
Recommending suitable levels of English books based on your pre vocabulary test result.	8
Users can immediately check the meaning through double-clicking of the words during their reading.	6
Reading English books on a mobile phone is convenient and you can do this at any time or places.	6
Providing authentic English materials (famous work).	5
Increase their reading ability through reading English books.	3
Providing daily after-reading notes to help understand the content.	2

Analysis found four negative attitudes towards the app. Some users thought that it was not good to do daily practice questions only once, because they may not be able to make them all correct due to some carelessness. Some users felt that the 100-day reading time was too long, and there was a sense of slack at the end. Some users considered that the daily sign-in reminders were not obvious enough, so they occasionally forgot to read. Some users indicated that it was annoying when stop reading before the climax and waiting until the next day to read the climax.

Table 5: Disadvantages of this app

Disadvantages	No. of users
---------------	--------------

They could only do the daily practice once.	10
There is a sense of slack during the reading process.	8
The sign-in reminder is not obvious.	5
The division of the text is not so reasonable.	4

2. How do they use Mint Reading to practice English reading?

With regard to the result from the questionnaire item 3, 4, 5, 6 in Table 6 ($M = 4.30$, $SD = 0.316$), it showed similar information as the case study. 86% of the users completed on-time reading for more than 80 days ($M = 4.86$, $SD = 0.351$). All of them listened to the audio while reading ($M = 5.00$, $SD = 0$), and they broadly used the dictionary function to assist their reading ($M = 4.06$, $SD = 0.314$). More than 60% of the users showed neutral attitude (3 points) towards reading the after-reading notes after reading, which meant that they had read it, but only occasionally ($M = 3.26$, $SD = 0.600$).

Table 6: How to use the App

	Items	Mean	SD
3	Completing daily reading for over 80 days	4.86	0.351
4	Reading daily after-reading notes	3.26	0.600
5	Listening to audio while reading	5.00	0.000
6	Checking unfamiliar words while reading	4.06	0.314
	Average	4.30	0.316

3. What aspects of reading ability can be developed? To what extent have they improved their reading ability?

As for the results of the questionnaire items 7 to 12 ($M = 4.38$, $SD = 0.418$), which focused on students' improvement in overall comprehensive ability, reading speed, vocabulary and syntactic analysis (Table 7). All the users agreed that their reading abilities improved through the use of this app and over half of them strongly agree it ($M = 4.52$, $SD = 0.505$). All the users could understand the daily reading content ($M =$

5.00, $SD = 0$). Nearly 40% of users can answer the daily comprehension test completely correctly ($M = 4.38$, $SD = 0.490$). The users thought that their reading speed had improved, and 74% of them even agreed strongly ($M = 4.74$, $SD = 0.443$).

Only one user in questionnaire showed neutral attitude about vocabulary, while the others thought they had learnt more words ($M = 4.16$, $SD = 0.422$). As for the syntactic analysis skills, nearly half of the users maintained a neutral attitude, and the other half thought they had some improvement. It was worth noting that two users gave 2 points, which meant that they considered there was not much improvement on this ability ($M = 3.46$, $SD = 0.646$).

When the users were asked to choose a skill that they had improved most, four of them thought it was vocabulary, and three of them said it was grammar and sentence analysis. Other users thought their general ability to read and comprehend a passage improved the most.

Table 7: Improvement in four aspects

	Items	Mean	SD
7	This app benefits my reading skills	4.52	0.505
8	Understanding the content	5.00	0.000
19	Finishing the daily after-reading test correctly	4.38	0.490
10	Improving the reading speed	4.74	0.443
11	Learning more words	4.16	0.422
12	Learning syntactic analysis ability	3.46	0.646
	Average	4.38	0.418

Discussion

Improvement and modification during the research

During the research, the researcher adjusted the content of the experiment in two parts. One is that the interviews with subjects changed from every 10 days to every 15 days. Because during the interview, it was found that their learning situation had hardly changed every 10 days, so the researcher extended the time interval to record the learning situations more effectively. The other is to cancel the translation evaluation. Because each learner read different books and the content of the after-reading notes was different, the researcher cannot uniformly detect the sentence patterns they had learned. Moreover, because the answers to translations were more diverse and there was no standardized measurement for the translation accuracy, the effectiveness of evaluating their syntax analysis and comprehension skills through translation testing was poor.

Comparing results with previous researches

Yan (2018)'s research summarized the three advantages of Mint Reading, namely book difficulty, assisted reading, and distraction and fragment learning. The previous research on learners' perception towards online reading software reflected the importance of user's own initiative and reading apps' convenience. In this research, the results of the users' positive attitude towards Mint Reading proved all the aspects mentioned in the previous researches.

Shang and Chen's (2018) research indicated that the use of autonomous learning tools, including reading apps, improves the overall English reading ability. However, the present researcher specifically explored the impact of using reading apps on reading speed, comprehensive abilities, vocabulary and syntactic analysis, and found that the improvement in first two abilities were the most obvious and easiest to measure. The hypothesis that listening while reading may improve reading ability raised in Rochdi and Eppard's (2017) experiment was also verified though indirectly via students' report

in the interview.

Perfetti and Stafura (2014) pointed out that comprehension of the text relied on suitable interpretation of words in the text. The design of the in-text dictionary in Mint Reading also confirmed this theory since it provided the most appropriate word explanation according to the paragraph. The results of this research indicated that understanding the meaning of words was very helpful for understanding sentences and paragraphs. Also, because users can understand the paragraphs by understanding the word meaning then associating the meaning of the entire sentence, the syntactic analysis abilities for reading did not seem to be essential.

Inconsistency discussion

Comparing the actual research results with the assumptions before the research, the researcher found that there were differences in how users used this app and the improvement in reading ability. The experiment assumed that more than half of users would insist on using audio and after-reading notes, in fact, all the users used audio and dictionary functions, but most users only read after-reading notes occasionally. The researcher supposed that audio and dictionary could be considered as tools to help understand the content of the article since it improved the comprehension of the content and the convenience of the reading process. However, after-reading note was more like a tool that helped understand the details of the language and learn grammar knowledge. Based on the results of the advantages for the app, it can be seen that most users hoped to use this app to read English books, rather than focus on the improvement of language usage abilities. Therefore, most users did not insist on reading after-reading notes.

In terms of predicting the improvement of users' English reading abilities, the researcher ignored the improvement of reading speed, and focused more on the users' syntactic analysis abilities before the experiment. While in actual results, reading speed

and overall comprehensive abilities were the most obvious improvements. This also confirmed that users' main purposes were reading the English books and understanding the content.

Limitations of the research

Based on the design of this research, there are still some limitations. First of all, the number of subjects is small. Only 50 users were selected in the questionnaire, and 8 university students were selected in the case study. Therefore, it is difficult to get effective generalizations due to such a small sample size (Shang and Chen, 2018). Secondly, the subjects selected in the case study are all Chinese university students so the results may not be applicable to other English learning groups. Moreover, the subjects had different English levels and learning abilities. And the experimenter cannot control whether they had additional English learning experience during the research to help them improve their English reading ability. These uncontrollable factors may affect the results. Thirdly, the research results may not be reliable and valid due to the shorter duration of the research which only lasted for 100 days. If the length of the research is increased to two to three times, the improvement of reading abilities in different aspects may be more obvious, and the difference in the progress of different subjects may be more significant. Finally, the research lacked a systematic assessment of vocabulary and syntax analysis abilities with clear evaluation criteria. The assessment of these two aspects of abilities only comes from students' subjective self-cognition and self-reflection. Moreover, the number of questions in the comprehension test was small, and there may be accidental errors in the detection.

Implications for teaching and learning

This research finds that autonomous learning tools are conducive to promoting students to read English texts. The tools included, such as electronic dictionary and audio, are very helpful for students to understand the content of the article. Therefore, teachers in

universities can use Mint Reading as a teaching and learning tool. They can require students to complete daily reading before class, then help students expand related vocabulary, teach difficult sentence patterns and lead after-reading sharing activities in the lessons. Thus, in the process of improving students' reading abilities, students can also improve their vocabulary, grammar knowledge, listening and speaking skills. Although Mint Reading itself has already provided daily "Word Lists" and after-reading notes, students with poor learning motivation may ignore these learning contents. Therefore, the teacher can act as a supervisor to assist students in learning English knowledge other than just reading in English reading lessons (Jia, et al., 2018).

Conclusion

Research showed that the Mint Reading App had the convenience of online learning and provided complete self-learning tools. Users got a better English reading experience in the Mint Reading App, and most of them also developed the habit of daily English input during the 100-day reading process. Although the researcher only conducted a short period of time research on a small number of university students, he still found that the autonomous use of the Mint Reading App for English reading could effectively improve the users' reading speed and reading comprehension. In terms of vocabulary and syntax analysis abilities, it also had a promoting effect. Based on the research results, the researcher supposed that in the era of rapid development of the Internet, if teachers can guide students to use online tools for self-learning after lessons, students' English learning would benefit.

Appendix

Appendix 1: Interview Questions

1. 你是怎么使用这个 App 的？可以说一下你的使用步骤、方法吗？
2. 你这段时间的学习目标是什么？你怎么看待用这个 app 去帮助你学习的？
3. 你最近有什么收益？单词、语法、阅读能力等各个方面都可以说说。
1. How do you use this app? Can you say the using steps?
2. What is your learning goal in this period? What is your attitude towards this app for your learning?
3. What is your benefit? You can think about it in vocabulary, grammar, comprehensive ability aspects.

Appendix 2: Test link

Retrieved from <http://www.kekenet.com/cet6/tiku/lnzt/>.

Appendix 3: Questionnaire Questions

1. 在你看来这个 app 有什么优点？
2. 请分享一个你使用过程中不太愉快的经历（缺点）。

在 1-5 个等级中选择（1:非常不同意 5:非常同意）

3. 我已经完成了超过 80 天的阅读。
4. 我在完成每日阅读后会看知识点讲解。
5. 我在阅读的过程中聆听录音。
6. 我总是需要查阅词典（文内）以便了解文章内容。
7. 我认为这个 app 对我的阅读能力的提高有帮助。
8. 我可以理解文章内容。
9. 我全对地完成每日练习。
10. 我的阅读速度更快了。
11. 我学到了更多单词以及它们的用法。

12. 我对于长难句分析能力有所提高。
13. 你认为你哪一项阅读技能得到了最有效的提高？（词汇量、语法和句子结构分析、理解能力）

1. What are the advantages of this App in your perspective?
2. Please share an unhappy experience in your learning in this app.

1-5 level (1: strongly disagree 5: strongly agree)

3. I have completed more than 80 days of reading.
4. I read the “after-reading notes” after every day’s reading.
5. I listen to the recording of the text while reading.
6. I always need to check the dictionary so that I can understand the content.
7. I think this app is useful for improving my reading ability.
8. I can understand the content.
9. I can finish the daily test correctly.
10. My reading speed is faster.
11. I learn more words and the use of the words.
12. My syntactic analysis ability improves.
13. Which reading ability do you think get the most effective improvement?
(vocabulary, grammar and sentence structures, comprehension)

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