Self-directed language learning using mobile technology in higher education

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Appendices

Appendix A. References of studies included in the systematic scoping review.

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Appendix B. Taxonomy of language learning strategies from O'Malley and Chamot (1990)

Dimensions	Categories	Explanations
Cognitive strategy	Repetition	Intentionally practicing and rehearsing the words or phrases repeatedly.
	Resourcing	Understanding or reciting language elements by utilizing reference books, encyclopaedias, websites, dictionaries, etc.
	Grouping	Making classifications of words, phrases, or sentences based on their attributes or meaning.
	Note taking	Writing down key words and concepts in abbreviated verbal, graphic, or numerical form.
	Summarising	Summing up the gained information in a written or mental way.
	Deduction	Applying rules to comprehend or create language output.
	Imagery	Utilizing visual images to recite and understand new language contents or mentally represent problems.
	Auditory representation	Playing the sound of words, phrases, or sentences in the back of one's mind so as to assist in comprehending and recalling.
	Recombination	Combining known knowledge in a new way to formulate meaningful sentences or language expressions.
	Inferencing	Using the known information to infer the meaning of new elements, predict results, or complete the tasks.
	Translation	Using the native language as a basis to understand and/or produce the foreign language.
	Contextualisation	Assisting comprehension or recall by placing a word or phrase in a meaningful language sequence or situational context.
Metacognitive strategy	Advance organisation	Previewing the main ideas and concepts of the material to be learned, often by skimming the text for the organising principle.

	Selective attention	Knowing how to focus on specific aspects of language learning before executing tasks.
	Directed attention	Doing or setting something beforehand to remind learning tasks.
	Organisational planning	Generating plans for language learning tasks.
	Problem identification	Identifying the problems which should be solved in tasks, or the parts that hinder understanding and completing tasks.
	Production monitoring	Checking whether learners' language output is correct.
	Comprehension monitoring	Checking whether learners understand.
	Time management	Seeking, arranging, or adjusting time for learning.
	Effort management	Seeking, arranging, or adjusting efforts for learning.
	Resourcing management	Seeking, arranging, or adjusting resources for learning.
	Self-evaluation	Checking the outcomes of one's own language learning against a standard after it has been completed.
Affective strategy	Self-motivation	Driving learners to keep going by reminding themselves of the benefits of self-directed learning or mastering new languages.
Social strategy	Questioning for clarification	Eliciting additional explanation, rephrasing, examples, or verification from a teacher or peer.
	Help-receiving	Other agents, such as teachers and friends, actively offering support to learners.
	Cooperation	Learning with others to update information, check learning outcomes, or get feedback on learning performance.

Appendix C. Studies coded by proficiency level, cognitive dimension, metacognitive dimension, affective dimension and social dimension.

	Authors (year)	Country	Proficiency level	Cognitive strategies						Metacognitive strategies			Affective strategies	Social strategies
				Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	Forethought phase	Performance phase	Self-reflecting phase		
1	Alm (2015)	New Zealand	x					x		x				x
2	Çelik, Arkın & Sabriler (2012)	North Cyprus	x		x					x	x		x	x
3	Chen (2013)	China	x							x				x
4	García Botero, Questier & Zhu (2018)	Colombia		x		x					x			
5	Hamat & Hassan (2019)	Malaysia		x										
6	Kuznetsova and Soomro (2019)	The United States												x
7	Lai (2015)	China												
8	Lai (2019)	China	x	x	x	x				x	x			x
9	Lai & Gu (2011)	China	x		x					x	x	x	x	x
10	Lai, Hu & Lyu (2017)	China	x	x	x				x	x	x			x
11	Lai, Yeung & Hu (2015)	China												x
12	Lai & Zheng (2017)	China	x	x	x			x			x	x		x
13	Ma (2017)	China		x	x			x	x	x		x		x
14	Sockett & Toffoli (2012)	France	x	x	x						x			x
15	Steel (2012)	Australia		x						x		x		
16	Trinder (2017)	Austria	x	x										
17	Wrigglesworth & Harvor (2017)	South Korea	x		x									x
18	Yao (2016)	China			x									x

19	Zhang & Pérez-Paredes (2019)	China		x	x					x	x	x		
20	Zou & Yan (2014)	China	x	x	x					x				x

Appendix D. Mobile applications mentioned in this study.

Mobile Apps	Description	Websites
Baicizhan	Bai Ci Zhan is an APP that helps users to recite words. The software sets up a series of dictionaries such as high school entrance examination vocabulary, college entrance examination vocabulary, and sixth-level vocabulary. Users can choose a dictionary and make a study plan to determine the amount of words to recite every day. Users can also play vocabulary games with others.	https://www.baicizhan.com/
Douban	Douban.com is a Chinese social networking service website that allows users to record information and create content related to film, books, music, recent events, and activities in Chinese cities.	https://www.douban.com/
Duolingo	Duolingo is an American platform that includes a language-learning website and mobile app, as well as a digital language-proficiency assessment exam.	https://www.duolingo.com/
English Liulishuo	English Liulishuo App is an engaging and fun English learning mobile app. It empowers you to learn English efficiently and happily through the combination of advanced auto-scoring engine of spoken English developed in Silicon Valley, professional English training courses, comprehensive learning materials, and well-designed leveled games.	https://www.liulishuo.com/en/liulishuo.html
Facebook	Facebook is an American online social media and social networking service.	https://www.facebook.com/
MySpace	Myspace is a social networking website that allows users to make personal profiles to connect with friends, share messages, photos, blog posts, and video, as well as stream music.	https://myspace.com/

Quizlet	Quizlet is an American online study application that allows students to study information via learning tools and games. It trains students via flashcards and various games and tests.	https://quizlet.com/en-gb
Skype	Skype is a telecommunications application that specializes in providing video chat and voice calls between computers, tablets, mobile devices, and smartwatches over the Internet. Skype also provides instant messaging services. Users may transmit text, video, audio and images. Skype allows video conference calls.	https://www.skype.com/zh-Hans/
Twitter	Twitter is an American microblogging and social networking service on which users post and interact with messages known as “tweets”. Users can read, post, like, and retweet tweets. It can also be used for the purpose of foreign language learning.	https://twitter.com/
WeChat	WeChat is a Chinese multi-purpose messaging, social media and mobile payment app developed by Tencent. Some learners take advantages of its functions of social media and messaging to learn foreign languages with others.	https://www.wechat.com/en/
WhatsApp	WhatsApp Messenger, or simply WhatsApp, is an American freeware, cross-platform messaging and Voice over IP (VoIP) service owned by Facebook, Inc. It allows users to send text messages and voice messages, make voice and video calls, and share images, documents, user locations, and other media.	https://www.whatsapp.com/
Yahoo	Yahoo provides a Web portal, search engine Yahoo! Search, and related services, including Yahoo! Directory, Yahoo! Mail, Yahoo! News, Yahoo! Finance, Yahoo! Groups, Yahoo! Answers, advertising, online mapping, video sharing, fantasy sports, and its social media website.	https://hk.yahoo.com/

Youdao Dictionary	Youdao Dictionary is an online and offline electronic dictionaries and it can support of 107 languages among Chinese in translation, such as English, Japanese, Korean, French, German, Russian, Spanish, Portuguese etc.. https://youdao.com/
YouTube	YouTube is an American online video-sharing platform. It allows users to upload, view, rate, share, add to playlists, report, comment on videos, and subscribe to other users. It offers a wide variety of user-generated and corporate media videos. https://www.youtube.com/
Zhihu	Zhihu is a Chinese question-and-answer website where questions are created, answered, edited and organized by the community of its users. https://www.zhihu.com/signin?next=%2F

Appendix E. Constructs and items (Chapter 4).

Constructs	Items
Actual behavior (AB)	AB1: I use mobile technology to help understand learning materials.
	AB2: I use mobile technology to acquire more knowledge of English.
	AB3: I use mobile technology to help express my thoughts.
	AB4: I use mobile technology to seek learning strategies and tips.
	AB5: I use mobile technology to check my understanding.
	AB6: I use mobile technology to check my learning progress.
	AB7: I use mobile technology to expand opportunities to use English.
	AB8: I use mobile technology to sustain motivation and interest in learning English.
	AB9: I use mobile technology to ask for support and help.
Behavioral intention (BI)	BI1: I will use mobile technology on a regular basis.
	BI2: I will frequently use mobile technology.
	BI3: I will strongly recommend others to use mobile technology if they self-study English language.
Attitude (ATT)	ATT1: Using mobile technology is a good idea.
	ATT2: Using mobile technology is a wise idea.
	ATT3: I like the idea of using mobile technology.
	ATT4: Using mobile technology would be pleasant.
Self-efficacy (SE)	SE1: I am confident about using mobile technology.
	SE2: Using mobile technology would not challenge me.
	SE3: I would be comfortable to use mobile technology.
Self-regulation skills (SRL)	SRL1: I constantly check my understanding.
	SRL2: I have ways to make learning the language more attractive.
	SRL3: I try to sort out and address the problem, when learning environment becomes less favorable.
	SRL4: I know how to arrange time and environment to make learning more efficient and effective.

	SN1: Most people who are important to me (teachers and peers) think that it would be fine to use mobile technology.
Subjective norms (SN)	SN2: I think other students in my classes would be willing to adapt mobile technology.
	SN3: Most people who are important to me (teachers and peers) would be in favor of using mobile technology.

Appendix F. Constructs and items (Chapter 5).

Constructs	Items
	Learning Engagement
Behavioral engagement	1. I set aside a regular time each week to use mobile technology for self-studying English.
	2. I marked what I did not understand while using mobile technology for self-studying English.
	3. I revisited my notes when using mobile technology for self-studying English next time.
Cognitive engagement	1. I searched for further information when I encountered something that puzzled me during using mobile technology for self-studying English.
	2. When I had trouble understanding a word or a sentence while using mobile technology for self-studying English, I went over it again until I understood it.
	3. If I listened or read something while using mobile technology for self-studying English that I did not understand at first, I listened or reread it again to make sure I understood the content.
Emotional engagement	1. I was inspired to expand my knowledge while using mobile technology for self-studying English.
	2. I found it interesting to use mobile technology for self-studying English.
	3. I enjoyed learning knowledge while using mobile technology for self-studying English.
	Learning persistence
	1. When self-studying English, I intend to continue to use mobile technology for learning resources gathering
	2. When self-studying English, I intend to continue to use mobile technology for knowledge construction.
	3. When self-studying English, I intend to continue to use mobile technology for learning resources sharing
	4. Next time I am willing to use mobile technology again to learn English language.
	5. I think mobile technology is suitable for learners who want to self-study English.
	6. I will recommend other people who want to self-study English to use mobile technology.

	7. Overall, I intend to continue to use mobile technology when self-studying English.
	Learning Satisfaction
	1. When self-studying English, I am satisfied with mobile technology
	2. When self-studying English, I am satisfied with the Internet speed of mobile technology.
	3. When self-studying English, I am satisfied with the functions provided by mobile technology
	4. When self-studying English, I am satisfied with the quality of information available on mobile technology.
	5. When self-studying English, I am satisfied how learning materials are presented in mobile technology.
	6. When self-studying English, I can easily download the available learning materials in mobile technology
	7. When self-studying English, I have no problem in viewing the posted information in mobile technology
	Mobile learning readiness
ML self-efficacy	1. I feel confident in performing the basic functions of mobile technology.
	2. I feel confident in my knowledge and skills of mobile technology.
	3. I feel confident in using mobile technology to effectively communicate with others
	4. I feel confident in using the internet (Baidu, etc.) to find or gather information for self-directed learning.
	5. I feel confident in studying with mobile technology.
	6. I feel confident in how to use mobile technology.
	7. I feel confident in how to use mobile technology for learning
Optimism	1. I like studying via mobile technology because I am able to study anytime and at any place.
	2. Mobile technology make me more efficient in my studying.
	3. I like mobile technology (or mobile apps) that allows me to tailor things to fit my own needs.
	4. I like mobile technology.
	5. Mobile technology give me control over my studying time

	6. The newest mobile technology (or mobile apps) is convenient to use.
	7. Mobile technology gives me freedom of studying.
Self-directed learning	1. When self-studying English, I can manage my own learning progress
	2. When self-studying English, I carry out my own study plan
	3. When self-studying English, I set and actively pursuit my goals.
	4. When self-studying English, I manage time well
	5. When self-studying English, I am self-disciplined and find it easy to set aside learning time
	Teacher support
	1. My English teacher encouraged us to use mobile technology for self-studying English.
	2. My English teacher discussed with us how technological resources or tools could enhance language learning.
	3. My English teacher shared with us useful technological resources/sites/tools for language learning outside the classroom.
	4. My English teacher shared tips/strategies on how to use technological resources or tools for language learning.
	5. My English teacher often used technological resources or tools in her/his classes.
	6. My English teacher engaged us with learning activities that involve the use of technological resources or tools.