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Article

Factors Influencing Learners' Motivation in Mobile-Assisted Language Learning: A Case Study on Four Chinese EFL Learners

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Abstract
As mobile-assisted language learning (MALL) has become increasingly popular among learners of English, their motivation in using mobile technologies to learn the language has attracted the attention of researchers. This study investigates possible factors that may influence learners' motivation in MALL in natural learning environments. A case study was conducted involving four Chinese adult EFL learners who used a mobile application named MintReading for eight weeks. Weekly learning journals and semi-structured interviews were conducted to collect in-depth data from each participant. The results indicated that the following affected learners' motivation as they were learning: (1) interesting and useful reading content; (2) language difficulties; (3) affordance of mobile technologies; (4) motivational design of the application. On the other hand, their interaction with an online community, that of the social media app WeChat, failed to contribute to their learning motivation. Discussions of the research findings are based on self-determination theory, and implications and limitations of this study are also addressed.

Keywords
Mobile-assisted language learning (MALL), motivation, self-determination theory

1 Introduction

With the rapid development of mobile technologies, mobile-assisted language learning (MALL) has attracted considerable attention from teachers, researchers and mobile application developers looking at the value of mobile technology in assisting foreign language learning (Ushioda, 2013; Burston, 2015). One argument in favor of such tools is that they provide language learners with a more flexible, personalized and interactive learning environment (Mondahl & Razmerita, 2014; Pilar et al, 2013), and recent studies have identified the advantages of mobile technologies in assisting language learning in both formal and informal learning settings (e.g. Fouz-González, 2020; Gao & Shen, 2020; Jin, 2017; Loewen et al, 2019). However, most of the research focuses on how emerging technologies are embedded with teaching and learning four basic language skills, which has left motivation as an area in MALL that needs more scholarly exploration (Gillespie, 2020). Moreover, learners' motivation in MALL deserves closer investigation because of the complexity of the virtual learning environment (Stockwell,

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2013; Ushioda, 2013). Previous studies in the field largely focused on learners' motivation in controlled experimental settings (e.g. Berns, Isla-Montes, Palomo-Duarte, & Dodero, 2016; Chang et al, 2016; Chen & Jang, 2010; Huang et al, 2016; Hsu, 2015), and little is known about what factors may influence their motivation during a prolonged period in natural learning settings. To address the gap, this qualitative study aims to explore various factors that may facilitate or inhibit EFL learners' motivation in a natural MALL environment. It has pedagogical implications for educators and educational institutions in making the best use of the motivational features of mobile technologies in language learning.

2 Literature Review

2.1 Introduction to mobile-assisted language learning

Mobile-assisted language learning (MALL) is the learning of a second language or foreign language by using hand-held devices with some form of wireless connectivity (Fouz-González, 2020; Loewen et al, 2019). Thanks to their smallness, accessible price and multiple functions (Wang & Smith, 2013), smart phones have become the most popular mobile technology carriers and have provided new opportunities for users to learn foreign languages (Stockwell, 2013). A wide range of mobile applications have been developed for learners to learn English with their smart phones, such as mobile dictionaries and podcasts. Furthermore, the boom in mobile social media (e.g. Facebook, Twitter and WeChat) in recent years has further driven the trend toward mobile language learning by creating interactive and collaborative learning communities (Tran, Warchauer & Conley, 2013).WeChat, a popular social media platform owned by the Chinese technology company Tencent, has been explored as a potential e-learning platform in mainland China for its "movable, sociable, community-based synchronous and asynchronous" learning environment (Wang & Heffernan, 2009, p. 483; e.g. Jin, 2018; Zhang, 2015). Advantages and affordances that WeChat provides to facilitate language learning have also been well documented in studies (see Jin, 2018; Wang, 2017; Zhang, 2015). Against this backdrop, this study aims to explore how WeChat is employed as a platform in motivating learners to complete online English reading tasks.

2.2 Motivation and self-determination theory in MALL

Motivation is "responsible for why people decide to do something, how long they are willing to sustain the activity, and how hard they are going to pursue it" (Ushioda & Dörnyei, 2011, p. 4). Based on this definition, learners' motivation in this study can be reflected by how long they are willing to sustain their learning with mobile technologies and how much time and effort they are willing to devote to their learning. To explain learners' motivation in the mobile-enhanced environment, self-determination theory is frequently cited (Chen & Jang, 2010; Tran et al, 2013; Xie, Debacker & Ferguson, 2006). According to SDT, human motivation can be divided into categories, intrinsic and extrinsic. The former refers to doing an activity because it is enjoyable and the latter to doing something for a separable outcome (Deci & Ryan, 2002). Another important postulation of SDT is that humans have three universal and fundamental psychological needs: autonomy (a sense of volition and choice), relatedness (a sense of connection with others) and competence (a sense of being able to finish a task) (Ryan & Deci, 2000). The satisfaction of these three basic needs contributes to learners' extrinsic motivation; the deprivation of those needs diminishes learners' extrinsic motivation.

Based on SDT, features are built into mobile technologies aimed at boosting learners' motivation in language learning (Stockwell, 2013). First, emerging technologies are able to stimulate learners' intrinsic motivation because of their novelty compared with traditional learning modes (Murray, 1998). However, the opposing view argues that the technically savvy generation may no longer be impressed by new technologies (Stockwell, 2013). Apart from that, the distinctive features of the e-learning environment

have the potential to satisfy learners' perceived competence, autonomy and relatedness (Chen & Jang, 2010). Learners are endowed with flexibility and a sense of choice in language learning thanks to the portability of mobile devices, which fulfils their perceived autonomy (Viberg & Grönlund, 2012; Wang & Heffernan, 2009). With anonymous communication and interaction with real audiences, the online community provided by social media can build a sense of relatedness among a large group of learners (Xie et al, 2006). Moreover, the instant feedback through asynchronous communication also provides learners with more individualised scaffolding in finishing tasks, increasing their perceived competence (Tran et al, 2013; Polat, 2013).

Learners' motivation does not remain stable but is a complex and constantly changing construct (Mondahl & Razmerita, 2014; Loewen et al, 2019), which may be influenced by a variety of factors (Norbrook & Scott, 2003; Ushioda, 2013; Raby, 2007). First, learners' perceived ability to achieve a task may influence their motivation (Raby, 2007). Since language learning requires more demanding cognitive and meta-cognitive efforts (Ushioda, 2013), individuals with high self-efficacy are more likely to deal with problems that arise during learning and maintain the commitment to goals and sustain motivation (Raby, 2007). What's more, learners' attitudes towards adopting mobile technologies as learning tools would affect their motivation as well. Students having "psychological barriers" tend to regard mobile phones as their private space (Stockwell, 2007), so that they are unwilling to adopt mobile technologies for educational purposes (Stockwell, 2008). Shortcomings that learners may perceive mobile technology to have may also negatively influence their participation in learning activities (Jin, 2017). Teacher instruction is the third factor that plays an important role in influencing learners' motivation in the virtual environment (Appel & Mullen, 2002; Xie, et al, 2006). Research results show that it is easier for students to continue to engage in mobile learning if they are being supervised (Appel & Mullen, 2002). Fourth, motivational design in the application, such as record-keeping function and gamification, also significantly influences learners' motivation in MALL (Stockwell, 2013; Loewen et al, 2019).

2.3 Empirical studies in MALL

Previous studies have reported mixed results on whether mobile technologies could constantly increase learners' motivation during learning. Several quasi-experimental studies in Taiwan reported overall positive results that mobile technologies can noticeably increase students' motivation and performance compared with traditional classrooms (Chang et al., 2016; Chen & Jang, 2010; Huang et al, 2016; Hsu, 2015). Notwithstanding, there is also research that has produced conflicting findings. One quantitative study detected a steady drop in students' motivation when they were required to take part in online discussion for a certain period (Xie et al, 2006). This unexpected result not only suggests that motivation in technologically enhanced contexts is a dynamic and complex construct (Raby, 2007), but also necessitates a focus on exploring learners' perspectives and experience to understand how they interact with technologies in a particular context (Levy, 2015). A recent case study on the popular commercial mobile application Duolingo identified decreasing motivation among participants as they learned Turkish for a semester (Loewen et al, 2019). This study reported that a lack of interaction and repetitiveness of the tasks were blamed for the reduced motivation in learning.

In terms of the methodology adopted in MALL research, both qualitative and quantitative design exist. Quantitative studies largely follow a large-scale survey or quasi-experimental approach (Demouy et al, 2015), which primarily investigates learners' preferences in choosing mobile applications (e.g. Rosell-Aguilar, 2018), or compares the effectiveness of technology-enhanced learning with traditional learning modes (e.g. Chang et al, 2016; Chen & Jang, 2010). In contrast with short-term quantitative studies, small-scale qualitative research is capable of giving an insight into participants' perspectives and depicting the contextual factors that impact upon the implementation of MALL projects (Levy & Moore, 2018). For example, a number of studies have employed qualitative methods to investigate

learners' perceptions and attitudes during a longer period (e.g. Demouy et al, 2015; Lai & Gu, 2011; Steel, 2012). Notwithstanding, one obvious limitation of those studies is that answers from self-reported questionnaires and retrospective interviews will not always align with participants' behavior in natural settings. To overcome this limitation, Raby (2007) conducted a multiple case study in which in-depth data were collected from learning journals consecutively while learners performing computer assisted autonomous language learning (CAALL). Raby's study provided insightful and valuable information in constructing learners' motivation in computer-assisted language learning. However, because of the unique features of the mobile technologically enhanced environment, further scrutiny is needed.

In sum, though the advantages of mobile technologies have proven to be valid in teacher- or researcher-controlled conditions, it is unwise to apply those results directly to natural settings in which learners use their personal technology devices for language learning on daily bases (Levy, 2015). The above-mentioned short-term quasi-experimental studies and self-reported questionnaires not only neglect the contextual factors that affect learners' motivation but also fail to identify how different factors influence learners' motivation in learning. Having recognized this gap, this case study explores learners' motivation in MALL in a natural setting, and the research question is: What factors influence participants' motivation while they are learning English with the mobile application *MintReading* and how?

3 Methodology

3.1 Introduction to *MintReading*

MintReading is a mobile application developed for reading English e-books that is available on both Android and iOS operating systems. It offers reading programs in which participants are expected to finish reading one English book in 100 days. A wide range of e-books is available for users to choose from, such as *Little Princess* and *Psychology Encyclopedia*. After joining the program, users can receive one section of their selected book every day on the application.

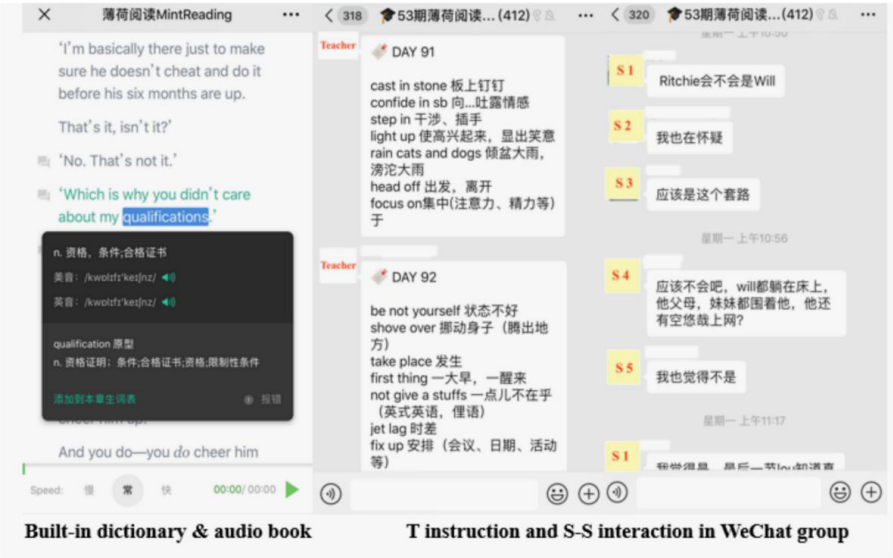

Figure 1. Mobile technologies on *MintReading*

MintReading is embedded with various mobile technologies to facilitate English reading. First, the built-in dictionary enables readers to double-tap an unknown word and retrieve the definition and pronunciation of it immediately. Second, the application allows readers to listen to an audio recording

of text as they read it. Finally, those reading the same book are brought together in a WeChat group in which an online teacher instantly offers assistance and all members are free to interact with one another as well.

Figure 2. Motivational design (checkpoint function) on *MintReading*

The *MintReading* program is also designed in a way said to increase a reader's motivation. The Checkpoint function enables users to keep track of their learning progress in a study calendar. If they finish the reading assignment on time, a green dot is shown in the study calendar; otherwise, the color is grey (see Figure 2). If a user persists in finishing the reading assignment more than 80 out of 100 days, at the end of the program he or she is awarded a paper version of the book they read.

3.2 Participants

The participants in this study were recruited through a call-for-participants invitation on WeChat's public accounts platform (a public blog platform based on WeChat). Four volunteers, namely Gloria, Frey, Lynn, and Cherries, were selected as the participants. Before the study, a questionnaire was administered to each of them as a way of ascertaining basic personal information and previous MALL experience (results can be found in Appendix 5). Questions were adapted from Hyland (2004), Saidouni (2018) and Ma (2017), composed and completed in Mandarin Chinese. All four participants were intermediate to upper-intermediate Chinese EFL learners and had had experience in learning English on their smartphones. They chose to use *MintReading* to learn English voluntarily because they wanted to develop a reading habit and improve their English reading skills.

3.3 Research design

According to Levy and Moore (2018), one of the objectives of qualitative studies in CALL is to clarify and depict the contextual factors that affect the implementation of MALL projects. Therefore, in order to clarify and depict the contextual factors that influence learner motivation, a qualitative case study was adopted to address the research question. This case study lasted for eight weeks and gathered rich data mainly by way of two data collection methods, weekly learning journals and semi-structured interviews.

Data collection and analysis followed an interactive process: data gathered from learning journals were coded and analyzed first, and the results informed the questions asked in the interim interview. Both interim inter-view transcripts and journal entries were coded and analyzed, the findings then functioning as the basis for the post-study interview.

3.4 Data collection

Various data collection methods (interviews and reflection journals) were adopted as a way of methodological triangulation (Atkins & Wallace, 2012). Participants' feelings, perceptions and problems recorded in their reflective reading journals provided effective triangulation to compare what they expressed in the interviews.

3.4.1 Learning journals

Eight reflection journals were collected from each participant weekly. The journal prompts were semi-structured, with both close-ended and open-ended questions (see Appen-dix 3). The close-ended questions mainly recorded the average length of time that each participant spent on *MintReading* every week. The open-ended questions enabled them to note down their feelings, attitudes and difficulties in using the application. Journal templates were sent to them every week via the online questionnaire instrument named Wenjuanxing. All journal entries were drafted and completed in Mandarin Chinese.

3.4.2 Semi-structured interviews

Two semi-structured interviews were conducted during this study and at its end. The interim interview investigated various factors influencing their learning during the process. There were some pre-set questions, and the other questions were grounded on their response on learning journals (see Part I in Appendix 2). The post-study interview collected participants' overall evaluation of *MintReading*, especially how the above-mentioned factors influenced their learning motivation as they were learning (see Part II in Appendix 2). All interviews were conducted online via audio chat in Mandarin Chinese, lasting for 15-20 minutes.

4 Data Analysis

4.1 Quantitative data analysis

Data obtained from the close-ended questions on learning journals were analyzed quantitatively. Specifically, the total length of time spent on *MintReading* every week was recorded and compared within each case. Change in participants' devoted time on *MintReading* indicated their change of learning motivation during the process.

4.2 Qualitative data analysis

Most data obtained followed a qualitative data analysis approach. The open-ended questions and two semi-structured interview transcripts were analyzed in an inductive qualitative method (Ellis & Barkhuizen, 2005). Thematic charts were created at first to display different participants' responses towards the same questions for the convenience of finding patterns and themes (Richie et al, 2003). After that, the researcher conducted the coding by looking for keywords or repeated themes in participants' responses with regards to factors that influenced their motivation. The coding scheme is

composed of two parts (see Appendix 4). The preset codes were generated by the literature review, including factors such as teachers' instruction, S-S interaction and self-regulation. Some emergent codes were grounded on themes repeatedly mentioned by participants, such as interest in learning content and language difficulties. Moreover, particular attention was paid to themes associated with descriptions of motivation, such as "I am willing to spend more time in …", "I am more interested in …", "I feel more motivated to …" or "I feel less motivated to …". To avoid subjectivity and make the data analysis more rigorous, intra-coding was conducted (Nunan & Bailey, 2009). The researcher repeated the coding process after the first coding and the intra-coder agreement reached 85%. With intra-coder agreement, findings in this study were deemed to be more reliable.

5 Results

5.1 Change of participants' learning motivation

According to Figure 3, four participants' learning behaviours were reflected by the total time they spent on *MintReading* each week. Changes in learners' motivation could be indicated by the change in the total length of time they spent on *MintReading*. As illustrated in Figure 3, the total time that Frey and Lynn devoted to *MintReading* remained relatively unchanged during the eight weeks (although there were some minor fluctuations), illustrating their sustained motivation throughout this study. In contrast, the time that Gloria and Cherries spent in reading declined, indicating that they failed to maintain their motivation over these weeks. In the following sections, factors that influenced their learning motivation will be discussed.

	week one	week two	week three	week four	week five	week six	week seven	week eight
Frey	70	70	70	70	70	70	35	70
Lynn	105	105	105	105	140	105	105	105
Gloria	75	105	60	30	30	60	30	30
Cherris	140	140	140	100	100	10	30	30

Figure 3. Time spent on *MintReading* per week for each participant

5.2 Factors influencing learners' motivation

5.2.1 Interesting and useful reading content

In this study, interesting and useful reading content was the most significant factor contributing to participants' motivation. Participants said the primary reason for them to keep learning with *MintReading* was the interesting and useful reading content, rather than other external attractions. For example, Frey, who read a book about psychology, felt the content was very useful and related to his life and study so that he was motivated to read the following chapters. Lynn was particularly interested in the language

used in the book and said "*the language is very vivid, and it is even more comfortable and pleasing to read than Chinese. Especially, I am attracted by some wonderful metaphors in the book, which can impart the psychology knowledge in such a clear and vivid manner*" (Lynn, interview 1). Gloria also expressed her interest in the detective fiction she read and wanted to keep reading because of "*her eagerness to find out what was going on next*" (Gloria, interview 2). Therefore, in this study, in the MALL setting interesting and useful reading content functioned as the most significant facilitating factor that influenced participants' motivation.

5.2.2 Language difficulties

Language difficulties encountered by participants inhibited their learning motivation significantly. Nearly all participants in their weekly journals reported that they experienced difficulties in understanding some words, expressions or background information, making them feel less competent and unwilling to continue reading. For example, Gloria read a detective novel written by Agatha Christie that contained many expressions used chiefly in the 1980s. She found it very difficult to follow the meaning of the text, which overwhelmed her and greatly demotivated her. In the post-study interview, Gloria said, "*Sometimes, I didn't want to read anymore because I couldn't understand what the paragraphs were about. And I didn't get what the jokes meant either*" (Gloria, interview 2). Gloria's experience also pointed to why the time she devoted to reading dropped constantly from the second week. Frey's learning journal in week seven also supported the idea that comprehension difficulties demotivated him. He said, "*I feel that it is getting more difficult for me to understand the content because there begins to appear too many sophisticated technical words. I have to guess to get the general meaning, and I feel less interested in the book*" (Frey, journal 7). A slight drop in the time Frey devoted to reading in week seven also validated the causal relationship between learning difficulties and declining motivation. This finding strengthens the view that language learning is a demanding cognitive activity and requires learners to be capable of dealing with problems that may emerge to maintain their motivation (Ushioda, 2013).

5.2.3 Affordances of mobile technologies

The affordance of mobile technologies available on *MintReading* facilitated learners' motivation by helping them overcome language obstacles and alleviating their learning anxieties. Participants all reported that they benefited greatly from the built-in dictionary because they could retrieve the meaning of unknown words easily just by double tapping on the screen. Gloria said this function helped her adapt to reading long English texts and develop a more effective reading strategy. As she gradually built her confidence in reading with the help of the built-in dictionary, she could read more fluently by grasping the main idea of a passage and skip over unfamiliar words that seemed to be unimportant. She was thus more motivated to read because of her sense of capacity to handle the long English texts. In addition to the appreciation participants expressed over the convenience of the built-in dictionary, they also spoke positively of its audio-book function. Lynn said that listening to the audiobook made her "feel better" in gaining an understanding of the reading content:

> Lynn: *When I felt it very difficult to understand the text, I would choose to listen to the audio. Because I found I could understand better by listening than by reading words.*
>
> Researcher: *So do you think the audio-book function helped you a lot?*
>
> Lynn: *Yeah. Although sometimes I couldn't understand very well by reading, I could listen to the audio and felt better. It made me feel more confident. (Lynn, interview 2)*

For Lynn, listening to the audiobook, instead of reading texts, seemed to be a more suitable approach.

Therefore, this mobile technology could establish her competence in reading English and encourage her to sustain motivation during this process.

5.2.4 Motivational design of MintReading

In line with the literature (Stockwell, 2013), the motivational design of *MintReading* indeed affected learners' motivation. However, whether it facilitated or inhibited their motivation depended on their attitudes towards this function. Cherries and Frey viewed the Checkpoint function positively, saying it helped them sustain motivation because it could "supervise", "remind", and "urge" them to read every day. Cherries told of how this function could help her obtain a sense of achievement:

> *Although the checkpoint function sounds very superficial, unexpectedly, I have a sense of achievement when seeing that I have read English books for 50 days! I think the way of quantifying learning enables me to see how I have changed and achieved in reading English these days. (Cherries, journal 5)*

Gloria, on the other hand, saw the checkpoint function in a negative light, considering it demotivational in sustaining learning. In the interim interview she said:

> *I felt very depressed and frustrated when I saw a gray dot on the calendar because I felt it was imperfect for me. Even though I could read that section again afterwards, I still think it was not perfect. After that, because of that imperfect record, I started not to take it seriously to read every day. So I feel that my motivation decreased a lot. (Gloria, interview 1)*

That declaration also pointed to why Gloria spent gradually decreasing time on *MintReading* from week two. Because of one experience of failure she was demotivated by the "imperfect" learning experience and unwilling to spend as much effort as before.

In conclusion, the motivational design of *MintReading* was a two-edged sword. Some users could be motivated by it because they thought it could regulate their learning process, while others were apt to be demotivated because they felt they overly relied on it and thus were deprived of learning autonomy. Therefore, whether the checkpoint feature could truly motivate users depended on their attitudes towards it.

5.2.5 Interaction in WeChat group

Surprisingly, all participants said interaction in the WeChat group, either T- S or S-S, barely had any impact on their learning motivation. First, participants complained of too many irrelevant chats, messages and interactions among students in the WeChat group, inconveniencing users and making it difficult to locate the most useful and important information. Gloria, Cherries and Lynn said that as a result of these problems they wanted to cease participating in the WeChat group discussion. The second reason was that the online instructor could not provide personalized guidance. Usually, the interviewees said the online teacher would only send general language explanations to all group members. In this way, individual students found it difficult to derive information that addressed their own language difficulties and learning needs. For example, Lynn wrote in her learning journal, "*I benefited little from the WeChat group because I found the topics and messages were not very useful for me. So I choose to learn by myself, not participating in the group discussion*" (Lynn, journal 3). Finally, teacher-students interaction in the WeChat group was not such that it could create a sense of relatedness between the teacher and the student. Because of the convenience brought by mobile technologies, teachers were able to respond to students promptly with prepared answers. However, it was this instant but impersonal feedback that made participants feel that their questions were not

valued and respected. Cherries expressed her feelings on the matter to her online teacher:

> *One day, I finished the reading assignment and asked the teacher a simple question in the WeChat group. But the teacher did not answer my question directly. Instead, she sent me a web link and asked me to find the answer on that web page. Afterwards, I did find the answer I expected but I felt it very boring to ask her questions. You know, it is not a real person-to-person interaction. It is like I asked a robot and it is so meaningless. I think artificial intelligence can do this too. (Cherries, interview 1)*

Therefore, owing to the unrelated S-S interaction, non-individualised T-instruction and T-S interaction, participants benefited little from the WeChat group discussion. In turn, the online community made no contribution to participants' learning motivation as it failed to provide a sense of relatedness.

6 Discussion

This paper has explored factors that influenced Chinese EFL learners' motivation in mobile-assisted language learning with one English reading application named *MintReading*. Through the analysis of data collected from weekly journals and semi-structured interviews, the researcher discovered that (1) interesting and useful learning content, (2) language difficulties, (3) affordance of mobile technologies, and (4) motivational design of the application all had a bearing on participants' learning motivation. Surprisingly, in contrast with what is indicated in the literature (Xie et al, 2006), interaction among teachers and students in online community had little influence on participants' learning motivation.

One important finding is that the most prominent motivating factor for learners to sustain their learning was interesting learning content, rather than other external technological attractions. In this study, for adult learners, the interesting text not only refers to appealing content and plot but is also relevant to their needs and purposes of learning. This finding not only verifies the use of interesting text as one significant factor in enhancing readers' intrinsic motivation in reading (Protacio, 2012), but more importantly substantiates the observation that the current technologically savvy generation is less likely to be impressed by emerging technology than they used to be (Stockwell, 2013). According to the pre-study survey, all subjects had a degree of experience of MALL, so learning English with *MintReading* was not as novel or as appealing an experience as it once might have been. However, their motivation could be sustained when they found the learning content itself was interesting and relevant to them. This also mirrors a Duolingo study finding that external forces may not be that sufficient for adult learners to maintain their motivation during a period of learning (Loewen et al, 2019).

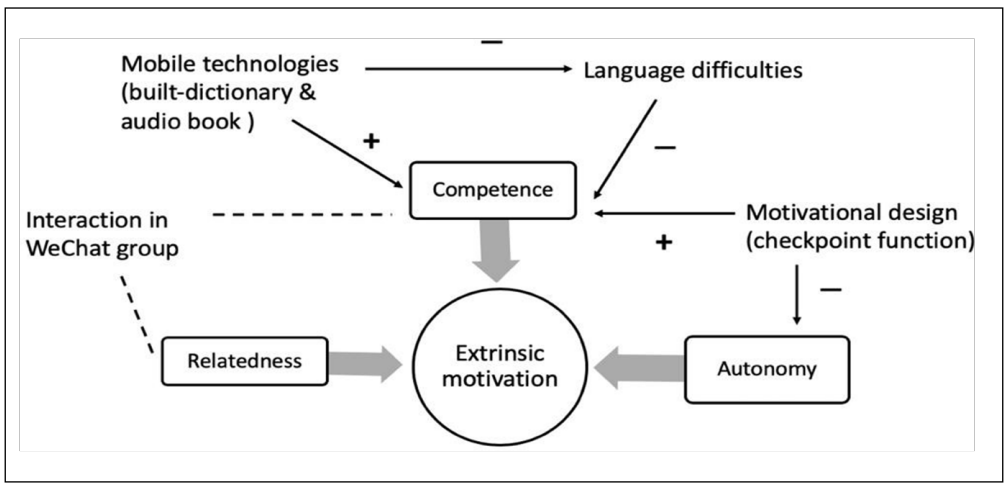

Figure 4. How factors influenced learners' motivation in this study

Findings of this study also validate the postulation of SDT in the MALL environment that perceived competence, perceived relatedness and perceived autonomy are three key psycho-logical factors that affect learners' motivation (Ryan and Deci, 2000). As illustrated in Figure 4, whether different factors can foster or hinder learners' motivation depends on whether they positively or negatively affect the three psychological needs. To be specific, in this study, as participants encountered a surfeit of language difficulties, they would feel frustrated and even defeated, which lowered their perceived competence and thus demotivated them to learn. Especially for online reading, which involves more complex cognitive tasks and requires more advanced language abilities (Cong-Lem, 2020), learners may have encountered more difficulties that diminished their perceived competence. Conversely, when they had easy access to certain mobile technologies and used them to try to overcome their language difficulties, their efficacy in learning was augmented. Positive feelings about their competence were reinforced by their successful learning experience, which in turn motivated them to devote more effort continuously. Moreover, participants' perceived competence was also reinforced by the motivational design of *MintReading*. Such record-keeping function visualised learners' progress and achievement, enabling them to have a sense of control over their own learning process and boosting their confidence (Stockwell, 2013). However, for some individuals such as Gloria in this study the motivational design of *MintReading* may lead to reduced motivation because it threatens their perceived autonomy. Since the Checkpoint function required users to finish the assigned reading task every day, to some extent it deprived them of flexibility and freedom in fixing their learning pace. Therefore, those who think negatively of the motivational design may not benefit from it, which echoes the statement that diversified attitudes towards MALL can have an indirect influence on learning motivation (Stockwell, 2008).

Finally, in contrast with previous research findings that interactive online learning functions as a significant motivating factor (Xie et al, 2006), this study surprisingly discovered that both T-S and S-S interaction in WeChat group failed to foster learners' motivation. One possible reason is that the online interaction on WeChat neither provided learners with a sense of relatedness nor boosted their perceived competence. As mentioned in 4.1.5, due to the limitation of online discussion and teacher instruction, students cannot have their specific learning difficulties solved to build their perceived competence. Additionally, a sense of relatedness between the teacher and the student was hardly created and maintained in the visual community owing to impersonal T-S interaction. Because of non-personalized feedback, participants thought they did not benefit from the WeChat group and chose to remain silent. Therefore, the online community in this study failed to yield expected positive outcomes in facilitating and motivating learners.

Some implications can be drawn from the discussion above. First, for teachers and mobile application developers, useful and appealing content should be the prime focus in MALL, and mobile technologies are only supposed to work as carriers of good content. Stockwell (2013) distinguishes two types of motivation in mobile language learning: one comes from learners' inherent interest in using technology devices, which may drive them to explore the benefits of technology for language; the other stems from the strong motivation to learn language itself, which leads to learners' interest in looking for technological affordances to support and enhance language learning. This study indicates the latter may be the key impetus for the young technology-savvy generation as they are likely to be immune to a variety of technologies. Therefore, for teachers and application developers, it would be more productive to include meaningful and interesting content on mobile learning devices to trigger and boost learners' motivation in MALL.

Second, it is important for teachers or application developers to investigate students' specific language learning difficulties. Only by doing so can they make full use of appropriate mobile technologies to tackle students' problems, boost their confidence and sustain their learning motivation. Finally, despite the benefits of social media for mobile learning, teachers should be mindful of its shortcomings as well. Unlike traditional face-to-face interaction between teacher and students, online interaction is unable to engender close, supportive teacher-student relationships. It is thus suggested that online teachers adopt

more encouraging and personalized language to interact with students, making them feel they are valued and cared for in a way to sustain their motivation to learn.

7 Conclusion and Limitations

This case study explored Chinese EFL learners' motivation in MALL over a prolonged period in a natural setting. The findings reveal that learners' motivation was mainly influenced by four factors: interesting reading content, language difficulties, the affordances of mobile technologies, and the motivational design of the application. However, interaction in the WeChat group had no direct impact on learners' motivation, which is at variance with results of most previous studies. Discussion about the research findings indicates all these factors either have a direct or indirect impact on participants' perceived competence, autonomy and relatedness, which to some extent validates self-determination theory in the natural MALL setting. Arising from that, some pedagogical implications are suggested for teachers and application developers in terms of how to sustain and facilitate learners' motivation in MALL over a long time frame.

It ought to be noted that this study has several possible limitations. The focus on just four participants learning with one mobile application in a particular context is one of them. The results ought not be generalized to other contexts or apply to other English learning applications. However, the aim of case study is to provide thick description and in-depth analysis of a phenomenon in a particular context. Another major limitation relates to research design. Since this study mainly adopted qualitative data collection and analysis methods, the challenge remains to accurately trace changes of learners' motivation over a long period. Self-reported journals and interviews are probably not as valid as figures presented by motivational scales. Further studies could incorporate both quantitative and qualitative approaches and provide a more comprehensive depiction of learners' motivation in natural MALL settings.

Appendix 1. English learning with mobile technologies questionnaire

Part I. General information (please circle the information or provide the information if re-quested)

1. Please circle your gender. a. Male b. Female
2. Please circle your age group.
   a. 18–25 b. 26–30 c. 31–35 d. 36–40 e. 41–45 f. > 45
3. Your major/job:
4. Please circle your educational background:
   a. Bachelor's degree b. Master's degree c. Doctorate d. Other
5. Please circle the statement that best describes your current level of English.
   a. My English is weak and I need to improve it considerably.
   b. My English is kind of good, but I still have a lot to learn.
   c. My English is reasonably good, but there is still some room for improvement.
   d. My English is near to native speaker level and I don't think I need to develop it further.
6. Please circle the statement that best describes your proficiency in using mobile technologies.
   a. I am very proficient in using all mobile technologies.
   b. I can use most mobile technologies confidently.
   c. I can use common mobile technologies but sometimes have difficulties.
   d. I am not good with mobile technologies and always meet difficulties.

Part II. Using mobile technologies for language learning

1. What kind of activities have you performed with your smartphone to learn English? (You can choose more than one option)

a. Listen to English podcasts (e.g. BBC, VOA).
b. Read online English articles or newspapers
c. Read e-books
d. Watch English videos (e.g. TED talks, Youtube videos)
e. Use English mobile dictionaries
f. Voice chatting in English on WeChat or Skype.
g. Text chatting in English on WeChat, through email, or text messages.
h. Attend mobile English courses

Others _____ (please specify)

Appendix 2. Interview prompts

Part I. Interview during study

General questions

1. Why did you choose to join the *MintReading* program?

2. What did you expect to achieve in the program?

3. Have you enjoyed learning English with *MintReading*? Why?/ Why not?

4. What achievements have you made in learning English with *MintReading*? Do you feel more competent in reading English novels? Why?

5. Have you taken part in the WeChat group discussion? Do you think the WeChat group is helpful in your English learning? How?

6. Have you had any problems or difficulties in reading English with *MintReading*? How have you overcome these problems?

7. For you, what are the advantages or benefits in learning English using *MintReading*?

Individualised questions

1. From your learning journals, I notice that during these weeks you have spent less/more time reading English with *MintReading*. Could you explain why that has happened? What difficulties did you encounter? / What factors motivate you to make more effort?

2. Why do you like to participate/seldom participate in the WeChat group discussion? (Other following-up questions may be generated from participants' reading journals.)

Part II. Post-study interview

1. Did you like the English novels you read? Do you think it was difficult for you?

2. Do you like the design of the application? (e.g., the audio book function, the record keeping function, etc.). How does the design of these help you with your learning?

3. Do you think the WeChat group has helped you to learn? Why?

4. Having completed the program, what do you think the overall benefits and disadvantages of learning English with *MintReading* are?

5. Are you satisfied with your achievement in learning English with *MintReading*? Did you fulfill your expectations?

6. What feature of *MintReading* is your favorite in helping you learn English? Why?

7. What are some important factors that keep you learning English with *MintReading*?
8. What are some hindrances that make you want to give up during the process?

Appendix 3. Journal template

1. How long did you spend on *MintReading* this week? About_____minutes.
2. How often did you participate in the WeChat group this week?
   A. Never B. Sometimes C. Often D. Always
3. Why did you spend more/less time on the app than last week?
4. Did you encounter any problems when learning English with *MintReading* this week? What were they? How did you overcome them?
5. What progress do you think you have made this week?
6. Please feel free to share anything (your feelings/opinions, etc) related to your learning experience with *MintReading*.

Appendix 4. Coding Scheme

Codes	Descriptions
Language difficulties	Language difficulties encountered during learning
Interest in the content	Express his or her interest in the learning content
Attitudes towards MALL	Express his or her attitudes towards the advantages or disadvantages of MALL during learning
Affordance of mobile technologies	The mobile functions embedded in the *MintReading* app (e.g., text annotation, audio book).
Motivational design	The motivational design provided by the *MintReading* program.
T-instruction	The teacher offers instruction on English learning in the WeChat group.
S-S interaction	Student members interact with each other in the WeChat group.

Appendix 5. Participants' profile

Name	Gender	Age	Education background	Perceived English level	Perceived proficiency in using mobile technologies	Previous MALL experience
Frey	Male	18-25	Bachelor degree	My English is reasonably good, but there is still some room for improvement.	I am very proficient in using all mobile technologies.	Listen to English podcasts (e.g. BBC, VOA); read online English articles or newspapers; read e-books; watch English videos (e.g. TED talks, YouTube videos); use English mobile dictionaries; voice chatting in English on WeChat or Skype; text chatting in English on WeChat, through email, or text messages; attend mobile English courses.

Cherries	Female	26-30	Bachelor degree	My English is kind of good, but I still have a lot to learn	I can use most mobile technologies confidently.	Listen to English podcasts (e.g. BBC, VOA); read online English articles or newspapers; read e-books; watch English videos (e.g. TED talks, YouTube videos); use English mobile dictionaries; text chatting in English on WeChat, through email, or text messages; attend mobile English courses.
Lynn	Female	26-30	Master degree	My English is kind of good, but I still have a lot to learn.	I can use common mobile technologies but sometimes have difficulties.	Listen to English podcasts (e.g. BBC, VOA); read online English articles or newspapers; watch English videos (e.g. TED talks, YouTube videos); attend mobile English courses.
Gloria	Female	18-25	Bachelor degree	My English is kind of good, but I still have a lot to learn.	I can use most mobile technologies confidently	Listen to English podcasts (e.g. BBC, VOA); watch English videos (e.g. TED talks, YouTube videos); use English mobile dictionaries.

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